<u>Original Paper</u>

Frequency of Online Health Information Seeking and Types of Information Sought Among the General Chinese Population: Cross-sectional Study

Zihui Xiong[1,2], MA; Liang Zhang[3], MA; Zhong Li[4], PhD; Wanchun Xu[1,2], MA; Yan Zhang[1,2], PhD; Ting Ye[1,2], PhD

[1]School of Medicine and Health Management, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, China

[2]Research Center for Rural Health Service, Key Research Institute of Humanities & Social Sciences of Hubei Provincial Department of Education, Wuhan, China

[3]School of Political Science and Public Administration, Wuhan University, Wuhan, China

[4]School of Health Policy and Management, Nanjing Medical University, Nanjing, China

Corresponding Author:
Ting Ye, PhD
School of Medicine and Health Management
Tongji Medical College
Huazhong University of Science and Technology
No 13 Hangkong Rd
Qiaokou District
Wuhan, 430030
China
Phone: 86 134 7621 5639
Email: yeting@hust.edu.cn

Abstract

Background: The internet is one of the most popular health information resources, and the Chinese constitute one-fifth of the online users worldwide. As internet penetration continues to rise, more details on the Chinese population seeking online health information need to be known based on the current literature.

Objective: This study aims to explore the sociodemographic differences in online health information seeking (OHIS), including the frequency of OHIS and the types of online health information sought among the general Chinese population in mainland China.

Methods: A cross-sectional study for assessing the residents' health care needs with self-administered questionnaires was implemented in 4 counties and districts in China from July 2018 to August 2018. Pearson's chi-square test was used to identify the sociodemographic differences between infrequent and frequent online health information seekers. We also performed binary logistic regression for the 4 types of online health information as the dependent variables and the sociodemographic factors as the independent variables.

Results: Compared with infrequent online health information seekers, frequent seekers were more likely to be female (infrequent: 1654/3318, 49.85%; frequent: 1015/1831, 55.43%), older (over 60 years old; infrequent: 454/3318, 13.68%; frequent: 282/1831, 15.40%), married (infrequent: 2649/3318, 79.84%; frequent: 1537/1831, 83.94%), and better educated (bachelor's or above; infrequent: 834/3318, 25.14%; frequent: 566/1831, 30.91%). They were also more likely to earn a higher income (over RMB ¥50k [RMB ¥1=US $0.15641]; infrequent: 1139/3318, 34.33%; frequent: 710/1831, 34.78%), have commercial health insurance (infrequent: 628/3318, 18.93%; frequent: 470/1831, 25.67%), and have reported illness in the past 12 months (infrequent: 659/3318, 19.86%; frequent: 415/1831, 22.67%). Among the 4 health information types, health science popularization was the most searched for information by Chinese online health information seekers (3654/5149, 70.79%), followed by healthy behaviors (3567/5149, 69.28%), traditional Chinese medicine (1931/5149, 37.50%), and medical concerns (1703/5149, 33.07%). The binary logistic regression models showed that males were less likely to seek information on healthy behaviors (adjusted odds ratio [AOR] 0.69, 95% CI 0.61-0.78) and traditional Chinese medicine (AOR 0.64, 95% CI 0.57-0.73), and respondents who had at least 1 chronic disease were more likely to seek information on medical concerns (AOR 1.27, 95% CI 1.07-1.51) and traditional Chinese medicine (AOR 1.26, 95% CI 1.06-1.49).

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Conclusions: Sociodemographic factors were associated with the frequency of OHIS and types of information sought among the general Chinese population. The results remind providers of online health information to consider the needs of specific population groups when tailoring and presenting health information to the target population.

Introduction

Given its rapid development, the internet has become an essential source of health information worldwide. According to Internet World Stats, the number of internet users has reached 5 billion, accounting for more than 60% of the world population [1]. The internet has the highest usage rate among health information sources [2-4]. Although certain groups still rely on traditional media for health information [5], the internet is increasingly growing in popularity as a source of health information.

The advantages of online health information seeking (OHIS) manifest in various aspects. Turning to the internet before seeking a professional diagnosis has the potential to improve the relationship between patients and their physicians, and patients are more inclined to trust in their physicians' advice by discussing their findings online with these professionals [6-8]. The likelihood of individuals changing their health behavior rises as the frequency of using the internet to retrieve health information increases [9]. For people who live with chronic diseases, the internet may improve their skills in managing their condition [10,11]. However, seeking health information online can be a mixed blessing. Studies have shown that online health information can be inadequate and inaccurate [12-14]. The information may be of questionable quality, leading to hasty, ill-informed, and dangerous health choices [15]. Compared with that available in Western countries, the low-quality online health information seems to be particularly serious in Asian countries [16].

Previous studies have explored how sociodemographic factors influence OHIS behavior. The frequency of OHIS is higher among individuals who are female, younger, better educated, or have a higher household income [9,17,18]. A study that analyzed 2 Pew data sets collected in 2002 and 2012 showed that the sociodemographic factors of gender and education strongly predicted OHIS in both years; meanwhile, age and income were significant predictors in 2012 but not in 2002 [19]. Internet access and OHIS behavior have been shown to vary by race and ethnicity [20-24]. Other factors, such as health status [17] and employment status [24], were also found to be statistically significant in OHIS. A meta-analysis on OHIS revealed that age, gender, education, income, race, and experience were social determinants of OHIS [25]. In summary, most related studies indicate that the crucial characteristics of online health information seekers are age, level of education, income, and ethnicity [26]. Several studies have consistently focused on the predictors of OHIS; however, most of them aimed at identifying determinants that discriminate between online health information seekers and nonseekers [4,20,24,27-29], and elements associated with OHIS among those who have used the internet for health information should also be examined.

Seekers of online health information seek various health topics. Some studies reported information about disease to be the most common topic sought by online health information seekers [19,30]. Other frequently searched topics include symptoms, medication, treatment, exercise and fitness, and nutrition or diet [8,10,30,31]. However, there is no official or agreed upon classification for these common health topics. By reviewing previous studies, these topics can be mainly grouped into 2 types: (1) healthy behaviors, including information related to nutrition or diet, exercise, and body maintenance; (2) and medical concerns, including information related to disease, medications, and treatments [19,32]. Of these 2 types, information on medical concerns is more likely to be sought by people with more health risks [8,31,32]. For instance, compared with the population with no chronic disease, people with chronic conditions are more likely to search about medicines [10]. Overall, evidence shows that medical information seems to be the most popular health information on the internet. However, different population groups have different preferences for health information, and how individuals who seek this information may vary by their characteristics remains obscure.

