The Internet as a Source of Health Information and Services

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Abstract

The Internet is increasingly used for health-related purposes and evolves with the ever-changing needs of patients. The aim of this study was to assess the level of reliance on the Internet as a health information source, to examine which online communication activities are the most common for health purposes, and to determine the attitudes and needs of patients in this area and the factors affecting its use. A total of 1000 adults were selected from the Polish population by random sampling. The survey was administered by the Computer-Assisted Telephone Interview (CATI). The study concluded that 76.9% of the participants used the Internet for health purposes, among whom 72.6% of active and 27.4% of passive users were distinguished. The role of the Internet as a source of health information has increased, which corresponds to a growing interest in online health services. The majority of individuals searching for health information in the Internet lived in urban areas, had a high level of education, and was professionally active. We conclude that the increased interest in the use of the Internet related to health determines the direction in which e-health should be developed in the future.

1 Introduction

The future of health care services is increasingly associated with the rapid development of information and communication technologies (ICT). New forms of telecare bring considerable benefits in the field of using health systems, patient–doctor relations, and individuals' health (Santana et al. 2011). A significant increase in the number of chronically ill people, due to population aging and severe constraints imposed on health budgets in response to the shortage of health care staff, requires a fundamental change in the care process (Peeters et al. 2013). Online health communication results in lower management costs as, instead of being referred to hospitals, more and more patients receive support in their homes. Telecare works well for both acute and chronic illnesses as it allows health professionals to make diagnoses, treat, and provide specialist consultation to distant communities (Burke and Hall 2015). It increases the level of convenience, and thus the quality of

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healthcare, and it ensures the independence of patients who wish to stay at home. On the one hand, the Internet reduces barriers and facilitates the availability of medical services, but on the other hand, it affects the doctor–patient relationship and may influence treatment. Nowadays, patients are well-informed about a wide range of health-related topics and more and more willing to take advantage of the opportunities created by the ICT development.

Many studies confirm that the Internet is an increasingly popular source of health information for health care providers and consumers alike. The Pew Internet and American Life Project Survey, conducted in 2012, has shown that 72% of US adults use the Internet for health purposes and one-third believes it is a good diagnostic tool (Fox and Duggan 2013). In the Polish population, the use of the Internet for health-related purposes significantly increased from 41.7% in 2005 to 66.7% in 2012 (Bujnowska–Fedak 2015). For many years, it has been mainly used to seek information. However, in the last two decades, there was a shift in the role of the patient from a passive recipient of health information to an active Internet user (Lustria et al. 2011). Data generated from the US Health Information National Trends Surveys (HINTS) of 2003–2013 have shown a growing trend in using online health services, including ordering medications, sending emails to doctors, and accessing personal medical information through online patient portals. According to the HINTS, 7% of Internet users reported communicating online with a health care provider in the past 12 months as of 2003. Then, the proportion of the American population that used the Internet for communication was gradually growing. There were 10% of Internet users in 2005, 14% in 2008, 19% in 2011, and 30% in 2013 (Tarver et al. 2018; Beckjord et al. 2007). Two surveys conducted in seven European countries in 2005 and 2007 have shown a higher interest in using the Internet to communicate with health professionals. Kummervold et al. (2008) have reported a growth in the use of interactive Internet health services from 15.3% in 2005 to 22.7% in

2007. In the Polish population, the use of such services also is on the rise. It was 15.5% of the population in 2005, 22.9% in 2007, and 38.2% in 2012 (Bujnowska–Fedak 2015).

Even though the ways and methods in which people obtain health information from the Internet have already been studied in the past, there are still few data on the current use of the Internet for health communication and on the factors affecting it. Therefore, the aim of this study was to assess the level of trust with regard to the Internet as a health information source, to examine which online communication activities are the most common for health purposes, and to determine the attitudes and needs of patients in this area and the factors affecting its use.

2 Methods

2.1 Study Design

This survey-type study expands on the previous one that has presented the needs and expectations of the lay public in Poland, potential recipients of health services, concerning the role of mobile communication devices in medical care (Waligóra and Bujnowska–Fedak 2019). The source of research material for both studies was the same and consisted of a nationwide random sample of 1000 Polish adults (F/M: 558/442). The median age was 53 years (min-max: 18–88). The study was conducted in December 2017 and January 2018. The use of the Internet for health information and services, and the determination of patients' attitudes and activities in this area were considered an independent research ramification of the e-health services. Therefore, it was herein described as a separate entity.

