

The Internet as a Source of Health Information Among Singaporeans: Prevalence, Patterns of Health Surfing and Impact on Health Behaviour

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Abstract

Objective: The Internet is an increasingly popular source of healthcare information. This study describes the prevalence of health surfers in Singapore and their health-surfing patterns. It also assesses their confidence in online health information and the impact the Internet has on health-seeking behaviour. **Materials and Methods:** A cross-sectional survey using a standardised questionnaire was carried out among residents aged 13 to 55 years in 1852 units in Bishan North. These units were selected by single-stage simple random cluster sampling method. **Results:** The household response rate was 51% (n = 950) and the individual response rate was 69% (n = 1646). Responding and non-responding households were similar in terms of ethnicity and housing type. Of the responders, 62.9% surfed the Internet and 37.7% have surfed for health information. Health surfers tended to be younger (20 to 39 years) and have higher education status. Indians were also more likely than other ethnic groups to surf for health. Professional health-related sites comprised the majority (68%) of sites visited, and the most common search keywords concern chronic degenerative diseases, e.g. hypertension. The top preferred sources of health information were doctors (25.9%), the Internet (25.3%) and the traditional mass media (20.5%). Almost half (45.1%) considered online health information trustworthy if it was from a professional source or if the website displayed the source, while 10.6% trusted the information if it concurred with the doctors' advice. The vast majority (91.7%) had taken some action in response to the information. **Conclusion:** The Internet is being used as an accessible source of health information by a substantial proportion of the lay public. While this can facilitate greater partnership in healthcare, it underlines the need for doctors to be pro-active in the practice of evidence-based medicine, and for guidelines to enable patients to use this tool in a discerning manner.

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Introduction

Over the past 2 years, home Internet penetration in Singapore has more than tripled.¹ Today, the Internet has become a major source of information, rivalling traditional media like newspaper and television.

In 2000, 55% of American Internet users searched for health information online at least once a month.² Unfortunately, the accuracy of health information found on the myriad of websites can be highly variable. Although guidelines and recommendations exist,³⁻⁶ there is no governing body to regulate the contents of health websites. False and potentially harmful information may thus be easily propagated on the Internet. Medical professionals are also concerned how this powerful alternative source of health information will affect the doctor-patient relationship. On the other hand, the Internet has the potential to bridge

the gap between doctors and patients; a recent survey has shown that patients prefer to be able to communicate with their doctors via email.⁷

Studies have been carried out to gauge the extent of Internet use for health purposes within specific patient groups in urological⁸ and fertility⁹ clinics. Both found that 21% and 42% of patients surveyed, respectively, have consulted websites regarding their disease, but fewer than 30% of these patients found the information to be useful in decision-making. In a Danish general practice study, 8% of patients interviewed had consulted the Internet in relation to their current visit to the doctor.¹⁰ To date, no community-based study has been carried out to determine the prevalence and patterns of Internet health surfing in our community. This study aims to achieve this; in addition it also assesses the impact of online health information on the public's

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health-seeking behaviour, as well as the degree of confidence local surfers have in such information.

Materials and Methods

Study Design

The study was a community-based, cross-sectional study. The eligible population consisted of all residents in the housing estate aged between 13 and 55 years old, the age range in which 95% of Internet surfers in Singapore¹ falls. The sample area was defined as Bishan North, blocks 201 to 293, and consisted of 6367 units. A single-stage random cluster sampling method was used for sampling, and 1900 households, of which 48 were vacant or under renovation leaving 1852 households, were approached. Within each responding household, all eligible members are invited to participate.

Survey Instrument

The survey instrument was a standardised questionnaire designed to establish the prevalence of health surfers, their demographics and practices. To facilitate standardisation, the questionnaire was translated to Mandarin and Malay versions and the interviewers underwent appropriate training. Two pilot studies were conducted and changes to the questionnaire were made accordingly. For the purpose of our study, we used a classification of health websites adapted from other similar studies.^{2,11} We defined health websites as those that provide information on how to enhance or maintain physical or mental well-being, or information on specific diseases or medication. A health-surfer was defined as a respondent who answered “yes” to the question “Have you ever been to websites which provide information on health?”. In addition to basic demographic information, respondents were asked to state the 3 most important reasons for surfing for health and to list the 3 most recent health-related keywords used for their search. To determine the respondents’ level of confidence in online health information, they were requested to rate themselves on a scale from 1 to 10 where 1 = “I never trust the Internet” and 10 = “I trust the Internet all the time”. Health surfers were also asked to choose the 3 most important criteria by which they judged a health-related website’s trustworthiness, out of a list of criteria and guidelines published by the World Health Organization¹² and the Health on the Net Foundation.¹¹ Impact of the Internet on health behaviour was assessed by asking respondents to identify actions (up to a maximum of 3) they had taken in response to information found on health-related websites.

