

# **Are Health Websites Ready for the Mobile World?**

## **A Study of Readability among Traditional and Mobile Websites**

Janice R. Cunningham and Linda Lee  
KTH Royal Institute of Technology

Janice R. Cunningham, Ph.D. Student, Division of Industrial Marketing, KTH Royal Institute of Technology, Sweden

Linda Lee, Ph.D. Student, Division of Industrial Marketing, KTH Royal Institute of Technology, Sweden

The authors contributed equally to this manuscript. Correspondence concerning this article should be directed to Linda Lee, [linda.lee@strategexconsulting.com](mailto:linda.lee@strategexconsulting.com)

### **Abstract**

More people are expected to access online information from mobile devices than from personal computers by 2015. This study asks whether the websites of health organizations have taken into consideration the greater difficulty of reading text on the small screens of mobile phones. Specifically, this study examines readability scores of traditional websites and mobile websites among 55 American health organizations.

While 22% of the organizations studied had mobile websites, only one-third of the mobile websites had better readability than their traditional website counterparts. The Grade Level Score for these mobile websites averaged 6.5 compared to 8.5 for their traditional websites but none had superior readability of 5<sup>th</sup> grade level or lower. Conversely, another one-third of the mobile websites had worse readability than their traditional website counterparts. These findings suggest most health organizations have yet to leverage the accessibility of online information through mobile phones.

## **Introduction**

Today, a patient with a headache, fatigue, and body chills can self-diagnose or learn how to manage his disease through information on a health website. Are health organizations, however, ready to serve up their information in an increasingly mobile world?

Not that long ago, people went to libraries to find information. Digital information through the Internet is now old hat and the personal computer, once the default access device, is now joined by the mobile device. Recognizing the wide range of literacy levels within the American population, the health sector has for several decades explicitly recognized the need to present information that can be read and understood by people with low literacy (C. C. Doak, Doak, & Root, 1996). The small screens on mobile phones present both a challenge to and an opportunity for delivering more understandable information. Is the health sector ready for this new challenge?

This paper examines readability of traditional and mobile websites of health organizations. The authors review the literature on the growth of mobile phones and how mobile phones are used to access online information in the context of health literacy and readability of health information. The methodology of how the online content was selected and analyzed is discussed. The findings of the readability analysis are presented along with limitations and areas for future research. Finally, the authors discuss their conclusions.

## **Literature Review**

Mobile Phones in Context. Soon, more people are expected to use mobile devices to access online information than from traditional laptop and desktop computers. Annual global shipments of smartphones already exceeded that of PCs and tablets in 2011 (Canalys, 2012). In

the USA, comScore (2012b) reported 49% of American mobile phone subscribers used their mobile phones to browse online during the three months ending April 2012. Forecasts project that by 2015, more people will use their mobile device to go online than will use a PC (International Data Corporation, 2011). The near ubiquitous penetration of mobile phones also presents new opportunities to reach traditionally hard-to-reach populations. Indeed, those with low household incomes and low education levels are more likely to go online using their mobile phone than the average mobile phone subscriber. Notably, 38% of those who are Black or Hispanic go online mostly using their mobile phone compared with 25% for the average mobile subscriber (Zickuhr, Smith, & The Pew Research Center, 2012).

With this continued growth and the “continuous access” that consumers now have (Lamarre, Galarneau, & Boeck, 2012), health information providers have a compelling opportunity to harness the power of the mobile environment.

Still, reading from a computer screen or tablet is slower than reading from paper (Paul & PC World, 2010) and web users tend to scan a webpage for very short periods. Add to this the small screen of the mobile phone and it is no surprise that Cui & Roto (2008) showed mobile web users prefer web content that presented small amounts of information at a time. The availability of so many media devices has also led to multi-tasking across mobile phones, television, and other electronic devices, affecting the level of attention people pay to the information they access. “...Even if traditional health communicators garner users’ attention, they may not hold it for long” (Della, Eroglu, Bernhardt, Edgerton, and Nalll, 2008, p 150).

Health Literacy. Health literacy is important to health outcomes because those with higher health literacy use preventative measures to a greater degree, make better use of

available health care, and have better health than those with low health literacy (Bodie & Dutta, 2008; Pirisi, 2000). The American Medical Association (AMA) defines health literacy as “a patient’s ability to obtain, process, and understand basic health information and services needed to make appropriate health decisions” (Kathiresan & Patrick, 2012).

