

COMPUTATIONAL ASSESSMENT OF E-HOSPITAL AWARENESS TOWARDS DIGITAL INDIA INITIATIVE

Shankar Kumar^{1,*} and Jeyaprabha²

Received: July 27, 2021; Revised: November 23, 2021; Accepted: December 14, 2021

Abstract

Digital India is an initiative taken for the citizens to access the government services in a digital forum. E-hospital means connecting patients, doctors and hospitals on a one single window digital platform, thereby ensuring efficient delivery of health services to the citizens. The main objective of the study is to assess the awareness of E-Hospital services and opinion towards the features of E-Hospital services at Chennai. This research is based on descriptive research design and target population is Chennai. The sampling method is used in this research as non-probability sampling as well as a convenience method of sampling and the sample size of the study is 108 for the target population. The research instrument for collecting the data through structured questionnaire using Likert 5-Point scale. The finding revealed that the E-Hospital awareness and perception towards digital India initiative at Chennai was highly appreciated and they sensed that they are aware of E-Hospital features and advantages having the positive opinion on E-Hospital initiative. In this research study, suggests that keeping users engaged with the E-Hospital services is the most important aspect and it leads them to feel self-confident and make self-reliant towards better results. The future study would be pre determine categories like usage, adoption, loyalty and satisfaction of users through E-Hospital services.

Keywords: E-Hospital, Public Health, Awareness, Perception, Features, Digital India.

Introduction

We are living in the era of the digitalisation world, which has seen an unconditional change of digitization in every sector. E-health is an initial stage of the health care sector based on health surveillance, e-consultation and health education and so on (Kaur *et al.*, 2019). Each individual needs to reduce the time like doing things physically and select the things engaging with the most recent available technology. As a part of the Digital India

initiative, the Prime Minister of India, Shri Narendra Modi introduced the scheme called e-hospital program. Digital India is an initiative taken for the citizens to access the government services in a digital forum. The Government of India is taking effort to maximise the economic efficacy and transparency in the nation. The Digital India visions are “Digital Infrastructure, Governance and services on demand and Digital Empowerment of Citizen”.

¹ Department of Business Administration, SRM Institute of Science and Technology, Chennai, India, E-mail: shankarkumar698@gmail.com

² School of Management, Vel Tech Rangarajan Dr Sagunthala R&D Institute of Science and Technology, Chennai, India.

* Corresponding author

The Ministry of Electronics and Information Technology in March 2020 is the showing of the ‘Strategy for National Open Digital Ecosystems’ makes the major strength of the initiative towards digitalizing the entire country in all the fields and sectors of the nation

E-hospital means connecting patients, doctors and hospitals on a one single window digital platform, thereby ensuring efficient delivery of health services to the citizens. It is an online registration services framework portal. Individuals can endure online services such as registration and appointment in Out Patient Department (OPD), fee payment, see lab or diagnostics reports and check for the accessibility of blood in government hospitals in this portal. This scheme was initiated to engage citizens with the usage of technology and empower the citizens in areas related to health. The program facilitates patients to take online appointments and connects with premier institutions like AIIMS and NIMHANS. The one more unique feature of this activity is DigiLocker that allows patients to store sensitive information. It specifies the reason for hospital selection based on patient choices. They are using the technology for hospital selection and having high level awareness. However, in this research following empirical analysis and collected 258 data from patients in private and public hospitals. There is a greater need for quality of treatment, hospital reputation, cleanliness, payment facility and food provision in hospitals (Prabhu *et al.*, 2016; Chauhan *et al.*, 2019).

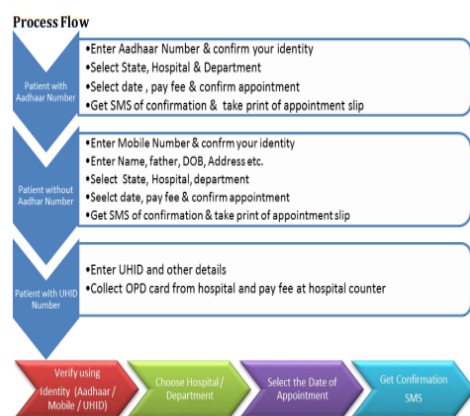


Figure 1. Online Registration System Process Flow

E-hospital implies Online Registration System (ORS). ORS is an online gateway where aadhaar can be used by citizens to enroll for appointments in hospitals spread across states and union territories in India. Online Registration System is being executed in hospitals for the counter based registration of outpatient department and appointment based

system via Hospital Management Information System has been implemented. The application has been facilitated on the cloud services of NIC. The Website encourages online schedules with different departments of various Hospitals utilizing eKYC information of Aadhaar number, if a patient's mobile number is enrolled with UIDAI. As of June 2021, 480+ hospitals are providing this service.

