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Internet Uses for Health Information Search: a literature review.

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SUMMARY

Background: With the widespread dissemination of the Internet throughout the world of health, it would be relevant to report on current knowledge about health information search on the Internet from the *consumers'* standpoint.

Methods: We conducted a bibliographical research over the past five years and distinguished between international and French studies.

Results: For a long time, the (mostly US) studies have been merely descriptive. The studies highlight that the factors associated with health searches on the Internet are similar to the factors underlying the digital divide. Consumer searches are deemed efficient although search skills are comparatively below standard. Attempts are underway to set up tools, circulate them widely, and ensure better quality information on the Internet. However, comprehension and literacy are still issues in some social groups. Regarding the impact on consumer health per se, a (positive) effect of the Internet seems to emerge but research should be continued.

Conclusion: Many of the behaviors, uses or limits addressed in this paper pertain to any information search on the Internet but other problems or differences also occur in the specific area of health. Longitudinal investigations are needed, specifically to gain deeper insight into the impacts we have addressed, while rolling out a comprehensive approach to the temporal evolution of user practices and experiences. Specifically, the central issue is still to determine how (and for whom) the Internet alters information search behaviors and, *in fine*, to what extent this affects health behaviors and the recourse to healthcare.

Information seeking. Health. Internet

RESUME

Position du problème : Face à la diffusion massive de l'Internet dans le monde de la santé, il est apparu important de dresser un état des lieux des connaissances concernant la recherche d'information de santé sur Internet, du point de vue des « consommateurs ».

Méthodes : La recherche bibliographique a été conduite sur les cinq dernières années en distinguant les études internationales et françaises.

Résultats : Les études, essentiellement états-uniennes, sont restées longtemps descriptives. Les facteurs associés à la recherche d'information de santé sur Internet mis en évidence par les études sont similaires à ceux de la fracture numérique. Les recherches menées par les consommateurs sont jugées efficaces, mêmes si les techniques de recherche employées semblent sous optimales. Des outils tentent d'être mis en place et diffusés à grande échelle pour assurer une meilleure qualité de l'information diffusée sur Internet ; des problèmes de compréhension et de lisibilité sont toutefois relevés au sein de certaines catégories sociales. Concernant l'impact sur la santé des consommateurs eux-mêmes, un effet (positif) de l'Internet tend à se dégager, mais les travaux doivent être poursuivis.

Conclusion : Nombre de comportements, usages ou limites avancés au cours de cet article concernent toute recherche d'information sur Internet, mais des difficultés ou différences s'y ajoutent dans le cadre spécifique de la santé. La conduite d'enquêtes longitudinales permettrait de mieux mesurer les impacts sur lesquels on s'interroge en prenant en compte l'évolution temporelle des pratiques et des expériences des utilisateurs. En particulier, la question centrale reste de savoir en quoi (et pour qui) l'Internet modifie les comportements de recherche d'information, puis *in fine*, dans quelle mesure les comportements de santé et de recours aux soins en sont modifiés.

Recherche d'information. Santé. Internet

Internet Uses for Health Information Search: a literature review.

INTRODUCTION

Over the past ten years, Internet dissemination has contributed to the change in medical practices in industrialized countries. From the standpoint of healthcare professionals and services, the Internet has enabled numerous advances in medical information technology and telemedicine. Medical guidelines of good practices and evidence-based medicine have also developed and their results have been widely disseminated. At the same time, a new field called 'cybermedicine' has emerged. As early as 1999, Eysenbach defined it as a new academic discipline at the crossroads of medical information and public health [1]. It concerns the study of Internet applications and Web technologies for medicine and public health. Cybermedicine also studies the impact and implications of the Internet and assesses the resulting opportunities and challenges for healthcare.

Even though patients are the final beneficiaries, at first all the technological advances were for healthcare professionals and were used by them. Then, gradual familiarization with new information and communication technologies (NICT) cleared the way for entering into the "Age of Information" [2]. Patients' perception of their own ability and aptitude to care for themselves has changed, viz., from 'passive receivers' they have become 'active consumers' of health information [3]. The growth of interactive services coincides with the emergence of a (real or imagined) desire in patients to assume more responsibilities in their health management.

