Internet Usage Trends in Medical Informatics

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ABSTRACT

Technological growth in the 21st century is exponential. Simultaneously, developments of the associated risk, uncertainty and user acceptance are scattered. This required appropriate study to establish people accepting controversial technology (PACT). The Internet and services around it, such as World Wide Web, e-mail, instant messaging and social networking are increasingly becoming important in many aspects of our lives.

Information related to medical and personal health information sharing using the Internet is controversial and demand validity, usability and acceptance. Whilst literature suggest, Internet enhances patients and physicians' positive interactions, some studies establish opposite of such interaction in particular the associated risk. In recent years Internet has attracted considerable attention as a means to improve health and health care delivery. However, it is not clear how widespread the use of Internet for health care really is or what impact it has on health care utilisation. Estimated impact of Internet usage varies widely from the locations, locally and globally. As a result, an estimate (or predication) of Internet use and their effects in Medical Informatics related decision-making is impractical. This opens up research issues on validating and accepting Internet usage when designing and developing appropriate policy and processes activities for Medical Informatics, Health Informatics and/or e-Health related protocols.

 Access and/or availability of data on Internet usage for Medical Informatics related activities are unfeasible. This paper presents a trend analysis of the growth of Internet usage in medical informatics related activities in USA. This study is an initiation of Internet usage in developing countries in particular healthcare services related indirect measures. In order to perform the analysis, data was extracted from surveys carried out by Pew Internet and American Life Project. Internet health information usage trends and their influence to the field of medical informatics is reviewed and discussed. The study clearly indicates a trend of people becoming active consumers of health information rather than passive recipients.

Keywords: Health Information, Internet Use for Healthcare, Trend Analysis

INTRODUCTION

Easy and widespread access to the Internet has transformed worldwide communication and delivery of all types of information including information related to healthcare (Ayantunde et al., 2007). The Internet is emerging as a means to propagate information about health and health care, improve communication, and facilitate various interactions between patients and the health care delivery process (Baker et al., 2003).

The Internet presents opportunities for combining great reach as a mass medium of communication with good effectiveness for supporting health behaviour change through computer adaptation, and possibilities for increasing availability of social support (Wangberg et al., 2009). In contrast, Internet may perhaps aggravate existing socio-economic differences in health (Korp, 2006; Wangberg et al., 2008), spread faulty health information (Sillence et al.,

2007; Ipser et al., 2007), contribute to medicalization (Korp, 2006) and overwhelming responsibility for own illness (Pitts, 2004). Furthermore, Internet is a medium with unlimited possibilities, and that it is the users who put meaning into it through their use and their creation (Henwood et al., 2003). It is observed that, individuals are taking on greater responsibilities in managing their own health (Gianchandani, 2011).

The Internet is already an important source of providing health information, which will further increase in significance in the future. This study highlights the potential of Internet use for health related purposes. The aim of this research paper is to study the trends in the use and projected use of Internet for health purposes in United States of America. This includes more detailed analyses of various aspects related to the use of Internet for healthcare.

In USA, the use of Internet for health purposes has been monitored since 2000 by Pew Internet and American Life Project (Pew Internet, n.d.). This study looks closer at the trends in the USA population's use of the Internet for health purposes, and pursues five research questions.

1. On the basis of the present data, what can we predict about the future health-related use of the Internet?

2. How the Internet is used for health related activities by different age groups?

3. What kind of health-related Internet activities appear more important?

4. What are the trends in health related information search using Internet for people under various employment statuses?

5. What are the trends in health related information search using Internet by gender?

METHODS

The data collected by Pew Internet and American Life Project through survey sampling were used. The study was conducted through telephone interviews with a nationally representative sample of adults living in continental United States telephone households. The survey sampling was obtained during years 2004, 2006, 2008 and 2010 respectively.

Sample Design

'The sample was designed to represent all continental U.S. telephone households. The telephone sample was provided by Survey Sampling International, LLC (SSI) according to PSRAI specifications. The sample was drawn using standard list-assisted random digit dialing (RDD) methodology. Active blocks of telephone numbers (area code + exchange + two-digit block number) that contained three or more residential directory listings were selected with probabilities in proportion to their share of listed telephone households; after selection two more digits were added randomly to complete the number. This method guarantees coverage of every assigned phone number regardless of whether that number is directory listed, purposely unlisted, or too new to be listed. After selection, the numbers were compared against business directories and matching numbers purged.' (Topline et al., 2004)

Measures

There were 1124, 2928, 2253, 3001 participants for the surveys conducted for the years 2004, 2006, 2008 and 2010 respectively. All the survey questionnaires contained general and specific questions related to the use of Internet. We filtered out the data relevant to the questions about age, employment status and use of Internet for healthcare purposes.

