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MALAYSIAN RURAL COMMUNITY AS CONSUMER OF HEALTH INFORMATION AND THEIR USE OF ICT

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Abstract
We investigate the use of ICTs in the context of the rural community of Sarawak, Malaysia and attempt to profile them as consumers of health information. A survey method was deployed to obtain data. The research outcomes reveal that a majority of our respondents reported that they do not actively seek online health information although they have an access to the Internet at home or workplace. A majority of them strongly agreed about the Internet's role in providing extensive and useful information about illnesses, and viewed enhancing ICT skills is quite important to search health information online effectively. They also strongly agreed that creativity is needed in designing online health information. However, there was a mixed view among the respondents about the Internet access reliability and coverage around their area. The findings of the research are useful for relevant agencies that aim to capitalize ICTs to disseminate vital health information to reach rural communities.

Keywords: *ICT; Malaysia; Online health information; Sarawak; Internet*

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KOMUNITI LUAR BANDAR MALAYSIA SEBAGAI PENGGUNA MAKLUMAT KESIHATAN DAN PENGGUNAAN ICT

Abstrak
Kami menyelidik penggunaan ICT dalam konteks komuniti luar bandar Sarawak, Malaysia dan cuba memprofail mereka sebagai pengguna maklumat kesihatan. Kaedah survei digunakan untuk mendapatkan data. Dapatan kajian menunjukkan kebanyakan responden tidak cuba mendapatkan maklumat kesihatan secara atas talian dengan aktif walaupun mereka mempunyai akses kepada Internet dirumah mahupun di tempatkerja. Sebahagian besar responden sangat bersetuju tentang peranan Internet dalamm menyediakan maklumat yang ekstensif dan berguna mengenai penyakit, dan berpendapa bahawa memperkayaka nskil ICT adalah penting untuk mencari maklumat kesihatan secara atas talian dengan efektif. Mereka juga amat bersetuju bahawa kreativiti diperlukan untuk merekabentuk maklumat kesihatan secara atas talian. Bagaimanapun ada pendapat berbelah bagi dalam kalangan responden mengenai keboleh percayaan dan kawasan liputan akses Internet di kawasan mereka. Dapatan kajian ini amat berfaedah bagi agensi yang berkenaan yang boleh memanfaatkan ICT untuk menyebarkan maklumat kesihatan yang penting bagi komuniti luar bandar.

***Katakunci**: ICT; Malaysia; Atastalian; Maklumat kesihatan; Sarawak; Internet*

INTRODUCTION

Individuals who obtain any information to allow them to comprehend about any health-related issues and to support health-related decisions for themselves and families are called consumer health information (Patrick and Koss, 1995 cited from Khalil, 2001). Health information is typically generated and targeted for areas related to: individual and community-based health promotion and improvement; self-care practice; shared decision making such as between doctor and patient; patient education and rehabilitation; effective use of the health care system including selecting insurance or a provider; and the development and role of peer-group support (Patrick and Koss, 1995 cited from Khalil, 2001). Health information can be obtained and accessed through various communication

channels and settings. Today, consumer health information can acquire an abundance of such information freely through the use of ICTs. There is no doubt that effective use of ICT applications can lead to cheaper and speedy information delivery and access. From the standpoint of information sender, ICT applications can permit personalized health information to be creatively designed, packaged and quickly delivered to reach a wider audience across various geographical regions. In the context of the Internet and website applications for example, Cline and Haynes (2001) have elaborated in great detail about their impact and how these applications can complement the needs and information seeking behavior and style of consumer health information. One of the interesting impacts that they highlight in the paper is the potential of the Internet application to promote interactive health communication and to enable effective risk communication to be delivered to a wider range of consumer health information.

