



DIGITAL ACCESS TO SCHOLARSHIP AT HARVARD

Social Determinants of Health Information Seeking among Chinese Adults in Hong Kong

The Harvard community has made this article openly available.
[Please share](#) how this access benefits you. Your story matters.

| | |
|--------------------------|--|
| Citation | Wang, Man Ping, Kasisomayajula Viswanath, Tai Hing Lam, Xin Wang, and Sophia S. Chan. 2013. "Social Determinants of Health Information Seeking among Chinese Adults in Hong Kong." PLoS ONE 8 (8): e73049. doi:10.1371/journal.pone.0073049. http://dx.doi.org/10.1371/journal.pone.0073049 . |
| Published Version | doi:10.1371/journal.pone.0073049 |
| Accessed | February 19, 2015 2:30:54 PM EST |
| Citable Link | http://nrs.harvard.edu/urn-3:HUL.InstRepos:11877028 |
| Terms of Use | This article was downloaded from Harvard University's DASH repository, and is made available under the terms and conditions applicable to Other Posted Material, as set forth at http://nrs.harvard.edu/urn-3:HUL.InstRepos:dash.current.terms-of-use#LAA |

(Article begins on next page)

Social Determinants of Health Information Seeking among Chinese Adults in Hong Kong

Man Ping Wang¹, Kasisomayajula Viswanath², Tai Hing Lam^{1*}, Xin Wang¹, Sophia S. Chan³

1 School of Public Health, The University of Hong Kong, Hong Kong SAR, China, **2** Center for Community-Based Research, Dana-Farber Cancer Institute/Department of Social and Behavioral Sciences, Harvard School of Public Health, Boston, Massachusetts, United States of America, **3** School of Nursing, The University of Hong Kong, Hong Kong SAR, China

Abstract

Background: Health communication inequalities were observed in Western population but less is known about them among the Chinese. We investigated health information seeking behaviours and its social determinants among Chinese adults in Hong Kong.

Methods: Probability-based sample surveys over telephone were conducted in 2009, 2010/11 and 2012 to monitor family health and information use. Frequency of health information seeking from television, radio, newspapers/magazines and Internet were recorded and dichotomised as ≥ 1 time/month and < 1 time/month (reference). Logistic regression was used to yield adjusted odds ratios (aOR) of health information seeking for different demographic characteristics, socioeconomic status (education, employment and income), chronic disease and behaviours (smoking, drinking and physical activity).

Results: Among 4553 subjects in all surveys, most (85.1%) had sought health information monthly from newspapers/magazines (66.2%), television (61.4%), radio (35.6%) or Internet (33.2%). Overall, being male, lower education attainment, lower household income, ever-smoking and physical inactivity were associated with less frequent health information seeking (all $P < 0.05$). Compared with younger people, older people were less likely to search health information from Internet but more like to obtain it from radio (both P for trend < 0.001). Having chronic diseases was associated with frequent health information seeking from television (aOR = 1.25, 95% CI: 1.07–1.47) and Internet (aOR = 1.46, 95% CI: 1.24–1.73).

Conclusions: This study has provided the first evidence on health information inequalities from a non-Western population with advanced mass media and Internet penetration. Socioeconomic inequalities and behavioural clustering of health information seeking suggested more resources are needed for improving health communication in disadvantage groups.

Citation: Wang MP, Viswanath K, Lam TH, Wang X, Chan SS (2013) Social Determinants of Health Information Seeking among Chinese Adults in Hong Kong. PLoS ONE 8(8): e73049. doi:10.1371/journal.pone.0073049

Editor: Hamid Reza Baradaran, Iran University of Medical Sciences, Iran (Islamic Republic Of)

Received: May 6, 2013; **Accepted:** July 19, 2013; **Published:** August 23, 2013

Copyright: © 2013 Wang et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Funding: This study was a part of the project "FAMILY: A Jockey Club Initiative for a Harmonious Society," which was funded by The Hong Kong Jockey Club Charities Trust. The funder had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Competing Interests: The authors have declared that no competing interests exist.

* E-mail: hrmrlth@hku.hk

Introduction

Social factors play important roles in explaining health disparities and one plausible mechanism is through inequalities in health communication, defined as the difference in accessing, seeking, processing and acting on information by different groups in a society [1,2]. Mass media and Internet are main sources for health information seeking and their influence is evident across the continuum of health from disease prevention, treatment to recovery or end of life [3]. Benefits of health information, particularly among patients with chronic diseases (e.g. cancer), are well-documented including better compliance, improved self-management, reduced psychological stress and increased satisfaction [4].