To assist health information providers, Mackert and Love (2011) suggest evaluating health messages based on the four-dimensional model of health literacy proposed by Zarcadoolas, Pleasant and Greer (2005, 2006). This health literacy model identifies “fundamental literacy, scientific literacy, civic literacy and cultural literacy as a framework for developing and evaluating health messages” (Davis et al., 2006). Applying the Suitability Assessment of Materials (SAM) instrument (C. C. Doak et al., 1996), this study examines the readability component of health information. SAM evaluation criteria include literacy factors, graphics and layout, and cultural appropriateness in addition to learning stimulation and motivation factors. Measures of good readability within SAM literacy factors have historically shown a consistent correlation with a positive SAM score (C. C. Doak et al., 1996)

Though searching the Internet for health information has become ubiquitous among Americans (Bodie & Dutta, 2008), there continues to be a disparity in who can take advantage of these resources. Those with high literacy have much higher rates of using the Internet than those with low literacy (Hernandez & Institute of Medicine (U.S.) Roundtable on Health Literacy, 2009). Indeed, Bodie & Dutta (2008) argue that online health information must avoid “dry Web pages and hard to understand text” to help promote good health literacy since more readable text leads to greater readership and comprehension (DuBay, 2007). C. C. Doak et al. (1996) suggest that health materials should be written at no higher than a grade 7 or 8 reading

level to match the average reading level of the American adult. Further, grade 5 should be the target because a full 20% of the population reads at or below the 5<sup>th</sup> grade level. Accordingly, the authors assess readability based on these grade level criteria.

### Research Question

Previous studies have shown that health website content is typically written above the 8<sup>th</sup> grade level despite the average American reading at the 7<sup>th</sup> or 8<sup>th</sup> grade level (Badarudeen & Sabharwal, 2008; C. C. Doak et al., 1996; Kunz & Osborne, 2010; McInnes & Haglund, 2011; Risoldi Cochrane, Gregory, & Wilson, 2012). As mobile phones are increasingly used to access online content, has this changed? This study asks:

- Are health organizations' mobile websites easier to read than their traditional websites?
- Are health organization's traditional websites easier to read when they have an online mobile initiative, either mobile website or mobile application?

For this study, *traditional websites* are defined as those websites where there is no change to the navigation or content when accessed by a mobile device, whether a data-capable mobile phone (feature phone) or a smartphone (such as an iPhone, Android, or BlackBerry). Some websites are *mobile optimized*, retaining all the navigation capabilities of a traditional website but modified to support faster downloads and easier viewing on a smaller screen.

*Mobile websites* are defined as those websites developed specifically for viewing on feature phones or smartphones. They typically have streamlined navigation choices. The font and image size cannot be increased or decreased (the screen cannot be expanded). The web pages do not exceed the width of the mobile screen, but length is variable (one can scroll up or down to see additional information that does not fit on the screen).

## Methodology

Readability formulae can be used to quickly determine the degree of reading difficulty and provide objective data to indicate whether text should be re-examined with a view to enhancing readability (Leong, Ewing, & Pitt, 2002). The authors have chosen one of the most commonly used, the Flesch-Kincaid Grade Level Score (FK).

This study examined the websites of 55 large American health organizations:

- Thirty-three from the 2010 Consumer and Patient Health Information Section's Top 100 List of "Health Websites You Can Trust" in the General Health and Specific Health Problems categories (Medical Library Association, 2010).<sup>i</sup>
- Twenty-two in the insurance/health management organization category,<sup>ii</sup> from:
  - 2011 Fortune 500 list of the top 11 American organizations in the category of "Health Care: Insurance and Managed Care" based on revenues (Fortune 500, n.d.).
  - The top 25 health insurance companies for 2009 by market share as listed by National Association of Insurance Commissioners (US News Health, n.d.).

These represented a cross-section of online health information providers and include clinics (e.g. Mayo Clinic), non-profits (e.g. American Diabetes Association), government (e.g. Centers for Disease Control), websites with an advertising revenue model (e.g. webmd.com), and insurance/health management organizations (e.g. Kaiser Permanente).

Information was collected in June and July 2012 from each organization's traditional website and mobile website, if there was one. For each website, four 100-word samples were selected, along with headings. While C. C. Doak et al. (1996) recommend selecting three 100-word samples and omitting headings, this study selects four 100-word samples, including

headings, to take the navigation of the online world into consideration. Four 100-word (minimum) samples were chosen because many websites used two different methods of presenting information: articles and slideshows. Selecting four 100-word (minimum) samples allowed the authors to collect two samples of each method of information presentation. For websites without slideshows, four 100-word (minimum) samples were selected. Each sample included 100 words plus any additional words to complete a sentence. Where there were fewer than 400 words (e.g. mobile websites), all available content was selected.