Various services, with the sole purport of providing information, are available to Web users. The resources include general search engines (such as Google or Yahoo) and Internet access providers (AOL, Wanadoo, and so on) that direct consumers to the websites and pages providers consider relevant. Health websites or portals are also available; they

may be institutional (in France for instance, the website of the Ministry for Health, the National Institute of Health and Medical Research, the High Commissioner for Health, or the CISMef) or private (DrKoop in the United States or Doctissimo in France). Bibliographical databases are also available online for healthcare professionals (Medline[®]) or for the general public (MedlinePlus[®]). In 1997, websites and documents on health amounted to the hundreds of thousands worldwide, including more than 10,000 documents and websites in French [4].

Several published reviews of the literature have already addressed the various aspects of consumers' health information on the Internet. The studies focus on a special information or communication mode [2, 5-8], on the quality of the disseminated information [9], or on a particular disease, such as cancer [10, 11]. Therefore, this paper does not review a new social aspect of Internet-based health information but rather draw up a general inventory of the knowledge on web-based searches for health information in industrialized countries. We propose not only to describe the different uses of the Internet by health information consumers but also to detail the place and importance of the Web in the health information search. We have elected to restrict our review of the literature to 'direct' information tools and not address online communication tools (forums, chats, and so on). In other words, we deal with the 'informational' facet of cyberhealth rather than its 'communication' one. As Internet resources and uses for health information searches may vary from one country to the next (depending on Internet penetration rate on the one hand, and on the culture special to the countries and the organization of their healthcare systems, on the other), we first look at international studies and then go on to distinguish the case of France. For each study, we provide the main figures for Internet-based health information searches in the general population as well as the related factors and the characteristics of the search. We

then deal with the perception and assessment of the acquired information and the place Internet has in the health information seeking.

METHODOLOGY

In early 2005, a bibliographical research over the past five years (although the first publications date back to 1997, most of the research was published from 2000 on) was conducted at Medline[®] and *Banque de Données en Santé Publique* (BDSP, French public health databank). Other search engines or special health catalogues were used such as Medscape and CISMef. Several key words in English and/or in French depending on the tools were routinely used, i.e., “Internet”, “health information”, “consumer health information” and “consumer health informatics”. General web searches were also done from Google.

RESULTS

We selected sixty of the most relevant articles or referenced reports out of more than 200 for our review of the literature. At the outset, we would like to point out that the topic of health actually only accounts for a minor proportion of all information searches on the Internet. A recent study of an English language catalogue website listing different topics estimates that the share of searches involving health issues is 4.5% [12]. However, numerous studies take pains to describe the characteristics of Internet health information seekers and attempt to understand their behaviors.

HEALTH INFORMATION SEEKING ON THE INTERNET: INTERNATIONAL STUDIES

The main figures

The main studies assessing the prevalence of searches for health information on the Internet in the general population come from the United States. For instance, Harris

Interactive, a company specializing in interactive media marketing, conducts surveys with panels of more than 1,000 respondents representative of the general US population every year. Results show that the percentage of all adults over 18 who are online went from 38% to 69% from 1998 to 2004 [13]. The proportion of all those online who have ever looked for health information online (even if health searches are infrequent) went from 71% to 74% (rising to 80% in 2002). Also, several studies lead by a research center (Pew Internet & American Life Project) show that the prevalence of Internet users in the population rose from 50% [14] to nearly 60% [15] from 2000 to 2002. Fifty-five percent of this Internet users had already searched for medical or health information on the Internet in 2000 [14] and 62% in 2001 [16]. In 2002, 80% of US Internet users had already searched for information on at least one of the 16 major health topics listed in the questionnaire (specific illness, treatments, nutrition, physical fitness, and so on) [15]. Therefore, compared to all adult US citizens (whether or not they have access to the Internet), the share of people having searched for health information on the Internet (called *health seekers* in this paper) amounted to more than 50% in 2004.

The estimated figures in countries other than the United States are fewer and older. In 2000 or 2001 for instance, 10% of the Swiss [17] and roughly 26% of the Australians [18] had already conducted this type of search. In Germany, 50% of Internet users were concerned [19].