All four surveys consisted of questions starting form general demographic questions, background questions on Internet usage in general to Internet usage for health related activities.

Response alternatives for Internet use for health related activities questions were, 'Yes, have done this', 'No, have not done this', 'Don't know' and 'Refused'. 'Don't know' and 'Refused' alternatives were re-coded and added in to the category of 'No, have not done this'. For a particular respondent, if at least one of the questions with respect to Internet usage on health related activities were answered with 'Yes, have done this' response alternative, the respondent was classified as an Internet health resource user.

Employment status of respondents was registered as 'Employed full-time', 'Employed part-time', 'Retired', 'Not employed for pay', 'Disabled', 'Student', 'Other' and 'Refused'. 'Retired' and 'Disabled' response categories were re-coded in to one category 'Retired or Disabled' and , 'Not employed for pay', 'Student', 'Other' and 'Refused' response categories were re-coded as 'Others including students and not employed'.

Respondent's age was recorded directly, and hence grouped in to categories; 'Less than 30', '31 to 45', '46 to 60'and 'Above 60'.

Analyses

The analysis was carried out in three main sections. First, testing for the differences in proportions of users with respect to age, gender and employment categories throughout four survey years. Second, testing for the differences in proportions of users from 2008 to 2010, based on a wide range of user activities, such as seeking information on a specific health related area, posting information on the Internet, signing up to receive information, consulting online rankings of facilities or health care professionals …etc. (Table 4). Third, projecting the proportion of users in the population in 2015. First and second tasks were carried out using the Chi-Squared test, while the multiple column proportion comparisons in the first task were carried out using Bonferroni adjusted z-test procedure in SPSS 19. The third task, projection was carried out using a logistic regression model.

RESULTS

Table 1: Age group classification of proportion using Internet for healthcare purposes (2004-2010)

|		Age Group				Test values for overall difference in age groups	
		less than 30	31-45	46-60	above 60	Chi-Square	p-value
Proportion using the Internet for health care purposes	2010	$73.4\%_a$	$66.7\%_b$	$60.0\%_c$	$31.6\%_d$	304.898	0.000
	2008	$72.8\%_a$	$73.8\%_a$	$69.6\%_a$	$36.3\%_b$	258.17	0.000
	2006	$67.6\%_a$	$67.9\%_a$	$58.6\%_b$	$28.8\%_c$	368.929	0.000
	2004	$53.0\%_a$	$60.1\%_a$	$55.2\%_a$	$21.9\%_b$	93.318	0.000
Each subscript letter denotes a subset of age whose column proportions do not differ significantly from each other at the .05 level.							
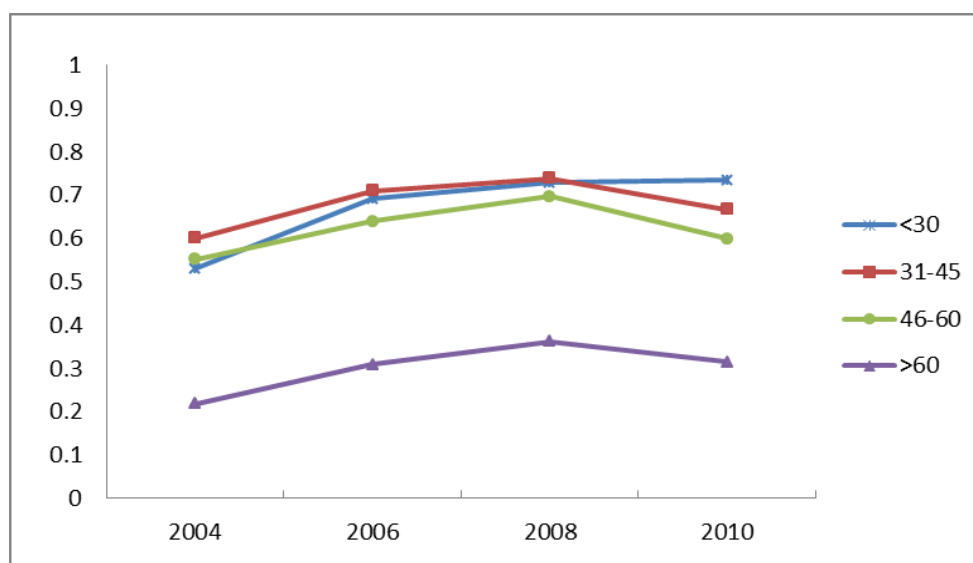
Figure 01: Proportion of people using the Internet for health purposes by age group

