Examining e-Health Literacy and the Digital Divide in an Underserved Population in Hawai‘i

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Abstract

Seeking health information is one of the leading uses for the Internet and World Wide Web (WWW). Research has found the amount one benefits from e-Health information (health information from electronic sources) is directly related to the level of e-Health literacy. e-Health literacy is defined as "the ability to seek, find, understand, and appraise health information from electronic sources and apply the knowledge gained to addressing or solving a health problem." In order to gain a further understanding of the effects and use of technology, the digital divide, and the relationship between technology utilization and health outcomes, focus group interviews were conducted with participants diagnosed with diabetes and currently residing in a Medically Underserved Area. Overall, 25 volunteers participated in the four focus group meetings. Based on the focus group discussions, a general low e-Health literacy rate was identified. This was demonstrated by the lack of access to the Internet and the skills needed to retrieve health information. Of the 25 participants, 64% reported having Internet access at some level, but, only one reported going on the Internet every day. When the barriers to using the Internet were discussed, many participants expressed a lack of knowledge in how to retrieve information. Results of this study further show that having access to technology is not necessarily associated with usage. This dynamic is evolving into a new form of digital divide, gap in information retrieval and usage, versus gap in access. This is the first known study to examine e-Health literacy in an underserved population in Hawai‘i. With the proliferation of information and communication technology and the transformation of information retrieval to be mobile and "on demand", a multi-pronged communication and education strategy is needed to explore how technology can improve e-Health literacy and health outcomes among underserved populations.

Introduction

Seeking health information is one of the leading uses for the Internet and World Wide Web (WWW). Research conducted by the Pew Research Center found that approximately 74% of adults use the Internet; 80% of those users seek information related to health.[1] In other words, 59% of all adults surveyed use the Internet for health information seeking activities. Searching and retrieving health information includes activities such as accessing blogs or news groups, watching online videos, reading drug or treatment reviews, and reading reviews on provider ratings.[2] Other health-related uses of the Internet include tracking weight, diet and exercise, social networking with health related groups, and fundraising for medical causes.[2] e-Health literacy is defined as "the ability to seek, find, understand, and appraise health information from electronic sources and apply the knowledge gained to addressing or solving a health problem."[3] Research has found that e-Health literacy is associated with health outcomes. In other words, those who are more knowledgeable and capable in accessing e-Health information also have been shown to have better self-management of their health and health behavior, and greater interaction with their physician over the Internet.[4] Research on Internet use for healthcare has shown that minority and underserved populations are less likely to use technology compared to non-Hispanic whites and those with higher educational and financial resources. Common barriers were shown to be lack of computer access and knowledge on how to use the Internet and e-mail.[5] Those who did not utilize information technology in managing their health were more likely to have poor control of their diabetes compared to those who did use the information technology. This is evidenced by poor management of blood glucose, blood pressure, and lipids.[6] Thus, technology has the potential to influence health outcomes and not having access to the technology and computers, or the literacy skills that are needed to utilize these resources, can negatively influence one's health.

In the United States, research has shown that income is directly related to the adoption of information technology; the lower the income, the less often people access the Internet.[1] Access to broadband technology, or high speed Internet access, has been associated with younger age, higher education, and geographic location in urban areas.[7] Hseih and colleagues have shown that the strongest predictor of the use of information technology is one's socio-economic status.[8] The division between those who have access to and use information technology (typically those who are younger, have higher education and income, and live in urban areas), and those who do not, is known as the "digital divide."

To our knowledge, no research exists examining e-Health literacy or the digital divide in Hawai‘i. A comprehensive literature search conducted February 2013, found no published articles that explored e-Health literacy, computer literacy or the digital divide with underserved populations in Hawai‘i. As part of a larger study of diabetes self-management, e-Health literacy was examined to gain a better understanding of the effects and use of technology, the Internet, and the digital divide among an underserved patient population.