The questionnaire was carried out through the Computer-Assisted Telephone Interviews (CATI). Geographical distribution of participants was controlled on the basis of voivodeship and town size, to ensure the representativeness of the study group. The selection of participants was planned in such a way as to reach people with the required sociodemographic characteristics.

Both landline and mobile telephones were included in the survey, with a ratio of 37–63%, respectively. An average response rate was 5.2%. A "nonresponse" group included people who failed to answer the phone, did not want to participate in the interview, or were too sick to participate. The vast majority of "nonresponses" were people who refused to participate in the survey without giving any reason. In such a case, the household was replaced by another one with the same characteristics (region, town size, etc.). Sampling continued until at least 1000 complete interviews were carried out.

2.2 Questionnaire

The questionnaire was developed based on the currently available literature and our earlier studies (Bujnowska–Fedak and Mastalerz–Migas 2015; Bujnowska–Fedak and Pirogowicz 2014; Andreassen et al. 2007). It included 23 questions covering demographic and health status characteristics and also questions related to online information-seeking behavior and interactive use of e-health services. Firstly, participants were asked how often they used the Internet and how often they used it for health-related purposes. The response categories were the following: "everyday" (1), "at least once a week" (2), "once or several times a month" (3), and "less than once a month" (4), "I never use the Internet" (5), and "I never use the Internet but I ask others to do it for me" (6). The importance attributed to the Internet (1) as a source of medical information compared with other sources such as TV/radio (2), books/health and encyclopedias/booklets (3), courses/lectures/seminars (4), newspaper/magazines (5), family/friends/colleagues (6), pharmacy (7), and direct personal contact with medical professionals (8) was also assessed. The responses to this question were given according to the five-point Likert scale from "not important" to "very important" with the neutral response in the middle. The frequency of various activities related to online communication was assessed by asking the participants how often they used the Internet to communicate with doctors, participate in forums or self-help groups, and buy medications or medical components. The response categories were: "everyday" (1), "at least once a week" (2), "once or several times a month" (3), "less than once a month"(4), and "I never use the Internet" (5). The frequency of the following activities was measured among the Internet users who contacted their family doctors online: obtaining a prescription, making an appointment, asking a particular health question, and getting to know the content of health professionals' websites. The questionnaire also contained questions related to the sociodemographic characteristics and health conditions (e.g., respondent's age, gender, education, or place of residence).

2.3 Data Analysis

The entire group of participants was divided into four different groups: the total sample, which represented the general population, and subsamples of the participants who reported that they used the Internet for health-related purposes (HI-users), further divided into active (HI-active users) and passive users (HI-passive users). A descriptive analysis, followed by a statistical analysis, was carried out to identify significant associations between the participant independent variables and their opinion on the use of the Internet for health-related communication purposes. The correctness of the distribution of quantitative variables was checked using the Shapiro-Wilk test. None of the variables had a normal distribution. For this reason, only the following nonparametric ones were used for further analysis: Fisher's exact test of independence, Chi-squared test for equal proportions (homogeneity test), and Wilcoxon multiple comparison test for unrelated samples. The significance level of 0.05 was assumed in all the tests. The statistical package R software v3.5.1 was used in the calculations.

3 Results

3.1 Characteristics of Participants

There were 769 out of the 1000 people who declared they used the Internet for health-related purposes. 61.3% of the participants lived in the city and 38.7% in rural areas. As far as the employment status is concerned, 59.4% of the participants performed paid or unpaid work, 31.7% were retired or chronically ill/disabled, and 4.4% were university students. More details on the study population are provided in Table 1.

3.2 Sources of Information About Health and Illness

Forty-eight percent of the participants declared that the Internet was an important source of health information. In fact, it turned out to be more popular than other media such as television and newspapers. The most important source of information, however, was direct contact with health professionals. In the ranking of the most popular sources of medical information, the Internet took the third position, following direct contact with health professionals and family and friends, among active users, and the fourth position following pharmacies, among passive users (Table 2).

3.3 Internet Use for Health Purposes

The Internet was used by 89% of the entire study group, 77% of which used it for health-related purposes (HI users). Unlike non-HI users, HI users were younger ($p < 0.001$) and more often females ($p = 0.049$). People with higher or secondary education were more willing to use it than those with basic/vocational education ($p < 0.00001$). Furthermore, the participants who were university students and professionally active used the Internet more frequently than retirees and disabled people ($p < 0.00001$). A significantly greater percentage of HI users than that of non-HI users lived in the city ($p = 0.026$)

or with someone else ($p = 0.008$). What is more, healthy people more often used the Internet for health purposes (87) than those in poor health (50) ($p < 0.00001$) (Table 3).