Age wise comparisons of users reveal that there has been a significant difference in proportions of users below 60 and above 60 up to year 2008. However, this difference in proportions is evident across all age groups in 2010. It is further evident that more than 70% of the youngest age group are Internet health resource users, while almost 70% of the oldest age group are non-users.

Table 2: Employment category classifications & use of Internet for healthcare purposes (2004-2010)

|		Employment Category				Test values for overall difference in employment	
		Employed full-time	Employed part-time	Retired or Disabled	Others including students and not employed	Chi-Square	p-value
Proportion using the Internet for health care purposes	2010	71.8%$_a$	66.1%$_b$	36.0%$_c$	51.1%$_d$	277.042	0.000
	2008	74.5%$_a$	68.3%$_b$	36.7%$_c$	58.0%$_d$	237.932	0.000
	2006	67.8%$_a$	65.1%$_a$	30.3%$_b$	49.8%$_c$	325.223	0.000
	2004	58.1%$_a$	55.3%$_a$	21.1%$_b$	38.3%$_c$	88.379	0.000
Each subscript letter denotes a subset of employment whose column proportions do not differ significantly from each other at the .05 level.							
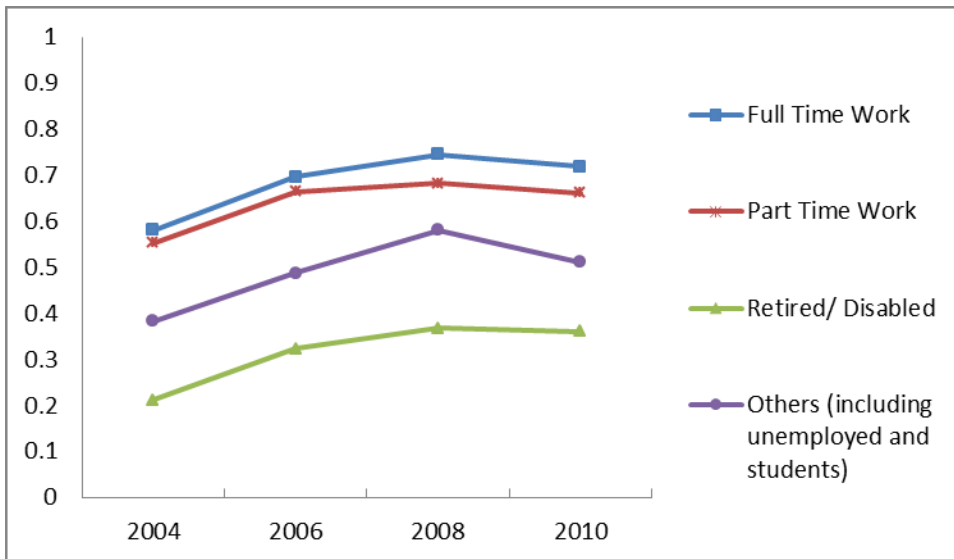
Figure 02: Proportion of people using the Internet for health purposes by employment category

Comparisons in employment categories reveal that up to 2006, there has not been a significant difference among proportions of users in fulltime and part time employees. But there has been a significant difference between proportions of employed users (full time and part time taken as one group), retired/ disabled users and other users (including students and not employed). After 2008, the difference in proportions is significant among all employment categories. In general, employed (full time and part time) persons are dominant users of Internet for health related resources.

Table 3: Gender wise classification of proportion using Internet for healthcare purposes (2004-2010)