Although health information seeking behaviour (HISB) is partly explained by psychological factors (e.g. self-efficacy, trait, perception and belief), increasingly studies report that HISB is socially patterned mostly based on evidence from studies in the United

States (US) [4–6]. Seeking health information requires both financial resources and cognitive skills developed through schooling which puts those from a lower socioeconomic status (SES) at a greater disadvantage. Health communication behaviours were also influenced by race and ethnicity due to culture difference and language barriers [5]. However, inequalities in health information seeking is less known in Asian populations which, compared with the West, have different SES inequalities, telecommunication infrastructure and perceptions of health. Only one study among Japanese has reported that lower education attainment and family income were associated with less health information seeking [7]. Explosive development of information technologies in recent years provides easier access to health information and thus may bridge inequalities in health communication [8]. However, the complexity of the use and interpretation of content on the Internet may hinder health communication access, seeking and uses among disadvantaged groups.

Health information seeking is also patterned by other demographic and lifestyle factors. HISB, particularly on Internet, is less frequent among the elderly probably due to the higher perceived barriers, poor health literacy and a lack of interest in self-health management [9]. In general, males and non-Hispanic Whites are less likely to seek health information [4]. HISB patterns may vary with lifestyle behaviours, for example, heavy smokers sought health information less frequently than light and moderate smokers [10]. A bidirectional association between health problems and HISB was also reported [9].

Hong Kong (93.6% are Chinese), the most westernised city in China, has a profound and widening income inequalities with a higher Gini Coefficient (from 0.43 in the 1970s to 0.53 in the 2000s) than Japan (0.45 in the 2000s) and other developed countries [11,12]. Mass media in Hong Kong is vibrant owing to the complete freedom of speech and the universal coverage of television (87.2% watched television for more than one hour per day) and radio broadcasting.[13] Daily newspaper circulation ranks 3rd in Asia and 14th in the world (222 copies per 1000 people).[14] In recent years, newspaper readership has been increasing (69% read newspaper daily) due to a surge in the number of free newspapers.[15] Moreover, advanced cyber-infrastructure and relatively low cost of Internet access in Hong Kong have led to high prevalence of Internet use (72.9% have used Internet in the past 12 months) [16]. Prior local studies have reported that HISB on Internet were associated with being younger female and people with positive perception towards Internet use [17,18]. These findings may not be generalizable as a non-representative sample was adapted [17] and only Internet users were included [18]. Therefore, we investigated the pattern of health information seeking and the association of social determinants with HISB in mass media and the Internet in a representative sample of Hong Kong Chinese adults.

Methods

Ethical Statement

Ethical approval was granted by Institutional Review Board (IRB) of the University of Hong Kong/Hospital Authority Hong Kong West Cluster. Verbal informed consents were obtained from the respondents and the procedure was approved by the IRB.

Survey design

The Hong Kong Family and Health Information Trends Survey (FHinTs) was a regular survey (about once every 12–18 months), and the first 3 were conducted in 2009 (Nov–Dec), 2010/11 (Dec–Mar) and 2012 (Aug–Oct) using probability-based telephone surveys of the general public to monitor the opinions and behaviours on family health, information use and health communication. All interviews were conducted by trained interviewers of the Public Opinion Programme, The University of Hong Kong. The survey targeted the Cantonese-speaking adult population aged 18+. Interviews were mostly conducted in the evenings (6–10pm) and day time when the respondents could not be reached in the evening. A 2-stage random sampling method was used. Telephone numbers (seed numbers) were retrieved from residential telephone directories which cover about 76% of Hong Kong residents [19]. To capture the unlisted telephone numbers, the last digit of the seed numbers with plus or minus one or two generated new random telephone numbers. The telephone numbers were then listed in a random order by a computer programme. Invalid household numbers, non-response calls (not reachable after 8 times of calling) and ineligible households (non-household telephone number, unable to speak Cantonese or aged

<18) were excluded. In the second stage, after interviewers introduced the study purpose, adult respondents were asked how many eligible persons were living in the households. All eligible persons were listed and those with dates of the next birthday closest to the interview days and were immediately available for interviews were selected. Each interview took about 20 minutes to complete.

