Rural Health Care Information Access and the Use of the Internet: Opportunity for University Extension

Biswa R. Dias
Iowa State University, bdas@iastate.edu

John C. Leatherman
Kansas State University, jleather@k-state.edu

Bonnie M. Bressers
Kansas State University, bressers@ksu.edu

Rural Health Care Information Access and the Use of the Internet: Opportunity for University Extension

Abstract

The Internet has potential for improving health information delivery and strengthening connections between rural populations and local health service providers. An exploratory case study six rural health care markets in Kansas showed that about 70% of adults use the Internet, with substantial use for accessing health information. While there are statistical differences for general Internet use based on socio-economic characteristics, these "digital divides" are not so apparent in relation to Internet usage for health-related information. The study opens opportunities for Extension to include Internet usage as an added dimension to programs to aid in community and economic development.

Biswa R. Das
Assistant Professor
Community and
Regional Planning
College of Design
Iowa State University
Ames, Iowa
bdas@iastate.edu

Bonnie M. Bressers
Associate Professor
A.Q. Miller School of
Journalism and Mass
Communications
Kansas State
University
Manhattan, Kansas
bressers@ksu.edu

John C. Leatherman
Professor
Department of
Agricultural
Economics
Kansas State
University
jleather@k-state.edu

Introduction

As evidenced by the recent rollout of the new federal health care exchange, the use of Web-based resources and support is critical for not just good health care services but for reducing service costs that affect consumers and providers. Researchers, health care practitioners, and health communicators are eyeing health-related Internet usage for its potential to improve the quality of health care and efficiency of delivery (Hsu et al., 2005). Information technology is ushering in an era of "consumer health informatics" (Ginossar & Nelson, 2010). Overall, 70% of homes in the U.S. have broadband access (Pew Research Center, 2013). Approximately 77% of adults in the United States are using the Internet. A Pew Internet survey suggested that 80% of Internet users have looked for health/medical information, with 10% seeking health/medical information on an average day (Pew Research Center, 2009).

Some demographic trends have emerged, with women more likely to seek online health information than men (Pew Research Center, 2010), and those with higher educational attainment more likely to seek online health information than their less-educated counterparts (Weaver et al., 2009). People 55 and older are the fast-growing Internet demographic (Bill & Melinda Gates Foundation, 2004), and older adults are the biggest consumers of health care (Brodie et al., 2000). A digital divide in Internet access and computer usage that affects low-income individuals, who are also typically a medically-underserved population, has not been improving despite the fact that health information on the Internet has the potential to help individuals make informed health-care decisions, seek appropriate care, mitigate risks, and promote health (Ginossar & Nelson, 2010). Finally, it is observed that rural places are lagging behind their urban and suburban counterparts, first in telecommunication policy (Parker & Hudson, 1992), basic Internet access (NTIA, 1999; Bell, Reddy, & Rainie, 2004), and now broadband access (Malecki, 2008).

Objective and Purpose

The main objective was to understand the role of the Internet in households' access to health care information and services. The study identified who was using Internet, who was using it for seeking local and general health information, and their relative confidence in finding health-related information.

An improved understanding of this issue can enhance programming efforts by university Extension in a number of areas including health care (Case, Cluskey, & Hino, 2011). Through its extensive reach, the Extension community is uniquely positioned to engage communities on this issue (Green, 2012; Whitacre, 2008). Further, the use of social media not only increases the reach, but also improves the impacts Extension educators have on their clients (Cooper, Cox, & Corbin, 2011). Online delivery methods will also offer potential for involvement of stakeholders to partner with Extension to bring late Internet adopters into the system, which will enhance the use of the Internet to access health care and other services and will possibly instill leadership skills in those imparting training (Kolodinsky, Cranwell, & Rowe, 2002; Shuffstall, Alter, Bridger, & Sager, 2007).