Headings were included where the headings were part of the main content, consistent with the intent of *chunking* - using headings and subheadings to improve readability (C.C. Doak et al., 1996). This study does not include long lists of menu items (commonly found on the far left side of a website), as they are not considered part of the main content.

The authors collected content that appeared to be meant for the general public (as opposed to health professionals) and health information (rather than insurance information). Content was selected by navigating each website to find information related to diabetes (for general health websites) and for the specific health issue (with websites for specific health conditions). Where possible, the content was selected from different aspects of the health condition (e.g. symptoms, treatments, managing).

The content collected represented, for the most part, information that was prominently displayed on the website, such as slideshows and quizzes if they were prominently displayed (meaning the authors did not search specifically for slideshows and quizzes). If quiz content was collected, a separate analysis was run on the quiz.

An online tool (<http://www.online-utility.org/>) was used to score readability using the

FK Grade Level Score. The FK Grade Level Score calculates the number of years of education required to understand text, using number of words in a sentence and number of syllables in a word (DuBay, 2007). The AMA recommends no higher than 6th-grade level for written patient materials (Weiss, 2007) and C. C. Doak et al. (1996) ranks superior readability as 5<sup>th</sup> grade level or lower, adequate readability at 6<sup>th</sup>, 7<sup>th</sup>, or 8<sup>th</sup> grade level and anything at or above the 9<sup>th</sup> grade level is considered poor. After discovering none of the websites scored 5<sup>th</sup> Grade Level or lower, the authors moved the 6<sup>th</sup> Grade Level into a separate category, grouping the readability scores into Under 7<sup>th</sup>, 7<sup>th</sup> to 8<sup>th</sup>, and 9<sup>th</sup> and Over Grade Levels.

### **Findings**

Of the 55 organizations examined, 28 had a mobile initiative (meaning, a mobile website or a mobile app), and 9 had a quiz prominently displayed on their traditional website. Of the 28 with a mobile initiative, 12 had a mobile website (mobile apps were not included in this study).

Traditional and Mobile Websites are Equally Readable. The average readability of traditional and mobile websites was in the acceptable range. The average for the traditional websites was 8.4, ranging from 6.1 to 12.0. See Table 1 for details. This finding represents an improvement over earlier studies that found higher grade levels for health information. For example, a 2012 study of websites with consumer health information found that commercially-funded websites had a FK Grade Level of 10.1 and government-funded websites had a 9.3 Grade Level (Risoldi, Cochrane, Gregory, & Wilson, 2012). Surprisingly, the readability of the mobile websites was no better than the traditional websites. The mobile websites had an average Grade Level of 8.2 compared to 8.4 for the traditional websites. With a range from 6.3 to 11.2, the mobile websites had a similar range as the traditional websites, although the upper

end of the range for the mobile websites was slightly lower.

INSERT TABLE 1 HERE

Readability Scores for Mobile Websites Are More Polarized. The mobile websites tended to have either good readability (33%) or poor readability (42%), with few in the middle group (25%). On the other hand, most of the traditional websites were in the middle group (60%), with only 12% achieving good readability scores and 28% delivering poor readability scores. See Figure 1 for details.

INSERT FIGURE 1 HERE

Quizzes Are More Readable. Quizzes were prominent on nine traditional websites. The authors view quizzes to have potential in the mobile environment due to their short question and answer format that can be easily adapted to a typical mobile menu format. Thus, the quizzes were analyzed separately from the traditional websites. The nine quizzes averaged a score of 7.6 FK Grade Level, an improvement over the traditional websites and mobile websites. However, the Grade Level Scores of the quizzes ranged quite dramatically, from 4.4 to 11.9 – see Table 1 for comparisons. The distribution of quizzes into Grade Level groupings was similar to the distribution for the traditional websites – see Figure 1.

While the quizzes generally had good readability for their questions and answers, the readability differed quite substantially in their educational content. After the reader enters his or her choice for the quiz answer, a few sentences of educational health information appear. Some educational content seems to have been carefully crafted while others seem to have been lifted from a technical source.