According to the 47th Statistical Report on China's internet Development [33], as of December 2020, 9.89 million Chinese had access to the internet, and the penetration rate in China reached 70.4%, a rate higher than the average level in Asia (62.6%) [1]. The Chinese population constitutes one-fifth of the world's internet users, and easy access to specialized information, such as medical and health care information, accounts for 29.8% of the factors facilitating China's nonnetizens' access to the internet [33]. However, academic research on OHIS has mostly collected evidence from Western countries, especially the United States [5,10,21], or has focused on certain groups, such as women [23,34], adolescents [28,35], and patients with chronic disease [10,11]. Studies on the general Chinese population, particularly the Mainland population, are still limited.

According to the literature review, OHIS has not only positive but also negative influences on individuals. With the rise of the internet penetration rate, an increasing number of people will have access to online health information. New health information is difficult to effectively categorize when individuals are overwhelmed by diverse or mixed health information, and an overabundance of health information on the internet can make individuals feel confused and become more anxious about

their conditions [36,37]. To ensure that online health information can be effectively used and to understand how individuals can best avoid the negative influence of OHIS, it is crucial to understand the characteristics and preferences of online health information seekers so that practical information can be tailored and presented to the target population. As a result, we aimed to answer 3 questions: (1) Which groups of people are frequent online health information seekers? (2) Which types of online health information do people usually search for? (3) What are the preferences for types of online health information among different population groups? Given that sociodemographic factors have provided an increasingly significant explanation of the variance in OHIS [19], our study aimed to explore sociodemographic differences in OHIS behavior among the general Chinese population, including frequency of OHIS and types of health information sought.

This study used the data of a household survey conducted in 4 counties and districts in Mainland China, which may additionally contribute to the current research. As inaccurate information and the inability to find information may discourage people from retrieving professional information [38], our findings may offer additional knowledge to online health information providers so that appropriate health information content can be tailored and presented. Therefore, we believe this study can significantly contribute to online health information management and promotion in China.

Methods

Study Design

From July 2018 to August 2018, the Research Center for Rural Health Services carried out a study to assess residents' health care needs. Based on the assessment of socioeconomic development and geographic distribution and suggestions from experts [39], 4 counties and districts across China were purposely selected as the survey areas, including 2 districts in urban China (Xiling in central China, Futian in eastern China) and 2 counties in rural China (Dangyang in central China, Sinan in western China) [40].

A multistage stratified random sampling was implemented to select representative samples of the districts' and counties' populations. In the sample size calculation, the design effect was set at 2.5, and the allowable error at the significance level of .05; the chronic disease prevalence was 21.338% according to the 2013 National Health Service Survey [41], and thus the minimum sample size in each survey area was calculated to be 3584 individuals. Given that a family in China has an average of 2.9 members [41], at least 1235 families in every study site needed to be investigated. In the 2 counties (Dangyang and Sinan), 5 towns in each county were randomly selected according to the distance to the county hospitals. Meanwhile, 6 villages in each town were randomly selected according to the distance to the township hospitals. In the 2 districts (Xiling and Futian), 5 streets in each district were randomly selected according to the distance to the medical centers. To ensure that at least 248 families in each town or street were effectively interviewed, 1 other town or street in each county or district was selected as a backup in case of refusal, closed household, or removal of defective questionnaires. We resampled and surveyed until the final sample size met the estimated requirement. The surveyed families were systematically sampled in the rosters of residents from the village or street councils. Under the guidance of well-trained interviewers, face-to-face interviews were conducted, and self-administered questionnaires were used on all the members of the sampled families. Finally, data from 15,126 respondents in 5547 families were collected in total: 3310 individuals in 1360 families in 30 villages in Dangyang, 3983 individuals in 1355 families in 30 villages in Sinan, 4386 individuals in 1513 families in 6 streets in Futian, and 3447 individuals in 1319 families in 5 streets in Xiling. A total of 12,646 individuals above 15 years of age needed to answer the questions related to OHIS, and 5354 respondents (5354/12,646, 42.34%) reported using the internet to seek health information. Among the online health information seekers, those who failed to provide information for all variables queried in this study were excluded, and 5149 individuals were finally included in the analysis.

Ethical approval was obtained from the Ethics Committee of Tongji Medical College, Huazhong University of Science and Technology (#IORG0003571).

Variables

Sociodemographic Factors

The survey questionnaires were divided into several parts, including basic family information, individual information, health status, health care use, and health promotion need. Sociodemographic factors, including gender, age, marital status, area of residence, education level, annual household income per capita, employment, health insurance, having at least 1 chronic disease, and reported illness in the past 12 months, were considered to be independent variables. The coding of independent variables is shown in Table 1.

Table 1. Coding of independent variables.

Variables	Assignment
Gender	Female=0; male=1
Age (years)	15-45=1; 46-60=2; >60=3
Marital status[a]	Single=0; married=1
Area	Rural=0; urban=1
Education level	Junior high school or below=1; senior high school =2; 3-year college=3; bachelor's or above=4
Annual household income per capita (RMB ¥[b])	<10k=1; 10k-30k=2; 30k-50k=3; >50k=4
Employment[c]	Unemployed=0; employed=1
Types of primary health insurance	Urban employee basic medical insurance=1; urban-rural resident basic medical insurance=2; others[d]=3
Having commercial health insurance	No=0; yes=1
Having at least 1 chronic disease	No=0; yes=1
Reported illness in the past 12 months	No=0; yes=1

[a]Marital status was divided into 2 categories: single (unmarried, divorced, or widowed) and married (married).

[b]RMB ¥1=US $0.15641.

[c]Employment was recoded as 2 groups: unemployed (unemployed, students, and retired) and employed (employed).

[d]Others included no primary health insurance and health insurance outside mainland China.