The Features of E-hospital includes the appointment process is simplified, easy access of data and information in website, dashboard report for easy understanding, to know the old and new patient booking of appointment, hospital comes on board for online booking and managing appointment process. It brings the secured E-hospital database management system for maintaining the records of patients in electronic form (Ross *et al.*, 2015; Ross *et al.*, 2016; Rana *et al.*, 2020). The researcher recommended bringing more awareness for risk reduction and cyber threats for healthcare databases stored in hospitals or common websites (Ikram *et al.*, 2010; Bharath *et al.*, 2019). The implementation of the e-health system towards E-hospital and innovation development highlight the compulsory uses of E-hospital in technology, providing necessary scope in rural areas (Ahmed and Zeebaree, 2017). It is based on technology and health care sector integration in modern days, E-hospital structure and E-hospital facility. In order to recognize E-Hospital is benefiting the society at large or not. (Smith, 2007; Mukhtar, 2020)

The need of this research is to showcase the awareness of E-Hospital services should be addressed, opinion about features of E-Hospital services has been studied and users perception about E-Hospital services has been evaluated. Finally, the socio economic profile of users using E-Hospital services has also been investigated.

Research Gap

Some researchers have identified that E-Hospital stakeholders like healthcare specialist, Doctor, patient and Government are having a major role in executing this initiative (Vivek and Vikrant, 2016). However there is non-existence of sufficient research that examines the awareness of E-Hospital in Chennai as well as the state of Tamilnadu. This study is important to evaluate and validate the awareness and perception of E-Hospital service. The research also assess the opinion of E-Hospital service on perceived value among users. It's taking the existing situation of possibilities for telemedicine, m-health and electronic health record for feasibility and accessibility of health services in our nation

(Ali *et al.*, 2012; Abdulsalam *et al.*, 2015). In future it will create a more security reason for using patient data such as retinal scan, voice recognition, facial recognition and so on (Kraus *et al.*, 2021). The study would support the government, as the research examines the relationship between features, opinion, and advantages using E-Hospital Services.

Objective

- To assess the awareness of E-Hospital services at Chennai.
- To analyse the opinion towards the features of E-Hospital services.
- To evaluate the users perception on advantages of E-Hospital services.
- To investigate the socio economic profile of users using E-Hospital services at Chennai.

Materials and Methods

The research design, sample size, mode of data collection, Research Instrument, Sampling Techniques, Sampling frame and Statistical Techniques are shown below.

Table 1. Research methodology

S. No	Research Methodology	Description
1	Research Design	Descriptive Research
2	Sample Size	108 Sample in Chennai
3	Sampling Techniques	Non Probability Sampling Convenience Sampling
4	Data Collection	Primary Data, Secondary Data (Journals, websites and magazines)
5	Research Instrument	Close-ended Questionnaire using 5- Point Likert scale Mean & Standard Deviation
6	Statistical Techniques	One Sample t-Test and Independent Sample t- Test to compare groups

26-35 years, 28.6% are the age category between 36-45 years, 24.1% are 18-25 years and remaining 13% were above 45 age group. The marital status of respondents were 54.6% are married and 45.4% are single. In respect to the qualification of respondent, 31.5% of them are studied in degree as education, 25% of the respondents are having school level as education and the remaining 24.1% and 19.4% of them are studied in higher education (Post Graduate Degree & Professional Degree). The Respondents occupation varies with 32.5% were government employee, 23.1% are having profession and remaining 22.2% were self-employed and private employee. In respect to the annual income of respondent, 43.5% of them are having income group of 50000-100000 and 32.4% of them are >100000 and the remaining 24.1% of the respondents are having <50000. Table 2 is showing the descriptive data of current revision. The purpose of descriptive statistics is to clarify the facts and its benefits to carry out descriptive research that comprises of sample size on different demographic variables

Table 2. Sampling Frame (N=108)

Parameter	Target Audience	Sample size	Percent
Gender	Male	65	60.2%
	Female	43	39.8%
Age	18-25	26	24.1%
	26-35	37	34.3%
	36-45	31	28.6%
	Above 45	14	13%
	Single	49	45.4%
Marital Status	Married	59	54.6%
	School Level	27	25%
Qualification	Degree Level	34	31.5%
	Post Graduate Level	26	24.1%
	Professional Level	21	19.4%
	Self-Employed	24	22.2%
Occupation	Government Employee	35	32.5%
	Private Employee	24	22.2%
	Profession	25	23.1%
Annual income	<50000	26	24.1%
	50000-100000	47	43.5%
	>100000	35	32.4%