Data

Representative data from six rural Kansas health care markets obtained through a survey as part of the Kansas Rural Health Works outreach initiative (a federally supported initiative intended to strengthen rural Critical Access Hospitals in Kansas) during 2009-11 were used in the study. The geographic unit of analysis was the hospital's primary market area, identified by the residential zip code of inpatients from the year prior to the survey. Typically, this was a county or sub-county region. Only adults over 18 years of age were surveyed. The participants were randomly selected for a telephone survey. Respondents came from three sub-county rural communities and three rural counties in the state of Kansas. The surveys were conducted by the Docking Institute of Public Affairs in Hays, Kansas. All surveys were pilot tested prior to administration. The surveys employed random sampling of telephone landlines by zip code. Minimums of 200 responses were secured in each survey to ensure representativeness of the overall results to the broader market area.

The 1,236 survey respondents were asked four standard questions about Internet usage: 1) "Do you

use the Internet?" [Yes/No]; 2) "Have you used the Internet to find health-related information?" [Yes/No]; 3) "Have you used the Internet to find [local] health services information and providers?" [Yes/No]; and 4) "In general, how confident are you that you can find local health-related information on the Internet?" [Very Confident/Somewhat Confident/Not Confident at All].

Methods

In conducting the analysis, we aggregated responses from the six surveys. The analysis was conducted in two parts. The first part focused on a chi-square test of independence (Ott & Longnecker, 2001) by comparing the purpose of Internet use based on household characteristics. This reveals the differences that exist between the various purposes for which Internet is used. The second part of the study used binomial logistic regression (Pindyck & Rubinfeld, 1997; Gujarati, 1995) to estimate the probability of Internet use based on the same set of household characteristics.

We investigate the influence of demographic characteristics using logistic regression analysis (Pindyck & Rubinfeld, 1997; Gujarati, 1995). These estimates for Question 1-3 tell us about the relationship between the independent or predictor variables and the dependent variable, where the dependent variable is on the logit scale, (i.e., Internet use = 1, do not use = 0). These estimates tell the amount of increase (or decrease, if the sign of the coefficient is negative) in the predicted log odds of Internet use = 1 that would be predicted by a 1 unit increase (or decrease) in the predictor, holding all other predictors constant. The "Exp(B)" column label in Table 2 represents the odds ratio. It is the predicted change in odds for a unit increase in the corresponding independent variable. Odds ratios less than 1 correspond to decreases, and odds ratios more than 1.0 correspond to increases in odds. Odds ratios close to 1.0 indicate that unit changes in that independent variable do not affect the dependent variable.

Findings

Chi-Square Test of Independence

Overall Internet Use by Purpose

Approximately 72% of the respondents used the Internet for some general purpose, which is about 6% lower than the national average Internet use (Table 1) (NTIA, 2009). Among those who use the Internet, 78% had sought health-related information. When asked about the extent to which the Internet was used to connect with local services or providers, only 12% of respondents indicated such usage. Based on our analysis for general Internet use, there exists a statistical difference between the three purposes for which Internet is used. With respect to their level of confidence in finding local resources and providers, 62% were very confident, and 33% were somewhat confident.

Internet Use by Purpose and Age

Findings suggested differences in Internet usage by the four adult age cohorts (Table 1). For general Internet usage, 89% of adults age 18-34 reported using the Internet. A high proportion of those reported using the Internet for finding health-related information. However, the number drops to 15%

for using Internet to locate local health services and providers. In contrast, for the age group of 65 years and older, only 40% indicated general Internet use. However, among this small group, 73% report using Internet for health-related information. This finding may reflect the increasing value seniors place on accessing health-related information. With the exception of the oldest age cohort, 80 to 90% of adults reported using the Internet. Approximately 80% of all users reported accessing general health-related information. Only 10 to15% use it to access local health services information and providers.

Internet Use by Purpose and Income

It was evident that low-income households had substantially lower levels of Internet use overall and that the high-income group had the largest proportion of Internet use (Table 1). The low-income group went online at a rate of 44% and the intermediate-income group at 83%. Nearly all rural households in the highest-income cohort in the sample went online. Overall, general Internet use is dependent on the level of income, as is the case for using Internet use for finding health-related information. However, the majority of respondents in all income groups responded in the negative for using the Internet to locate health services.