		Gender		Test values for overall difference in gender	
		Male	Female	Chi-Square	p-value
Proportion using the Internet for health care purposes	2010	55.82%a	57.83% a	1.197	0.274
	2008	59.02% a	61.95% a	2.015	0.156
	2006	54.89% a	54.12% a	0.170	0.680
	2004	a45.27%	a46.57%	0.156	0.693
Each subscript letter denotes a subset of gender whose column proportions do not differ significantly from each other at the .05 level.					
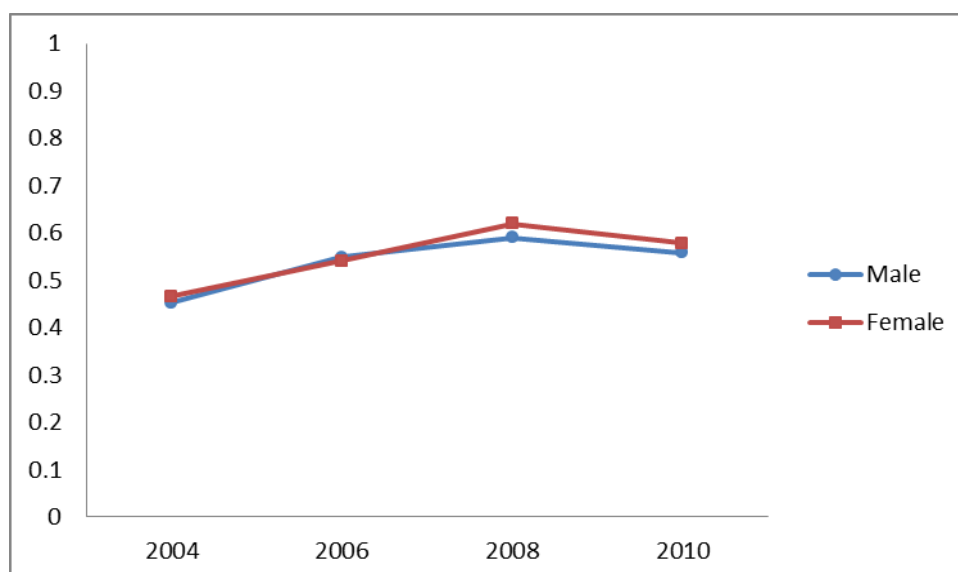
Figure 03: Proportion of people using the Internet for health purposes by gender

Gender group comparisons do not reveal any significant differences in proportions of male and female users. This implies that men and women are equally participating in the use of Internet for health purposes.

Second part of the study was focused on Internet health resource users in 2008 and 2010. The analysis was looking in to specific activities they were engaged using the Internet, with the objective of assessing the changes in proportions of users engaged in each activity from 2008 to 2010.

Other than activities listed in Table 4, there were considerable percentages of people engaged in activities; seeking information on a specific disease or medical problem, certain medical treatment or procedure, doctors or other health professionals and hospitals or other medical facilities recorded during 2008 and 2010. However, the changes in percentage of population seeking such information on the Internet, between years 2008 and 2010 were not statistically significant for these activities. All such activities can be categorised in to one broad category named 'Seeking health related information'. Evidence from Table 4 indicate that people are not merely seeking information on the Internet on diseases or treatments, but they are actively participating in discussion groups, posting information on social networking sites, consulting, posting reviews on health care practitioners on the web. In summary people are becoming active participants of Internet related health activities than being passive recipients of Internet health information.

Table 4: Changes in proportions of Internet health resource users from 2008 to 2010