Measurement

Frequency of health information seeking was assessed by 4 separate questions: “In the past 12 months, how often have you: watched television, listened to radio, read newspapers/magazines and surfed on Internet for health related information?” with responses of “ ≥ 1 time/week”, “1–3 times/month”, “1 time in several months”, “rarely” and “never”. The frequencies were dichotomised as ≥ 1 time/month (monthly) and < 1 time/month (reference). As in other similar studies [5,7], socioeconomic status (SES) was measured using education attainment, household monthly income and employment. Several studies have documented the influence of these SES variables on a variety of health outcomes [20–22]. The responses for SES and behaviours were based on our previous studies and the Hong Kong census with slight modifications. Education attainment was categorised as primary or below (combining “no formal education” and “primary education”), secondary, and tertiary or above. Monthly household income was categorised as $< \$10,000$ (combining “ $< \$4,000$ ” and “ $\$4,000$ – $\$9,999$ ”); $\$10,000$ – $\$19,999$; $\$20,000$ – $\$29,999$; $\$30,000$ – $\$39,999$; and $\geq \$40,000$ (HKD, 1 USD = 7.8 HKD). Employment status was categorised as full-time, part-time, self-employed, and unemployed. Smoking was categorised as never-smokers, ex-smokers and current smokers who smoked daily or occasionally. Similarly, alcohol drinking was categorised as never-drinkers, ex-drinkers, occasional drinkers (less than once per month) and monthly drinkers (1–3 days per month) and weekly drinkers (at least 1 day per week). Frequency of moderate physical activities for 10 minutes in the past 7 days was classified as none, 1–3 days and 4–7 days. History of doctor-diagnosed chronic diseases (cancer, cardiovascular diseases, respiratory diseases, liver diseases, allergy and others) were recorded and classified as none and any. Other collected information included sex, age and marital status.

Statistical analysis

Sample representativeness was estimated by comparing basic characteristics with Hong Kong 2011 census data using Cohen’s effect with a smaller size indicating greater representativeness of the samples [23]. All data were weighted by sex and age from the census data. Prevalence of monthly health information seeking by SES was tracked from 2009 to 2012. Inequalities of health information seeking by sex, age, marital status and SES indicators were assessed by logistic regression which yielded adjusted odds ratios (aOR) of health information seeking. Associations of behaviours and chronic diseases with health information seeking were also analysed in a separate model adjusting for socio-demographic characteristics and SES. Sensitivity analysis was conducted using a different cut-off point of health information seeking (ever vs never). All analyses were performed using STATA 10. A P-value of less than 0.05 was considered statistically significant.

Results

Among 6222 adults with confirmed eligibility, 4553 were successfully interviewed which yielded a response rate of 73.2%. Sex, age and living area distributions of the survey subjects were

similar to Hong Kong 2011 census population data (Cohen's effects were small: 0.02–0.17) suggesting that the sample is quite representative [23]. Of 4553 subjects, 54.1% were female, 74.0% were aged 25–64 and 61.9% were married or cohabitated (Table 1). Most subjects had secondary or above education (75.3%) and 57.1% had monthly family income of \$20,000 or above (average monthly income in Hong Kong was \$20,200). Among 2012 unemployed subjects (44.2%), mostly were retired (42.3%) or homemakers (33.2%). Only a small proportion of subjects were smokers (9.0%) and weekly alcohol drinker (10.7%), near half (44.0%) were physically inactive and one-third (32.2%) had diagnosed chronic diseases.

Among all respondents, most (85.1%) had sought health information at least once a month (monthly) from newspapers/magazines (66.2%), television (61.4%), radio (35.6%) or Internet (33.2%) (Table 2). During 2009–2012, monthly health information

seeking on television and radio came down slightly from 62.2% to 61.4% and 35.1% to 33.2%, respectively, (all *P* for trend <0.05). In contrast, prevalence of online health information seeking increased from 30.6% in 2009 to 35.6% in 2012 (*P* for trend <0.001).

Female and older subjects were more likely to seek health information although increasing age was associated with infrequent health information seeking on Internet (*P* for trend <0.001) (Table 3). Compared with education attainment of primary or below, higher aORs (95% CI) of monthly health information seeking from any source were 1.55 (1.16–2.07) for secondary and 1.86 (1.32–2.63) for tertiary education or above (*P* for trend <0.001). This trend was consistently observed for newspapers/magazines, televisions and Internet. In particular, higher education was strongly associated with monthly health information seeking on Internet (secondary education: aOR = 4.76, 95% CI:

Table 1. Socio-demographic characteristics, chronic disease and behaviours of all subjects in 3 surveys (%).

