



Online Health Information Seeking and Information Quality: A Preliminary Contemplation

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Abstract: *The healthcare industry has undergone a rapid change as the internet shows latent abilities to assist in information seeking and decision making regarding self-care and health-related issues. Therefore, it is essential to discern issues concerning the quality of the information and the system. Thus, this paper aims to explore the current issues in information quality, system quality and health risks within the context of online health information seeking. First, a literature review is conducted to gather information about the issues in detail. Second, a preliminary study is implemented to clarify the existence of the research problem in the real world. Relying on online survey method, the data were collected from doctors, health professionals, nurses, and consumers. The results found that the main issue in information quality is the consumers' lack of ability to distinguish quality health information, whereas, the lack of system integration is the major problem associated with system quality. 88.6% of the respondents had underlined that health information could be misleading as a vital health risk. This study is a significant addition to the literature, in that it confirms the impacts of information quality, system quality and health risks on consumers' behavior in health information seeking while using e-health websites.*

Keywords: *Health Information Seeking, Information Quality, System Quality.*

I. INTRODUCTION

The consumers had selected the internet as their primary source in seeking for health information (Case et al., 2004; Hesse et al., 2005; Marrie et al., 2013; Prestin et al., 2015; Zhang et al., 2017). It also fosters the good practice of healthcare by dispersing health information widely. For health searches, internet sources such as search engines, social networking sites, and health websites have different targets or purposes and provide different levels of interactivity. Some of the sources only allow the users to access information and others designate for user participation. Consequently, their content differs in various aspects, specifically in quantity, diversity, nature and also in quality. Zhang et al. (2015) did a systematic review which disclosed the great diversity in accuracy and comprehensiveness of health information in health websites.

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Online information quality is defined as the perception of users about the quality of information presented on a website (McKinney et al., 2002). It is a necessity for users to retrieve complete, accurate, understandable, relevant and current information (Ahn et al., 2005; Zhang et al., 2015). Studies have revealed that successful websites which presented high-quality information can help consumers in making better online decisions (Bellman et al., 1999, Zhang et al., 2017). Nonetheless, although perceived high information quality is one of the success factors to improve consumers' overall satisfaction with their online experience (DeLone and McLean, 2003; Deng et al., 2015; Zhang et al., 2017), many research come to the conclusion that the quality of online information differs significantly between websites, with most of the information provided is incomplete and inaccurate (Bruce-Brand et al., 2013; Ghasemaghaei and Hassanein, 2016).

As the concern regarding the quality of information available on the Internet is constantly growing, online information quality has obtained a substantial amount of attention in the literature over several years (Savolainen, 2011; Ghasemaghaei and Hassanein, 2016). This paper is an initial attempt to examine the current issues in information quality, system quality and health risks within the context of online health information seeking through literature review and preliminary study. There are three sections following this introduction: the methodology used to identify and classify research problems is presented; a discussion of the online health information seeking research is presented with detailed analysis; and some research limitations and suggestions for future research.

II. MATERIALS AND METHODS

There are two major activities involved in order to find a comprehensive research gap and identify the problems that occur in the research. This research started by first conducting a literature review to gather information on online health information seeking. The research area problem will be identified. The previous related research about the issues of online health information seeking will also be explored. The second activity is conducting a preliminary data collection to identify the problem statement. This investigation will also be carried out to clarify how the research problem that was identified from the literature exists in the real world. What are the elements that have an impact on the acceptance and use of online health information seeking via e-health websites? As a start,

a survey is distributed to the medical centers in Malaysia. The target population is doctors, health professionals, nurses, and consumers.

The preliminary study questionnaire was divided into Part A and Part B. Part A contains the demographic information. Respondents were asked information about their gender, age, and occupation. The second part includes five quantitative and three qualitative questions. Items regarding information quality and system quality were formulated based on studies by Diviani and Meppelink (2017), Nikoloudakis et al. (2016), Zhang et al. (2015), Schuers et al. (2016) and Mohamadali et al. (2017). Meanwhile,

perceived health risk items were obtained from Liang et al. (2011). The research constructs details presented in Table 1. A total of fifty (50) copies of the questionnaires were divided out online. The survey was conducted in a week and 37 completed responses were collected. From the 37 sets of questionnaire returned, 35 responses were usable after excluding cases with incomplete information. Therefore, the response rate is 94.6%. Approximately, 68.8% of the respondents are females, whereas 31.4% are males. Roughly 85.7% of the respondents are less than 40 years old. Majority of the respondents (77.1%) hold the position as a doctor. Table 2 represents the sample characteristics.

