



**ORIGINAL RESEARCH PAPER**

**Management**

**E-HEALTH SERVICES IN DELHI-NCR : AN EXPLORATORY STUDY**

**KEY WORDS:** E-Health, Technical Acceptance Model, Exploratory Factor Analysis, Reliability Analysis

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**ABSTRACT**

E-health is not just a buzzword; it can deliver immense benefits, improve the service quality of health care and provide greater efficiency. Yet, even though the potential of e-health has been recognized in practice as well as in academia, and since the first papers on e-health were published more than a decade ago, its application in the health-care sector has still proven to be remarkably difficult. The aim of the study was to determine factors prompting customers to accept and adopt e-health services offered by the public and private hospitals in Delhi-NCR and to analyze the Reliability and Internal Consistencies of the questionnaire using Cronbach's Alpha. The study yielded a nine-dimensional framework comprising of factors prompting customers to accept and adopt e-health services offered by the public and private hospitals in Delhi-NCR and labelled as Perceived Usefulness, Output Quality, Results Demonstrability, Ease of Use, Subjective Norm, Attitude, Perceived Accessibility, Credibility, Intention to Use. A high value of Cronbach's Alpha (.96) indicated the internal consistency of the questionnaire.

**INTRODUCTION**

E-health (i.e., electronic health-care service delivery) is generally seen as a strategic tool for overcoming the challenges faced by health-care sectors worldwide (Chismar and WileyPatton, 2003). The huge potential that is attributed to e-health to help balance an enormous and consistently growing health-care demand with limited resources, has already led to an increased use of the Internet as a source for health information and service delivery. Additionally, the market for information technology in health care is expected to grow even further (Cline and Haynes, 2001; Kerwin, 2002; Powell et al., 2003; Tarre, 2003; Jai Ganesh, 2004; An, 2005). According to the Commission of the European Communities (2004) four out of five doctors in Europe had access to the Internet in 2004. A fourth of the European population used the Internet to collect health information and around 40% considered the Internet to be a good medium for collecting such information (Commission of the European Communities, 2004). Yet, the full potential of e-health is far from being tapped, which makes understanding citizens' needs and expectations—and taking them in to consideration—essential and a precedent for moving toward more sophisticated and high-quality health-care services.

E-health constitutes the application of ICT across the whole range of functions that affect the health sector (Commission of the European Communities, 2004). Also other terms are often used interchangeably; these include e-healthcare, medical informatics, health informatics, consumer health informatics, telemedicine, telecare or telehealth. Most, however, refer to different aspects of technology in health care, which results in confusion about what really is meant by e-health (Pagliari, 2005). Pagliari (2005) thus attended to this problem and suggested a common definition of e-health based on the work of Eng (2001), which, according to Pagliari (2005), aptly represents the phenomenon. We regard this definition being the most suitable as it highlights the particular role played by the Internet in e-health. Accordingly, e-health is defined as: "The use of emerging information and communication technology, especially the Internet, to improve or enable health and health care" (Pagliari, 2005).

There are two main objectives of e-health. The first one is to give more responsibility, power and information to the patient so that he/she can be an active part in his/her own health care (Baldwin et al., 2002a; Guillén et al., 2002; Nicholas et al., 2003). The second aim is to utilize ICT in the most effective and efficient ways to support the interaction of patient and healthcare provider in primary as well as in secondary care (Baldwin et al., 2002a). E-health is about improving access to and the quality of health-care services to citizens (Mukherjee and McGinnis, 2007). As stated by Mukherjee and McGinnis (2007) the future of e-health envisions patients who are empowered by current health information

relative to diagnosis and treatment to make their own decisions on their health care without having to leave the house. In the following section, we will further explain what e-health comprises and how it can benefit providers and consumers. Also, the disadvantages and challenges posed by e-health will be discussed leading to the problem discussion and the problem statement of this research.

India, like most other developing nations, is facing several public health challenges like communicable diseases, malnutrition, and cardiovascular disorders. The diversity and heterogeneity of basic facilities and health care delivery mechanisms in different parts of this vast country is an area of concern for any nation-wide program. Several paradoxes and unresolved challenges still exist in the present health care system. While we boast of the recent launch of 'Tele-ICU' – an internet-based ICU 24x7 Health Care in New Delhi (<http://www.hospitalinfrabiz.com/latest-hospital-and-medical-news-india>. Accessed on 22-07-2015); there are several pockets in the country facing the everyday challenges of poor transport systems, poverty, illiteracy and large families. The doctor-population ratio in India has been worked to be around 1 per 2000 (<http://pib.nic.in/newsite/erelease.aspx?relid=77859> Accessed on 15-06-2015). The disparity in urban and rural doctor distribution is dismal. In the rural settings, it is as low as 1 doctor per 25000 people (Dahad, 2015). It is largely because, 68.8% of the population lives in villages ([http://censusindia.gov.in/2011-prov-results/paper2/data\\_files/india/Rural\\_Urban\\_2011.pdf](http://censusindia.gov.in/2011-prov-results/paper2/data_files/india/Rural_Urban_2011.pdf). Accessed on 22-07-2015) but only about 2% of doctors practice in urban areas. About 75% practice in urban areas and 23% practice in semi-urban areas (Mishra, 2015). Many young medical professionals are reluctant to work in rural areas due to the challenges of ill-equipped hospitals in poorly accessible location with limited physical facilities. Telemedicine can be a potential answer to the herculean task of reaching the masses and delivering the basic health services to one and all.