Differences between the groups that used the Internet in an active and passive way were also revealed. Active users were younger ($p < 0.001$) and better educated ($p < 0.00001$) than passive ones. The significant majority of active users were employees or students rather than retirees or the unemployed ($p < 0.00001$). Active users of the Internet more often lived in big cities than in rural areas ($p = 0.028$). E-health services were more often used actively by those who were in better health than those who assessed their health state as poor ($p = 0.001$). The interactive use of medical services is showed in Table 4.

3.4 Attitudes Toward E-Health Services and Factors Affecting Their Use

Interacting with unknown health professionals was the most frequently used e-health service. It concerned 47% of the HI users (Fig. 1). Statistically significant factors affecting the interaction with unknown health professionals included: age and employment status (Table 5). As far as age is concerned, the largest percentage was observed in the youngest age group (18–35 years old) – 51.6% ($p = 0.043$). Further, participants who performed paid or unpaid work and those who were still under education were more likely to interact with unknown health professionals than retirees ($p = 0.001$). There was no statistically significant difference depending on gender, place of residence, or type and mobile use. Thirty-seven percent of the HI users participated in forums or self-help groups; the most willing participants were young and middle-aged people ($p = 0.037$). Almost one-third of the HI users reported the purchase of medicines and medical components. It concerned more often younger people ($p < 0.00001$) with secondary or higher education ($p < 0.00001$), who were professionally active ($p < 0.00001$) and healthy ($p = 0.003$).

Table 1 Characteristics of the study group

Characteristics	All participants (n = 1,000) n (%)
Gender	
Men	442 (44.2)
Women	558 (55.8)
Median age (min-max) (years)	53 (18–88)
Age groups	
18–35	302 (30.2)
36–59	429 (42.9)
60+	269 (26.9)
Education	
Basic/vocational	339 (33.9)
Secondary	373 (37.3)
College/university	288 (28.8)
Employment status	
Education underway	44 (4.4)
Paid or voluntary work/other	594 (59.4)
Unemployed	45 (4.5)
Retired/sick or disabled	317 (31.7)
Residency type	
Alone	615 (61.5)
With family/other	385 (38.5)
Residency place	
Urban	613 (61.3)
Rural	387 (38.7)
Health status	
Good/very good	575 (57.5)
Fair	350 (35.0)
Bad/very bad	75 (7.5)
Mobile use	
Yes	957 (95.7)
No	43 (4.3)

Table 2 Ranking of various sources of health information

Source of health information	All participants	Rank	Health Internet users (HI users)					
			All users	Rank	Active users	Rank	Passive users	Rank
Internet	3.49 ± 1.54	4	3.69 ± 1.27	3	3.76 ± 1.22	3	3.51 ± 1.39	4
TV/radio	3.15 ± 1.42	6	3.05 ± 1.38	7	3.03 ± 1.37	7	3.10 ± 1.40	5
Books/medical encyclopedias/leaflets	3.48 ± 1.40	5	3.56 ± 1.33	4	3.59 ± 1.32	4	3.51 ± 1.34	4
Courses and lectures	3.00 ± 1.68	8	3.13 ± 1.63	6	3.21 ± 1.60	6	2.91 ± 1.71	7
Newspapers, magazines	3.00 ± 1.37	7	2.94 ± 1.31	8	2.92 ± 1.30	8	3.00 ± 1.33	6
Family, friends, and colleagues	3.87 ± 1.23	2	3.81 ± 1.20	2	3.79 ± 1.18	2	3.87 ± 1.25	2
Pharmacies	3.56 ± 1.37	3	3.55 ± 1.32	5	3.56 ± 1.28	5	3.52 ± 1.41	3
Face-to-face contact with health professionals	4.36 ± 1.07	1	4.40 ± 1.01	1	4.44 ± 0.97	1	4.31 ± 1.10	1

Data are mean ± SD scores on a 5-point scale of ranking, where 1 stands for "unimportant" and 5 for very "important"

