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Public use of electronic personal health information: Measuring progress of the Healthy People 2020 Objectives

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Abstract

Use of the internet for seeking and managing health information in the U.S., Europe, and emerging and developing nations is growing. Recent global trends indicate more interactive uses of the internet including online communication with providers. In the U.S., The Healthy People 2020 (HP2020) initiative was created by the Department of Health and Human Services to provide 10-year goals for improving the health of American citizens. Two goals of HP2020 were to increase the proportion of individuals who use the Internet to keep track of their personal health information (PHI) online and to increase the proportion of individuals who use the internet to communicate with their healthcare provider. In the present study, we use data from the seven administrations of the Health Information National Trends Survey (HINTS) to assess progress towards these goals. These data were analyzed using descriptive, bivariate, and logistic regression analytic techniques. Results of this study suggested that the HP2020 target of having 15.7% of individuals manage their PHI online by 2020 has already been exceeded (28.1%); similarly, the goal for proportion of individuals communicating with their provider using the internet (15.0%) was exceeded by 2014 (29.7%). While progress towards these goals was positive in all sociodemographic groups for both goals, differences in the rate of progress were seen by gender, race/ethnicity, income, and education, but not by age group. The rapidly increasing proportion of individuals globally who use the internet to manage their health information provides unique opportunities for patient-centered health information technology interventions.

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Keywords

personal health information; Healthy People 2020; health information technology; patient-provider communication

Introduction

The Internet and wireless technology have transformed consumer behavior across all spheres of information seeking, with health and healthcare as no exception.[1] In the U.S., Europe, Asia, and emerging and developing nations the use of the internet for seeking and managing health information is growing.[2] In the U.S. 72% of internet users in a 2012 survey say they looked for health information within the last year.[3] In comparison, of the 32 emerging and developing nations surveyed by Pew in 2014, a median of 46% of internet users reported getting information about health and medicine for individuals and their families, and more than 60% of internet users in Ukraine (64%), Poland (64%), and Russia (63%) had gotten health information in the last year. EHealth trends in Europe on the use of internet-based technologies for health purposes are more difficult to ascertain, with the last WHO eHealth consumer trends survey report published in 2008.[4] At that time internet use for seeking health information had increased 6.5% to 46.8% overall from an estimate of 40.3% in 2005. A notable finding was that there were more interactive uses of the internet for health purposes, including communication with providers and online purchasing of medical products. The third global survey report of eHealth trends conducted by the WHO is due to be released by end of summer 2016.

In the U.S. Healthy People 2020 seeks to improve the Nation's health overall and improve access to high quality care and services for all groups of citizens (www.healthypeople.gov). One important goal is the use of health communication strategies and health information technology (HIT) to improve health outcomes and quality, and to achieve health equity. These goals are consistent with the policies and priorities of the WHO's Global Conservatory for eHealth with respect to access, quality and equity (WHO eHealth).[5] The rapidly expanding scale and adoption of HIT and its increasing importance in health care decision making requires that trends in these areas be monitored and tracked reliably over time. [6] With respect to use of HIT for tracking personal health data, the most recent published data indicate that 21% say they use some form of technology to track their health data, and 7% use an app.[7] Just in the last several years there has been growing interest in the use of HIT for personal health management. The present study provides both an update on the use of HIT for personal health management as well as an indication of the national trends in use over time.

Methods

Survey population and data collection

Data were drawn from the Health Information National Trends Survey (HINTS), a national cross-sectional survey of adults in the United States. HINTS collects information from the general public on topics including health communication, perceptions and use of health- and

cancer- related information, and attitudes and use of health information technologies. Survey administration occurred periodically between 2003 and 2014 via random digit dialing and mailings. Collectively, the seven iterations of HINTS have yielded a sample of 34,080 respondents. Additional information about data collection, including sampling frames and weighting methodologies, can be found in the corresponding methodology report.[8]

Measures

Survey items of interest for this study included three questions examining use of the internet for personal health information management and related tasks. These included: 1) “In the last 12 months, have you used the internet to keep track of personal health information, such as care received, test results, or upcoming medical appointments?”, 2) “In the last 12 months, have you used e-mail or the internet to communicate with a doctor or doctor's office?”. Question 1 was asked in the 2008, 2011-2012, and 2013 administrations of HINTS (n = 7674, 3959, 3185, respectively). Question 2 was included in the 2003, 2005, 2008, 2011-2012, and 2013 administrations of HINTS (n = 6369, 5586, 7674, 3959, and 3185, respectively). Sociodemographic variables examined in relation to these items included age, sex, race/ethnicity, education, and income level.