Frequency of OHIS

Most frequency response scales use subjective terms as scale labels, such as the 3-point frequency scale (usually, sometimes or partially, never) and 4-point frequency scale (never, seldom/hardly ever, sometimes, often) [9,42,43]. In this study, the measurement of the frequency of OHIS was adapted from previous studies, which were based on respondents' subjective ratings. Respondents were asked to rate the frequency of OHIS on a 3-point frequency scale (frequent, infrequent, never), and those who selected "Frequent" and "Infrequent" were classified as frequent and infrequent online health information seekers, respectively. Given that our study participants were those who had used online health information, respondents who selected "Never" were excluded.

Types of Online Health Information

In the original survey, respondents were asked whether they had searched for the following health-related contents: sports and fitness, health science popularization, traditional Chinese medicine (TCM), women's health, nutrition and diet, medication guidance, disease consultation, health status monitoring, and others. In this study, 6 items were selected and then grouped into 4 types to be analyzed: (1) healthy behaviors, including sport and fitness, and nutrition and diet; (2) medical concerns, including medication guidance and disease consulting; (3) TCM, which may particularly be sought by Chinese users [31,44]; and (4) health science popularization, an emerging type of health information that aims at improving people's health literacy, which the National Health Commission of China has strongly supported in recent years. According to the National Health Commission of China, information on health science popularization mainly includes scientific knowledge about health technologies, ideas, methods, and skills, which is particularly

disseminated in a way that is easy to understand, accept, and participate in [45]. Of the 4 types of online health information, the first 2 contain the common health topics frequently sought by the general population worldwide, and the analysis of the latter 2 may be helpful to better understanding the OHIS behavior of the general population in the setting of Mainland China. Each type as a dependent variable was dichotomized (yes or no).

Statistical Analysis

First, Pearson's chi-square test was used to compare sociodemographic differences between infrequent and frequent online health information seekers. Second, descriptive analysis was applied to show the prevalence of different types of online health information. Finally, binary logistic regression was conducted on each type of online health information to identify the sociodemographic differences in searches for health information types, and the adjusted odds ratio (AOR) and 95% CI were reported. The significance level was set at a P value of .05.

Results

Sociodemographic Information of the Respondents

Table 2 shows an overview of the main sociodemographic characteristics of the study population and differences in the frequency of OHIS. Online health information seekers comprised more females (2669/5149, 51.84), and most of them lived in urban China (3993/5149, 77.55%). Almost two-thirds (3318/5149, 64.44%) of respondents reported infrequently using the internet to seek health information. Among people who were frequent seekers of online health information, more than half (1015/1831, 55.43%) were female. The comparison between the 2 groups revealed that differences in terms of gender

($P<.001$), age ($P=.01$), marital status ($P<.001$), education level ($P<.001$), annual household income per capita ($P<.001$), possession of commercial insurance ($P<.001$), and reported illness in the past 12 months ($P=.02$) were statistically significant. In contrast, area ($P=.12$), employment ($P=.79$), types of primary health insurance ($P=.57$), and having at least 1 chronic disease ($P=.14$) were not significantly different. Compared with infrequent online health information seekers, frequent seekers were more likely to be females (infrequent: 1654/3318, 49.85%; frequent: 1015/1831, 55.43%), were older (over 60 years old; infrequent: 454/3318, 13.68%; frequent: 282/1831, 15.40%), were more likely to be married (infrequent: 2649/3318, 79.84%; frequent: 1537/1831, 83.94%), were better educated (bachelor's or above; infrequent: 834/3318, 25.14%; frequent: 566/1831, 30.91%), earned a higher income (over RMB ¥50k [RMB ¥1=US $0.15641; frequent: 1139/3318, 34.33%; frequent: 710/1831, 34.78%), were more likely to have commercial health insurance (infrequent: 628/3318, 18.93%; frequent: 470/1831, 25.67%), and were more likely to have reported illness in the past 12 months (infrequent: 659/3318, 19.86%; frequent: 415/1831, 22.67%).

Table 2. Sociodemographic characteristics of the respondents by frequency of OHIS (online health information seeking).

Sociodemographic characteristics	Overall (N=5149), n (%)	Infrequent (N=3318), n (%)	Frequent (N=1831), n (%)	P value
Gender				<.001
Male	2480 (48.16)	1664 (50.15)	816 (44.57)	
Female	2669 (51.84)	1654 (49.85)	1015 (55.43)	
Age				.01
15-45 years	3015 (58.56)	1992 (60.04)	1023 (55.87)	
46-60 years	1398 (27.15)	872 (26.28)	526 (28.73)	
>60 years	736 (14.29)	454 (13.68)	282 (15.40)	
Marital status				<.001
Single	963 (18.70)	669 (20.16)	294 (16.06)	
Married	4186 (81.30)	2649 (79.84)	1537 (83.94)	
Area				0.12
Rural	1156 (22.45)	767 (23.12)	389 (21.25)	
Urban	3993 (77.55)	2551 (76.88)	1442 (78.75)	
Education level				<.001
Junior high school or below	1476 (28.67)	1029 (31.01)	447 (24.41)	
Senior high school	1547 (30.04)	996 (30.02)	551 (30.09)	
3-year college	726 (14.10)	459 (13.83)	267 (14.58)	
Bachelor's or above	1400 (27.19)	834 (25.14)	566 (30.91)	
Annual household income per capita[a]				<.001
<10k	578 (11.23)	406 (12.24)	172 (9.39)	
10k-30k	1600 (31.07)	1071 (32.28)	529 (28.89)	
30k-50k	1122 (21.79)	702 (21.16)	420 (22.94)	
>50k	1849 (35.91)	1139 (34.33)	710 (38.78)	
Employment				.79
Unemployed	1764 (34.26)	1141 (34.39)	623 (34.03)	
Employed	3385 (65.74)	2177 (65.61)	1208 (65.97)	
Types of primary health insurance				.57
UEBMI[b]	2331 (45.27)	1494 (45.03)	837 (45.71)	
URBMI[c]	2620 (50.88)	1702 (51.30)	918 (50.14)	
Other	198 (3.85)	122 (3.68)	76 (4.15)	
Having commercial health insurance				<.001
No	4051 (78.68)	2690 (81.07)	1361 (74.33)	
Yes	1098 (21.32)	628 (18.93)	470 (25.67)	
Having at least 1 chronic disease				.14
No	4154 (80.68)	2697 (66.40)	1457 (79.57)	
Yes	995 (19.32)	621 (57.19)	374 (20.43)	
Reported illness in the past 12 months				.02
No	4075 (79.14)	2659 (80.14)	1416 (77.33)	
Yes	1074 (20.86)	659 (19.86)	415 (22.67)	

[a]Income is reported in renminbi ¥. RMB ¥1=US $0.15641.