| | | Un-weighted | Weighted |
|----------------------------|---------------------------|-------------|----------|
| Sex | Male | 37.6 | 45.9 |
| | Female | 62.4 | 44.1 |
| Age | 18–24 | 12.6 | 10.5 |
| | 25–44 | 23.9 | 37.6 |
| | 45–64 | 47.1 | 36.4 |
| | ≥65 | 16.4 | 15.6 |
| Marital status | Single | 27.4 | 32.0 |
| | Married/cohabitated | 65.3 | 61.9 |
| | Others (divorced/widowed) | 7.4 | 6.1 |
| Education | ≤Primary | 18.7 | 14.8 |
| | Secondary | 50.3 | 48.4 |
| | ≥Tertiary | 31.0 | 36.9 |
| Employment status | Full-time | 37.5 | 46.0 |
| | Part-time | 6.8 | 6.3 |
| | Self-employed | 2.9 | 3.5 |
| | Unemployed | 52.8 | 44.2 |
| Monthly household income | <\$10,000 | 22.4 | 19.4 |
| | \$10,000–\$19,999 | 24.5 | 23.5 |
| | \$20,000–\$29,999 | 20.7 | 21.4 |
| | \$30,000–\$39,999 | 14.3 | 14.2 |
| | ≥\$40,000 | 21.4 | 21.4 |
| History of chronic disease | No | 64.3 | 67.8 |
| | Yes | 35.7 | 32.2 |
| Smoking | Never | 85.8 | 84.3 |
| | Ex-smokers | 6.5 | 6.7 |
| | Smoker | 7.7 | 9.0 |
| Drinking | Never | 53.8 | 50.5 |
| | Ex-drinkers | 1.5 | 1.4 |
| | Occasional drinkers | 26.7 | 28.2 |
| | 1–3 days/month | 8.4 | 9.3 |
| | 1 day+/week | 9.6 | 10.7 |
| Moderate physical activity | None | 44.2 | 44.0 |
| | 1–3 days/week | 25.0 | 27.1 |
| | 4 days+/week | 30.9 | 29.0 |

doi:10.1371/journal.pone.0073049.t001

Table 2. Prevalence (weighted) of monthly health information seeking (%; 95% CI) by year.

| Sources | Year | | | Average | OR (95% CI) [†] | P for trend [‡] |
|----------------------|---------------------|---------------------|---------------------|---------------------|--------------------------|--------------------------|
| | 2009 | 2010 | 2012 | | | |
| Newspaper /magazines | 65.5 (63.1–67.9) | 66.1 (63.7–68.5) | 67.1 (64.7–69.4) | 66.2 (32.4–35.2) | 1.87 (0.93–1.25) | 0.64 |
| Televitions | 62.2 (59.7–64.6) | 63.8 (61.3–66.2) | 58.4 (56.0–60.9) | 61.4 (60.0–62.9) | 0.86 (0.74–0.99)* | <0.001 |
| Internet | 30.6 (28.3–33.0) | 38.2 (35.7–40.6) | 38.0 (35.6–40.4) | 35.6 (34.2–37.0) | 1.39 (1.20–1.61)*** | <0.001 |
| Radio | 35.1 (32.7–37.5) | 33.7 (31.3–36.1) | 30.9 (28.6–33.2) | 33.2 (31.9–34.6) | 0.83 (0.71–0.96)* | 0.04 |
| Any | 84.3 (82.4–86.2) | 86.0 (84.1–87.7) | 85.0 (83.2–86.8) | 85.1 (84.1–86.1) | 1.06 (0.87–1.29) | 0.44 |

[†]Comparing proportion of monthly health information seeking in 2012 vs 2009.

[‡]P for trend of odds ratios (OR) of monthly health information seeking using 2009 as reference group.

*P<0.05, **P<0.01, ***P<0.001.

doi:10.1371/journal.pone.0073049.t002

3.23–7.03; tertiary education: aOR = 8.00, 95% CI: 5.30–12.06). Similarly, increasing household income was associated with higher odds for monthly health information seeking (P for trend = 0.07) particularly for newspapers/magazines (P for trend = 0.05) and Internet (P for trend <0.001). Unemployed subjects were more likely to seek health information than full-time employed subjects (aOR = 1.42, 95% CI: 1.10–1.82).