Organizations with Mobile Websites Do Not Score Better. When the 12 organizations with

mobile websites were examined, just one third of the mobile websites had better readability compared to their traditional website counterparts:

- Four mobile websites had worse readability - higher by at least 1 Grade Level.
- Four mobile websites had roughly equivalent readability - within 1 Grade Level.
- Four mobile websites had better readability - lower by at least 1 Grade Level.

This is an unexpected finding, as the authors anticipated organizations' mobile websites would have better readability than their traditional websites. The distribution by Grade Level groupings of the traditional websites of the organizations with mobile websites was similar to that of all traditional websites examined. This distribution was also similar to that of the traditional websites of the organizations without mobile websites. In addition, the distribution by Grade Level groupings of the traditional websites of the 28 organizations with mobile app initiatives was similar to those without mobile initiatives.

Only Four Organizations with Good Readability on their Mobile Websites. There were four organizations with mobile websites that had Grade Level Scores of under 7 and with improved or similar readability for their mobile websites compared to their traditional websites. The Grade Level Score for these mobile websites averaged 6.5 compared to 8.5 for their traditional websites, and 6.2 for their quizzes. See Figure 2 for details. The organizations with the best mobile website readability had a high propensity for quizzes, with three of the four organizations presenting quizzes on their traditional websites. Superior readability of 5<sup>th</sup> grade level or lower was achieved only by the Centers for Disease Control's quiz.

INSERT FIGURE 2 HERE

The four organizations with good readability on their mobile websites included two non-

profits (American Cancer Society and American Diabetes Association), one with an advertising revenue model (webmd.com), and one government (Centers for Disease Control).

Five Organizations with Worse Readability on Mobile Websites. There were five organizations with worse readability on their mobile websites compared to their traditional websites. Four had mobile websites with Grade Level Scores of 9 or higher – poor readability. Yet, their traditional websites had adequate 7<sup>th</sup> to 8<sup>th</sup> Grade Levels readability scores.

The Best and Worst Types of Organizations for Readability. The best: government and non-profit organizations dominated the group achieving scores under the 7<sup>th</sup> Grade level, with 6 of the 7 (85%) for traditional websites and 3 of the 4 (75%) for mobile websites. The worst: insurance/health management organizations, comprising 11 of the 14 (79%) with 9<sup>th</sup> Grade Level or higher for traditional websites and none below 7<sup>th</sup> grade level. See Table 1 for details.

### **Limitations and Areas for Future Research**

FK Grade Level Scores were reported for this analysis to allow for comparison with the FK Grade Level Scores used more broadly in the studies reviewed. SMOG (or Simple Measure of Gobbledygook by G. Harry McLaughlin) consistently yielded a higher average score by 2 grade points. Integrating additional readability formulae may have value in more quantitative studies.

The authors could not find research validating the application of these methodologies designed for written prose to the medium of mobile communications. The need to consolidate multiple screens of mobile content to obtain 100 word samples of text raised a question for the authors: are modified guidelines required to assess mobile content? There may be value for validating and enhancing these tools to address the unique attributes of mobile content.

Short message service (SMS) content was excluded from this study because it did not fit within the category of website content. Comparing SMS content could yield new insights into mobile content readability. A quick review of sample messages from the popular Text4Baby SMS program ([www.text4baby.org](http://www.text4baby.org)) revealed a FK Grade Level Score of 5. As more content transitions to the audio/visual world of video, video communications represent yet another growth area for future research.

### **Conclusions**

So, are health websites ready for the mobile world? The simple answer is no, most health organizations that are active in the mobile web do not have websites that are easier to read. The few with easy-to-read traditional websites and easy-to-read mobile websites were the minority. Except for this minority group of four (just 7% of the sample), mobile websites appear to be no easier to read than their respective traditional websites. Nor do those with mobile websites appear to have traditional websites that are easier to read.

These findings surprised the authors. While health organization websites in general have improved their readability compared to past studies, this progression has not applied to their mobile websites. Mobile websites need to fit the small screens of mobile phones, ideally with short, succinct, easy-to-digest chunks of information, accommodating not just health literacy needs and the mobile screen, but the growing trend to electronic multi-tasking. If health organizations address these constraints, it should be reasonable to expect mobile websites could achieve scores at or below the grade 6 level, or at a minimum, demonstrate improvement over traditional websites.

These findings suggest most health organizations have yet to address both the

opportunity and the challenges posed by online access through mobile phones. In not doing so, health organizations are not taking full advantage of the larger audience reach across all demographic segments. Previously hard-to-reach populations that did not have regular online access through laptop or desktop computers now have access through their mobile phones.