Internet Use by Purpose and Gender

For general Internet use, we observed no overall usage difference between men and women (Table 1). Approximately 70% of both sexes go online for general Internet use. However, we do note gender differences in Internet usage for health-related purposes. Women are significantly more likely to seek out general health-related information than men, 82 versus 68%. With respect to using the Internet for locating local health services, both men and women had a significantly low percentage, with no differences between the sexes.

Table 1

Findings of Chi-Square Test of Independence

	Affirmative Responses to Internet Use				Test Statistic (χ^2) (DF)	p-value
Overall	2	3	4	5	6	7
General Internet Use	887 (72)					
Internet for Health information	692 (78)				522.17 (2)	< 0.001
Internet for Health Services/Providers	105 (12)					
Caregivers	**One**	**Two +**				
General Internet Use	36 (88)	370 (91)			0.495 (1)	0.48

Internet for Health information	26 (72)	301 (82)			1.84 (1)	0.17
Internet for Health Services/Providers	3(9)	52 (15)				
Kids	**No Kids**	**With Kids**				
General Internet Use	481 (61)	406 (91)			125.59 (1)	< 0.001
Internet for Health information	365 (76)	327 (81)			3.03 (1)	0.08
Internet for Health Services/Providers	50 (11)	55 (14)			2.05 (1)	0.15
Gender	**Men**	**Women**				
General Internet Use	271 (72)	616 (69)			0.001 (1)	0.97
Internet for Health information	507 (82)	185 (68)			22.09 (1)	<0.001
Internet for Health Services/Providers	30 (12)	75 (13)			0.09 (1)	0.75
Income	**< $30K**	**$30-$70K**	**> $70K**			
General Internet Use	141 (44)	434 (83)	224 (93)		210.74 (2)	< 0.001
Internet for Health information	98 (70)	344 (79)	191 (85)		13.06 (2)	<0.001
Internet for Health Services/Providers	18 (14)	48 (12)	29 (13)		0.61 (2)	0.73
Age	**18-34**	**35-49**	**50-64**	**65+**		
General Internet Use	146 (89)	292 (88)	302 (81)	147 (40)	256.89 (3)	< 0.001
Internet for Health information	115 (79)	238 (82)	231 (76)	108 (73)	4.40 (3)	0.22
Internet for Health Services/Providers	21 (15)	41 (15)	29 (10)	14 (10)	4.35 (3)	0.22

Figures in parentheses represent percentages for Columns 2-5 and degrees of freedom for column

Internet Use by Purpose and Presence of Children

Research suggests that the presence of children in a household is a driver for Internet access. Our results support this finding as we observe that approximately 60% of households with no children are going online for general usage, while 90% of households with children are online (Table 1). Of course, we recognize that many of the households without children also are within the older demographic categories. Considering the differences in general Internet usage, we expected households with children to be using the Internet to go online to find health-related information.

Internet Use by Purpose and Presence of Caregiver

The frequency of Internet usage for all purposes for households with one caregiver versus those with two or more is almost identical at approximately 90% (Table 1). The findings are nearly the same for Internet use for health information.

Logistic Regression Model

Findings revealed that age, income, and households with children were found to be statistically significant, while the gender and caregiver variables were not. In our final model of Internet use for general purposes (Table 2), we focused on income, age, gender, and children. The overall age variables as well as the three age groups in the model were statistically significant. The coefficients indicated that as age increased, the probability of Internet use declined. The differences between the four age groups, however, were not very striking. The income variable was statistically significant, and the coefficients suggested that as income increased, the probability of using the Internet increased. Relative to the low-income category, the log odds were 11.8 times higher for high-income households to use Internet. Last, the children variable was also statistically significant, with a sign indicating that households with children were more likely to use the Internet than households without children.