Never smokers were more likely to seek health information from any sources (aOR = 1.39, 95% CI: 1.03–1.88) particularly on Internet (aOR = 1.48, 95% CI: 1.12–1.95) and radio (aOR = 1.54, 95% CI: 1.18–2.00), compared with current smokers (Table 4). Compared with physically inactive subjects, engaging in physical activity was associated with monthly health information seeking from television, radio, newspapers/magazines and Internet (all P <0.05). Overall, having chronic diseases were not consistently associated with monthly health information seeking (aOR = 1.18, 95% CI: 0.95–1.47) except that higher odds for online (aOR = 1.46, 95% CI: 1.24–1.73) and television (aOR = 1.25, 95% CI: 1.07–1.47) were observed among subjects with chronic diseases. Alcohol drinking was not consistently associated with monthly health information seeking except that occasional drinkers were more likely to seek health information from newspapers/magazines (aOR = 1.20, 95% CI: 1.01–1.42) and monthly (1–3 days/month) drinkers were more likely to seek health information on Internet (aOR = 1.49, 95% CI: 1.16–1.92) and radio (aOR = 1.39, 95% CI: 1.08–1.78), compared with never drinkers. We repeated all the analyses by using cut-off point of health information seeking as “ever” vs “never”, which yielded similar associations (data not shown).

Discussion

We have provided the first evidence of SES-based inequalities in health information seeking among Chinese adults in a highly Westernised city in China. Having lower education level and household income were associated with less frequent health information seeking. The findings were consistent with the US study on the inequalities of cancer information seeking and the Japanese study which identified inequalities in information seeking on Internet [5,7]. Having higher education attainment and income correlates with health literacy and self-efficacy on

information searching, and both are important predictors of health information seeking [24,25]. Among various sources of health information seeking, the inequalities of SES was particularly strong for searching for health information on the Internet in our study. This is consistent with findings from Western and other local studies [17,26], and supports the concept of digital divide which posits the differential access to Internet among different social class, racial/ethnic and geographic groups. The increasing use of Internet in Hong Kong may result in wider disparity of health communication given the large difference of health information seeking between socioeconomic groups.

Overall, being female, increasing age, never-smoking and physically active were associated with frequent health information seeking. Alcohol drinking and chronic diseases were not consistently associated with health information seeking. The finding that older people in our study were more likely to seek health information from newspapers/magazines and radio was in contrast to the inverse associations reported in Western studies [9,27]. This may be due to Asian elderly's tendency to trust health information from newspapers as observed in Japanese [7]. Traditional mass media remain as an important channel for disseminating simple and direct health education to the elderly while Internet use is relatively rare for older people.

Infrequent health information seeking was also observed for smokers and physically inactive subjects. This is in line with studies which found that health information seekers had a healthier lifestyle than avoiders [28]. Indeed, these people have greater needs for health information to restore healthy behaviors. More studies are needed to investigate the associations between health communication inequalities and risk behaviors.

Health information seeking is more prevalent in Hong Kong (85.1% sought health information at least monthly) compared with Japan where only 26.1% people reported recent health information seeking although using slightly different definition of frequency [7]. The near universal coverage of mass media (television and radio), increasing number of free newspapers (5 major free newspapers with daily circulation of 2 million copies) and high Internet access in Hong Kong provide immense opportunities for health information seeking [19]. Newspapers and magazines remained the common sources of health information probably due to increased popularity of free newspapers. A

Table 3. Associations of socio-demographic characteristics and economic status with monthly health information seeking among all subjects in 3 surveys.