[b]UEBMI: urban employee basic medical insurance.

^cURBMI: urban-rural resident basic medical insurance.

Types of Online Health Information Searched

Respondents reported 1 or more different types of health information they sought online. A majority of the respondents (3654/5149, 70.79%) had used the internet to seek health science popularization information, which was followed in popularity by healthy behaviors (3567/5149, 69.28%), TCM, and medical concerns (1703/5149, 33.07%). The prevalence of the searches for the 4 types of online health information is shown in Table 3.

Table 3. Prevalence of types of online health information sought by the study participants.

Types of online health information	Prevalence (N=5149), n (%)
Healthy behaviors	3567 (69.28)
Medical concerns	1703 (33.07)
Traditional Chinese medicine	1931 (37.50)
Health science popularization	3645 (70.79)

Sociodemographic Factors Associated With the Types of OHIS

The results of the binary logistic regression models illustrated sociodemographic differences in seeking the 4 types of online health information (Table 4). Being male was significantly associated with a lower possibility of seeking healthy behaviors (AOR 0.69, 95% CI 0.61-0.78) and TCM (AOR 0.64, 95% CI 0.57-0.73). Compared with individuals aged between 15 and 45 years, middle-aged individuals were more likely to seek TCM (AOR 1.86, 95% CI 1.61-2.15) and health science popularization (AOR 1.20, 95% CI 1.02-1.40), while older adults were more likely to seek information for medical concerns (AOR 1.40, 95% CI 1.12-1.76) and TCM (AOR 2.16, 95% CI 1.72-2.70). Compared with single respondents, married respondents were more likely to seek TCM (AOR 1.22, 95% CI 1.03-1.44) and health science popularization (AOR 1.20, 95% CI 1.02-1.41) but were less likely to seek healthy behaviors (AOR 0.67, 95% CI 0.56-0.80). Living in urban China was associated with increased odds of seeking TCM (AOR 1.23, 95% CI 1.01-1.52). Higher education attainment was correlated with a higher possibility of seeking healthy behaviors (3-year college: AOR 1.56, 95% CI 1.26-1.95; bachelor's or above: AOR 1.33, 95% CI 1.10-1.62), medical concerns (senior high school: AOR 1.19, 95% CI 1.01-1.39; bachelor's or above: AOR 1.46, 95% CI 1.20-1.77), and health science popularization (bachelor's or above: AOR 1.50, 95% CI 1.23-1.83). Lower annual household income per capita was associated with increased odds of seeking healthy behaviors (RMB ¥10k-30: AOR 1.21, 95% CI 1.02-1.44) but decreased odds of seeking TCM (<RMB ¥10k: AOR 0.70, 95% CI 0.54-0.91; RMB ¥10k-30k: AOR 0.76, 95% CI 0.64-0.89). Respondents with urban-rural resident basic medical insurance were less likely to seek health science popularization than those with urban employee basic medical insurance (AOR 0.86, 95% CI 0.74-1.00). Having commercial health insurance was associated with a higher possibility to seek healthy behaviors (AOR 1.55, 95% CI 1.32-1.83) and TCM (AOR 1.27, 95% CI 1.10-1.47) but a lower possibility to seek medical concerns (AOR 0.82, 95% CI 0.70-0.95) and health science popularization (AOR 0.83, 95% CI 0.71-0.96). Individuals who had at least 1 chronic disease were more likely to seek medical concerns (AOR 1.27, 95% CI 1.07-1.51) and TCM (AOR 1.26, 95% CI 1.06-1.49). Similarly, those who reported illness during the past 12 months were also more likely to seek medical concerns (AOR 1.41, 95% CI 1.21-1.65) and TCM (AOR 1.17, 95% CI 1.00-1.38).

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Table 4. Binary logistic regression models for AORs and 95% CIs of reporting the search for each type of online health information.

Sociodemographic Characteristics	Healthy behaviors, AOR[a] (95% CI)	Medical concerns, AOR (95% CI)	Traditional Chinese medicine, AOR (95% CI)	Health science popularization, AOR (95% CI)
Gender				
Female (Ref[b])				
Male	0.69 (0.61-0.78)**	1.11 (0.98-1.25)	0.64 (0.57-0.73)**	1.13 (1.00-1.28)
Age				
15-45 years (Ref)				
46-60 years	1.07 (0.92-1.25)	0.93 (0.80-1.08)	1.86 (1.61-2.15)**	1.20 (1.02-1.40)*
>60 years	0.85 (0.67-1.07)	1.40 (1.12-1.76)**	2.16 (1.72-2.70)**	1.14 (0.90-1.46)
Marital status				
Single (Ref)				
Married	0.67 (0.56-0.80)**	1.17 (0.99-1.37)	1.22 (1.03-1.44)*	1.20 (1.02-1.41)*
Area				
Rural (Ref)				
Urban	0.97 (0.79-1.19)	0.95 (0.77-1.16)	1.23 (1.01-1.52)*	1.05 (0.85-1.29)
Education level				
Junior high school or below (Ref)				
Senior high school	1.16 (0.99-1.37)	1.19 (1.01-1.40)*	1.04 (0.89-1.22)	1.14 (0.97-1.34)
3-year college	1.56 (1.26-1.95)**	1.21 (0.98-1.50)	1.05 (0.85-1.29)	1.19 (0.96-1.48)
Bachelor's or above	1.33 (1.10-1.62)**	1.46 (1.20-1.77)**	0.89 (0.74-1.08)	1.50 (1.23-1.83)**
Annual household income per capita[c]				
>50k (Ref)				
<10k	0.94 (0.72-1.21)	0.84 (0.65-1.09)	0.70 (0.54-0.91)**	0.99 (0.76-1.28)
10k-30k	1.21 (1.02-1.44)*	1.03 (0.87-1.22)	0.76 (0.64-0.89)**	1.11 (0.94-1.32)
30k-50k	1.17 (0.98-1.38)	1.09 (0.92-1.28)	1.01 (0.86-1.19)	1.19 (1.00-1.41)
Employment				
Unemployed (Ref)				
Employed	0.88 (0.75-1.04)	1.10 (0.94-1.29)	1.12 (0.96-1.31)	0.92 (0.78-1.07)
Types of primary health insurance				
Urban employee basic medical insurance (Ref)				
URBMI[d]	0.96 (0.83-1.11)	1.05 (0.91-1.21)	1.06 (0.92-1.22)	0.86 (0.74-1.00)*
Other	0.93 (0.67-1.29)	1.12 (0.81-1.53)	0.79 (0.58-1.09)	0.69 (0.50-0.94)*
Having commercial health insurance				
No (Ref)				
Yes	1.55 (1.32-1.83)**	0.82 (0.70-0.95)*	1.27 (1.10-1.47)**	0.83 (0.71-0.96)*
Having at least 1 chronic disease				
No (Ref)				
Yes	1.02 (0.85-1.22)	1.27 (1.07-1.51)*	1.26 (1.06-1.49)**	0.96 (0.80-1.15)
Reported illness during the past 12 months				
No (Ref)				
Yes	0.88 (0.75-1.03)	1.41 (1.21-1.65)**	1.17 (1.00-1.38)*	1.09 (0.93-1.29)