In the model to predict the use of the Internet to find general health-related information, only income and gender were statistically significant (Table 2). We selected a model including income, gender, and children. The log odds of the high-income group's Internet use for health-related information seeking were estimated to be 2.2 and 1.4 times greater than low- and medium-income households. Men were less likely than women to seek out general health-related information. Finally, households with children were shown to have greater chance of Internet use for finding health-related information. In the model to study the effects of demographics on use of the Internet to find local health-related information, none of the variables were found to be statistically significant.

Table 2.
Findings of Logistic Regression Analysis

	General Internet Use				Internet for Health related Information			

Variables	B	S.E.	Sig	Exp (B)	B	S.E.	Sig	Exp (B)
Constant	-1.65	0.41	0.00	0.19	-1.42	0.23	0.00	0.24
Age			0.00					
Age (1)	-1.84	0.36	0.00	0.16				
Age (2)	-1.52	0.29	0.00	0.22				
Age (3)	-1.42	0.20	0.00	0.24				
Income			0.00				0.05	
Income(1)	2.47	0.29	0.00	11.82	0.79	0.25	0.02	2.21
Income(2)	0.72	0.29	0.01	2.05	0.31	0.23	0.17	1.37
Gender(1)	-1.64	0.18	0.04	0.69	-0.63	0.18	0.001	0.53
Kids(1)	0.81	0.28	0.00	2.05	0.31	0.17	0.07	1.37

Conclusion and Discussion

Overall, there are distinct differences in how individuals and households use the Internet. While variables such as income, age, children, and gender affect Internet usage, these differences begin to disappear when the purpose becomes more specific, such as finding online health information or services. The study reported here validates the findings of national studies with respect to rural communities in the state of Kansas and highlights the need for more Internet use for health care purposes, both from a consumer and a provider perspective. From a policy perspective, the study identifies areas to target with respect to increasing Internet penetration, as well as for educational programming aimed at creating more awareness about the use of Internet for accessing health care information and services.

Given the difficulty of sustaining accessible and high-quality health care services in many rural areas and the increasing ubiquity of Internet-based access and usage, it would seem the Internet can play a role addressing these challenges. One such opportunity may lie in the untapped potential for local health care providers to strengthen communication bonds with their local customer base to reduce the leakage of health care dollars to larger urban areas. Further, given the centrality of health care to rural community economic viability, advanced telecommunication technologies such as the Internet and social networks may be important tools with which the community could rally around common interests related to healthy people and communities. Finally, given demographic trends, the general decline in many population health indicators and the economic realities of health care access, technologies such as the Internet must be harnessed to help provide solutions.

Study results clarify how and who within the rural population uses the Internet for accessing health-

related information. It also suggests opportunities for strengthening rural health care providers. This also applies to other local services for which the Internet is used in rural areas where local providers lag in applications intended to strengthen connections with the local market such as education, banking, public services, etc. This has relevance to most types of work Extension professionals are engaged in within rural areas across the nation. Including this as part of programmatic efforts by using the Internet as a bridge between service providers and consumers can improve service delivery, improve efficiencies, and enhance quality of life in rural areas, much as it is doing in urban areas.

References

Bell, P., Reddy, P., & Rainie, L. (2004). *Rural areas and the Internet*. Washington, D.C.: Pew Internet & American Life Project.

Bill and Melinda Gates Foundation. (2004). Toward equality of access: The role of public libraries in addressing the digital divide. Retrieved from: http://www.imls.gov/pdf/Equality.pdf

Brodie, M., Flournoy, R. E., Altman, D. E., Blendon, R. J., Benson, J. M., & Rosenbaun. M. D. (2000). Health information, the Internet, and the digital divide. *Health Affairs*, 19, 255.