Methods

Four focus group interviews were conducted among persons diagnosed with diabetes who resided in a Medically Underserved Area. Participants were recruited from a Federally Qualified Health Center that serves a Medically Underserved Area on the west side of O‘ahu. Focus group sessions ranged from five to eight participants each session. An inductive method of analysis and data collection was utilized in conducting the focus groups. Open-ended questions were asked to elicit responses of how participants felt about technology and how technology affected their health status. Human use approvals were obtained from the University of Hawai‘i (CHS #17909), the Health Center (IRB# 00006399) and the office of Research Protections, Hu-

man Research Protection Office, and the United States Army (A-15721.b). Written informed consent was obtained from all participants.

Data analysis included examining written notes, and listening to the audio taped sessions multiple times in conjunction with the notes to further gain an overall understanding of the interview as a whole; this method of data analysis has previously been reported.[9,10] Themes were identified and indexed in conjunction with the written notes. In addition, relevant quotes were highlighted and sorted such that comparisons could be made between the focus group interviews. Audio was analyzed taking into context the social interactions, intonations, emotions and cultural inflections. The data were analyzed utilizing the analysis continuum of, (1) examining raw data, ie, flip charts and audio recordings, (2) using descriptions of context, and then, (3) interpreting or analyzing the data within the context of the research questions.[11] The context of topics, frequency of comments and intensity of comments were considered in the analysis.

Results

Overall, there were 25 volunteers who participated. Participant demographics were 56% female, mean age 54, mean education level was 12th grade, mean BMI 36.9, 68% Native Hawaiian, 52% unemployed, and 36% retired. See Table 1 for further description of participant demographics.

Several key themes emerged from the discussions. These themes can be categorized into two areas, first of which was the barriers to access and usage of computer technology. These included cost, knowledge on how to retrieve information, and access to the Internet. The second key theme was the motivation to learn and use the Internet for health information. This included family encouragement to learn, and an understanding that increasing one's health knowledge would be beneficial. Many of the participants stated that they were in the process of learning how to manage their health condition and were interested in learning more.

Of the 25 total focus group participants, 16 (64%) reported surfing the Internet at least sometimes, despite the fact that 16 (64%) of the participants reported having no computers at their home. Of the nine focus group participants (36%) reported having a computer with Internet available to them, four reported that they did not know how to access the Internet at all. Only one participant reported surfing the Internet every day and used the Internet for health information. Another participant stated that she used the Internet only for e-mail or gaming.

> "*I have a phone you can go on the Internet but don't know how to use… only know how to play Texas Hold'em*" (Female, 54-years-old).

Many stated that they had relatives who owned computers that they have accessed on occasion. Also, many noted that their children or grandchildren used the computer to surf the net, but that they themselves did not know how.

Table 1. Participant demographics (N = 25)

	Mean
Age	54 (SD = 11.6)
BMI	36.9 (SD = 9.3)
	Frequency
Sex	
Male	11 (44%)
Female	14 (56%)
Ethnicity	
Native Hawaiian	17 (68%)
Caucasian	4 (16%)
Other	4 (16%)
Marital Status	
Married	9 (46%)
Not Married	11 (41%)
Widowed	1 (3%)
Divorced	4 (10%)
Education	
High School	21 (84%)
Some College	4 (12%)
Employment Status	
Employed full-time	1 (4%)
Homemaker	1 (4%)
Unemployed	13 (52%)
Retired	9 (36%)
No response	1 (4%)
Household Income	
Less than $30,000	16 (64%)
Less than $40,000	3 (12%)
Don't know or prefer not to say	6 (24%)
Internet Usage	
Have Internet access	16 (64%)
Surf the Internet	
Everyday	1 (4%)
Sometimes	15 (60%)
Never	9 (36%)

> "*I went on with my sister once, only my sister knows how to work it.*" (Female, 40-years-old)

> "*I have a computer but only my grandson uses it. I don't know how*." (Female, 62-years-old)

Among those who did not own computers, some mentioned accessing computers at the public library; however, they reported limited usage, citing long wait times and restrictions on maximum allotted time to one hour. Participants reported that there were no other known places in the local vicinity for

public access to the Internet. These results indicated that not owning a computer was not necessarily a barrier to accessing to the Internet, and availability of access to the Internet was not necessarily an indicator of usage.