| | Adjusted odds ratios (95% CI) ^a | | | | |
|---------------------------------|--|---------------------|----------------------|---------------------|---------------------|
| | Newspapers/magazines | Televisions | Internets | Radio | Any |
| Sex | | | | | |
| Male | 1 | 1 | 1 | 1 | 1 |
| Female | 1.48 (1.27–1.71)*** | 1.22 (1.06–1.41)** | 1.45 (1.26–1.67)*** | 0.93 (0.81–1.08) | 1.45 (1.20–1.76)*** |
| Age | | | | | |
| 18–24 | 1 | 1 | 1 | 1 | 1 |
| 25–44 | 1.34 (1.03–1.75)* | 1.20 (0.92–1.56) | 0.73 (0.56–0.96)* | 1.28(0.93–1.77) | 1.34 (0.94–1.90) |
| 45–64 | 1.93 (1.43–2.60)*** | 1.22 (0.92–1.63) | 0.42 (0.31–0.56)*** | 2.39 (1.70–3.37)*** | 1.91 (1.29–2.84)** |
| 65+ | 2.21 (1.55–3.14)*** | 1.36 (0.97–1.91) | 0.17 (0.11–0.26)*** | 3.08 (2.09–4.54)*** | 2.22 (1.38–3.58)** |
| P for trend | <0.001 | 0.11 | <0.001 | <0.001 | <0.01 |
| Marital status | | | | | |
| Single | 1 | 1 | 1 | 1 | 1 |
| Married/cohabitated | 1.12 (0.92–1.36) | 1.06 (0.86–1.31) | 0.88 (0.72–1.06) | 1.44 (1.18–1.77)*** | 0.92 (0.71–1.19) |
| Others | 0.89 (0.63–1.26) | 1.06 (0.76–1.47) | 0.67 (0.43–1.06) | 1.26 (0.90–1.78) | 1.03 (0.63–1.68) |
| Employment status | | | | | |
| Full-time | 1 | 1 | 1 | 1 | 1 |
| Part-time | 0.97 (0.72–1.30) | 1.14 (0.87–1.51) | 0.83 (0.61–1.12) | 0.94 (0.69–1.27) | 1.38 (0.92–2.07) |
| Self-employed | 0.79 (0.56–1.13) | 1.31 (0.89–1.94) | 1.04 (0.72–1.50) | 1.57 (1.11–2.23)** | 1.34 (0.81–2.24) |
| Unemployed | 1.03 (0.85–1.23) | 1.37 (1.15–1.62)*** | 1.09 (0.90–1.32) | 0.98 (0.81–1.80) | 1.42 (1.10–1.82)** |
| Education | | | | | |
| ≤Primary | 1 | 1 | 1 | 1 | 1 |
| Secondary | 2.12 (1.71–2.62)*** | 1.09 (0.90–1.32) | 4.76 (3.23–7.03)*** | 1.17 (0.95–1.44) | 1.55 (1.16–2.07)*** |
| Tertiary+ | 2.65 (2.04–3.41)*** | 1.27 (1.00–1.62)* | 8.00 (5.30–12.06)*** | 1.03 (0.80–1.32) | 1.86 (1.32–2.63)*** |
| P for trend | <0.001 | 0.04 | <0.001 | 0.84 | <0.001 |
| Monthly household income | | | | | |
| <10,000 | 1 | 1 | 1 | 1 | 1 |
| \$10,000–\$19,999 | 1.38 (1.11–1.72)** | 1.18 (0.96–1.46) | 2.00 (1.52–2.64)*** | 0.96 (0.77–1.20) | 1.79 (1.33–2.42)** |
| \$20,000–\$29,999 | 1.50 (1.19–1.90)** | 1.39 (1.12–1.74)** | 2.44 (1.84–3.23)*** | 0.83 (0.66–1.05) | 1.51 (1.11–2.05)* |
| \$30,000–\$39,999 | 1.40 (1.07–1.83)* | 1.17 (0.91–1.50) | 2.45 (1.81–3.32)*** | 0.96 (0.74–1.25) | 1.60 (1.13–2.28)* |
| ≥\$40,000 | 1.37 (1.07–1.70)* | 1.05 (0.8301.33) | 2.23 (1.25–3.00)*** | 0.84 (0.65–1.09) | 1.64 (1.16–2.32)* |
| P for trend | 0.05 | 0.83 | <0.001 | 0.14 | 0.07 |

^aAdjusting for year, and all variables in the table were mutually adjusted.

*P<0.05, **P<0.01, ***P<0.001.

doi:10.1371/journal.pone.0073049.t003

local survey has found a surge of readership of free newspapers from 27% in 2009 to 36% in 2011 and increase in reading time and number of newspapers [15]. Internet use increased from 70.2% in 2009 to 72.9% in 2012. Using same data, we found stable trends of television screen time (from 2.78 hours/day in 2009 to 2.76 hours/day in 2012) and radio listening time (from 1.28 hours/day to 1.21 hours/day in 2012). Prevalence of Internet use for health information seeking (57.8% sought at least monthly) was comparable with those reported among US adults (61.0% sought health information) [29]. This indicated that Internet is an important platform for facilitating health communication. However, using health information with varying quality on the Internet required high level of comprehension skills [30] which may hinder health information seeking among people with lower socioeconomic status.

Our study has several limitations. First, the temporal sequence of factors and health information seeking was uncertain given the cross-sectional design. It is unlikely that health information seeking would lead to lower education attainment and household income. Nevertheless, health information deficit may result in poor knowledge and perception towards health behaviours thus might be prone to reverse causality. Prospective studies are needed to confirm the findings. Second, our study is the first step to describe the general pattern and factors associated with health information seeking in this under-studied Chinese population. Future studies may explore more detailed information on health communication including attention, process, trust and use of health information. Studies are also needed to examine the quality of health information sought on Internet particularly information in Chinese. Third, information was based on self-reporting and studies using more valid methods in tracking behaviour such as

Table 4. Associations of health behaviours and status with health information seeking among all subjects in 3 surveys.