Table 3 Characteristics of users and nonusers of e-health services

| Category of users | Internet health-related services | | |
| | HI users | Non-HI users | |
	n (%)	n (%)	p
All	769 (76.9)	121 (12.1)	
Gender			
Men	337 (43.8)	65 (53.7)	0.049
Women	432 (56.2)	56 (46.3)	
Median age (min-max) (years)	51 (18–84)	53 (18–88)	<0.0001
Age groups			
18–35	274 (35.6)	20 (16.5)	<0.0001
36–59	362 (47.1)	49 (40.5)	
60+	133 (17.3)	52 (43.0)	
Education			
Basic/vocational	210 (27.3)	56 (46.3)	<0.0001
Secondary	297 (38.6)	47 (38.8)	
College/university	262 (34.1)	18 (14.9)	
Employment status			
Education underway	41 (5.3)	3 (2.5)	<0.0001
Paid or voluntary work/other	522 (67.9)	55 (45.5)	
Retired/ill or disabled	166 (21.6)	60 (49.5)	
Unemployed	40 (5.2)	3 (2.5)	
Residency type			
Alone	89 (11.5)	25 (20.7)	0.008
With family/other	680 (88.5)	96 (79.3)	
Residency place			
Urban	496 (64.5)	65 (53.7)	0.026
Rural	273 (35.5)	56 (46.3)	
Health status			
Good/very good	495 (64.4)	52 (43.0)	<0.0001
Fair	237 (30.8)	49 (40.5)	
Bad/very bad	37 (4.8)	29 (16.5)	
Mobile phone use			
Yes	754 (98.0)	109 (90.1)	<0.0001
No	15 (2.0)	12 (9.9)	

P-value shows significant differences between the two groups, using Fisher's independence test or Wilcoxon's test

3.5 Patterns in the Use of the Internet in Communication with General Practitioners

Fifteen percent of the HI users declared that they had contacted their general practitioners via the Internet. Citizens who were more willing to do it were younger ($p < 0.0001$), lived in the city ($p < 0.0001$), were better educated ($p < 0.0001$), and were university students or employees ($p < 0.0001$). The vast majority of citizens contacted their family doctors via the Internet to make an appointment (79%). Other services included: becoming acquainted with the doctor's website (48%), studying their medical records (34%), asking a particular health question (29%), and obtaining a prescription (27%) (Fig. 2). Young or middle-aged participants were most likely to make an appointment online ($p = 0.033$). People in bad or very bad health condition were most frequently interested in

Table 4 Interactive use of e-health services

Category of users	Active users n (%)	Passive users n (%)	p
All	558 (55.8)	211 (21.1)	
Gender			
Men	243 (43.5)	94 (44.5)	
Women	315 (56.5)	117 (55.5)	
Median age (years) (min-max)	49 (18–80)	51 (18–84)	<0.001
Age groups (years)			
18–35	230 (41.2)	44 (20.9)	<0.00001
36–59	253 (45.3)	109 (51.7)	
60+	75 (13.5)	58 (27.4)	
Education			
Basic/vocational	134 (24.0)	76 (36.0)	<0.00001
Secondary	210 (37.6)	87 (41.3)	
College/University	214 (38.4)	48 (22.7)	
Employment status			
Education underway	32 (5.7)	9 (4.2)	<0.00001
Paid or voluntary work/other	403 (72.2)	119 (56.4)	
Retired/sick or disabled	96 (17.3)	70 (33.2)	
Unemployed	27 (4.8)	13 (6.2)	
Residence place			
Urban	373 (66.8)	123 (58.3)	0.028
Rural	185 (33.2)	88 (41.7)	
Residency type			
Alone	66 (11.8)	22 (10.5)	0.703
With family/other	492 (88.2)	189 (89.5)	
Health status			
Good/very good	385 (69.0)	113 (53.8)	0.001
Fair	149 (26.7)	85 (40.0)	
Bad/very bad	24 (4.3)	13 (6.2)	
Mobile phone use			
Yes	548 (98.2)	206 (97.6)	0.570
No	10 (1.8)	5 (2.4)	

P-value shows significant differences between the two groups, using Fisher's independence test or Wilcoxon's test

obtaining a prescription ($p = 0.032$). A positive correlation between asking a particular health question and living in rural areas was observed ($p = 0.025$). There was no relationship between the above-mentioned activities and other sociodemographic variables; more details are presented in Table 6.