Data Analysis

Data were entered and analysed using SPSS for Windows Version 10. The chi-square test was used to calculate

statistical significance, where appropriate, and all *P* values quoted are two-sided. Prevalence rate ratios and their respective 95% confidence intervals were used to compare the prevalence of health surfing between various demographic groups.

Results

Response Rate

Of the 1852 households, 950 responded (51%). Respondent and non-respondent households were compared with respect to basic socio-demographic data and were found to be largely similar in terms of ethnicity and housing type. Among the 950 respondent households, a total of 2379 individuals were found to be eligible (i.e. between 13 and 55 years old), of which 1646 individuals (69%) participated.

Demographics of Responders

The demographics of the responders are presented in Table I. There was a slight over-representation of Indians (14.2%) and Malays (6.8%) compared to the population of Singapore. Most of the respondents (60.2%) were in the 30 to 49 years age group, and a fair proportion (17.9%) had completed tertiary education.

Prevalence of Health Surfers

62.9% of the respondents were Internet surfers. Of these Internet users, 37.7% (or 23.7% of the study population) had surfed for health information. Lack of awareness (30.6%) and the lack of interest or need to do so (26.7%) were the main reasons cited by surfers who had never surfed for health.

Demographics of Health Surfers

The majority of health surfers were from the younger age groups. Surfers in the 20 to 29 years age range were 1.50 (CI, 1.16 to 1.94, *P* <0.01) times more likely to surf for health information compared to those in the 13 to 19 years age group, even though the latter form the majority of Internet surfers. Among the ethnic groups, Indians had the highest proportion of health surfers; this finding was not confounded by age or educational level. Indian surfers were 1.66 (CI 1.40 to 1.96, *P* <0.01) times more likely to surf for health-related information than Chinese. The prevalence of health surfing increased with monthly income and education level. Those with higher educational qualifications (degree holders, A Level/diploma) were 1.96 (CI 1.38 to 2.77) times more likely to surf for health information than those with a lower education level (*P* <0.01).

Proportion of Surfing Time Spent on Health-related Sites

The majority (67.8%) of health surfers spent less than

TABLE I: DEMOGRAPHICS OF RESPONDENTS BY INTERNET AND HEALTH SURFING BEHAVIOUR

	Total*	Have surfed Internet for health (%)	Surfs Internet, but not for health (%)	Does not surf Internet at all (%)
Gender				
Male	763	35.5	52.3	12.1
Female	878	38.1	42.4	19.4
Ethnicity				
Chinese	1258	21.1	42.1	36.8
Malay	111	23.4	33.3	43.2
Indian	234	38.0	30.8	31.2
Others	38	36.8	36.8	26.3
Age group (y)				
13-19	239	27.2	65.3	7.5
20-29	246	37.0	46.7	16.3
30-39	513	30.2	39.2	30.6
40-49	468	13.9	33.3	52.8
50-55	165	8.5	13.9	77.6
Education				
None/PSLE	310	9.0	29.0	61.9
N Level/O Level/NTC	639	17.8	35.5	46.6
A Level/Diploma	397	32.0	48.1	19.9
Degree holder	294	42.5	49.0	8.5
Per capita monthly income				
<\$1,000	727	17.5	33.7	48.8
\$1001-\$2000	556	28.1	41.4	30.6
\$2001-\$3000	170	31.2	53.5	15.3
\$3001-\$4000	43	44.2	37.2	18.6
\$4001-\$5000	15	40.0	53.3	6.7
>\$5000	15	33.3	60.0	6.7
Unit type				
4-Room	983	19.8	38.1	42.0
5-Room	364	30.2	40.9	28.8
Executive	295	30.2	43.7	26.1

* Totals for each category may not add to up to 100% because of missing values.

10% of their surfing time surfing for health-related information. Those who spent more than 10% tended to be females and from a younger age group (20 to 29 years).