The cost of purchasing and repairing computer equipment and Internet access were also discussed as barriers. In general, participants felt that it was difficult to obtain access to computers and the Internet.

> *"I don't have money [if had computer], would love it" (*Female, 47-years-old)

> *"Yeah…I'm illiterate to that…It cost money, that stuff...I would go classes if someone gave me a computer*." (Male, 72-years-old)

When assessed about their willingness to learn, many participants stated that they had family encouragement. In Hawaiian culture, the family, or 'ohana is an integral part of identity,[12] including one's health and wellness.[13] Many participants stated that their children and grandchildren encouraged them to learn to use the Internet.

> *"My son says, Dad you gotta learn…you gotta do it yourself and learn the computer." (Male, 54-years-old)*

Many of the participants stated that they are in the process of learning more about managing their health and would like to expand their knowledge even further.

> "*The computer it helps a lot, because, I mean for myself, the more information I got, I can balance the scales, because now I'm retaining more information than before, so now the more information I get, I can tweak my plan and my train of thought in how I'm going to make things easier for me…so the more knowledge I'm gaining, the more it is motivating me to work in different ways, instead of the same, same*." (Male, 51-years-old)

Discussion

Based on the focus group discussions, low e-Health literacy was identified in many participants. This was demonstrated by the lack of knowledge on how to retrieve health information on the Internet. Only one participant was able to recall specific websites where health information is available. Very few participants were familiar with and able to search for health information on the Internet. Despite 64% of the group having Internet access, whether at home or elsewhere, only one participant discussed going online every day. This participant also enthusiastically reported retrieving health information from various sources such as WebMD.com. A few of the participants reported that they had Internet access via their cellular phones. Of those, only one of the focus group participants stated that they used their cellular phone for accessing the web; however, this participant reported only using her phone for email or to play games. One participant stated that he tried to access health information on the Internet, but was unable to find anything. Overall, the majority of participants reported either not having access to the Internet, or not knowing how to retrieve information online.

Other research studies that examined Internet usage in underserved populations also found that access to technology was not associated with e-Health literacy. For example, a study looking at low-income adults in the Midwestern United States found that limited health literacy was not correlated with access to computers and the Internet.[14] This study found that low-income individuals did have access to the Internet, but were not able to retrieve information. The study indicated that participants were confused on how to search for information, with many not knowing how to open an Internet browser. It is speculated that retrieving information online was too overwhelming and confusing for those with limited health literacy. Hence, despite having access to the Internet, a lack of knowledge on how to retrieve information online was the barrier.

Consistent across all study participants was the willingness to learn and become more literate with both the computer and e-Health information. Participants stated that if courses were available, they would be willing to attend. Many participants noted that they currently receive health information from their healthcare providers and staff at the clinic. Several participants also reported that their family members, especially children and grandchildren, encouraged them to use the Internet for retrieving heath information. Those that did surf the web had positive experiences. The few that were able to access health information found it to be helpful and empowering. All participants realized that learning more about Internet technology would help them to take personal responsibility for their health, and improve self-management of their chronic disease conditions; the participants noted that the Internet could be a source of empowerment. This enthusiasm to learn is consistent with other studies specifically looking at health literacy, which also found that despite the lack of use of Internet technology, participants were enthusiastic and wanted to learn and utilize information technology for diabetes care.[15]

There are several limitations to this study. Foremost, the extent to which participants underutilized the computer and the Internet was unknown at the beginning of the study. Since there were no published research articles on the digital divide or e-Health literacy with this population, it was assumed that the participant population was familiar with the Internet and the web. However, results revealed moderate access to broadband technology, and very low usage of the Internet for health information retrieval. A further limitation of the study was that participants were not systematically asked about how they accessed the Internet, for example by mobile phone or via a computer. Despite the many modes currently available, Internet access to health information was used as a general term.