4   Discussion

This study showed that the Internet plays an increasingly significant role, and almost half of the participants considered it an important source of information. It was positioned just behind family/friends and doctors, who remained the biggest authorities and verifiers of medical information.
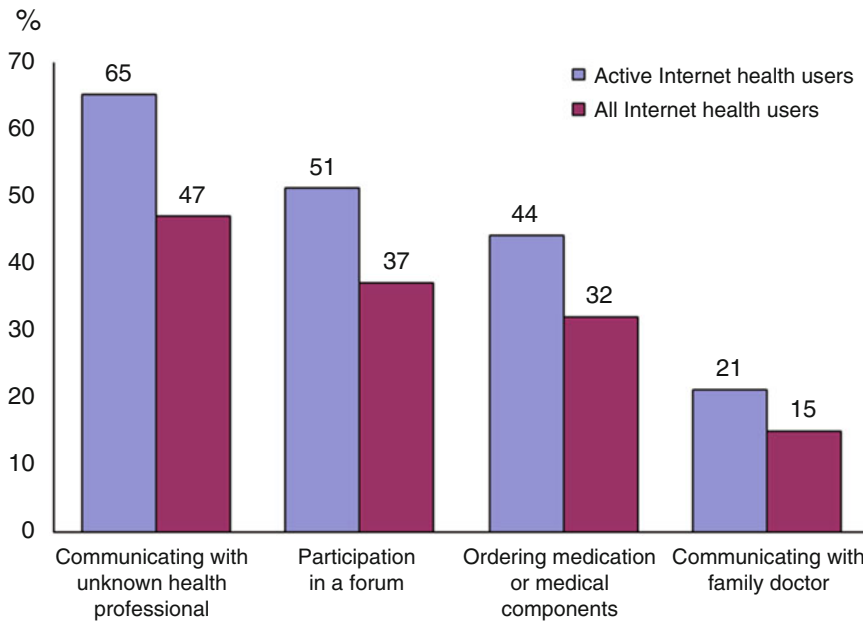
Fig. 1 The most frequent health-related online activities performed by Internet users

These findings are consistent with the results of other studies (Bidmon and Terlutter 2015; Kummervold et al. 2008) and with the US National Trends Survey of 2005–2013 (Tarver et al. 2018; Beckjord et al. 2007). The present study confirmed that although more confidence was placed in the Internet than in the "traditional" media, such as TV and radio, a lot of people still trust doctors, family, and friends during the last 10 years (Thai et al. 2018). In our previous research conducted in 2005 and 2007, TV and radio were indicated as more important sources of health information than the Internet. This situation had changed in 2012 when the Internet began ranking higher than the other media (Bujnowska–Fedak 2015). The growth of importance of the Internet may be caused by increasing difficulties in arranging an appointment with a doctor. In the face of population aging, the number of people in need of medical care rapidly grows. At the same time, there is no increase in employment in medical care. Furthermore, Internet absorbed other established media, and we now have a lot of e-books, online radio stations, or TV channels for content distribution. In the future, the Internet is likely to be considered not as a single source of information, but as a network of services that are potential sources of health information.

In this study, over three-quarters of the Polish society reported using the Internet for health purposes. There were slightly more women (56%), which also is in line with reports by other authors (Fox 2011a; Kummervold et al. 2008). Unlike men, women are generally more interested in issues related to health (Ek 2015). Evidence shows that due to the presumed gender role and social constructions of masculinity, men are unwilling or lack the motivation to engage in the exchange of health-related information (Wellstead 2011; Rice 2006). On the other hand, men demonstrate greater digital skills. Therefore, the evidence of gender differences in the use of the Internet for health purposes is divergent. The study conducted by Bidmon and Terlutter (2015) has shown that women and men differ in terms of how often they use different channels related to health. Women more frequently consult with friends and pharmacists, and they participate in forums and blogs related to health. Men, in turn, more frequently use applications to search for health-related information and contact their GPs