[a]AOR: adjusted odds ratio.

Discussion

Principal Findings and Comparison With Prior Work

In this population-based study, we examined the sociodemographic differences in frequency of OHIS and types of online health information sought among the general population in China. This study corroborated the findings of a great deal of previous work in that individuals who were female, better educated, and had a higher household income were positively associated with OHIS [17,18,20,23]. The differences in frequency of OHIS among socioeconomically defined groups implied that inequality in health communication might also exist in China, which was consistent with findings of a previous study from Hong Kong [29]. We also found that living areas had no significant difference between infrequent and frequent online health information seekers, while this difference might exist between seekers and nonseekers [20]. In addition, the sociodemographic characteristics included in the analysis were not consistently associated with the types of online health information sought among the Chinese population.

One unanticipated finding is that respondents who frequently sought online health information were more likely to be middle-aged or older adults. This result deviated from the bulk of previous studies, which showed that younger age groups preferred the internet as a source of health information [17,20,23]. Regardless of sources, however, individuals with older age are more likely to search for health information [4,29]. Moreover, a study from Hong Kong found that older adults were more frequently exposed to health information from instant messaging such as WeChat [42]. Given that our study participants were those who had already searched on the internet for health information, a possible reason for this discrepancy is that once older adults have obtained access to online health information, they are likely to seek it more frequently than are younger individuals, thus suggesting the strong demand for health information among middle-aged or older adults in China. However, additional research effort is needed to verify this hypothesis further. As the population ages in China, the health department of the government and other health organizations should take the internet into account as an effective resource to intervene with the older adults' health behaviors. Given that digital health is not reaching all seniors equally and that this disparity probably results in differences in health outcomes [23], the skills and knowledge of older adults should be reinforced so that more of them can use and benefit from online health information. We also found that the married group had a higher proportion of frequent seekers of online health information, suggesting that married respondents might also seek health information for their family members. A study among German older adults found that internet users were more likely to be married or with a partner [46]. Another study revealed that middle-aged adults were most likely to use the internet to search for information about a condition of a loved one [47]. The

association between marital status and the frequency of OHIS may coincide with the association between age and the frequency of OHIS, which may also mean that older people seek out health information for themselves as well as for their partners [47]. Therefore, meeting the health information needs of older adults (eg, information on medical concerns and TCM) is beneficial not only for themselves but also for their partners.

Health science popularization was the most searched for type of online health information among Chinese respondents, and medical concerns was the least searched for type of information. Conversely, earlier literature mostly reported that medical information was the most searched for type of online information [19,30]. This discrepancy may have several causes. On the one hand, the cultural differences between China and other countries, especially Western countries, might have played a role. In recent years, the National Health Commission of China has encouraged the dissemination of health science popularization information in various ways [45]. The increasing popularity of social media and the ever-growing number of official accounts of health science popularization might have attracted many Chinese netizens to follow such information. For instance, by comparing Americans and Hong Kongers, one study revealed that the latter were more likely to trust and use information from social websites [48]. On the other hand, only a minority of respondents in our study had a chronic disease (995/5149, 19.32%) or reported illness in the past 12 months (1074/5149, 20.86%), but they were found more likely to seek information about medical concerns. In addition, the results also showed that respondents over 60 years of age were more likely to seek information about medical concerns, but only 14.29% (736/5149) of the study participants were over 60 years old.

Consistent with previous studies, our study confirmed that people facing health challenges preferred medical information rather than information on healthy behaviors [10,32], which indicated that individuals with more health risks were more eager to improve their current health status. Therefore, people's preferences for health information may be influenced by distinct motivations [49]. More research needs to be conducted to understand Chinese people's motivation in searching for OHIS. Information on healthy behaviors was found to be more likely to be sought by female or better-educated respondents, which was broadly in line with previous studies [50-52]. Our study also found that single respondents were more likely to seek information on healthy behaviors. The sociodemographic differences in preferences for online health information highlight the importance of distinguishing online health information seekers when tailoring and presenting needed information to targeted users.

Information on TCM was more likely to attract attention from older adults, especially older women with chronic diseases. A cross-sectional study focused on older adults in Shanghai indicated that females were more likely to trust and use TCM [53]. Another study showed that having chronic lung disease

was significantly associated with higher TCM practitioner utilization [54]. Indeed, having a chronic condition was identified as one of the main factors that induced people to use TCM in China [55]. As the significant factors found in our study were consistent with those in several previous studies, the preference for online health information about TCM might partly reflect the preference for the use of TCM. Our findings also showed that 37.5% of the respondents had sought TCM information, while a study investigating OHIS behavior of Chinese college students reported that only 15.6% sought TCM information online [44]. Given that TCM is widely accepted and used among the middle-aged and older Chinese population [55], along with the advantages of online health information mentioned before, we believe the provision of TCM-related information on the internet may promote the use of TCM and improve the management of chronic disease in China.