In the context of rural communities, it is widely acknowledged in the literature about the benefits of using ICTs to disseminate, obtain and share health information to promote self-care practices. Ruggiero et al. (2011) for instance reported survey findings that involved a sample of 1,992 adults in the rural areas in the US who use the Internet regularly. They reported that these rural users were more likely to search information about smoking cessation and mental health issues. The survey was conducted in August 2006. The study also found that the rural adult users were also more likely to report feeling that online health information and advice had been helpful as compared to the non-rural adult users. Further, about 61% of the rural adult users had mentioned that the use of online health-related information could affect their decision about treatment of illness/condition. From the standpoint of developing and poor countries, the behavioural style related to seeking and obtaining health information among the rural communities will be very much driven and shaped by factors such as socio-demographic background and whether common communication channels (i.e., radio, TV, newspaper etc.) and basic ICT infrastructures are accessible by them. It is well known that some of the rural communities of the poor countries even do not have access to basic needs such as clean water. In the case of Nigeria, Momodu (2002) reported that the rural Ekpoma communities demanded the information in the area related to agriculture (40%), health (20%), economy (14%), political (8%), education (8%), community development (7%) and others (3%). In the context of health information, Momodu (2002) further highlighted that the rural respondents in the study needed information such as about how to handle disease outbreaks, health advices on alternative treatments apart from traditional medicine for illnesses such as cancer or tuberculosis, water treatment, health facilities and pre and postnatal care and immunization facilities for children and mothers. Further, the study mentioned about the following information sources that are available to and being utilized by them: radio, television, newspaper, government workers, teachers, and friends. Barriers such as the high illiteracy rate and language issues were noted as important factors in hindering the dissemination of health

information via traditional mass media.

This study explores a rural community setting in Serian District which is located in Sarawak, Malaysia and investigates the use of ICTs in the context of the community. This study attempts to profile the community as consumers of health information. Sarawak is one of the two states in East Malaysia located on the island of Borneo. It was reported that in 2010, about 52% of Sarawak populations living in rural areas (Borneo Post Online, 2012). To date, Sarawak is still facing difficulties in rolling-out adequate ICT infrastructures to reach many of its remote areas due to the state's geographical challenge as well as the issue of low population density. This study examines the context of rural communities located in Serian, Sarawak in using ICT applications to seek, obtain and share online health information. This paper is organized as follows. Section 2 provides an overview of the relevant literature and further elaborates the empirical setting. Section 3 explains the research methodology. Section 4 presents and discusses the survey findings. Section 5 highlights the contributions of the study, and provides a conclusion of this paper.

SARAWAK RURAL COMMUNITIES, HEALTH PROVISIONS AND ICT USE

Sarawak is popularly known as "Land of the Hornbills" with a population of more than 2.4 million (Malaysia Department of Statistics, 2010). It is the largest state in Malaysia with a recorded land area about 124, 450km2 (Wikipedia, 2012). The three largest ethnics of Sarawak are Iban, Chinese, and Malay; then followed by Bidayuh, Orang Ulu – Kayan, Lun Bawang, Kelabit, Kenyah, Penan, Bisaya -, Melanau and others. At present, Sarawak has 11 divisions. Serian District is within Samarahan Division. In 2010, Serian District recorded about 89,078 populations. Out of this, about 59% (52,886) of the population are of the Bidayuh ethnic group. The remaining groups are from Iban (16%), Malays (12%), Chinese (9%) and others (4%). There are more than 100 villages in Serian District (Leigh, 2002). Figure 1 below, excerpted from Google.com depicts the state of Sarawak which is located on the island Borneo and the location of Serian.

Figure 1. Sarawak Map (Google.com, 2012)

Jin (2007: 190) highlighted the following with regard to Sarawak population that is:

i. More than half of which is rural and low-income,

ii. Living in sparsely populated regions with poor communications infrastructure and correspondingly high transport costs,

iii. With considerable ethnic diversity,

iv. With substantial income inequalities and corresponding differences in demand for services, and

v. With substantial differences in educational levels and correspondingly subject to different degrees of information asymmetry.

Sarawak population has a life expectancy rate recorded in 2010 at 73.8 years for male, and 77.3 years for female (Malaysia Department of Statistics, 2010). The Sarawak health care system is managed directly by the Malaysia Ministry of Health. With regard to the challenges related to providing Sarawak health provisions, Jin (2007:191) further mentioned that among others, are about: (i) how to deliver health services for non-communicable and diseases of lifestyle to a small, relatively low income population in a vast area with a poor communications network, and (ii) how to operate an efficient public and preventive health service, including surveillance for epidemic infectious disease".