Table. 1 Research constructs

Construct	Definition	No. of Items	Sources
Information quality	The extent to which a user views the information provided by a website as current, accurate, relevant, useful and comprehensive.	5	Diviani and Meppelink (2017), Nikoloudakis et al. (2016), Zhang et al. (2015), Schuers et al. (2016)
System quality	The beneficial attributes of an information system such as ease of use, system flexibility, system reliability, and ease of learning.	4	Mohamadali et al. (2017)
Perceived health risk	The uncertainty of seeking health information on e-health websites.	4	Liang et al. (2011)

Table. 2 Sample characteristics (N=35)

Variable	Frequency	(%)	
Gender	Male	11	31.4
	Female	24	68.6
Age	20-29	13	37.1
	30-39	17	48.6
	40-49	3	8.6
	50-59	2	5.7
Occupation	Doctor	27	77.1
	Health Professional	4	11.4
	Nurse	1	2.9
	Consumer	3	8.6

III. RESULTS AND DISCUSSION

We used the Statistical Package for Social Science (SPSS) software to analyze the data. Table 3 demonstrates the frequency distribution and test statistics of the items. The responses are coded as 1 = yes which means the respondents agree with the question and 0 = no that means the respondents disagree with it. Frequency and chi-square tests are employed to exhibit the results. The first six items in Table 3 are about information quality problems in health information seeking while using e-health websites. According to the results, 80.0% of the respondents emphasized that the online health information is usually not filtered by doctors/health professionals, while 82.9% of them claimed that the consumers are lack of ability to accurately seek and distinguish quality health information in e-health websites. In addition, less than 50% of the respondents concurred with the other three problems which are the websites contained false information, or advice with little or no scientific basis (42.9%), the websites provided inaccurate and outdated health information (25.7%) and the

websites provided irrelevant health information to consumers' needs (31.4%).

On the contrary, the items from nos. 7 to 11 in Table 3 are associated with system quality problems in health information seeking while using e-health websites. As stated in the table, 71.4% of the respondents specified the lack of system integration as the main problem in system quality whereas 57.1% of them agreed about the poor usability, functionality, and performance of the system. Moreover, more than 45% of the respondents also recognized the other two problems, which are poor interface and less user-friendly (48.6%), and time-consuming especially for certain processes (45.7%).

On the other hand, the next five items from nos. 12 to 16 in Table 3 are about health risks in health information seeking while using e-health websites. Based on the results, more than 80% of the respondents underlined that health information in e-health websites could be misleading (88.6%) and consumers could make wrong decisions regarding their health based on the poor quality of health information in e-health websites (80.0%). 62.9% of the respondents also highlighted that the exaggerated health information in e-health websites could stressed out the consumers, while 45.7% of them agreed that health information in e-health websites could harm consumers' health.

Item no. 17 in Table 3 is investigating consumers' trust expectations i.e. whether they think that e-health websites are trustworthy and dependable. 11.4% of the respondents concluded that consumers' trust expectations could not be fulfilled by seeking health information through e-health websites. In contrast, 5.7% of them trusted and depended on e-health websites to seek health information. On the other

hand, 82.9% of the respondents stated that only some of the e-health websites are trustworthy and dependable. Finally, on the last item, the respondents declared that the research problem is significant as 97.1% of the respondents agreed that the problem is significant and deserves research attention.

Equally important is, Table 3 also illustrates the chi-square, degree of freedom (df) and significance of the dichotomous scale questionnaire items. However, there will be a null hypothesis that specifies the expected frequency of each category (i.e. yes or no). For each questionnaire item, the null hypothesis will conclude that half of the respondents will say yes and the other half will say no. In terms of the null hypothesis, the observed frequency may be contrary to the expected frequency. According to the table, zero cells have expected frequencies less than 5, which are good

because the larger value for chi-square means that the null hypothesis can be rejected. The degree of freedom (df) is one as it is simply one less than the number of options of the variable (i.e. 2 options – 1 = 1). However, on item 17, the df value is 2. P-value is the probability that the null hypothesis is correct. A small p-value (typically ≤ 0.05) indicates strong evidence against the null hypothesis, thus, the null hypothesis will be rejected while accepting the testing hypothesis as valid. The null hypothesis is retained if the p-value is greater than 0.05. The data in Table 3 is analyzed using chi-square goodness of fit. The p-values of nine items in the table (item nos. 1, 2, 4, 5, 7, 12, 14, 17 and 18) are smaller than 0.05, hence, all the statements are valid. For instance, for item no.1, out of 35 respondents in total, the number of respondents who agreed that the health information is usually