Case, P., Cluskey M., & Hino, J., (2011) Online nutrition education: Enhancing opportunities for limited-resource learners, *Journal of Extension* [On-line], 49(6) Article 6RIB5. Available at: http://www.joe.org/joe/2011december/rb5.php

Cooper, J., Cox J. N., Corbin, M. A., (2012), Social media in diabetes education: A viable option? *Journal of Extension* [On-line], 50(6) Article 6RIB3. Available at: http://www.joe.org/joe/2012december/rb3.php

Freeman, S. A., Whitman, S. D., Tormoehlen, R. L., & Embleton, K. M., (1997). Internet childhood safety and health resource guide**,** *Journal of Extension* [On-line], 35(2) Article 2IAW1. Available at: http://www.joe.org/joe/1997april/iw1.php

Green, S. (2012). Extension online: Utilizing technology to enhance educational outreach, *Journal of Extension* [On-line], 50(5) Article 5TOT4. Available at: http://www.joe.org/joe/2012october/tt4.php

Ginossar, T., & Nelson, S. (2010). Reducing the health and digital divides: A model for using community-based participatory research approach to e-health interventions in low-income Hispanic communities. *Journal of Computer-Mediated Communication*, 15, 530-551.

Gujarati, D. (1995). *Basic econometrics*, Third edition. New York: McGraw-Hill, Inc.

Hsu, J., Huang, J., Kinsman, J., Fireman, B., Miller, R., Selby, J., & Ortiz, E. (2005). Use of e-health services between 1999 and 2002: A growing digital divide. *Journal of the American Medical Informatics Association*, 12, 164-171.

Kolodinsky J., Cranwell, M., & Rowe, E., (2002). Bridging the generation gap across the digital divide: Teens teaching Internet skills to senior citizens, *Journal of Extension* [On-line], 40(3), Article 3RIB2. Available at: http://www.joe.org/joe/2002june/rb2.php

Malecki, E. J. (2008). *The rural digital economy: Competition and the geography of telecommunications*. Paper presented at the Economic Research Service's Broadband in the Rural Economy workshop. Washington, D.C. September.

Miller, E., & West, D. (2009). Where's the revolution? Digital technology and health care in the Internet age. *Journal of Health Politics, Policy and Law*, 34, 262-284.

National Telecommunications and Information Administration (NTIA). (1999). *Falling through the net: Defining the digital divide*. Washington, D.C.: U.S. Department of Commerce.

Ott, R. L., & Longnecker, M. (2001). *An introduction to statistical methods and data analysis*. Fifth edition. Pacific Grove, CA: Duxbury.

Parker, E. B., &. Hudson, H. E. (1992). *Electronic byways: State policies for rural development through telecommunications*. Boulder, CO: West View Press.

Pew Research Center. (2010). *Trend data*. Retrieved from: http://www.pewinternet.org/Trend-Data/Internet-Adoption.aspx

Pew Research Center. (2009). *Trend Data*. Retrieved from: http://www.pewInternet.org/Static-Pages/Trend-Data/Online-Activites-Total.aspx

Pew Research Center. (2013). *Trend data*. Retrieved from: http://www.pewinternet.org/fact-sheets/broadband-technology-fact-sheet/

Pindyck, R. S., & Rubinfeld, D. L. (1997). *Econometric models and economic forecasts*, Fourth edition. Boston: Irwin McGraw-Hill, Boston.

Shufstall, W. C., Alter T. R., Bridger, J. C., & Sager, S. S., (2007). Connecting communities: Third generation community network projects, *Journal of Extension* [On-line], 45(4), Article 4FEA2. Available at: http://www.joe.org/joe/2007august/a2.php

Weaver, J. B., Mays, D., Lindner, G., Eroglu, D., Fridinger, F., & Bernhardt, J. M. (2009). Profiling characteristics of Internet medical information users. *Journal of the American Medical Informatics Association*, 16, 714-722.

Whitacre, B. E., (2008). Extension's role in bridging the broadband digital divide: Focus on supply or demand? *Journal of Extension* [On-line], 46(3), Article 3RIB2. Available at: http://www.joe.org/joe/2008june/rb2.php

If you have difficulties viewing or printing this page, please contact *JOE* Technical Support