**Objectives of the research**

- To determine factors prompting customers to accept and adopt e-health services offered by the public and private hospitals in Delhi-NCR
- To analyze the Reliability and Internal Consistencies of the questionnaire using Cronbach's Alpha

**Statistical Techniques**

To achieve the objectives of the pilot study, Exploratory Factor Analysis was implemented to identify the key factors prompting customers to accept and adopt e-health services offered by the public and private hospitals in Delhi-NCR. The data collected was also used for the construction of the scale for customer behaviour towards e-health services offered by the public and private hospitals in Delhi-NCR while Cronbach's alpha was used to

determine the reliability. Extraction of factors was carried out implementing Principal Component Method while Varimax rotation was used in order to obtain uncorrelated factors.

**Sampling**

For the Pilot Study Convenient sampling was implemented for this study. The sample was collected from a set of public and private hospitals in Delhi-NCR which offer e-health services in various domains.

**Design of Questionnaire**

Data were collected from both healthcare service seekers which included patients along with the relatives of the patients and the healthcare professionals. The data were collected through survey method which included circulating self-administered questionnaires to the respondents. The key variables for which the data were collected are: • Adoption and acceptance behavior of the customers towards e-health services in hospitals of Delhi-NCR • Attitude of the customers towards the service quality of the e-health services provided by the hospitals in Delhi-NCR • Knowledge level of the customers about the existing e-health services provided by the hospitals in Delhi-NCR • Demographic details of customers

A study tool was prepared to collect the above-mentioned data and administered at all the study hospitals. All the selected hospital facilities was visited by the researcher followed by telephonic conversation with the concerned respondent for conducting research. The items were given the format of a proper questionnaire along with instructions in order to carry out the empirical evaluation of these items. A seven point Likert type scale was used with the following anchors: "1 -Strongly disagree", "2- Disagree", "3-Somewhat Disagree", "4-Undecided", "5-Somewhat Agree", "6-Agree", "7-Strongly Agree".

Data Analysis: Factor Analysis

**Table 1.1 : KMO and Bartlett's Test of Sphericity**

KMO Measure of Sample Adequacy	.915
Bartlett's Test of Sphericity	.000

Value of KMO was greater than 0.6 and Bartlett's Test of Sphericity revealed that the Sig value was <.000. Hence, the questionnaires were fit for factor analysis. Principal Component Analysis was implemented for factor analysis along with Varimax rotation was implemented to obtain uncorrelated factors. Only those variables were retained in each factor which shared correlation value of .5 or more.

Results of factor analysis for customer behaviour towards public and private hospitals in Delhi-NCR yielded nine factors prompting customers to accept and adopt e-health services offered by the public and private hospitals in Delhi-NCR and labelled as Perceived Usefulness, Output Quality, Results Demonstrability, Ease of Use, Subjective Norm, Attitude, Perceived Accessibility, Credibility, Intention to Use. The six factors accounted for around 66% of variance which indicated that these six factors explained 75% of customer behaviour towards public and private hospitals in Delhi-NCR. The factors along with the variables comprising the factors are given in Table 1.2

**Table 1.2: Final Selected Items for E-Health Dimensions**

Factors	Dimensions
Perceived Usefulness	Do E-health services make obtaining the health information more convenient?
	Do E-health services make obtaining the health information more accessible?
	E-health services help me to find quick answers to my health questions
	E-health services enhances the effectiveness in managing healthcare
	E-health services empower me to self-manage my health-related enquiries/ records.
	The e-health services provide me with additional information