Limitations

Our study has several limitations. First, the content about the motivation for OHIS (eg, for self-care, treating families, and improving lifestyles) and health information sources on the internet (eg, social media and professional websites) were not surveyed, thus resulting in fewer details on the OHIS behavior of Chinese internet users. Second, differences in online health information type classification made our results difficult to compare with those of previous studies. Finally, the research from which this study originated was implemented in 2018. The degree and diversity of internet use has grown since the beginning of the COVID-19 epidemic in 2020. As internet hospitals [56,57], health quick response codes, and antiepidemic science popularization online have been developed and used during the pandemic, the penetration rate of online health information users, especially online medical service users, continues to increase [33]. In addition, the status quo of OHIS in China needs to be further investigated in future research.

Conclusions

This study enriches the current research on the OHIS behavior of the Chinese population. Furthermore, it presents additional knowledge that providers of online health information, government health departments, and other organizations can use. The significant factors found in our study highlight the necessity of identifying the characteristics of the typical online health information users in China, especially age, gender, education level, marital status, and health status, when targeting and developing health interventions by offering health information on the internet. Those who provide health information online should be aware of the needs of specific population groups so that targeted strategies to promote health are presented appropriately.

Authors' Contributions

ZHX, YT, and ZL designed this study; ZL coordinated with the local government and organized the process of data collection; LZ assisted ZL to complete the data entry and quality control; ZHX analyzed the data and drafted the manuscript; YT, ZY, and WCX helped to interpret the results and modified the manuscript, LZ critically revised the manuscript. All authors read and approved the final manuscript.

Conflicts of Interest

None declared.

References

1. World internet users and 2021 population stats. Internet World Stats. URL: https://www.internetworldstats.com/stats.htm [accessed 2021-04-16]
2. Cherrez Ojeda I, Vanegas E, Torres M, Calderón JC, Calero E, Cherrez A, et al. Ecuadorian cancer patients' preference for information and communication technologies: cross-sectional study. J Med Internet Res 2018 Feb 20;20(2):e50 [FREE Full text] [doi: 10.2196/jmir.8485] [Medline: 29463492]
3. Cash T, Desbrow B, Leveritt M, Ball L. Utilization and preference of nutrition information sources in Australia. Health Expect 2015 Dec;18(6):2288-2295 [FREE Full text] [doi: 10.1111/hex.12198] [Medline: 24798108]
4. Khoong EC, Le GM, Hoskote M, Rivadeneira NA, Hiatt RA, Sarkar U. Health information-seeking behaviors and preferences of a diverse, multilingual urban cohort. Med Care 2019 Jun;57 Suppl 6 Suppl 2:S176-S183 [FREE Full text] [doi: 10.1097/MLR.0000000000001050] [Medline: 31095058]
5. Jacobs W, Amuta AO, Jeon KC. Health information seeking in the digital age: an analysis of health information seeking behavior among US adults. Cogent Social Sciences 2017 Mar 13;3(1):1302785. [doi: 10.1080/23311886.2017.1302785]
6. Peng Y, Yin P, Deng Z, Wang R. Patient-physician interaction and trust in online health community: the role of perceived usefulness of health information and services. Int J Environ Res Public Health 2019 Dec 24;17(1):1-13 [FREE Full text] [doi: 10.3390/ijerph17010139] [Medline: 31878145]

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7. Tan SS, Goonawardene N. Internet Health Information Seeking and the Patient-Physician Relationship: A Systematic Review. J Med Internet Res 2017 Jan 19;19(1):e9 [FREE Full text] [doi: 10.2196/jmir.5729] [Medline: 28104579]

8. Rider T, Malik M, Chevassut T. Haematology patients and the Internet--the use of on-line health information and the impact on the patient-doctor relationship. Patient Educ Couns 2014 Nov;97(2):223-238. [doi: 10.1016/j.pec.2014.06.018] [Medline: 25053474]

9. Ayers SL, Kronenfeld JJ. Chronic illness and health-seeking information on the Internet. Health (London) 2007 Jul;11(3):327-347. [doi: 10.1177/1363459307077547] [Medline: 17606698]

10. Madrigal L, Escoffery C. Electronic health behaviors among us adults with chronic disease: cross-sectional survey. J Med Internet Res 2019 Mar 05;21(3):e11240 [FREE Full text] [doi: 10.2196/11240] [Medline: 30835242]

11. Jin Y, Jing M, Zhang L, Song S, Ma X. Internet access and hypertension management among the elderly population: a nationally representative cross-sectional survey in china. J Med Internet Res 2019 Jan 31;21(1):e11280 [FREE Full text] [doi: 10.2196/11280] [Medline: 30702439]

12. Garfinkle R, Wong-Chong N, Petrucci A, Sylla P, Wexner SD, Bhatnagar S, et al. Assessing the readability, quality and accuracy of online health information for patients with low anterior resection syndrome following surgery for rectal cancer. Colorectal Dis 2019 May;21(5):523-531. [doi: 10.1111/codi.14548] [Medline: 30609222]

13. Storino A, Castillo-Angeles M, Watkins AA, Vargas C, Mancias JD, Bullock A, et al. Assessing the Accuracy and Readability of Online Health Information for Patients With Pancreatic Cancer. JAMA Surg 2016 Sep 01;151(9):831-837. [doi: 10.1001/jamasurg.2016.0730] [Medline: 27144966]

14. Glenton C, Paulsen EJ, Oxman AD. Portals to Wonderland: health portals lead to confusing information about the effects of health care. BMC Med Inform Decis Mak 2005 Mar 15;5:7 [FREE Full text] [doi: 10.1186/1472-6947-5-7] [Medline: 15769291]

15. Schulz PJ, Nakamoto K. Patient behavior and the benefits of artificial intelligence: the perils of "dangerous" literacy and illusory patient empowerment. Patient Educ Couns 2013 Aug;92(2):223-228. [doi: 10.1016/j.pec.2013.05.002] [Medline: 23743214]

16. Varady NH, Dee EC, Katz JN. International assessment on quality and content of internet information on osteoarthritis. Osteoarthritis Cartilage 2018 Aug;26(8):1017-1026. [doi: 10.1016/j.joca.2018.04.017] [Medline: 29758353]