In the context ICT infrastructures, one of the significant initiatives undertaken by the Malaysian government to ensure the infrastructures will reach remote areas of Sarawak is the formulation and implementation of the Universal Service Program (USP) and the National Broadband Implementation (NBI) initiatives (Ahmad, 2011). The USP model focuses on providing basic broadband infrastructure, community broadband centre and community broadband library (Ahmad, 2011). The NBI project, on the other hand, was launched on 24th March 2010 and focused upon five initiatives. The initiatives according to Ahmad (2011) are: (1) Citizen Internet Centres and Mini Community Broadband Centres; (2) 1Million Netbook Initiative to distribute notebooks to poor students across Malaysia; (3) Installation of E-Kiosks; (4) CBC (Community Broadband Centres) to the home; and (5) expansion of cellular coverage. According to the report by Malaysian Communications and Multimedia Commission (MCMC), such initiatives can boost the internet broadband penetration rate and coverage in Malaysia and can bridge the digital divide between rural communities and urban communities (MCMC, 2012). In 2009, it was reported that, the percentage household use of the Internet by urban and rural areas in Malaysia was 89.7% and 10.3%, respectively (MCMC, 2011).

Table 1 presents some relevant infrastructure indicators for Sarawak. As of the first quarter of 2012, the broadband penetration rate in Sarawak was only 47.5% and this has placed Sarawak as the third lowest household broadband penetration rate in Malaysia (MCMC, 2012). To date, there are 34 CBC (Community Broadband Centre), 26 CBL (Community Broadband Library) and 31 mini-

community broadband libraries across Sarawak. The recent announcement by the State MCMC Deputy Director Adiman Ajem about the MCMC's target to complete the installation of 600 WiFi villages across Sarawak by the end of 2012 will further reduce the digital divide gap in the context of Sarawak (The Borneo Post Online, 2012, March 22). As of 2011, Malaysia has 127.7% of penetration rate for cellular telephone.

Table 1. Telecommunication Infrastructures for Sarawak (MCMC, 2012, 2011)

Broadband Penetration Rate per 100 Households (Q1 2012)	47.5%
Sarawak CBC centres (number of members)	34 (31, 803)
Cellular Telephone Penetration Rate per 100 Inhabitants (2010)	74.3%
Households with Access to Radio/Hi-Fi (2009)	72.7%
Households with Access to Television (2009)	94.1
Households with Access to Personal Computer (2007)	26.5

Note: Community Broadband Centres (CBC) provide collective community Internet access to underserved areas identified under the Universal Service Provision (USP) programme. Each CBC is equipped with IT equipment including personal computers connected to the Internet via broadband to allow rural communities to enjoy the benefits of the Internet as enjoyed by those living in urban areas. Source: MCMC (2012)

West and Miller (2006) highlighted that there is always a disparity between rural and urban areas in the context of accessing quality online resources pertaining to health. They argued that health literacy can also contribute to such divide. Nutbeam (2000) previously proposed that health literacy should be viewed as an outcome of health promotion. Health literacy can be measured using variables such as health related knowledge, attitudes, motivation, behavioural intentions, personal skills and self-efficacy (Nutbeam, 2000). The website of the National Network of Libraries of Medicine (http://nnlm.gov/outreach/consumer/hlthlit.html/) stated the following:

"…Health Literacy is defined in Health People 2010 as…The degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions…Health literacy includes the ability to understand instructions on prescription drug bottles, appointment slips, medical education brochures, doctor's directions and consent forms, and the ability to negotiate complex health care systems. Health literacy is not simply the ability to read. It requires a complex group of reading, listening, analytical, and decision-making skills, and the ability to apply these skills to health situations. Health literacy varies by context and setting and is not necessarily related to years of education or general reading ability…"

In the context of delivering good quality of online health information, West and Miller further (2006) argued that it is vital for the policy makers and relevant

agencies to ensure that online information is produced in a comprehensible way and such information should reach marginal groups effectively to help to bridge the digital divide issue. To attain this, they urged health website designers to pay attention towards factors such as readability, disability access, non-English translation, privacy and security. In the context of marginal groups, the presentation and delivery of health information should aim towards enhancing health literacy among the groups.