Reasons for Surfing for Health Information (Fig. 1)

Most respondents surfed to find out more about a specific medical or health condition (43.4%). A further one-third (33.4%) surfed for more general information on health. A small but significant proportion (8.3%) surfed to clarify what a doctor said.

Type of Websites Visited (Table II)

The majority (68%) of sites respondents visited were professional health-related sites. These were fairly evenly distributed between professional organisation and expert group sites, government organisation sites, online medical journals and others. Eighteen per cent of the websites visited were commercial sites and 10% were personal sites. Most of the respondents found these sites through referrals

from non-professional sources, the commonest being search engines (32.8%).

Key words Most Commonly Used

As the keywords listed by respondents were diverse and specific, we categorised them according to disease or health topics. Table III shows the 10 most common categories of keywords used to search for health information, and findings from a similar study¹³ in the United States population are listed for comparison. The most prominent topics were chronic diseases such as heart disease and cancer; interestingly hand, foot and mouth disease (HFMD) was also among the top 5 topics searched, possibly because the survey coincided with an outbreak and public interest was high.

Sources of Health Information (Fig. 2)

The 3 main sources of health-related information among health surfers were the traditional mass media, e.g. radio,

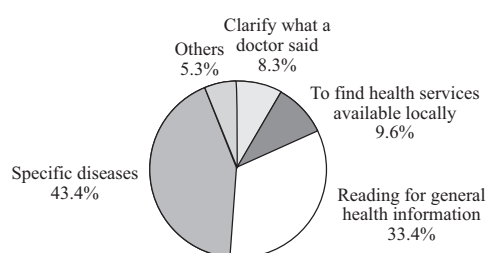


Fig. 1. Main reasons given for surfing for health-related information (No. of responses = 882).

TV and newspapers (26.4%), doctors (22.9%) and the Internet (21.3%). When asked for their *preferred* source of health information, about a quarter (22.9%) of health surfers still chose doctors, the majority (80%) stating perceived credibility of the physician as the reason. However, an equal proportion (21.3%) also indicated the Internet as their preferred source, with most citing accessibility, rather than the actual quality of the contents, as the reason.

TABLE II: TYPES OF HEALTH-RELATED WEBSITES VISITED BY RESPONDENTS

Types	No. of responses	%
Professional	590	68.0
Professional organisations*/expert groups		26.1
Government organisations		25.8
Online medical journals		22.2
Others		25.9
Commercial	156	18.0
Personal	87	10.0
Others	35	4.0
Total	868	100

* Examples of professional health-related organisation websites include hospital and university websites

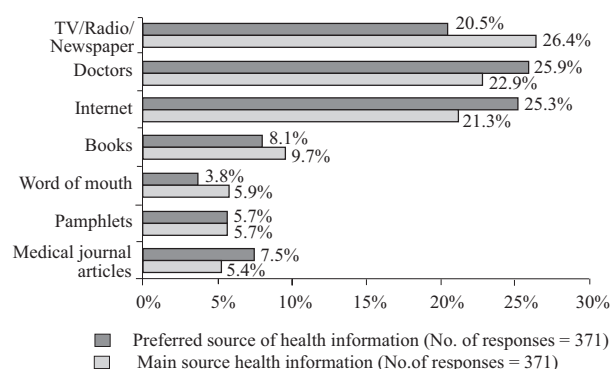


Fig. 2. Main and preferred sources of health information.

Confidence in Health Information Obtained from the Internet

Health surfers were asked to rate their trust in health information found on the Internet on a scale of 1 to 10. The median score was 6 (25th percentile = 5 and 75th percentile = 7). There was no difference in scores when compared between gender, age groups, ethnicity, educational qualifications and income per capita. About 45% of the responses indicated that trustworthiness of a site depended on whether the site displayed the source of the information or mentioned whether the information was from a professional source (Table IV). About a tenth of the responses indicated that a website was trustworthy if the information concurred with that of the doctors'. Seventy-nine per cent of respondents stated that they would consult a doctor first before following any advice on the Internet.