Statistical analysis

Analyses were conducted using SAS-callable SUDAAN 11.0.0 (RTI International, Research Triangle Park, NC, USA) and SAS 9.3 (SAS Institute Inc., Cary, NC, USA), which allowed for the use of jackknife replicate weights to account for two-stage sampling frames. Descriptive analyses were conducted for each of the three survey items of interest. To investigate trends in subpopulations of interest, logistic regression analyses were performed for each item, including predicted marginals adjusted for age, sex, race/ethnicity, education, and income level. These analyses included an interaction term for each sociodemographic variable to assess differential change over time of administration.

Results

Sample characteristics varied across administrations of HINTS, but were generally representative of the United States population. Respondents tended to be female, younger (18-34 years), and non-Hispanic white individuals with some college education and incomes greater than \$70,000 per year. No significant difference in sociodemographic factors was found among respondents across the seven iterations of HINTS.

Between 2007 and 2014, the percentage of individuals reporting that they kept track of personal health information online increased 16.2% (from 11.9% to 28.1%; Figure 1a). Management of personal health information online increased particularly in those who were non-Hispanic other (Odds Ratio [OR] = 1.90, 95% Confidence Interval [CI] = 1.33 to 2.71) and female (OR = 1.38, 95% CI = 1.14 to 1.67) compared to non-Hispanic white and male respondents, respectively (Figure 1d and b; Table 1). Tracking health information online was significantly positively associated with age, education, and income levels ($p < 0.05$; Table 1; Figure 1c, 1e, and 1f). The addition of interaction terms examining differences in

sociodemographic characteristics by year of survey administration proved to be statistically insignificant ($p > 0.05$ for all).

The percentage of respondents contacting their provider via e-mail or through the internet increased significantly from 7.0% in 2003 to 29.7% in 2013 (Figure 2a). E-mailing doctors was not associated with age or race/ethnicity ($p > 0.05$; Figure 2c and 2d; Table 2).

Contacting doctors via email was significantly positively associated with gender, education and income levels, 2b, 2e and 2f; Table 2; $p < 0.001$ each). Specifically, odds of e-mailing doctors were higher among women than men (OR = 1.37, 95% CI = 1.15 to 1.64); among college graduates compared to those who had less than a high school education (OR = 2.02, 95% CI = 1.15 to 3.54); and among those who reported an annual income of \$75,000 or greater compared to those with less than \$20,000 (OR = 1.84, 95% CI = 1.29 to 2.61 ; Table 2). Interaction terms examining differences in sociodemographic characteristics by year of survey administration in the model were not statistically significant ($p > 0.05$) for all characteristics.

Discussion

In 2005, the WHO adopted a resolution focused on “strengthening health systems in countries through the use of eHealth.” Success in the implementation of that goal, according to the WHO publically available documents, “is predicated on ... monitoring, documenting and analyzing trends in eHealth and publishing the results to promote eHealth uptake.”[5] To that end, many of the WHO's member states have begun implementing surveillance mechanisms to monitor adoption of eHealth functionalities and to investigate trends in population usage. This increasing trend in the use of the internet for access to health information and for engaging both patients and providers globally is considered to be instrumental for improving healthy behaviors of populations and quality of health and healthcare (Hesse, Nelson, et al. 2013).[9] In the U.S., the goal of HP2020 to increase the use of health communication strategies and health information technology (HIT) for improving health outcomes and quality is an example of government sponsored policies designed to stimulate this trend. Two objectives related to this are: 1) to increase the proportion of individuals who use the internet to track personal health information and 2) to increase the proportion of individuals who use the internet to communicate with their health provider.