Results and Discussion

The demographics evidences have been composed from few areas includes of gender, age, marital status, qualification, occupation and annual income. Findings dictates out of 108 respondents 60.2% were male and the remaining 39.8% were female. The Respondents age differs with 34.3% were

The Table 3 presents the awareness level on the features of E-Hospital and it was analysed with the help of t-test. Since the null hypothesis is rejected at 1% level of significance and P value is less than 0.01, with reference to all the Statements on features of E-Hospital. Hence the opinion regard to all the Statements on features of E-Hospital is not

equal to average level. Based on standard deviation and mean score, opinion regard to all the Statements on features of E-Hospital is above average level. The following reasons found that Manage Appointment Process, User friendly and Appointment Process Simplified is better than the Dashboard Report, Health services on finger tips, Dedicated Patient support and Easy to access and Hospitals Come On Board. It shows that citizen were very much aware about the features of E-Hospital, the respondents agreed that they have aware and ready to use the features of E-Hospital. The effective use of features of E-Hospital determines the respondents life easier which act as a services at footstep.

Null Hypothesis: The opinion regarding Statements on features of E-Hospital are equal to Average level.

Table 3. Inferential Statistical Analysis- To compute t test for Specified value (Average = 3) of Statements on features of E-Hospital- Sample size: N=108

Criterion	Mean	Standard Deviation	t value	P value
Appointment Process	3.64	1.106	6.002	<0.001**
Simplified Dashboard Report	3.58	1.137	5.333	<0.001**
Easy to access and Hospitals Come On Board	3.51	1.188	4.455	<0.001**
Health services on finger tips	3.56	1.113	5.274	<0.001**
Dedicated Patient support	3.56	1.186	4.949	<0.001**
User friendly	3.65	1.328	5.073	<0.001**
Manage Appointment Process	3.76	1.093	7.222	<0.001**

** denotes significant at 1% level

The Table 4 presents the perception level on the advantages of E-Hospital and it was analysed with the help of t-test. Since the null hypothesis is rejected at 1% level of significance and P value is less than 0.01, with reference to all the Statements on advantages of E-Hospital. Hence the opinion regard to all the Statements on advantages of E-Hospital is not equal to average level. Based on standard deviation and mean score, opinion regard to all the Statements on advantages of E-Hospital is above average level. The following reasons found that Self Service Portal and Physician Management on the E-Hospital is a top priority for respondents.

The advantages of E-Hospital actively engage the respondents based on Digital Payment, Physician Scheduling, Empowerment of patient Life Style and Data Security. The government want to highlight the important information about Patient Portal which could be done by the government in the near future. Hence the users should think of using the E-Hospital services to improve their quality of life and standard of living.

Null Hypothesis: The perception regarding Statements on advantages of E-Hospital are equal to Average level.

Table 4. Inferential Statistical Analysis- To compute t test for Specified value (Average =3) of Statements on advantages of E-Hospital- Sample size: N=108

Criterion	Mean	Standard Deviation	t value	P value
Self Service Portal	3.68	1.118	6.285	<0.001**
Physician Scheduling	3.57	1.162	5.135	<0.001**
Patient Portal	3.44	1.155	4.000	<0.001**
Physician Management	3.68	1.066	6.588	<0.001**
Digital Payment	3.59	1.223	5.035	<0.001**
Empowerment of patient Life Style	3.57	1.146	5.208	<0.001**
Data Security	3.55	1.210	4.690	<0.001**

** denotes significant at 1% level

From the Table 5, it is observed that the mean score of the female respondents is 25.44 against 25.15 for the male respondents. It is also seen that the P value is lower than the 0.01 in that null hypothesis is rejected at 1% level. Hence there is significance difference between male and female on features of E-Hospital toward Easy to access and Hospitals Come On Board and Health services on finger tips. Since P value is less than 0.05, null hypothesis is rejected at 5% level with regard to there is significance difference between male and female on features of E-Hospital toward Appointment Process Simplified, Dashboard Report, Dedicated Patient support and User friendly. There is no significance difference between male and female with regard to Manage Appointment Process, since P value is greater than 0.05. Hence the null hypothesis is accepted at 5% level with regard to Manage Appointment Process. It was clearly found that the users are aware about the E-Hospital initiative but it is an important tool for the E-Hospital services on finger tips, all the information is shown in the digital India website by the government towards the users can access E Hospital services from anywhere. Also the users

acknowledge that the digital India programme made E-Hospital services on availability at need, it improves the users participation

Null Hypothesis: There is no significant difference between Male and Female with respect to features of E-Hospital.