| | Adjusted odds ratios (95% CI) ^a | | | | |
|-----------------------------------|--|---------------------|---------------------|---------------------|---------------------|
| | Newspapers/magazines | Televisions | Internets | Radio | Any |
| Smoking | | | | | |
| Current smokers | 1 | 1 | 1 | 1 | 1 |
| Ex-smokers | 1.03(0.73–1.45) | 0.77 (0.55–1.07)* | 1.37 (0.92–2.06) | 1.09 (0.76–1.56) | 1.11 (0.72–1.70) |
| Never smokers | 1.34 (0.88–1.45) | 1.04 (0.82–1.33) | 1.48 (1.12–1.95)** | 1.54 (1.18–2.00)** | 1.39 (1.03–1.88)* |
| Drinking | | | | | |
| Never | 1 | 1 | 1 | 1 | 1 |
| Ex-drinking | 0.86 (0.49–1.53) | 1.32(0.74–2.38) | 1.82 (0.92–3.58) | 0.71 (0.39–1.80) | 1.18 (0.54–2.62) |
| Occasional drinking | 1.20 (1.01–1.42)* | 1.10 (0.94–1.29) | 0.99 (0.84–1.18) | 0.99 (0.84–1.17) | 1.08 (0.86–1.35) |
| 1–3 days/month | 1.13 (0.88–1.37) | 1.07 (0.84–1.36) | 1.49 (1.16–1.92)** | 1.39 (1.08–1.78)* | 1.24 (0.87–1.75) |
| Weekly drinking | 1.07 (0.85–1.37) | 0.99 (0.78–1.24) | 0.98 (0.76–1.27) | 1.11 (0.88–1.42) | 0.94 (0.68–1.28) |
| Moderate physical activity | | | | | |
| None | 1 | 1 | 1 | 1 | 1 |
| 1–3 days/week | 1.54(1.30–1.83)*** | 1.84 (1.56–2.17)*** | 1.66 (1.39–1.97)*** | 1.45 (1.22–1.72)*** | 1.97 (1.55–2.49)*** |
| 4 days+/week | 1.66 (1.41–1.97)*** | 1.38 (1.17–1.60)*** | 1.58 (1.32–1.89)*** | 1.20 (1.01–1.41)* | 1.82 (1.44–2.29)*** |
| Chronic diseases | | | | | |
| No | 1 | 1 | 1 | 1 | 1 |
| Yes | 1.10 (0.93–1.29) | 1.25(1.07–1.47)** | 1.46 (1.24–1.73)* | 1.01 (0.86–1.19) | 1.18 (0.95–1.47) |

^aAdjusting for sex, age, marital status, education, employment, income, year and mutually adjusted for variables in the table.
doi:10.1371/journal.pone.0073049.t004

Internet use are warranted. Questions for assessing health information seeking were mostly adapted from the US Health Information National Trends Survey (HINTS). We are not certain about the direction of recall bias, if any, on the association. As an important focus of these surveys was on family information, it was unlikely that respondents or interviewers systematically introduced bias when reporting health information seeking. Although our samples are quite representative to general population, we are not certain about the influence of non-response bias and decrease in landline telephones on the findings.

Conclusion

This study has provided the first evidence on health information inequalities from a non-Western population with advanced mass

media and Internet structures. Socioeconomic inequalities and behavioural clustering of health information seeking suggested more resources may be needed for improving health communication in disadvantage groups.

Acknowledgments

We would like to thank the subjects who participated in the telephone surveys and Public Opinion Programme (HKU) for conducting the surveys.

Author Contributions

Conceived and designed the experiments: THL SSC. Performed the experiments: THL SSC. Analyzed the data: MPW XW. Contributed reagents/materials/analysis tools: THL SSC. Wrote the paper: MPW KV THL XW SSC.