17. Ghweeba M, Lindenmeyer A, Shishi S, Abbas M, Waheed A, Amer S. What Predicts Online Health Information-Seeking Behavior Among Egyptian Adults? A Cross-Sectional Study. J Med Internet Res 2017 Jun 22;19(6):e216 [FREE Full text] [doi: 10.2196/jmir.6855] [Medline: 28642216]

18. Wang X, Shi J, Lee K. The digital divide and seeking health information on smartphones in asia: a profile of users. J Med Internet Res Preprint posted online September 03, 2020.. [doi: 10.2196/preprints.24086]

19. Li J, Theng Y, Foo S. Predictors of online health information seeking behavior: changes between 2002 and 2012. Health Informatics J 2015 Aug 10;22(4):804-814. [doi: 10.1177/1460458215595851] [Medline: 26261218]

20. Din HN, McDaniels-Davidson C, Nodora J, Madanat H. Profiles of a Health Information-Seeking Population and the Current Digital Divide: Cross-Sectional Analysis of the 2015-2016 California Health Interview Survey. J Med Internet Res 2019 May 14;21(5):e11931 [FREE Full text] [doi: 10.2196/11931] [Medline: 31094350]

21. Asan O, Cooper Ii F, Nagavally S, Walker RJ, Williams JS, Ozieh MN, et al. Preferences for Health Information Technologies Among US Adults: Analysis of the Health Information National Trends Survey. J Med Internet Res 2018 Oct 18;20(10):e277 [FREE Full text] [doi: 10.2196/jmir.9436] [Medline: 30341048]

22. Massey PM, Langellier BA, Sentell T, Manganello J. Nativity and language preference as drivers of health information seeking: examining differences and trends from a U.S. population-based survey. Ethn Health 2017 Dec;22(6):596-609. [doi: 10.1080/13557858.2016.1244745] [Medline: 27766894]

23. Sedrak MS, Soto-Perez-De-Celis E, Nelson RA, Liu J, Waring ME, Lane DS, et al. Online Health Information-Seeking Among Older Women With Chronic Illness: Analysis of the Women's Health Initiative. J Med Internet Res 2020 Apr 09;22(4):e15906 [FREE Full text] [doi: 10.2196/15906] [Medline: 32271152]

24. Sherman LD, Patterson MS, Tomar A, Wigfall LT. Use of Digital Health Information for Health Information Seeking Among Men Living With Chronic Disease: Data From the Health Information National Trends Survey. Am J Mens Health 2020;14(1):1557988320901377 [FREE Full text] [doi: 10.1177/1557988320901377] [Medline: 31973642]

25. Wang X, Shi J, Kong H. Online health information seeking: a review and meta-analysis. Health Commun 2020 Apr 14:1-13. [doi: 10.1080/10410236.2020.1748829] [Medline: 32290679]

26. Chen J, Zhu S. Online Information Searches and Help Seeking for Mental Health Problems in Urban China. Adm Policy Ment Health 2015 May 16;43(4):535-546. [doi: 10.1007/s10488-015-0657-6] [Medline: 25981055]

27. Cotten SR, Gupta SS. Characteristics of online and offline health information seekers and factors that discriminate between them. Soc Sci Med 2004 Nov;59(9):1795-1806. [doi: 10.1016/j.socscimed.2004.02.020] [Medline: 15312915]

28. Tsai M, Chou Y, Lin S, Lin S. Factors associated with adolescents' perspectives on health needs and preference for health information sources in Taiwan. Arch Dis Child 2013 Jan;98(1):9-15. [doi: 10.1136/archdischild-2012-301629] [Medline: 22820106]

29. Wang MP, Viswanath K, Lam TH, Wang X, Chan SS. Social determinants of health information seeking among Chinese adults in Hong Kong. PLoS One 2013;8(8):e73049 [FREE Full text] [doi: 10.1371/journal.pone.0073049] [Medline: 24009729]

30. Ramsey I, Corsini N, Peters MDJ, Eckert M. A rapid review of consumer health information needs and preferences. Patient Educ Couns 2017 Sep;100(9):1634-1642. [doi: 10.1016/j.pec.2017.04.005] [Medline: 28442155]

31. Wong DK, Cheung M. Online Health Information Seeking and eHealth Literacy Among Patients Attending a Primary Care Clinic in Hong Kong: A Cross-Sectional Survey. J Med Internet Res 2019 Mar 27;21(3):e10831 [FREE Full text] [doi: 10.2196/10831] [Medline: 30916666]

32. Weaver JB, Mays D, Weaver SS, Hopkins GL, Eroglu D, Bernhardt JM. Health information-seeking behaviors, health indicators, and health risks. Am J Public Health 2010 Aug;100(8):1520-1525. [doi: 10.2105/AJPH.2009.180521] [Medline: 20558794]

33. The 47th statistical report on China's internet development. China Internet Network Information Center. URL: https://www.cnnic.com.cn/IDR/ReportDownloads/202104/P020210420557302172744.pdf [accessed 2021-04-22]

34. Maslen S, Lupton D. "You can explore it more online": a qualitative study on Australian women's use of online health and medical information. BMC Health Serv Res 2018 Dec 03;18(1):916 [FREE Full text] [doi: 10.1186/s12913-018-3749-7] [Medline: 30509261]

35. Freeman JL, Caldwell PHY, Scott KM. The Role of Trust When Adolescents Search for and Appraise Online Health Information. J Pediatr 2020 Jun;221:215-223.e5. [doi: 10.1016/j.jpeds.2020.02.074] [Medline: 32446485]

36. Chae J, Lee C, Jensen JD. Correlates of Cancer Information Overload: Focusing on Individual Ability and Motivation. Health Commun 2016;31(5):626-634. [doi: 10.1080/10410236.2014.986026] [Medline: 26512760]

37. Soroya SH, Farooq A, Mahmood K, Isoaho J, Zara S. From information seeking to information avoidance: Understanding the health information behavior during a global health crisis. Inf Process Manag 2021 Mar;58(2):102440 [FREE Full text] [doi: 10.1016/j.ipm.2020.102440] [Medline: 33281273]

38. Tang C, Wu X, Chen X, Pan B, Yang X. Examining income-related inequality in health literacy and health-information seeking among urban population in China. BMC Public Health 2019 Feb 21;19(1):221 [FREE Full text] [doi: 10.1186/s12889-019-6538-2] [Medline: 30791882]