This study provides an update on both of these HP 2020 objectives. From our analyses, the percentage of individuals reporting that they kept track of personal health information online increased from 11.9% to 28.1%, which exceeds the HP 2020 target goal of 15.7%. With respect to the second objective, about 30% of individuals have used the internet to communicate with a health provider, twice as much as the target goal of 15%. At the same time, we also learned that certain sociodemographic characteristics, such as race, gender, education, and income, were correlated with the management of personal health information online and online communication with a health provider; others, such as age group, were not. In general, females and racial/ethnic minorities had a higher probability of using the internet to keep track of personal health information. In fact, females and non-Hispanic others (e.g., Asians) were significantly more likely to use the internet to keep track of their

personal health information compared to males and non-Hispanic Whites, respectively. Females were also significantly more likely to communicate with their health provider online compared to males. Individuals with higher levels of education and income were also more likely to engage in online management of personal health information and to communicate with a health provider using e-mail or the internet.

Although the use of the internet to track personal health information and to communicate with providers has increased and exceeded the target goals set by HP2020, there continue to be disparities in use by certain demographic groups. These findings suggest the persistence of a “digital divide” that is not only based in access to the internet, as the most recent data show that 87% of all US adults have internet access, but perhaps also in digital literacy skills that may be required to effectively utilize these tools.[10-15] These differential trends in usage offer key insights into how best to communicate and intervene with certain subpopulations with regard to digitally managing and communicating health information. For current users, personalization to support the needs of each user may increase treatment adherence, self-management, and/or engagement.[1] Meanwhile, education and training to develop and improve the skills needed to utilize these tools may be more important for non-users.[16]

These investigations into the diversity of technology usage for health purposes highlight the importance of comparing results across geopolitical contexts. For example, the U.S. island territories of Puerto Rico and Guam have expanded our understanding of how communication technologies can be utilized to span naturally occurring geographic barriers for health information seekers.[17, 18] Both of these island territories sought to compare their results with data from the U.S. national sample, and to do so adopted HINTS items for purposes of data harmonization. In a similar vein, the health ministry of the Peoples' Republic of China adopted HINTS items for inclusion in a large national surveillance effort to guide policy on internally focused internet resources.[19] Their analyses have shed light on how public health practices, telecommunications regulations, and the public's interest in complementary and alternative medicines can be assessed for comparison purposes between the Asian and American contexts. Conversations are ongoing between HINTS managers and the public health sectors in Jordan, the United Kingdom, Korea, Australia, and Germany to facilitate other comparisons.

The main point here is that internet adoption for health purposes within each of these localized, national contexts represent natural experiments in the use of telecommunications policy, healthcare governance, and resource funding. We concur with the WHO's argument: that surveillance efforts within countries should be conducted routinely to monitor trends in eHealth adoption, and that those results should be shared with the global scientific community for comparison and for learning. In fact, we would encourage global policy makers to encourage the international community to set standards for data harmonization between countries. Understanding how the worldwide information revolution can be leveraged to support healthy people is a worthwhile objective not just for individual nations but for the global community as well.

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Highlights

- We use data from the Health Information National Trends Survey (HINTS) to assess progress towards achieving the Healthy People 2020 objectives dealing with management of personal health information online and communicating with providers electronically
- Data presented here demonstrates that the target numbers for these objectives have already been exceeded as of 2014
- These data demonstrate that an increasing number of individuals are using the internet for personal health management, and that these access points provide opportunities for increased patient engagement

Figure 1.

Trends of using the internet to manage personal health information online in the past 12 months by HINTS survey cycle. a) Overall weighted response percentages, b) predicted marginals by sex c) predicted marginals by age, d) predicted marginals by race/ethnicity, e) predicted marginals by education, f) predicted marginals by income.

Figure 2.

Trends of using the internet to email doctor or other provider in the past 12 months by HINTS survey cycle. a) Overall weighted response percentages, b) predicted marginals by sex c) predicted marginals by age, d) predicted marginals by race/ethnicity, e) predicted marginals by education, f) predicted marginals by income.

Predictors of managing electronic Personal Health Information (ePHI) online among respondents to the Health Information National Trends Survey in 2008, 2011, and 2013.