Health seekers' attributes

Numerous descriptions of health seekers' attributes can be found in the surveys. Other studies focus on determining what factors are associated with the use of the Internet for health information seeking. The results are from samples of general population, of people living with cancer, HIV, or chronic diseases (or other) or of special groups (women,

adolescents, or older adults). Thus virtually all the quantitative studies report that more women have already searched for health information on the Internet than men except for a few studies on special pathologies such as HIV infection [20] or lung cancer [21]. However, multivariate analyses (often using logistic regression models) show that, after adjustments for other (mainly socioeconomic) variables, gender is no longer a factor significantly associated with the search for health information on the Internet. On the other hand, studies highlight that, overall, the search for health information on the Internet concerns the youngest adults and that, then, the proportion of health seekers drops with age [22-25]. For instance, the proportion of the adults over 60 is three times lower than the proportion of 18 to 39 year olds [25] when other studies show that people in the 30 to 60 age bracket search more for health information on the Internet (20 to 30%) than people under 30 or over 60 (about 10%) [16, 26]. These differences probably reflect the changing health concerns and expectations with age, even if this is not explicitly demonstrated.

The other two socioeconomic variables, the most common objects studied by the literature, are level of education and income. There is a larger proportion of health seekers among individuals with a higher education and income. Results from multivariate analyses are significant with ORs varying, depending on the study, from 1.24 to 3.29 for people with higher education and from 1.50 to 3.10 for people with high incomes [20, 22-25, 27]. One last attribute, which is especially studied in North American surveys, is 'racial affiliation'. There are higher proportions of health seekers among 'whites' than among Afro-Americans or Hispanics (in the North American meaning of the terms). Depending on the study, the figures respectively range from 46% [27] to 82% [15] compared to a range from 27% to 75% of Afro-Americans or Hispanics. Nevertheless, after adjusting for the preceding variables, the factor is never significant in multivariate analyses.

Finally, a study highlights that, after adjustments for age and level of education, individuals living in urban areas are more likely to search for health information on the Internet [25]. Other factors are noted such as length of time person has been using the Internet or a home connection. Individuals with a home connection to the Internet and with several years' experience search for health information online more often than individuals without experience or a home connection [15, 16, 20, 21].

Characteristics of the searches

Several studies focus on describing the characteristics of the health information search per se: frequency, tools, skills, topics, and end beneficiaries of the information.

Web-based searches for health information are fairly infrequent. Actually, in about 80% of the cases, individuals carry out a search only once a month or less often, in general population studies [15]. The searches are also mostly done from general search engines rather than from identified medical websites [15, 16, 26]. Qualitative studies confirm these behavior patterns based on observations made in Germany [28] and Australia [29]. The studies also highlight the widespread absence of any search strategy. Most health seekers do not know standard Internet search skills. For instance, effective and appropriate key words are seldom used; the same is true for Boolean operators or quotation marks [28-31]. The spelling of the medical terms themselves may present an additional stumbling block, especially for adolescents [32] or low-literacy adults [33]. Finally, users only go to the first links listed by the search engines and navigate but superficially through the tree structure of the Web. Yet, consumers believe they often get the information they are looking for, except in the case of low-literacy adults or adults with reading problems [33].

Overall, defining the content of health information searches accurately is hard. However, 40% of health seekers most often search for information about several leading topics such

as nutrition or dietetics [15, 31, 34]. The figure amounts to almost 35% for information about physical condition and sports [15, 31, 34] and 20% for mental health information [15, 34]. For questions about sexuality, alcohol and tobacco, the figures are lower for the general population (respectively 10%, 8% and 6%) [15] than for adolescents (27% and 25% for sexuality and alcohol) [34]. Finally, the searches may concern special diseases (for 23% to 63% of the health seekers, depending on the study) [15, 34, 35]. Other studies show that a high proportion of health seekers has already looked for information on drugs (81%) [26] or treatments (47% of adults [15] and 19% of adolescents [34]). Health seekers also use the Internet to get a second opinion (49%) [26] or to find a physician or a hospital or get information about them (21% to 36% of health seekers, depending on the study) [15, 22].

Although quantitative studies of the general population or of adolescents show that usually searches are for getting information in 40% [35] to more than 75% of the cases [22, 26], qualitative studies of patients seem to provide a better grasp of the aims and backgrounds of the searches. For instance, a study distinguishes different types of searches for people with cancer [36]. The searches may be done before going to see a physician, to find a possible explanation for the symptoms, or during the time spent finding a diagnosis, to make sure that every hypothesis is being considered or that every necessary medical test is being run. Searches may also be about the treatments to complete or better understand the information provided by physicians or be made to contact other people with the same disease. The search may be for information about the different recognized medical treatments, side effects or other alternative treatments. Another aspect is disease follow-up and management. In the short term, the searches may involve the daily management of the treatments or life hygiene. In the long term, they may serve for experience sharing or for contacting support groups.