**Table 5** Type of e-health services and factors affecting their use

Category of users	Communication with family doctors (YES answers)	p	Communication with unknown health professionals (YES answers)	p	Participation in forums (YES answers)	p	Ordering medications or medical components (YES answers)	p
Gender								
Men; n (%)	42 (12.5)	0.084	160 (47.0)	1	115 (33.9)	0.154	98 (28.9)	0.161
Women; n (%)	74 (22.3)		204 (47.2)		169 (38.9)		147 (33.9)	
Age group (years)								
18–35; n (%)	54 (19.7)	<0.0001	143 (51.6)	0.043	114 (41.1)	0.037	117 (42.2)	<0.00001
36–59; n (%)	57 (15.7)		170 (46.8)		133 (36.6)		112 (30.9)	
60+; n (%)	6 (4.5)		52 (38.5)		38 (28.1)		17 (12.6)	
Education								
Basic/vocational; n (%)	20 (9.5)	<0.001	101 (47.9)	0.962	76 (36.0)	0.870	41 (19.4)	<0.00001
Secondary; n (%)	39 (13.1)		139 (46.6)		114 (37.9)		84 (28.2)	
College/university; n (%)	57 (21.8)		124 (47.0)		95 (36.0)		120 (45.5)	
Employment status								
Education underway; n (%)	9 (21.2)	<0.0001	20 (48.8)	0.001	15 (36.6)	0.751	15 (36.6)	<0.00001
Paid/voluntary work/other; n (%)	90 (17.2)		259 (49.4)		199 (38.0)		191 (36.5)	
Unemployment	11 (27.5)		26 (65.0)		14 (35.0)		7 (17.5)	
Retired/sick or disabled; n (%)	6 (3.6)		59 (35.1)		56 (33.3)		32 (19.0)	
Residence place								
Urban; n (%)	92 (18.5)	<0.0001	238 (47.7)	0.652	188 (37.7)	0.484	166 (33.3)	0.226
Rural; n (%)	24 (8.8)		126 (46.0)		96 (35.0)		79 (28.8)	
Residency type								
Alone; n (%)	15 (17.0)	0.639	36 (40.0)	0.177	32 (35.6)	0.817	30 (33.3)	0.719
With family/other; n (%)	101 (14.9)		328 (48.1)		252 (37.0)		215 (31.5)	

(continued)

Table 5 (continued)

Category of users	Communication with family doctors (YES answers)	p	Communication with unknown health professionals (YES answers)	p	Participation in forums (YES answers)	p	Ordering medications or medical components (YES answers)	p
Health status								
Good/very good; n (%)	83 (16.8)	0.110	245 (49.3)	0.214	193 (38.8)	0.270	178 (35.8)	0.003
Fair; n (%)	26 (11.2)		99 (42.5)		77 (33.0)		57 (24.5)	
Bad/very bad; n (%)	7 (18.9)		17 (44.7)		12 (31.6)		8 (21.1)	
Mobile phone use								
Yes; n (%)	113 (15.0)	0.481	354 (46.7)	0.190	276 (36.4)	0.187	242 (31.9)	0.411
No; n (%)	3 (20.0)		10 (66.7)		8 (53.3)		3 (20.0)	

P-value denotes significance of differences between or among the percentages of each category users of a given type of communication pattern (Fisher's independence test)
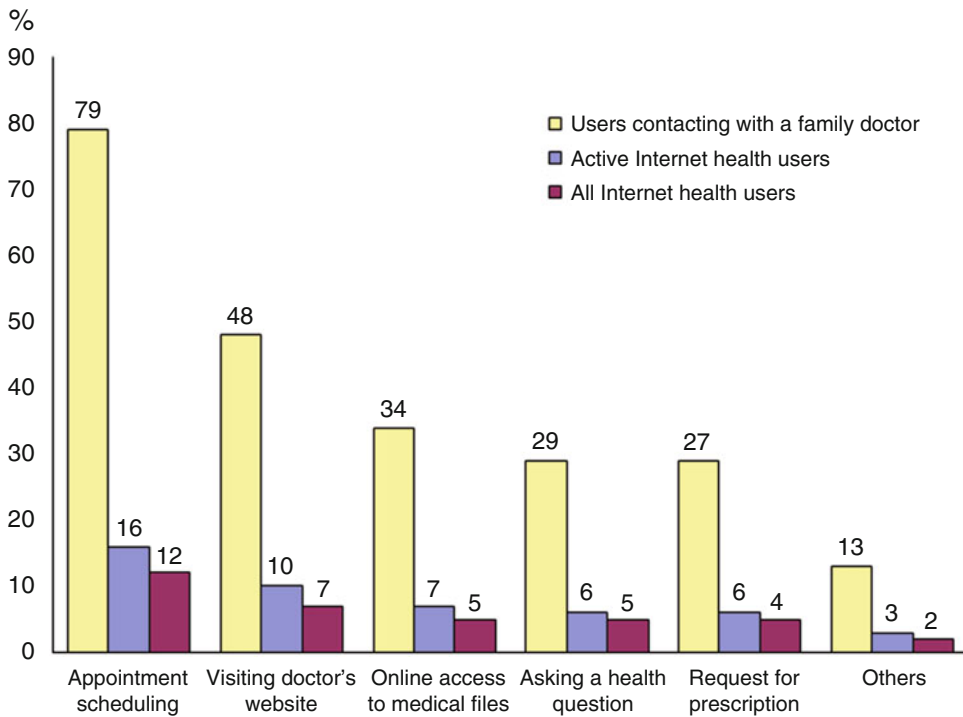
Fig. 2 The most frequent reasons to communicate online with a family doctor

online. They are also more willing to communicate with doctors and undergo treatment via the Internet than women. The present study, however, showed that women more frequently used online communication channels than men, even though the respective gender differences did not meet statistical significance.