Table 1

	Predictors of managing ePHI online				
	Odds Ratio (95% CI)	Beta coefficient	SE Beta	Adj Wald F	P-value
Sex				10.72	<0.001
Male	Ref	Ref	Ref		
Female	1.38 (1.14, 1.67)	0.32	0.10		
Age				1.01	<0.001
18-34	Ref	Ref	Ref		
35-49	0.88 (0.67, 1.15)	-0.13	0.14		
50-64	0.94 (0.73, 1.20)	-0.06	0.12		
65-74	0.91 (0.66, 1.26)	-0.10	0.17		
75	1.29 (0.87, 1.94)	0.26	0.20		
Race/ethnicity				4.58	0.004
NH White	Ref	Ref	Ref		
NH Black	1.22 (0.87, 1.69)	0.19	0.17		
NH Other	1.90 (1.33, 2.71)	0.64	0.18		
Hispanic	1.27 (0.97, 1.66)	0.24	0.14		
Education				6.56	<0.001
Less than high school	Ref	Ref	Ref		
High school graduate	0.78 (0.43, 1.43)	-0.24	0.30		
Some college	1.36 (0.75, 2.46)	0.30	0.30		
College graduate	1.64 (0.90, 3.01)	0.50	0.31		
Income				2.46	0.045
<\$20,000	Ref	Ref	Ref		
\$20,000 to <\$35,000	1.15 (0.76, 1.74)	0.14	0.21		
\$35,000 to <\$50,000	1.26 (0.83, 1.91)	0.3	0.21		
\$50,000 to <\$75,000	1.54 (1.03, 2.30)	0.43	0.20		
\$75,000 +	1.69 (1.15, 2.49)	0.53	0.20		

Predictors of managing ePHI online					
	Odds Ratio (95% CI)	Beta coefficient	SE Beta	Adj Wald F	P-value
Survey Year				42.3	<0.001
2008	Ref	Ref	Ref		
2011	1.83 (1.45, 2.31)	0.60	0.12		
2013	3.13 (2.45, 3.99)	1.14	0.12		

Predictors of emailing a healthcare provider among respondents to the Health Information National Trends Survey in 2003, 2005, 2008, 2011, and 2013.

Table 2

	Predictors of emailing doctor				
	Odds Ratio (95% CI)	Beta coefficient	SE Beta	Adj Wald F	P-value
Sex				12.72	<0.001
Male	Ref	Ref	Ref		
Female	1.37 (1.15, 1.64)	0.32	0.09		
Age				0.61	0.655
18-34	Ref	Ref	Ref		
35-49	1.01 (0.81, 1.26)	0.01	0.11		
50-64	1.02 (0.82, 1.28)	0.02	0.11		
65-74	0.94 (0.69, 1.27)	-0.06	0.15		
75	1.28 (0.85, 1.92)	0.25	0.21		
Race/ethnicity				1.46	0.225
NH White	Ref	Ref	Ref		
NH Black	1.11 (0.82, 1.49)	0.10	0.15		
NH Other	1.34 (1.01, 1.79)	0.30	0.15		
Hispanic	1.07 (0.80, 1.43)	0.07	0.15		
Education				13.30	<0.001
Less than high school	Ref	Ref	Ref		
High school graduate	0.87 (0.48, 1.58)	-0.14	0.30		
Some college	1.48 (0.84, 2.60)	0.39	0.29		
College graduate	2.02 (1.15, 3.54)	0.70	0.29		
Income				10.14	<0.001
<\$20,000	Ref	Ref	Ref		
\$20,000 to <\$35,000	0.85 (0.56, 1.30)	-0.16	0.21		
\$35,000 to <\$50,000	1.13 (0.76, 1.69)	0.12	0.20		
\$50,000 to <\$75,000	1.26 (0.86, 1.83)	0.23	0.19		
\$75,000 +	1.84 (1.29, 2.61)	0.61	0.18		
Survey Year				70.98	<0.001

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	Predictors of emailing doctor				
	Odds Ratio (95% CI)	Beta coefficient	SE Beta	Adj Wald F	P-value
2003	Ref	Ref	Ref		
2005	1.30 (1.02, 1.65)	0.26	0.12		
2008	1.67 (1.34, 2.07)	0.51	0.11		
2011	2.70 (2.15, 3.38)	0.99	0.12		
2013	5.31 (4.31, 6.54)	1.67	0.11		