39. Li Z, Zhang L. Poverty and health-related quality of life: a cross-sectional study in rural China. Health Qual Life Outcomes 2020 May 26;18(1):153 [FREE Full text] [doi: 10.1186/s12955-020-01409-w] [Medline: 32456683]

40. Xu W, Li Z, Pan Z, He R, Zhang L. Prevalence and associated factors of self-treatment behaviour among different elder subgroups in rural China: a cross-sectional study. Int J Equity Health 2020 Mar 12;19(1):32 [FREE Full text] [doi: 10.1186/s12939-020-1148-2] [Medline: 32164667]

41. An analysis report of the National Health Services Survey in China, 2013. Center for Health Statistics and Information. 2015. URL: http://www.nhc.gov.cn/ewebeditor/uploadfile/2016/10/20161026163512679.pdf [accessed 2021-04-22]

42. Shen C, Wang MP, Wan A, Viswanath K, Chan SSC, Lam TH. Health information exposure from information and communication technologies and its associations with health behaviors: Population-based survey. Prev Med 2018 Aug;113:140-146. [doi: 10.1016/j.ypmed.2018.05.018] [Medline: 29787775]

43. Woltz DJ, Gardner MK, Kircher JC, Burrow-Sanchez JJ. Relationship between perceived and actual frequency represented by common rating scale labels. Psychol Assess 2012 Dec;24(4):995-1007. [doi: 10.1037/a0028693] [Medline: 22642441]

44. Zhang D, Zhan W, Zheng C, Zhang J, Huang A, Hu S, et al. Online health information-seeking behaviors and skills of Chinese college students. BMC Public Health 2021 Apr 15;21(1):736 [FREE Full text] [doi: 10.1186/s12889-021-10801-0] [Medline: 33858389]

45. Notification of the National Health Commission on printing the guidelines of generating and spreading health science popularization information. National Health Commission of the People's Republic of China. 2015 Aug 11. URL: http://www.nhc.gov.cn/cms-search/xxgk/getManuscriptXxgk.htm?id=5fe32b5a1a8243e2bd819f9eeebfd8b1 [accessed 2021-08-15]

46. Quittschalle J, Stein J, Luppa M, Pabst A, Löbner M, Koenig H, et al. Internet Use in Old Age: Results of a German Population-Representative Survey. J Med Internet Res 2020 Nov 23;22(11):e15543 [FREE Full text] [doi: 10.2196/15543] [Medline: 33226351]

47. Ybarra M, Suman M. Reasons, assessments and actions taken: sex and age differences in uses of Internet health information. Health Educ Res 2008 Jun;23(3):512-521 [FREE Full text] [doi: 10.1093/her/cyl062] [Medline: 16880222]

48. Song H, Omori K, Kim J, Tenzek KE, Morey HJ, Lin W, et al. Trusting Social Media as a Source of Health Information: Online Surveys Comparing the United States, Korea, and Hong Kong. J Med Internet Res 2016 Mar 14;18(3):e25 [FREE Full text] [doi: 10.2196/jmir.4193] [Medline: 26976273]

49. Dutta-Bergman MJ. Health attitudes, health cognitions, and health behaviors among Internet health information seekers: population-based survey. J Med Internet Res 2004 May 28;6(2):e15 [FREE Full text] [doi: 10.2196/jmir.6.2.e15] [Medline: 15249264]

50. Pollard CM, Pulker CE, Meng X, Kerr DA, Scott JA. Who Uses the Internet as a Source of Nutrition and Dietary Information? An Australian Population Perspective. J Med Internet Res 2015 Aug 26;17(8):e209 [FREE Full text] [doi: 10.2196/jmir.4548] [Medline: 26310192]

51. McCully SN, Don BP, Updegraff JA. Using the Internet to help with diet, weight, and physical activity: results from the Health Information National Trends Survey (HINTS). J Med Internet Res 2013;15(8):e148 [FREE Full text] [doi: 10.2196/jmir.2612] [Medline: 23906945]

52. Visschers VH, Hartmann C, Leins-Hess R, Dohle S, Siegrist M. A consumer segmentation of nutrition information use and its relation to food consumption behaviour. Food Policy 2013 Oct;42:71-80. [doi: 10.1016/j.foodpol.2013.07.003]

53. Xin B, Mu S, Tan T, Yeung A, Gu D, Feng Q. Belief in and use of traditional Chinese medicine in Shanghai older adults: a cross-sectional study. BMC Complement Med Ther 2020 Apr 28;20(1):128 [FREE Full text] [doi: 10.1186/s12906-020-02910-x] [Medline: 32345283]

54. Aw JYH, Yiengprugsawan VS, Gong CH. Utilization of Traditional Chinese Medicine Practitioners in Later Life in Mainland China. Geriatrics (Basel) 2019 Aug 25;4(3):1-15 [FREE Full text] [doi: 10.3390/geriatrics4030049] [Medline: 31450713]

55. Liu T, Li X, Zou Z, Li C. The Prevalence and Determinants of Using Traditional Chinese Medicine Among Middle-aged and Older Chinese Adults: Results From the China Health and Retirement Longitudinal Study. J Am Med Dir Assoc 2015 Nov 01;16(11):1002.e1-1002.e5. [doi: 10.1016/j.jamda.2015.07.011] [Medline: 26344870]

56. Xu X, Cai Y, Wu S, Guo J, Yang L, Lan J, et al. Assessment of Internet Hospitals in China During the COVID-19 Pandemic: National Cross-Sectional Data Analysis Study. J Med Internet Res 2021 Jan 20;23(1):e21825 [FREE Full text] [doi: 10.2196/21825] [Medline: 33417586]

57. Gong K, Xu Z, Cai Z, Chen Y, Wang Z. Internet Hospitals Help Prevent and Control the Epidemic of COVID-19 in China: Multicenter User Profiling Study. J Med Internet Res 2020 Apr 14;22(4):e18908 [FREE Full text] [doi: 10.2196/18908] [Medline: 32250962]

Abbreviations

AOR: adjusted odds ratio
OHIS: online health information seeking
TCM: traditional Chinese medicine

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