Perhaps very soon, the patient with a sudden onset of headache, fatigue, and body chills while on a road trip who does not want to wait until he has access to a PC will be in luck. He will be able to access mobile websites from numerous respected health organizations and will be able to easily grasp the content. Perhaps soon, but not today.

**Tables and Figures**

Table 1

*Readability Comparisons*

**Flesch-Kincaid Grade Level Comparison of Traditional Websites, Quizzes, and Mobile Websites**

Scores	Traditional	Quizzes	Mobile
Average	8.4	7.6	8.2
Range	6.1 to 12.0	4.4 to 11.9	6.3 to 11.2

**The Best and Worst Readability by Type of Organization**

Number	Traditional Websites		Mobile Websites	
	Best	Worst	Best	Worst
Government	3	2	1	0
Non-Profit	3	1	2	0
Advertising Revenue	1	0	1	3
Insurance/Health Mgmt.	0	11	0	0
Clinic	0	0	0	1
Total	7	14	4	4

Best means under 7<sup>th</sup> Grade Level, Worst means 9<sup>th</sup> Grade Level or over

Figure 1  
*Distribution of Organizations by Flesch-Kincaid Grade Level*  
*Traditional Websites vs. Quiz vs. Mobile Websites*

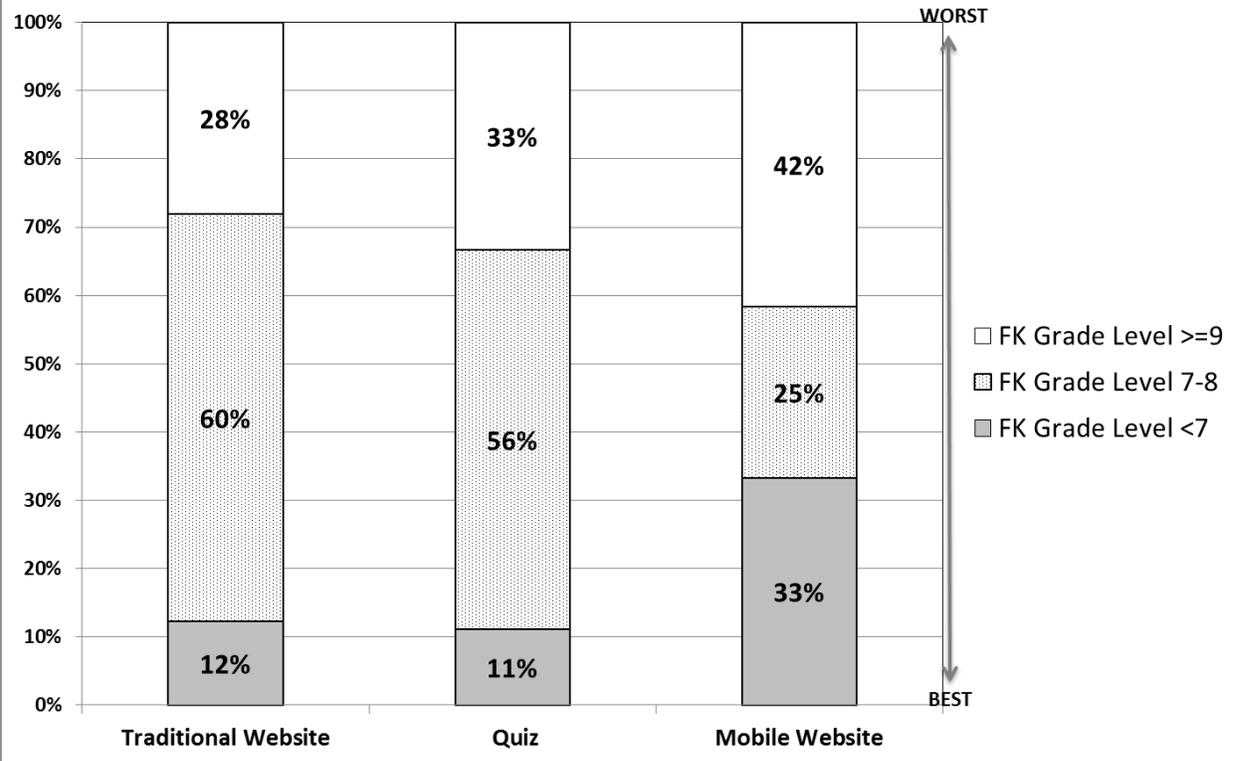
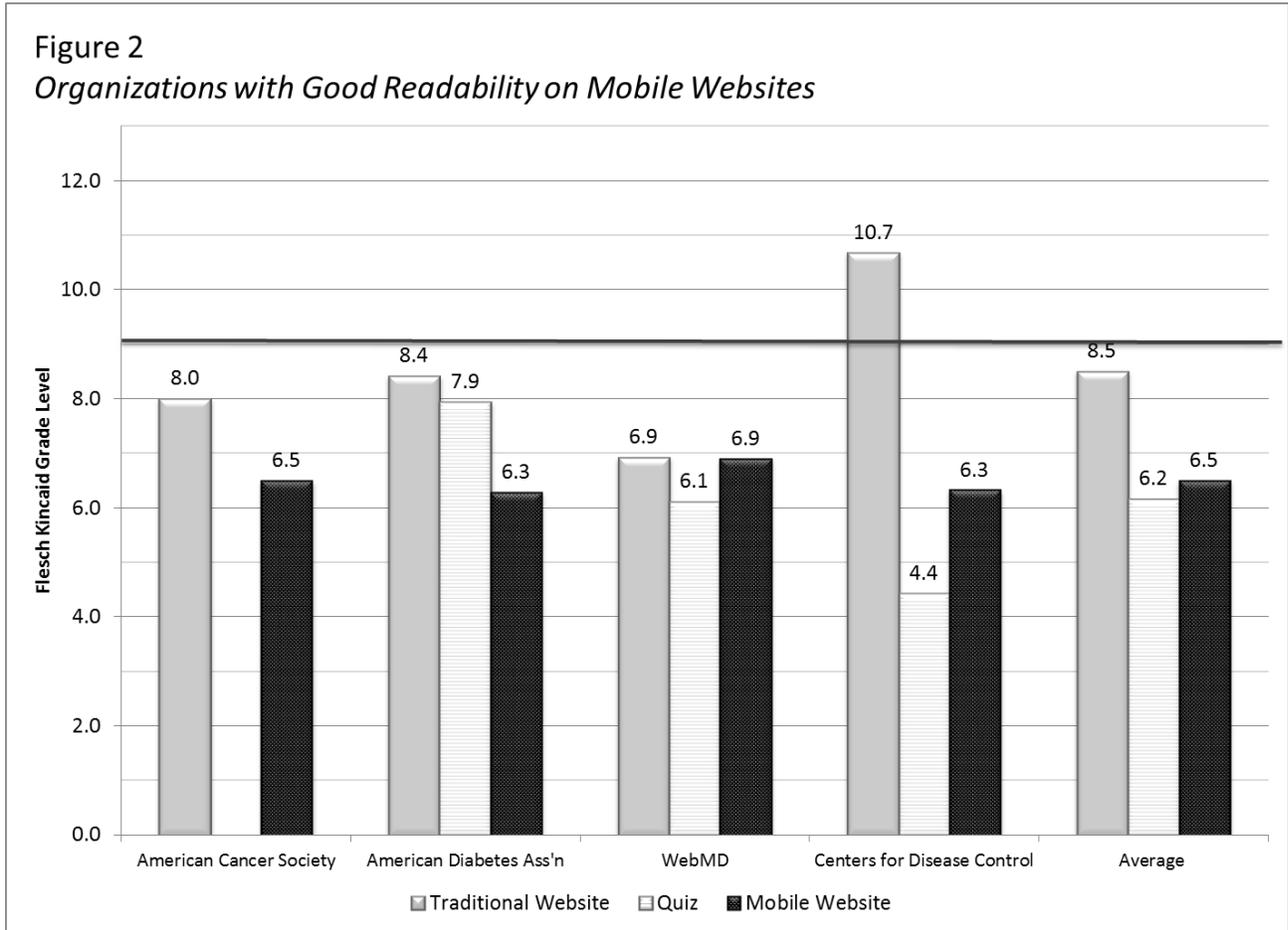


Figure 2  
*Organizations with Good Readability on Mobile Websites*



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<sup>i</sup> Consumer and Patient Health Information Section (CAPHIS), is a section of the Medical Library Association, an association of health information professionals with more than 5,000 individual and institution members. Two websites were excluded because they consisted of links to other websites rather than presenting their own content.

<sup>ii</sup> In some instances, the website analyzed was that of an organization owned by the parent company. Fourteen websites from these lists were excluded because they did not have health information written for and accessible to the general public.