To date, there has been very limited research in the areas related to health literacy as well as rural community accessibility of online health information for Sarawak. The digital divide issue in Sarawak however has been noted consistently by many studies that investigate rural ICT applications. Songan et al., (2004), reflecting on the e-Bario project in Sarawak, have mentioned the following ICT challenges in bridging the digital divide: costly infrastructure, connectivity and use; language resources; coordinated approaches and skilled human resources; and rural community awareness about ICT. E-Bario project is about the initiatives to develop and provide ICT infrastructures that can enable the use of computers and the Internet. Bario is one of the remote areas in Sarawak.

METHODOLOGY

To undertake the research, we deployed a survey method and used a questionnaire as a research instrument. The questionnaire is divided into four different sections as follows: Section A: Socio-Demographic Profile; Section B: ICT Access and Use; Section C: Obtaining Health Information; and Section D: Perceived Infrastructure Accessibility, ICT Skills and Online Information Delivery. For Section C to obtain data about the preferred source of the communication channel to obtain health information, we utilized Likert scale questions, and asked the respondents to rate each statement using a scale from 1 (Never) to 5 (Always); for Section D to obtain data about respondents' perceptions, the scale 1 (Strongly Disagree) to 5 (Strongly Agree) were used. Means were calculated by basing on these scales. The study had engaged a local enumerator who could understand and speak the local language in doing data collection. The enumerator was briefed and trained to facilitate the data collection, and to ensure that the potential illiterate respondents were not being excluded from the sample. The questionnaire is also translated into the Malay language to facilitate the survey respondents' understanding. 200 questionnaires were randomly distributed around the Serian District at the end of March 2012 until beginning of April 2012. The data collection process took about two weeks. Overall, the survey response rate is 97%. A total of 193 respondents participated in the study. The Statistical Package for the Social Sciences (SPSS) software version 19 was used. We utilized descriptive statistical analysis to analyse the survey data.

FINDINGS AND DISCUSSION

Socio-Demographic Profiles

The majority of respondents in the survey were female (61.1%). Male respondents were 38.9%. About 65.8% of them were between the age of 18 and 35 years old. 18.6% and 13.5% of the respondents were between the age of 36-45 and the age of 46-65 years old, respectively; the remaining 2% is the respondents who were under 18 years old. All of our respondents had obtained a formal education (59% of secondary school; 5% of primary school; and the remaining 36% had a college education, i.e., diploma, first degree or postgraduate degree). The largest number of our respondents is from the Bidayuh ethnic group (34.2%), and then followed by Malay (29%), Iban (16.6%), Chinese (11.9%) and other ethnics (8.3%). Table 2 depicts the socio-demographic profiles of the respondents.

Table 2. Socio-demographic profiles of the respondents (n = 193)

Characteristics	N	%
Gender		
Male	75	38.9
Female	118	61.1
Age		
< 18 years old	4	2.0
18 – 23 years old	63	32.6
24 – 35 years old	64	33.2
36 – 45 years old	36	18.6
46 – 65 years old	26	13.5
Highest Education		
Primary School	9	4.7
Secondary School	114	59.1
College	70	36.3
Ethnic Group		
Bidayuh	66	34.2
Malay	56	29.0
Iban	32	16.6
Chinese	23	11.9
Others	16	8.3

Figure 2 depicts the income level and employment status of the respondents. A majority of our respondents (63%) reported income level of MYR1000 and below. Housewife, students and unemployed respondents reported that they do receive income in the form of an allowance from close family. Out of 30% of the

respondents who reported working as assistance workers in a restaurant or shop, about 72% (or 41 respondents out of 57) of them are female.