Table 5. Independent Sample t-Test for Male and Female with respect to features of E-Hospital

Criterion	Male (N=65)		Female (N=43)		t-value	p-value
	Mean	S.D	Mean	S.D		
Appointment Process	3.68	1.062	3.58	1.180	1.02	0.020*
Simplified Dashboard	3.55	1.225	3.63	1.001	1.08	0.040*
Report Easy to access and Hospitals Come On Board Health services on finger tips	3.48	1.312	3.56	.983	0.331	<0.001**
Dedicated Patient support	3.46	1.119	3.72	1.098	0.612	<0.001**
User friendly	3.55	1.146	3.58	1.258	0.233	0.041*
Manage Appointment Process	3.68	1.324	3.60	1.348	0.094	0.044*
Appointment Process	3.75	1.090	3.77	1.109	0.234	0.813
Total	25.15		25.44			

** denotes significant at 1% level

* denotes significant at 5% level

From the Table 6, it is observed that the mean score of the male respondents is 25.57 against 24.35 for the female respondents. It is also seen that the P value is lower than the 0.01 in that null hypothesis is rejected at 1% level. Hence there is significance difference between male and female on advantages of E-Hospital toward Digital Payment. Since P value is less than 0.05, null hypothesis is rejected at 5% level with regard to there is significance difference between male and female on advantages of E-Hospital toward Self Service Portal, Physician Scheduling, Patient Portal, Physician Management, Empowerment of patient Life Style and Data Security. Therefore, the users are agreed towards changing the pattern of health care access. This also helps the users to learn more and there is a chance to improve the users support in the E-Hospital initiative. The users expect that the government should bring major reform through technology for improving the quality of the E-Hospital services.

Null Hypothesis: There is no significant difference between Male and Female with respect to advantages of E-Hospital.

Table 6. Independent Sample t-Test for Male and Female with respect to advantages of E-Hospital

Criterion	Male (N=65)		Female (N=43)		t-value	p-value
	Mean	S.D	Mean	S.D		
Self Service Portal	3.72	1.053	3.60	1.218	0.326	0.049*
Physician Scheduling	3.66	1.149	3.44	1.181	0.771	0.050*
Patient Portal	3.42	1.074	3.49	1.279	0.332	0.043*
Physician Management	3.77	1.012	3.53	1.141	0.79	0.048*
Digital Payment	3.72	1.218	3.40	1.218	0.28	<0.000**
Empowerment of patient Life Style	3.65	1.165	3.47	1.120	0.58	0.043*
Data Security	3.63	1.193	3.42	1.239	0.69	0.029*
Total	25.57		24.35			

** denotes significant at 1% level

* denotes significant at 5% level

Research Implication

As a result of the E-Hospital awareness towards digital India initiative especially in the past few years, some respondents claiming that E-Hospital is a new and emerging concept in the healthcare industry has the possibility to go hand in hand to the extent of practicing. The finding revealed that the E-Hospital awareness and perception towards digital India initiative at Chennai was highly appreciated and they sensed that they are aware of E-Hospital features and advantages having a positive opinion on E-Hospital initiative. The advantages of using this E-Hospital service might be based on the information and fact it has the potential to offer more opinion to the government so it enables users who are often using the E-Hospital services to be able to improve their satisfaction level by benefiting the health services online.

From the findings, some important implications and suggestions can be specified in this regard. First, respondents having a positive opinion towards the awareness and perception of the E-Hospital initiative and the government must bring best efforts to generate a flexible situation for users and involve the users for using the E-Hospital services. Another implication is that, the government is the sole responsible for improving E-Hospital services through digital India programme, they must motivate the users to use their E-Hospital services in this regard.

In this research study suggests that keeping users engaged with the E-Hospital services is the most important aspect and it leads them to feel self-confident and make self-reliant towards better results. E-Hospital can be used to support and supplement the users when enriching through the digital platform.