Activity	2008			2010			Significance Level	
	%	95% CI		%	95% CI		Chi-Square	p-value
		Lower Bound	Upper Bound		Lower Bound	Upper Bound		
Seeking information related to health insurance, including private insurance, Medicare or Medicaid	31.74	29.27	34.22	40.62	38.29	42.95	25.7	0.000
Posted information related to health on a social networking site such as Facebook, MySpace or Linked In	4.91	3.77	6.06	31.15	28.96	33.35	1715.7	0.000
Posted information related to health on Twitter or another status update site	1.03	0.49	1.56	21.33	19.39	23.27	2611.3	0.000
Signed up to receive email updates or alerts about health or medical issues	18.26	16.21	20.31	19.05	17.19	20.91	5.9	0.054
Read someone else's commentary or experience about health or medical issues on an online news group, website or blog	39.22	36.63	41.81	40.62	38.29	42.95	5.0	0.080
Watched/ listened to an online video/audio about health or medical issues	11.66	9.95	13.36	31.15	28.96	33.35	171.6	0.000
Consulted online rankings or reviews of doctors or other providers	23.97	21.71	26.24	18.82	16.97	20.67	22.5	0.000
Consulted online rankings or reviews of hospitals or other medical facilities	22.80	20.57	25.03	17.42	15.62	19.21	23.0	0.000
Posted an online review of a doctor	4.77	3.63	5.90	5.32	4.26	6.38	10.5	0.005
Posted an online review of a hospital	4.11	3.05	5.16	3.62	2.74	4.51	11.9	0.003
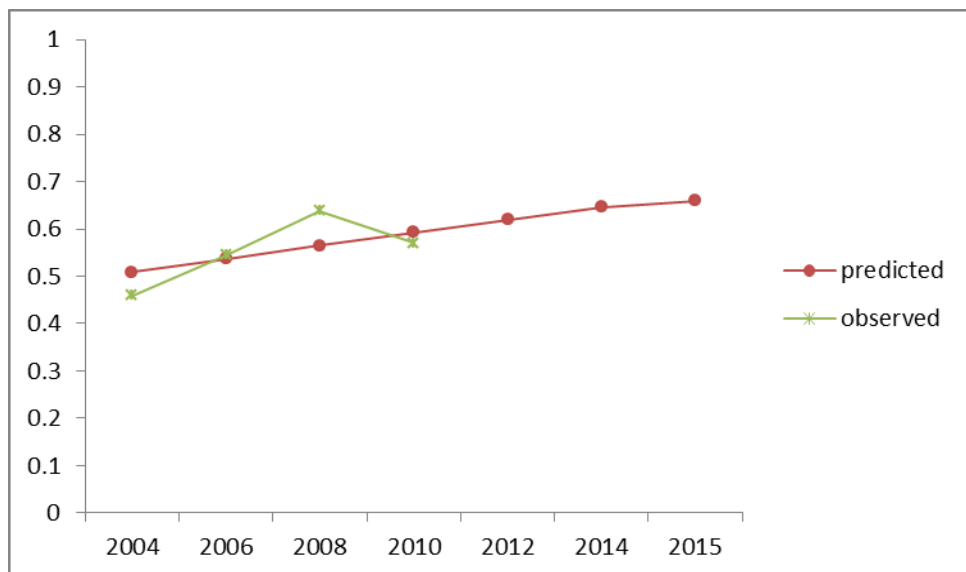
Figure 04: Logistic Regression of proportion of population using Internet for health purposes in American population

The logistic regression (Chi-square goodness of fit 30.751, p-value 0.000) results indicate that the proportion of Internet health resource users will increase but will gradually slow down. In 2010, around 57% of the population has used Internet for health purposes, while only 45% recorded in 2004. If the current trend continues, by 2015, the proportion of population engaged in Internet health related activities will increase and reach 66%.

DISCUSSION

If the observed increase in use of the Internet for health purposes in USA continues, we have estimated that by the year 2015, 66% of the American population will use the Internet for health purposes. Initially, the uptake is slow while the technology is new and is gradually increasing with the time. A similar pattern had been observed in a survey conducted in Norway by Wangberg et al., 2009.

There has been a significant increase (8.88 percentage points in proportion) of people who are seeking information related to health insurance, including private insurance, Medicare or Medicaid from 2008 to 2010. For the same period there was a strong increase of (26.24 percentage points) people who posted information related to health on a social networking site such as Facebook, MySpace or LinkedIn. Similar trend was observed in people who posted information related to health on Twitter or another similar status update site. There has been a substantial increase of (19.49 percentage points) people who watched/listened to an online video/audio about health or medical issues from 2008 to 2010. These increases reflect that video sharing, social networking and status updating activities are not merely activities of leisure, but Internet users have converted such resources on the net to productive health information dissemination.

There has been a significant decrease in activities such as consulted online rankings or reviews of doctors or other providers, consulted online rankings or reviews of hospitals or other medical facilities and posting an online review of a hospital for the period between 2008 to 2010.

CONCLUSIONS

Use of the Internet for health purposes continues to grow in the American population. Apparently, such mode of communications becomes an importan source of health information exchange. Moreover, the study shows a trend towards a more positive attitude of using the Internet for various healthcare related activities. This approach is a practicable realization if country specific data is available. The trend analysis performed, confirms that the potential of using the Internet for healthcare promotion is following similar pattern in comparison to Technological maturity around the globe. The Internet clearly is a key communication protocol with a potential to increase information propagation and possibly to improve health care delivery and outcomes. Professional, social and policy wise obstacles are inevitable however; "*the Internet has rapidly become indispensable to Medical Education. And, the Internet has transformed the patient-Physician relationship by empowering patients with information*" (Rajendran, 2001). Further research useful to identify the efforts that required to maximise the potential of this tool in particular Internet protocols, which could have great value for both patients and clinicians relationship. Such development may have greater impact on healthcare cost and service deliveries.

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