Young people, who accessed the online network on an everyday basis, were the most active users of the Internet for health purposes (Asibey et al. 2017; Kummervold et al. 2008). The reason for that could be that they were more willing to try new technologies (Chiu 2011). The elderly, on the other hand, had lower computer skills and the frequency of using the Internet for health purposes decreased with age (Fox and Duggan 2013; Zajac et al. 2012; Livingston et al. 2008). However, as reported by Blusi et al. (2016), the frequency with which older people used the online network for medical issues increased after training.

This study showed a positive correlation between using the Internet for health purposes and living in urban areas, and being educated and professionally active or still at school. Such a relationship has also been found in other studies (Fox and Duggan 2013; Livingston et al. 2008; Andreassen et al. 2007). People who live in metropolitan areas more often graduate from universities, obtain higher income, and have easier access to computers with Internet connection. These findings are related to the digital divide (Romano et al. 2015; Connolly and Crosby 2014; Cresci et al. 2010), which must be perceived in terms of differences not only in access to technology but also in the retrieval, understanding, and use of information (Zach et al. 2012). Jensen et al. (2010) have shown that despite having access to the Internet, the people do not know how to open an Internet browser and retrieve information online, and they often cannot overcome this barrier. It has also been shown that accessing the Internet is associated with health outcomes. Those who have better digital skills tend to have better self-management of health and greater interaction with doctors via the

Table 6 Patterns of communication with family physicians using e-health services

Category of users	Online registration (YES answers)	p	Visiting doctor's website (YES answers)	p	Online access to patient file (YES answers)	p	Asking a health question (YES answers)	p	Recipe request or renewal (YES answers)	p	Others (YES answers)	p
Gender												
Men; n (%)	29 (69.0)	0.110	17 (40.5)	0.248	18 (42.9)	0.162	13 (31.0)	1	7 (16.7)	0.053	5 (11.9)	1
Women; n (%)	61 (82.4)		39 (52.7)		22 (29.7)		22 (29.7)		26 (35.1)		10 (13.5)	
Age group (years)												
18–35; n (%)	41 (77.4)	0.033	24 (54.3)	0.527	19 (35.8)	0.806	17 (32.1)	0.795	14 (26.4)	0.512	8 (15.1)	0.576
36–59; n (%)	47 (82.5)		30 (52.6)		20 (35.1)		17 (29.8)		16 (28.1)		6 (10.5)	
60+; n (%)	2 (33.3)		2 (33.3)		1 (16.7)		1 (16.7)		3 (50.0)		1 (16.7)	
Education												
Basic/vocational; n (%)	15 (75.0)	0.956	11 (55.0)	0.334	3 (15.0)	0.135	6 (30.0)	1	8 (40.0)	0.295	4 (20.0)	0.578
Secondary; n (%)	31 (79.5)		15 (38.5)		15 (38.5)		12 (30.8)		12 (30.8)		4 (10.3)	
College/university; n (%)	44 (77.2)		30 (52.6)		22 (38.6)		17 (29.8)		13 (22.2)		7 (12.3)	
Employment status												
Education underway; n (%)	6 (66.7)	0.956	3 (33.3)	0.106	6 (40.0)	0.116	3 (33.3)	0.482	3 (33.3)	0.949	0 (0.0)	0.578
Paid or voluntary work/other; n (%)	72 (80.0)		47 (52.2)		31 (33.7)		29 (32.2)		26 (28.9)		14 (15.6)	
Unemployed; n (%)	8 (72.7)		2 (18.2)		2 (18.2)		1 (9.1)		3 (27.3)		1 (9.1)	
Retired/sick or disabled; n (%)	4 (66.7)		4 (66.7)		1 (16.7)		2 (33.3)		1 (16.7)		0 (0.0)	