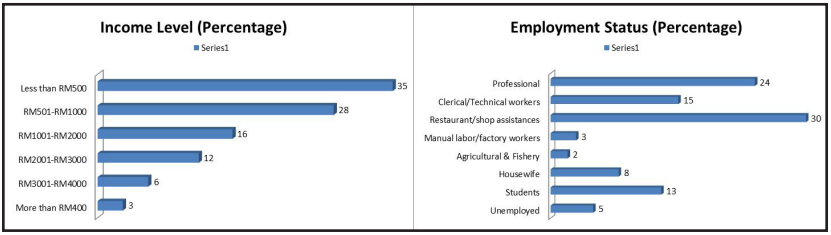

Figure 2. Respondents' Income Level and Employment Status

Access to ICT Infrastructure and Use of the Internet

More than half of the respondents (57%) reported that they have accessed on the Internet at home and the workplace (61%), as well as having access to a computer or notebook at home (73%). However, this study found that less than half of Serian respondents (46%) were actively sought for online health related information. The top five activities related to the Internet use as reported by the respondents are as follows: checking email (75%), using online social networking tools (74%), browsing the website (67%), searching information (58%) and downloading documents (53%). Facebook application is very popular among our respondents. About 92% of the respondents reported that they have access to Facebook applications. Figure 3 depicts the survey results.

The widespread utilization of social network application such as Facebook is not that surprising. The recent statistics obtained from SocialBakers.com (2012) has mentioned that Malaysia was ranked at 17 out of 213 countries by Facebook users recorded about 12,462,900 users. The largest age group of Facebook users according to SocialBakers.com is between 18 and 24 years old, and then followed by the users in the age group between 25 and 34 years old.

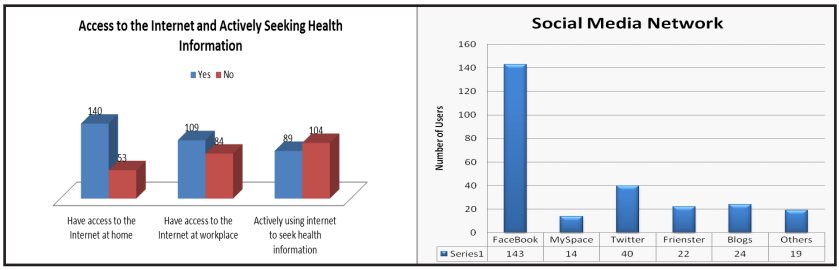

Figure 3. Access to the Internet and Use of Online Social Networks

Obtaining Health Information

When asked to rate sources of communication channel to obtain health information, we found that the majority of the respondents preferred traditional mass media such as TV (mean = 3.56; S.d = 0.99) and radio (mean= 3.27; S.d = 0.97). For newspapers and the Internet, the mean is 3.19 (S.d. = 1.00) and 3.19 (S. d=1. 25), respectively. Interestingly, about 11.4% of the respondents never utilized the Internet to obtain health information.

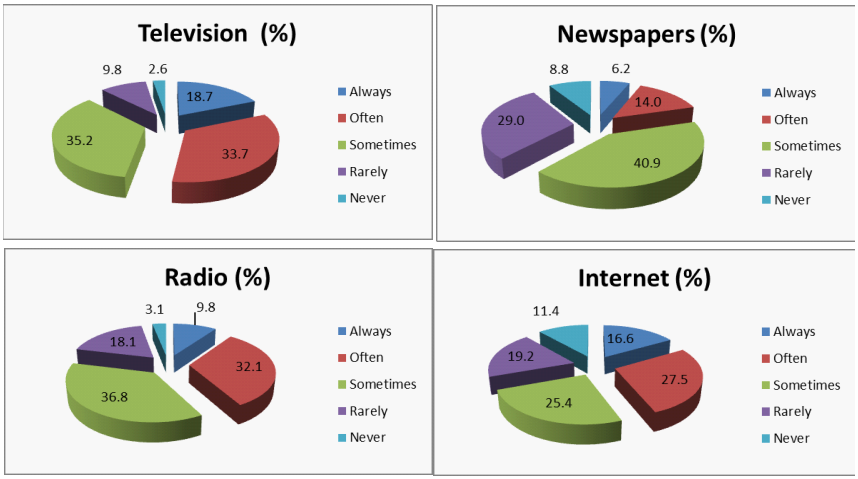

Figure 4. Media Use in Obtaining Health Information

Out of 193 respondents, 63 of them provided their views with regard to issues or barriers that can explain why they do not actively seek health information. Their feedbacks can be grouped into four areas as follows:

- Awareness and Training: Out of 63 respondents, 24 respondents believed that creating awareness about the benefits of using ICT to find health information is important to encourage more active consumer health information in using ICT such as the Internet to find health information. Five of them also mentioned about the needs to have ICT training.
- Infrastructure and Access: Out of 63 respondents, 20 respondents provided their views related to infrastructure and access. They suggest: free Internet access should be made available around the public places (14 respondents); mobile internet broadband use should be encouraged and the coverage should be expanded with cheaper cost to subscribe broadband (5 respondents); and more computers are made available to be used by the public (1 respondent).
- Traditional means of obtaining information: Out of 63 respondents, 14 respondents viewed that frequent activities such as organizing health

talk, seminar, and providing health information through traditional media such as TV, radio and newspaper are important.

- Web site functionality: The remaining five respondents mentioned about the issues related to website functionality such as the availability of multiple languages, particularly the native language, and the needs of the responsible agencies to provide a rating on the quality of healthcare websites.

Perception towards ICT Accessibility, ICT Skills and Online Information Delivery

With regard to ICT infrastructure and access, as shown in Table 3, more than two-thirds of the respondents agreed that good access to ICT infrastructures could offer benefits related to obtaining and sharing online health information. More than half of the respondents also positively perceived that mobile applications with the Internet access could create benefits to them with regard to obtaining online health information. When asked about the Internet's role, about 78% of the respondents strongly agreed that the Internet provides useful and extensive information on illnesses. There was however, a mixed view among the respondents with regard to the performance of the Internet access around the area. More explicitly, less than half of the respondents agreed that the Internet access in their area is very good and reliable. Further, the majority of them positively viewed that the use of ICTs and social networking tools can improve their knowledge about practicing good self-care practices.

Table 3. Perceived on ICT Infrastructure and Access, and ICT Skills

Statements	Mean (S.d)	SD	D	N	A	SA
		n (%)	n (%)	(%)	n (%)	n (%)
Good accessibility to ICT infrastructures can provide the benefits of learning and sharing online health information.	3.95 (0.82)	2 (1)	7 (3.6)	36 (18.7)	101 (52.3)	47 (24.4)
The use of the Internet using mobile applications such as mobile phone can provide convenience, ease and fast speed in obtaining online health information.	3.75 (0.96)	3 (1.6)	19 (9.8)	43 (22.3)	86 (44.6)	42 (21.8)
Around my area, the Internet access coverage (including broadband) is very good and reliable.	3.32 (1.08)	8 (4.2)	39 (20.2)	59 (30.6)	58 (30.1)	29 (15.0)
The use of ICTs and other social networking applications can enhance my knowledge in practicing positive health care practices.	3.85 (0.79)	2 (1.0)	6 (3.1)	46 (23.8)	103 (53.4)	36 (18.7)

The Internet provides very resourceful and comprehensive information on illnesses	4.02 (0.75)	0 (0.0)	5 (2.6)	37 (19.2)	100 (51.8)	51 (26.4)
Continuous learning about ICT can improve my skills in obtaining health-related information online.	4.04 (0.72)	1 (0.5)	3 (1.6)	31 (16.1)	110 (57.0)	48 (24.9)
I have appropriate ICT skills to search for online health related information.	3.49 (0.93)	9 (4.7)	13 (6.7)	65 (33.7)	86 (44.6)	20 (10.4)

SD=Strongly Disagree; D=Disagree; N=Neither Agree/Disagree; A=Agree; S=Strongly Agree

When asked about their views with regard to "I have appropriate ICT skills to search for online health related information", about 55% of the respondents reported agreed/strongly agreed with the statement. Further, a majority of the respondents viewed positively that on-going upgrading their ICT skills and knowledge can improve skills in obtaining online health information. However only 28% of the respondents reported agreed/strongly agreed with the statement "to obtain health information, I register with relevant websites, blogs, social networking sites and online forums" (see Table 4 below). The statement also scores a low mean (mean = 2.91).