Conclusions

Digital India and E-Hospital are supporting all the users in several levels. While considering the present research findings, several implications and suggestions are considered. This research study contributed to understanding the E-Hospital awareness towards digital India initiative. In this research, the limitation is indicated by the sampling method used as convenience sampling to achieve the research objectives. The sample size for this study might be another limitation because it is not enough to represent all the users in Chennai. This research may benefit both academics in E-health and public administrations. In terms of E-health academics might be portray the overview of E-hospital to users and create in-depth opinion on Telemedicine, M-Health, Electronic Health Records (EHR), Healthcare Information Systems (HIS), Consumer Health Informatics (CHI), Health Knowledge Management (KM) and Virtual Healthcare Teams (VHT). For public administrations they should bring confidence and privacy for the users using E-hospital services, build the reliability about software, and conduct special camps about E-hospital services should increase usability and accessibility among users. Therefore, it is concluded that users have positive opinion and feedback on E-Hospital. But we never stop moving towards using the E-Hospital services might be prospective to change the face of the country undoubtedly

Future Research Directions

This study directed only users awareness and perception of E-Hospital services on Chennai for sampling, maybe in forthcoming there is a possibility of going an exhaustive and in depth research in the state of Tamilnadu and also it can be extended to cover the entire nation can be targeted. The future study would be pre determine categories like usage, adoption, loyalty and satisfaction of users through E-Hospital services. This study would be further enhanced on other vital parameters such as telemedicine, computer aided diagnosis and so on. In this study suggesting academicians, scholars

and practitioners should acknowledge the role for E-Hospital on digital India Programme towards supportive and increase knowledge sharing.

References

- Kaur, S., Kaur, R., and Aggarwal, R. (2019). E-health and its impact on Indian Health Care: An Analysis. *Paradigm*, 23(2):164-174.
- Chauhan, V., Sharma, A., and Sagar, M. (2019). Exploring Patient choice in India: A Study on Hospital Selection. *International Journal of Healthcare Management*, 14(2):610-620.
- Bharath, K.K., Kumar, A., Varma, A., and Rajyashree, R. (2019). Secured Electronic Hospital Database Management System. *International Journal of Recent Technology and Engineering*, 8(1S4):402-405.
- Ahmed, M. and Zeebaree, S. (2017). Design and Implementation an E-Hospital System at Kurdistan. *Kurdistan Journal of Applied Research*, 2(3):80-86.
- Prabhu, A.D., Ojha, P., and Pathak, A. (2016). E-Hospital: A Single Window Hospital. *International Research Journal of Engineering and Technology*, 3(9):1480-1485.
- Vivek, C. and Vikrant, K. (2016). Tele-ECG and 24-hour physician support over telephone for rural doctors can help early treatment of acute myocardial infarction in rural areas. *Journal of Telemedicine and Telecare*, 22(3):203-206.
- Abdulsalam, Y., Gopalakrishnan, M., Maltz, A., and Schneller, E. (2015). The emergence of consolidated service centers in health care. *Journal of Business Logistics*, 36(4):321-334.
- Kraus, S., Schiavone, F., Pluzhnikova, A., and Invernizzi, A.C. (2021). Digital transformation in healthcare: Analyzing the current state-of-research. *Journal of Business Research*, 123:557-567.
- Smith, A.C. (2007). Telemedicine: challenges and opportunities. *Expert Rev Med Devices*, 4(1):5-7.
- Ross, J., Stevenson, F., Lau, R., and Murray, E. (2015). Exploring the challenges of implementing e-health: a protocol for an update of a systematic review of reviews. *BMJ Open*, 5(4):1-5.
- Ross, J., Stevenson, F., Lau, R., and Murray, E. (2016). Factors that influence the implementation of e-health: a systematic review of systematic reviews (an update). *Implement Science*, 11:1-12.
- Rana, W., Mukhtar, S., and Mukhtar, S. (2020). Mental Health of Medical Workers in Pakistan during the Pandemic COVID-19 Outbreak. *Asian Journal of Psychiatry*, 51:1-3.
- Mukhtar, S. (2020). Mental Health and Emotional Impact of COVID-19: Applying Health Belief Model for Medical Staff to General Public of Pakistan. *Brain, Behavior, and Immunity*, 87:28-29.
- Ikram, A., Shah, S.I.H., Naseem, S., Absar, S.F., Ullah, S., Ambreen, T., Sabeeh, S.M., and Niazi, S.K. (2010). Status of hospital infection control measures at seven major tertiary care hospitals of northern punjab. *J Coll Physicians Surg Pak*, 20(4):266-270.
- Ali, H., Shaheen, A., Ehsan, N., Arif, W., Khan, A.A., and Khizer, M.A. (2012). Awareness of hospital waste management issues among hospital administration and local residents of Pakistan. *Int J Biol Med Res*, 3(2):1783-1795.
- Ministry of Electronics and Information Technology Government of India. 2020. "Strategy for National Open Digital Ecosystems (NODE)." (https://www.medianama.com/wp-content/uploads/mygov_1582193114515532211.pdf).