Impact on Health Behaviour

In response to information gained from the Internet, improving one's own lifestyle (e.g. more regular check-ups, change of diet) was the most popular action taken (Fig. 3). About 30% of responses involved seeking more information from a doctor, such as clarifying a prescription or persuading loved ones to see a doctor. About 13% of the

TABLE III: MOST FREQUENT CATEGORIES OF KEYWORDS CITED BY RESPONDENTS

Current Study		US Population ¹³
Categories	Examples	
1. Heart disease	Heart attack, hypertension	1. Allergies
2. Cancer	Lung, breast, liver	2. Cancer
3. Asthma		3. Heart disease
4. Diabetes		4. Diabetes
5. Hand, foot and mouth disease		5. Digestive disorders
6. Diet, nutrition, food	Fats, cholesterol	6. Arthritis
7. Common ailments	Cough, flu, cold, fever	7. High cholesterol
8. Skin diseases	Eczema, rash	8. Migraine
9. Drugs and health supplements	Vitamins, antibiotics	9. Asthma
10. General fitness		

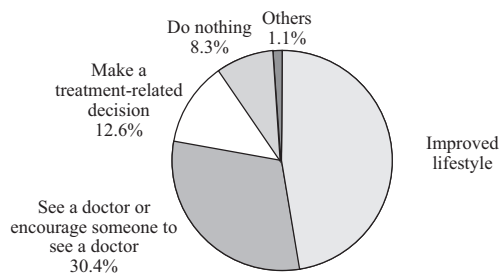


Fig. 3. Actions taken after surfing health-related websites.

(Each respondent was asked to give a maximum of 3 responses. Total number of responses = 850)

TABLE IV: CRITERIA USED BY RESPONDENTS TO ASSESS THE CREDIBILITY OF A HEALTH WEBSITE

Criteria	% of responses
Site states whether information is from a professional	24.2
Site states source of information and has links	20.9
Information on the site agrees with the doctor's	10.6
Dates that the content is posted and updated is indicated	10.3
Any claims are supported by clear balanced evidence	8.7
Site is accredited to a reputable organisation	8.4
Support for the site is clearly identified	6.3
Data relating to patient is kept confidential	4.4
Site displays e-mail of webmaster	2.9
Others	3.3
Total	100

(Each respondent was asked to give a maximum of 3 responses. Total number of responses = 970).

health surfers actually made treatment-related decisions such as improving compliance in medication, buying an over-the-counter drug or even asking doctors for a specific medication.

Discussion

Increasingly, doctors everywhere are encountering patients who come to a consultation already prepared with some information on their disease and treatment options. The major source of such information is the Internet. However, due to the lack of any Internet-governing body, much of the information directed at the lay public is 'unchecked, unstructured and unregulated',¹⁴ and patients need to critically evaluate the information they receive to avoid being misled. Our study hopes to define the profile of typical health surfers and their surfing patterns, as well as to describe how health surfers assess the information they find, and how they apply it.

In interpreting the results of this study, its limitations should be borne in mind. The household response rate was 51% and the individual response rate was 69%, which may affect the accuracy with which the results can be extrapolated to the entire sample area or to the rest of Singapore. Health surfers could have been more willing to respond to the

survey, introducing some degree of selection bias, which is a limitation in many community-based studies.

We found that a quarter of the study population has used the Internet for health information. This is substantially lower than the 55% who regularly surfed for health reported by the Pew study in the US.² The proportion of women who surfed for health, however, is very similar to that of a telephone-based survey in New Jersey, in which 29% of women 18 to 60 years of age said they had ever consulted the Internet for health information.¹⁵

In general, our results suggest that health surfing spans a fairly wide cross-section of the study population. Prevalence rates are similar between men and women, and while rates among Malay and Chinese were lower than among Indians, at least one-fifth of respondents in these ethnic groups had surfed for health. The main demographic differences were seen between education levels and income groups, a finding which will be alluded to later. The highest proportion of health surfers occurred in the 20 to 39 years age group. Although the current study is not able to provide evidence to examine this in detail, we hypothesise that the outbreak of HFMD, which preceded this survey, may have had some impact on our results. This is supported by the fact that this illness was one of the more frequent keywords reported, and that a substantial proportion of respondents in the 20 to 39 years age group were possibly parents of young children who may have surfed for information on this illness.

It is interesting that among the 3 major ethnic groups in Singapore, Indians were more likely to surf for health-related information; and this finding is not confounded by age or academic qualifications. The 1998 National Health Survey reported that the Indian community has the largest proportion of people who exercise regularly.¹⁶ The higher prevalence of health-related surfing among Indians may also be a reflection of greater health awareness in this group.