Additionally, the majority of the participants reported being unemployed or retired. The mean age of the participants was 54 years; results from a younger population who are more likely to be digital natives (people using digital technology from childhood) would not be comparable. Therefore, the results are not representative of the population as a whole. Future research needs to include a more diverse participant population with participants who are employed, younger, and have experience

using the Internet. In addition, the use of focus groups can be subjective both in the participant discussion and in analysis of the data, thus results may not be generalizable to the targeted population. Finally, the sample was a convenience sample, which also limits the generalizability of the findings.

Conclusion

Despite the limitations of the study, the results contribute to the overall knowledge about computer literacy, e-Health literacy, and the digital divide in an underserved population in Hawai'i. Results showed that amongst a diabetic underserved population, despite access to the Internet, there was very low usage for accessing health information. However, this population is motivated to learn more about the Internet and how to retrieve e-Health information. The results of this study are consistent with several other studies that have examined the use of the Internet for e-Health information in underserved communities.[16] For example, a study assessing health information seeking in a medically underserved community in Philadelphia also found that the digital divide was not in access to technology, but in information retrieval, understanding, and use.[17] Future research in this area is needed to specifically address and parse out the variables that impact underserved populations and computer and technology utilization, including social support, computer access, computer literacy, e-Health literacy and education. Additionally, as technology access changes, such as with the availability of mobile devices, the digital divide is changing from a gap in access, to a gap in differentiation in the patterns of usage, ie, for information, education, or entertainment. The results of this study suggest that despite having Internet access, participants were not knowledgeable enough to access and utilize e-Health information on the Internet. The use and understanding of data available through information databases, social networks, and news, as opposed to mere access to broadband technology, is evolving into the new digital divide. With the proliferation of information and communication technology, and the transformation of information retrieval to being mobile and "on demand," a multi-pronged communication and education strategy is needed to explore how technology can improve e-Health literacy and health outcomes among underserved populations. In particular, mobile devices have evolved such that they now have the ability to circumvent many of the barriers to Internet access that previously affected low income and hard to reach populations. According to the United Nations Broadband Commission, mobile technology has the potential to bridge the gap between the connected and the unconnected, as evidenced by a predicted estimate of 2.1 billion mobile broadband subscriptions globally by end of 2013.[18] As a result of the increase in mobile technology usage, the growth in mobile health (mHealth) applications in healthcare has expanded to include disease prevention, health promotion, treatment compliance, data collection, and disease surveillance.[19] The usefulness of mHealth has been shown in underserved populations when used by community health workers to facilitate health education, conduct person-to-person communication, collect health data, and receive alerts and reminders.[20] In an underserved migrant farm worker population, 81% of the participants reported their willingness to use mHealth services for managing chronic diseases such as diabetes or hypertension. Those that had no experience with mHealth were receptive to receiving training on how to use the technology.[21]

In sum, there is growing evidence that the use of Internet-based health information can help improve health outcomes. Telemedicine and Internet-based interventions have the potential to address access and quality of care by reaching a broader population base. Because Internet-based interventions are available 24 hours a day, they can effectively be used by the patient to self-manage chronic diseases. Educational, web-based applications can be tailored to the population, and can deliver culturally appropriate education and communication. The personalization of information, which is the tailoring of information to a particular user, provides relevance and context for the intended recipient.

Unfortunately, the digital divide does exist, as evidenced by disparities among those that use e-Health information, and disparities in the literacy skills needed to understand and use information. From a governmental standpoint, there is a large push for the development and dissemination of technology in healthcare to both remove barriers to care and improve access. And to a large extent, it is a public health issue that people are excluded from benefiting from the Internet and denied the use and understanding of health information that can help manage and improve health conditions.[22] As such, in order to close the digital divide, computer literacy and e-Health literacy must accompany plans to expand programs to generate increases in e-Health usage in underserved areas.[23] Reiterated, further research and investigation is needed to understand which strategies would work best for an underserved population. In addition, information access is evolving at a rapid pace; whether it be desktop computers or mobile devices, research is needed to understand the best method for information access and what types of applications would best fit this population.

Conflict of Interest

None of the authors identify a conflict of interest.

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