References

- Marmot M (2005) Social determinants of health inequalities. *Lancet* 365: 1099–1104.
- Viswanath K (2006) Public communications and its role in reducing and eliminating health disparities. In: Thomson GE, Mitchell F, Williams MB, editors. Examining the health disparities research plan of the National Institute of Health: Unfinished business. Washington DC: Institute of Medicine.
- Viswanath K, Ramanadhan S, Kontos EZ (2007) Mass Media. In: Galea S, editor. Macrosocial determinants of population health. New York, NY: Springer Publishing Company.
- Galarce EM, Ramanadhan S, Viswanath K (2011) Health information seeking. In: Thompson TL, Parrott R, Nussbaum JF, editors. The Routledge handbook of health communication. New York, NY: Routledge.
- Viswanath K, Ackerson LK (2011) Race, ethnicity, language, social class, and health communication inequalities: a nationally-representative cross-sectional study. *PLoS ONE* 6: e14550.
- Ramanadhan S, Viswanath K (2006) Health Information nonseeker: a profile. *Health Commun* 20: 131–139.
- Ishikawa Y, Nishiuchi H, Hayashi H, Viswanath K (2012) Socioeconomic status and health communication inequality in Japan: a nationwide cross-sectional survey. *PLoS ONE* 7: e40664.
- Viswanath K, Nagler RH, Bigman-Galimore CA, McCauley M, Jung M, et al. (2012) The communication revolution and health inequality in the 21st century: implications for cancer control. *Cancer Epidemiol Biomarkers Prev* 21: 1701–1708.
- Cotten SR, Gupta SS (2004) Characteristics of online and offline health information seekers and factors that discriminate between them. *Soc Sci Med* 59: 1795–1806.
- Rutten IJ, Augustson EM, Doran KA, Moser RP, Hesse BW (2009) Health information seeking and media exposure among smokers: a comparison of light and intermittent tobacco users with heavy users. *Nicotine Tob Res* 11: 190–196.
- Economic Analysis Division of Economic Analysis and Business Facilitation Unit of Financial Secretary's Office (2012) Half-yearly economic report 2012. Hong Kong: Hong Kong Special Administrative Region.
- The Organisation for Economic Co-operation and Development (2008) Growing unequal - income distribution and poverty in OECD countries. Paris.
- Information Services Department (2012) Hong Kong The Facts. Hong Kong Special Administrative Region Government.
- UNESCO (2000) Public reports on communication: newspaper. United Nations Education, Scientific and Cultural Organization, Institute for Statistics. [Accessed: May 23, 2013] <http://stats.uis.unesco.org/unesco/tableviewer/document.aspx?ReportId=143>.
- Nielsen (2011) Free newspaper and new media squeeze paid newspaper market.

16. Census and Statistics Department (2013) Hong Kong monthly digest of statistics feature article: Usage of personal computers and Internet services by Hong Kong residents, 2000 to 2012.
17. Yan YY (2010) Online health information seeking behavior in Hong Kong: an exploratory study. *J Med Syst* 34: 147–153.
18. Leung L (2008) Internet embeddedness: links with online health information seeking, expectancy value/quality of health information websites, and Internet usage patterns. *Cyberpsychol Behav* 11: 565–569.
19. Census and Statistics Department (2012) Hong Kong as information society. In: Census and Statistics Department, editor. 2012 ed. Hong Kong.
20. Adler NE, Stewart J (2010) Health disparities across the lifespan: Meaning, methods, and mechanisms. *Ann N Y Acad Sci* 1186: 5–23.
21. Clougherty JE, Souza K, Cullen MR (2010) Work and its role in shaping the social gradient in health. *Ann N Y Acad Sci* 1186: 102–124.
22. Kawachi I, Adler NE, Dow WH (2010) Money, schooling, and health: Mechanisms and causal evidence. *Ann N Y Acad Sci* 1186: 56–58.
23. Cohen J (1977) *Statistical power analysis for the behavioral sciences*. New York: Academic Press.
24. Rakovski C, Sparks L, Robinson JD, Kee KF, Bevan JL, et al. (2012) A regression-based study using jackknife replicates of HINTS III data: predictors of the efficacy of health information seeking. *J Commun Healthc* 5: 163–170.
25. Committee on Health Literacy (2004) *Health literacy: a prescription to end confusion*. Washington, D.C.: Institute of Medicine.
26. Brodie M, Flournoy RE, Altman DE, Blendon RJ, Benson JM, et al. (2000) Health information, the Internet, and the digital divide. *Health Affairs* 19: 255–265.
27. Lambert SD, Loiselle CG (2007) Health information seeking behavior. *Qual Health Res* 2007: 1006–1019.
28. Beaudoin CE, Hong T (2011) Health information seeking, diet and physical activity: an empirical assessment by medium and critical demographics. *Int J Med Inform* 80: 586–595.
29. Fox S, Jones S (2009) The social life of health information: Americans' pursuit of health takes place within widening network of both online and offline sources. Washington, D.C.: Pew Internet & American Life Project.
30. Berland GK, Elliott MN, Morales LS, Algazy JL, Kravitz RL, et al. (2011) Health information on the Internet: accessibility, quality, and readability in English and Spanish. *JAMA* 305: 2612–2621.