The other main sources of health information among health surfers are the traditional mass media (26.4%) (e.g. radio and newspaper) and doctors (22.9%). This is expected, as the former has become an accessible and credible source of health information over the years. While a quarter (22.9%) of the health surfers still preferred doctors as their source of health-related information, an equal proportion (21.3%) chose the Internet, a significant proportion citing its accessibility as the main reason. This trend was also seen in the US-based Pew study,² where 93% of health-surfers felt the convenience of obtaining information was important to them. Among those who preferred the doctor to the Internet, 80% of them cited perceived credibility of the physician as the reason.

While the majority of health surfers consulted professional sites, including government organisation sites and online

medical journals, it is of some concern that 32% visited commercial and personal websites, many of which are not subject to regulation. Furthermore, almost a third of health surfers used commercial search engines to look for health websites. In the US-based Pew study,² 81% indicated that they arrived at the sites through search engines, and 64% were not even aware of those websites prior to their search.

Our results show that the most common reason given for surfing for health was to obtain information on specific diseases, a secondary reason being to find out about general health issues. A recent study explored reasons for health-surfing among New Jersey women, and found that Internet use for health was best explained as a tool for health promotion employed by health-conscious segments of the population, and to a lesser extent by those with specific health needs, and those for whom there were geographical or other barriers to consulting a health professional.¹⁵ While there are obvious differences in the background of the two samples that limit comparison, it would appear that, relatively speaking, there are greater felt needs among patients in our community for information on health conditions directly relevant to them or their families. This has implications for hospitals, and other organisations who seek to provide a service to their patients, and suggest that information on causes, treatment, self-care, and even Internet support groups for specific, common health conditions should be developed, in the languages commonly used in Singapore. Furthermore, advising patients on authoritative websites providing this information should be part of the management plan, delivered by the doctor rather than by the commercial search engine.

Given the wide range of sites consulted for health information, it is reassuring that 45% of surfers rate the credibility of a site by the source of its contents, e.g. information from medical journals; 10% felt the information was credible if it concurred with their physicians'; only a minority (6%) judged the quality of the contents by relatively trivial criteria like presence of the webmaster's email address. This reflects a certain degree of maturity among the surfing population, and should give the physician some confidence in the desire of their patients to distinguish credible scientific evidence from dubious claims.

Our findings suggest that the Internet has had a significant impact on health awareness with more than 90% of local health surfers taking some form of action after visiting the websites. However, they are generally cautious about the material they read on the Internet, and a large majority (79%) would not act without first consulting a doctor. Hence, there is clearly a need to establish a concrete set of guidelines to help surfers gauge the quality of the material found on a website. This will enhance the Internet as a tool for disseminating accurate medical information.

While the current study has focused on the Internet as a tool for health information, medicine on the Internet encompasses a vast number of possibilities, from email consultations, web-based disease management programmes for diabetics, and electronic prescribing systems to online support groups and commercial websites promoting health and wellness.^{14,17} Our results suggest that a substantial proportion of the population are already using the Internet for health information, and the potential of this medium for other innovative means to deliver healthcare is high. The availability of health information on the Web has been described as having a 'democratising' effect, changing the nature of the provider-patient relationship. On the other hand, our results and others' also support the existence of a 'digital divide',¹⁵ with accessibility to health information on the Web (as opposed to traditional media) being significantly higher among the socially advantaged. As providers increasingly use the Internet as a tool to deliver various aspects of healthcare, the needs of the population on the other side of the 'digital divide', and similarly innovative ways to meet them, should also be addressed.

Finally, the issue of ethical and legal governance is often uppermost, not least because of the potential for commercial interests to influence the content of health websites. Questions of confidentiality of sensitive health records, patient's rights to consent to disclosure and physician liability are among those for which guidelines have been drawn up by organisations such as the American Medical Association, and the International Healthcare Coalition.^{6,14,18} Both patient and provider should be made aware of their responsibilities in this area.

Conclusion

Our study shows that about a quarter of the study population and a third of the Internet surfers, primarily the younger and more educated respondents, have surfed for health information. These proportions will probably increase with time as the Singapore government places greater emphasis on both health awareness and acquisition of information technology skills. On one hand, there is the potential to build on this increased health awareness and use it to enhance partnership between doctors and patients in addressing the patient's health needs. On the other, our findings underline the need for doctors to be pro-active in the practice of evidence-based medicine and, with the aid of appropriate legal and ethical frameworks, to utilise the accessibility and potential of the Internet to deliver better healthcare for patients.

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