	I am aware of the full range of services provided by the public and private hospitals in Delhi - NCR
Output Quality	Information obtained from the e-health services provided by the public and private hospitals in Delhi-NCR is up to date
	Information obtained from the e-health services provided by the public and private hospitals in Delhi-NCR is highly relevant.
	Information obtained from the e-health services provided by the public and private hospitals in Delhi-NCR is highly accurate.
	E-health services system provided by the public and private hospitals in Delhi-NCR is efficient
	I am aware of the existence of the e-health services provided by the public and private hospitals in Delhi - NCR
	Is it advantageous to use the e-health services provided by the public and private hospitals in Delhi-NCR?
Results Demonstrability	I have no difficulty in telling others about the advantages of e-health services provided by the public and private hospitals in Delhi-NCR
	I am able to communicate the outcomes of using the e-health services provided by the public and private hospitals in Delhi-NCR
	I am completely aware of the advantages of using e-health services provided by the public and private hospitals in Delhi-NCR
	Using the e-health services provided by the public and private hospitals in Delhi-NCR is compatible with the way I like to do the things
	Using the e-health services provided by the public and private hospitals in Delhi-NCR fits well with my life-style
	Using the e-health services provided by the public and private hospitals in Delhi-NCR fits well with the way I like to do the things
	It is easy to access the e-health services provided by the public and private hospitals in Delhi-NCR
Ease of Use	My interaction with e-health services provided by the public and private hospitals in Delhi-NCR is simple
	It is easy for me to become skilful at using e-health services provided by the public and private hospitals in Delhi-NCR
	I find it easy to use the e-health services provided by the public and private hospitals in Delhi-NCR
	Learning to use e-health services provided by the public and private hospitals in Delhi-NCR is easy for me
Subjective Norm	My friends and relatives think that I should use e-health services provided by the public and private hospitals in Delhi-NCR
	My friends and relatives think that it is a bad idea not to use the e-health services provided by the public and private hospitals in Delhi-NCR
	My friends and relatives encourage me to use e-health services provided by the public and private hospitals in Delhi-NCR
Attitude	My friends and relatives think that it is a good idea to use the e-health services provided by the public and private hospitals in Delhi-NCR
	I feel good to use the e-health services provided by the public and private hospitals in Delhi-NCR
	I like to use the e-health services provided by the public and private hospitals in Delhi-NCR

Perceived Accessibility	E-health services provided by the public and private hospitals in Delhi-NCR is easily accessible for me
	I do not face any problems to access the e-health services provided by the public and private hospitals in Delhi-NCR
Credibility	I recommend the e-health services provided by the public and private hospitals in Delhi-NCR
	It is advised to use the e-health services provided by the public and private hospitals in Delhi-NCR
Intention to Use	I will continue to use the e-health services provided by the public and private hospitals in Delhi-NCR
	I will like to use any new e-health services provided by the public and private hospitals in Delhi-NCR

Table 1.3 showed that Factor I (Perceived Usefulness) had an Eigen value of 15.94, which explained 14.20% of the total variance after rotation, whereas Factor II (Output Quality) had an Eigen value of 2.56 and explained 12.44% of the total variance after rotation. Factor III (Results Demonstrability) had an Eigen value of 1.99 and explained 12.27% of variance; while Factor IV (Ease of Use), Factor V (Subjective Norm) and Factor VI (Attitude) had Eigen values of 1.57, 1.19 and 1.05 respectively explaining 8.75%, 8.05% and 5.38% of the total variance respectively. Factor VII (Perceived Accessibility), Factor VIII (Credibility) and Factor IX (Intention to Use) had Eigen values of .93, .87 and .81 respectively explaining 4.95%, 4.55% and 4.20% of the total variance respectively. The total variance explained by the five factors was around 75%.

**Table 1.3: Eigen Values and Percentage of Variances explained by six factors of E-Health Dimensions**

Factors	Eigen Value	% of Variance Explained By The Factors	Cumulative % of Variance
Perceived Usefulness	15.94	14.20	14.20
Output Quality	2.56	12.44	26.64
Results Demonstrability	1.99	12.27	38.91
Ease of Use	1.57	8.75	47.66
Subjective Norm	1.19	8.05	55.71
Attitude	1.05	5.38	61.09
Perceived Accessibility	.93	4.95	66.04
Credibility	.87	4.55	70.59
Intention to Use	.81	4.20	74.79

In order to establish the internal consistency and reliability of the questionnaire pertinent to customer behaviour towards public and private hospitals in Delhi-NCR, Cronbach's alpha was computed and the results were shown in Table 3.4. Results in the Table 3.4 showed a highly satisfactory level of reliability coefficients for the construct pertinent to customer behaviour towards public and private hospitals in Delhi-NCR. The reliability of the construct pertinent to customer behaviour towards public and private hospitals in Delhi-NCR. Came out to be 0.96.

**Table 3.4: Cronbach's Alpha Reliability and Internal Consistency of E-Health Dimensions**

Cronbach's Alpha	96
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**Recommendations of The Study**

The aim of the study was to determining factors prompting customers to accept and adopt e-health services offered by the public and private hospitals in Delhi-NCR and to analyze the Reliability and Internal Consistencies of the questionnaire using Cronbach's Alpha. The study was successful in revealing the key factors prompting customers to accept and adopt e-health services offered by the public and private hospitals in Delhi-NCR and also high internal consistency among the questionnaire was established which signified that the questionnaire could be used for further data collection for the purpose of the research.

The study recommends that further studies to be conducted as extension of this study to investigate citizens' acceptance of e-health by identifying the factors that explain and predict their intention to use e-health services and to develop a model that could quantify the relationship for the better decision-making purpose.

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