Table. 3 Overall frequency distributions and test statistics for questionnaire items

Item	Test Statistics			Distribution of Respondents				
	Chi-Square	df	Asymp. Sig.	Some of them N ^b %	Yes	Nb %	N o %	Nb %
Information Quality Problems in Health Information Seeking while Using E-health Websites								
1.					28	80.0	7	20.0
doctors/health professionals.								
2.					29	82.9	6	17.1
The consumer's inability to accurately distinguish quality health information in e-health websites.								
3.					15	42.9	20	57.1
The websites contained false information or advice with little or no scientific basis								
4.					9	25.7	26	74.3
The websites provided inaccurate and outdated health information								
5.					11	31.4	24	68.6
The websites provided irrelevant health information to consumers' needs								
6.					0	0	35	100
Others								
System Quality Problems in Health Information Seeking while Using E-health Websites								
7.					25	71.4	10	28.6
Lack of system integration								
8.					17	48.6	18	51.4
Poor interface and less user-friendly								
9.					16	45.7	19	54.3
Time-consuming especially for certain processes								
10.					20	57.1	15	42.9
Poor usability, functionality and performance								
11.					0	0	35	100
Others								
Health Risks in Health Information Seeking while Using E-health Websites								
12.					31	88.6	4	11.4
Health information on e-health websites could be misleading.								
13.					16	45.7	19	54.3
Health information on e-health websites could harm consumers' health.								
14.					28	80.0	7	20.0
Consumers could make wrong decisions regarding their health based on the poor quality of health information on e-health websites.								
15.					22	62.9	13	37.1
Consumers could be stressed out because of exaggerating health information on e-health websites.								
16.					0	0	35	100
Others								
Consumers' Trust Expectations								
17.				29 (82.9)	2	5.7	4	11.4
Do you think that e-health websites are trustworthy and dependable?								
The Significance of the Problem								
18.					34	97.1	1	2.9
According to your knowledge of the area, do you think that this problem is significant?								

0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 17.5.

N=Total number of respondents not filtered by doctors/health professionals (28) is not equal to the number of respondents who did not agree with the statement (7). Therefore, the null hypothesis is rejected at $p < 0.05$ for this

item. As mentioned above, 80% of the respondents agreed that the health information is usually not filtered by doctors/health professionals, which indicates strong evidence that there is information quality problem in health information seeking while using e-health websites.

Moreover, we also calculated if the numbers of respondents think that the research problem is significant (34) is equal to the number of respondents who think otherwise (1). It is concluded that the research problem is significant as p-value is less than 0.05. 97.1% of the respondents think that this problem is significant based on their area of knowledge. The same clarification goes to the other remaining seven items in Table 3. The first eleven items are exploring or validating the information quality, system quality, health risks and trust problems in health information seeking while using e-health websites since their p-value is statistically significant.

For item no. 18, the respondents were asked to give their opinions regarding the significance of these problems. Majority of the respondents (31.4%) agree that there is a high possibility that the consumers will gain wrong and misleading information. Some of the consumers are only looking for a point of interest instead of understanding the whole input and explanation given pertaining to a certain subject, health education and the effect of medication or treatment. This misleading information may cause harm to consumers, therefore, the information needs to be clarified and supervised by medical professionals. Meanwhile, 17.1% of the respondents have mentioned the importance of the accuracy of the information. Inaccurate source of health information will lead to inaccurate health decision. Approximately 14.3% of the respondents believed that consumers tend to seek their symptoms or diseases online rather than asking for professionals. On the positive side, the consumers could get some general idea and information on what they are facing. However, it also can be the cause of health complications as the information provided may not be updated according to the latest knowledge in reference to new evidence-based medicine. 14.3% of them also think that online health content definitely influences the consumer and affects how they see their illness. Table 4 summarizes the respondents' opinions associated with problems in online health information seeking. To conclude, the respondents listed down the e-health websites that they commonly used to seek health information. The most visited e-health website is Medscape (27.9%), followed by WebMD (14.0%). Some of them (14.0%) suggested the government e-health websites such as MOH.gov and myhealth. The other websites include e-Medicine, PubMed and Mayo clinic. Table 5 concludes most visited e-health websites by the respondents.