Table 4. Perceived Online Information Delivery

Statements	**Mean (S.d)**	**SD**	**D**	**N**	**A**	**SA**
		n (%)	**n (%)**	**(%)**	**n (%)**	**n (%)**
To obtain online health information, I register with relevant websites, blogs, social networking sites and online forums.	2.91 (1.01)	16 (8.3)	50 (25.9)	73 (37.8)	44 (22.8)	10 (5.2)
The use of creativity to deliver online information can effectively promote the importance of undertaking positive health care practices.	4.03 (0.74)	0 (0.0)	3 (1.6)	41 (21.2)	97 (50.3)	52 (26.9)
The online information delivered through health care institutions' websites is user friendly and easily accessible	3.83 (0.74)	0 (0.0)	2 (1.0)	65 (33.7)	89 (46.1)	37 (19.2)
The language is used by healthcare institutions to deliver online information is easy to understand.	3.80 (0.78)	0 (0.0)	7 (3.6)	61 (31.6)	89 (46.1)	36 (18.7)
The health care institutions provide interesting, updated and useful online information.	3.78 (0.78)	0 (0.0)	9 (4.7)	57 (29.5)	95 (49.2)	32 (16.6)

SD=Strongly Disagree; D=Disagree; N=Neither Agree/Disagree; A=Agree; S=Strongly Agree

In the survey, the respondents were also asked to respond to the statements related to the websites provided by healthcare institutions that provide access to online health information. Table 4 depicts the outcomes about their perceptions with the websites that provide access to online health information. More than two-thirds of the respondents (77%) viewed either agreed or strongly agreed about the need to use creativity in designing and delivering online information to promote positive health care practices. The mean score for the statement is 4.03. A majority of the respondents also perceived positively with regard to easy access and user friendliness of the websites that offer online health information. The majority of the respondents also viewed that the language use is easy to understand and the online information provided is interesting, updated and useful. These findings only reflect on the respondents' overall familiarity with several websites that they usually use or view when browsing websites.

CONCLUSION

Overall, the survey findings demonstrate that the use of ICT applications among the Serian respondents to seek, obtain and share online health information is still low. Despite more than two-thirds of the respondents realized about the benefits of using the Internet to obtain online health information, only slightly more than a third of the respondents (46%) were actively seeking online health information. Also, close to one-third of the respondents (28%) rarely/never used the Internet to seek health information. The outcomes from this study can be a useful baseline for future research.

In the developing country context, it is very constructive for the academic literature development to have more research that will investigate about factors that can contribute towards engaging rural communities to become an active user in seeking online health information. We recommend future studies to investigate further whether there is an association between social-demographic factors (i.e., income, education level, age) and information seeking style behavior in the context of rural communities in seeking online health information. Such studies will be able to highlight more clearly about the characteristics and profile of the marginal groups, who are consumer health information, but have not yet taken advantage of the abundance of health information that are available online.

In the Malaysian context, the findings of this research can offer valuable insights about the potential benefits of engaging ICT applications to reach the rural communities. The relevant agencies must recognize the rural communities as consumer health information and they are the underserved groups. We recommend the relevant policy makers and agencies including healthcare campaigners to seriously consider engaging multi-platform communication media and channels to disseminate health information to reach these underserved consumers. As shown in the survey findings, ICT applications including mobile Internet and social media and networking applications were found to be useful to serve the needs of the rural communities. The growing use of social media

to disseminate health information for instance has been consistently noted in the literature. Hawn (2009: 368) mentioned that integrating social media applications in health care "is about changing the locus of control to the patient" and changing the traditional relationship between caregivers and care receivers. More personalized and interactive online health information can promote better engagement and strong doctor-patient relationships (Hawn, 2009). Facebook applications for instance can encourage patient participation on matters related to the patient's health and healthcare (Eysenbach, 2008). An empirical study by Scanfeld et al. (2010) has further shown that how the Twitter application has already been engaged widely to share health information and advice about antibiotic use. In the Sarawak context, mobile Internet applications and social media tools should be effectively integrated in any healthcare campaigns and health information dissemination targeted for rural communities.

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