Category		p		p		p		p		p		p
Residence place												
Urban; n (%)	72 (78.3)	0.785	42 (45.7)	0.360	32 (34.8)	0.772	23 (25.0)	0.025	26 (28.3)	1	12 (13.0)	0.409
Rural; n (%)	18 (75.0)		14 (58.3)		8 (33.3)		12 (50.0)		7 (29.2)		3 (12.5)	
Health status												
Good/very good; n (%)	65 (78.3)	0.735	39 (47.0)	0.474	27 (32.5)	0.461	24 (28.9)	0.311	23 (27.7)	0.032	11 (13.3)	1
Fair; n (%)	19 (73.1)		12 (46.2)		9 (34.6)		7 (26.9)		5 (19.2)		3 (11.5)	
Bad/very bad; n (%)	6 (85.7)		5 (71.4)		4 (57.1)		4 (57.1)		5 (71.4)		1 (14.3)	
Mobile phone use												
Yes; n (%)	89 (78.8)	0.126	54 (47.8)	0.609	39 (34.5)	1	34 (30.1)	1	32 (28.3)	1	14 (12.4)	0.342
No; n (%)	1 (33.3)		2 (66.7)		1 (33.3)		1 (33.3)		1 (33.3)		1 (33.3)	

P-value denotes significance of differences between or among the percentages of each category users of a given type of communication pattern (Fisher's independence test)

Internet (Neter and Brainin 2012). Thus, e-health literacy improves individuals' health.

Another criterion that positively influenced the use of the Internet for medical purposes is good health. This correlation has also been found by other authors (Cresci et al. 2010; Andreassen et al. 2007). People in poor health may not be mentally or physically capable of using the online network. Moreover, we asked the participants about their feelings related to health, so it cannot be excluded that those who suffered from chronic illnesses or disabilities might believe that they were in good health. In addition, it was not clear whether people used the Internet on their own or on behalf of someone else. In fact, many caregivers could search the World Wide Web to find solutions to their patients' problems.

According to the present findings, 55.8% of the population used the Internet actively, which is encouraging. Communicating with unknown health professionals turned out to be the most frequent online activity. This is not surprising due to difficulties in making an appointment with a specialist in Poland. The similar tendency was observed in other European countries (Kummervold et al. 2008; Andreassen et al. 2007). It also indicates that e-health has considerable potential to improve access to health services. High levels of participation in forums or self-help groups were observed in the present study. According to the research carried out by Klemm et al. (1999), men more often use forums to ask questions, whereas women to share their experiences, with an increasing rate of 14.9% in 2005, 20.4% in 2007, and 24.1% in 2012, and 37% in 2018, which may indicate that young people place more confidence in social media and the Internet than in health professionals (Bujnowska–Fedak 2015; Fox 2011b). The role of a doctor as the only authority in the field of health has changed over the years. Nowadays, people more often search for health-related information before they visit the doctor's office, and they participate in making decisions about their health which may affect their relationship with the doctor. Generally, communicating with a GP via the Internet is not a common practice (15% in the group of the HI-users), but it increased in the

years 2005–2012 (Bujnowska–Fedak and Mastalerz–Migas 2015; Kummervold et al. 2008). Making an appointment with a doctor is still the most frequent online activity. In 2007, it constituted 3.2% of cases among the general population and 5.4% of cases among health-related Internet users (Santana et al. 2010). In comparison, it increased to 12% among health-related Internet users in the present study. This growth may be largely attributed to an increased interest in the use of online communication tools and opportunities currently offered by e-health services.

This study has a few limitations. The response rate was low, which might hinder the representativeness of the survey. A very large category of unrealized interviews were those in which no one answered the phone. This issue could, in part, have been related to the date of the audit (December–January), which was a time of Christmas and winter school holidays. Increased resistance to answering unwanted phone calls during a downtime has been observed in other studies (O'Toole et al. 2008). Reasons for a decline may include the unlisted telephone numbers, privacy (do not call lists), or distrust. Due to the swift nature of a phone conversation in CATI interviews, participants could hardly be able to give thought to the answer or to determine the appropriate point on the scale. In addition, specific e-health services were not tested separately, so that we do not exactly know what the participants had in mind when they evaluated the reliability of each source.

5 Conclusion

The development of online communication technologies has changed the way in which patients use the Internet for medical purposes. With new possibilities, patients' needs can be met not only through the passive search for information but also through the active participation in e-health services. The role of the Internet as a source of health information has increased, which corresponds to growing interest in online health services. The most common activity in

online health communication is interacting with unknown health professionals. Hence, it can be expected that e-health services might complement deficiencies in ordinary medical care. Given the prominence and importance of online communication for health purposes, the study offers insights into the understanding of the relations concerning the active use of the World Wide Web and a considerable potential to practitioners and researchers all over the world. Future strategies related to e-health development should take such relations into consideration in order to assess what type of e-applications would meet the expectations of the population at large to the greatest extent. There is certainly a need to continue and expand studies to this end.

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