Table. 4 Summary of respondents' opinion

Response	Frequency	(%)
Misleading the consumers	11	31.4
The accuracy of information	6	17.1
The information relevance	2	5.7
Affect consumers' health decision making	5	14.3
Seek symptoms or diseases	5	14.3
To get health information	3	8.6
Information is not updated	2	5.7
Information is not filtered	1	2.9

Table. 5 Commonly used e-health websites

Response	Frequency	(%)
Misleading the consumers	11	31.4
The accuracy of information	6	17.1
The information relevance	2	5.7
Affect consumers' health decision making	5	14.3
Seek symptoms or diseases	5	14.3
To get health information	3	8.6
Information is not updated	2	5.7
Information is not filtered	1	2.9

This preliminary study intends to examine the problems which have an effect on consumers' behavior in health information seeking while using e-health websites, including information quality, system quality, and health risk in Malaysia. It also offers valuable analysis and recommendations to the researchers in other countries. It is well acknowledged that the usage of the internet to seek for health information by the public, patients and health professionals continues to increase (Higgins et al., 2011; Fiksdal et al., 2014; Scantlebury et al., 2017). One of the internet's biggest strengths is offering a mass of information that is widely available. However, it also brings the drawback to the way of identifying accurate, reliable and current information (Fiksdal et al., 2014). One issue related to the capacity of online health information associates on how to determine the quality of the information. In our study, participants pinpointed a range of information and system quality problems that they encountered during online health information seeking. They also verified potential health risks experienced by the consumers due to inaccurate online health information.

This study found that the most important problem regarding information quality in health information seeking while using e-health websites is the consumer's inability to accurately distinguish quality health information in e-health websites. Despite the fact that public health has been targeting to enhance the consumers' ability to analyze online health information for several years, there is still a lack of theory-based and evidence-based interventions in this area (Car et al., 2011; Diviani and Meppelink, 2017). This result

is consistent with Jiang and Beaudoin (2016) who stated that when consumers are immersed by health information found on the internet and the quality of information is concerning, they need to put more effort in order to completely comprehend health and medical information associated with symptoms, disease, and medical care. Jeong and Kim (2016) have also found that consumers must gain access to high quality and reliable health information and be competent in understanding and interpreting information thoroughly so that health disparities can be eliminated and the individuals' status of health can be improved.

It is also clearly showed that the unfiltered information by doctors or health professionals is another main issue that needs to be taken into account. This result is supported by studies from Ahluwalia et al. (2010) and Tan and Goonawardene (2017) which emphasized that the quality of online health information can vary in personal blogs, viewpoints or narratives of other patients as the content can diverse from being peer reviewed or professionally reviewed. Equally important is our study supports existing evidence of online health information seeking behavior, in identifying the main problem regarding system quality which is lack of system integration. In a study by Mohamadali et al. (2017), when implementing a system, the lack of system integration is mentioned as one of the crucial aspects that need to be scrutinized for user acceptance. Findings from our study also suggest that consumers may encounter health risks while seeking online health information as the information could be misleading. Given that the internet is unregulated, a substantial proportion of the health information provided might be misleading and less trustworthy (Pant et al., 2012; Lin et al., 2016). The information explored by the consumer is certainly beneficial, but if misunderstood or misused, it can be detrimental to the consumer's health. Acquiring poor quality health information also may cause the consumers to make wrong decisions concerning their health whilst the exaggerated health information may cause the consumers to feel stressed out. Furthermore, our study also showed that consumers only trust and depend on some of the e-health websites to seek information. While previous research reveals that health consumers would anticipate on traditional health care professionals (Cotten and Gupta, 2004), this study conveys that online health information seeking can counteract real-world health uncertainties. Our study also gives an explicit view of the relationships between online health information seeking and information quality.

IV. CONCLUSION

Results of this preliminary study contribute to the understanding of the importance of information quality in seeking online health information via e-health websites. In contrast to many research which has concluded that most of the health information provided is inaccurate and incomplete; our findings show that the main issue regarding information quality is the consumer's inability to accurately distinguish quality health information. Hence, we also underlined the relationships between system quality, health risks, and trust. These findings would enrich the research literature on the influences of information quality, system

quality and perceived health risk on online health information seeking behavior. There are some limitations in this preliminary study. First, our sample contains a relatively high percentage of doctors because of sampling being conducted in medical centers in Malaysia. This may be a possible source of sample bias. Therefore, future study is suggested to include more consumers to enable a better understanding of consumers' preferences. Another potential limitation is the use of an online survey as a medium for obtaining survey replies. Therefore, we suggest that future studies could deploy a larger and more assorted sampling for a more representative study.

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