Following a 2000 quantitative survey of more than 1,000 women in New Jersey, a logistic regression analysis shows that the online search for health information is correlated with eating habits, sports habits, smoking, or regular visits to the gynecologist, for instance, as well as with the importance given to certain disorders (in areas as diverse as mental health, sterility, uterine fibroma, nutrition, and so on) [24].

Finally, several studies highlight that the 'end' beneficiary of the online information is not necessarily the person searching for it. For instance, a general population study shows that in 57% of the cases, the information search is for a relative or friend [15]. Similarly, a study on cancer patients shows that third parties often search for information on the Internet on behalf of the patients [36].

Perception and assessment of health information on the Internet

The Internet is usually perceived as a fast way of getting health information [22], confirming the information provided by physicians or finding alternative treatments [28]. Consumers also seem to appreciate the possibility of checking and comparing information on different websites. Qualitative studies of adolescents or of patients with cancer also show that the Internet is an ideal media for getting health information as searches can be done at any time, repeatedly and confidentially [36, 37]. The confidentiality prevailing on the Internet means it is easier to get information on 'sensitive' or embarrassing subjects such as sexuality or psychological problems.

Also, a large proportion of respondent users think that the Internet is a reliable source of information (from 72% to 87% depending on the study [16, 22, 38]) and about one-third of the respondents says they are concerned by the quality of the information [15, 26]. The issue of the quality of the information disseminated on the Web is one of professionals' main concerns. Numerous research teams have simulated lay queries on search engines and

then assessed the information. Despite the lack of comparability of the listed studies (regarding the topics and the search and assessment methods), a 2002 review of the literature shows that 70% of the relevant research concludes that there are problems with the quality of the health information disseminated on the Web [9]. Of course, tools and guides have been designed to help consumers appraise the credibility of the information (e.g. DISCERN, NetScoring, and MedCertain) and lists of quality criteria are disseminated (on the Health On the Net Foundation or HI-Ethic websites, among others). Nevertheless, few consumers know of or apply the different criteria [16]. For instance, observational studies reveal that only a small proportion of respondents – or perhaps even no respondents – click on the “about us” link (to learn about the website promoters and their aims) or only go to the website home page if so directed by the search engine [28, 29].

However, before reaching a point where Web-based information credibility and reliability can be assessed, studies underscore the problem of the comprehension and readability of the information. Studies have been conducted among patients [39], low-literacy adults [33], adolescents [32, 40], older adults [41] or people with disabilities [42]. Although it is very hard to measure the comprehension of what consumers read, the studies show that articles on Web pages require minimum schooling (i.e., high school) to be understood. Some studies also underscore that management and comprehension problems are due to the multitude of available sources and information.

The Internet and the physician-patient relationship

Seeing as the Internet presents a range of advantages and inconveniences for health information seeking, where does it actually stand with Internet users? Studies show that a mere one-third of individuals tell their physician of their search and its results. This holds true for general population surveys [16, 22, 26] and for surveys of people living with HIV,

for instance [20]. Some consumers fear their physician's reaction and aren't 'admit' to their search as if their behavior might suggest a challenge to the physician's authority. Conversely, seeing the huge amount of (sometimes conflicting) information disseminated on the Internet, many people need their physician to manage the information and, in the last analysis, help them make a decision [28, 31, 43]. Last, several studies show that now physicians are still patients' main source of information (mentioned by roughly 80% of individuals) whether or not the latter have a chronic disease [21, 23, 43]. This is still true even when different online information sources are compared. Consumers trust a physician more than they do a medical, institutional or pharmaceutical website [44].

Numerous studies address the impact of Internet searches on the physician-patient relationship. It seems altered but not necessarily in a negative way. Medical consultations are more productive and constructive, compelling physicians to learn how to deal with patients turned 'experts' [26, 36, 45].

Influence of seekers' health and impact on healthcare utilization

Some studies focus on the relationship between perceived health and the search for health information on the Internet. Two studies show that, overall, health seekers are in good health. Actually, a mere 12 to 14% of the respondents state that their health status is fair or poor [23, 46]. Specifically, a logistic regression analysis of the data from the Pew Internet & American Life Project 2000 survey of 520 health seekers shows that, after adjustments for age, level of education and income, the people who felt they were not in good health (accounting for 12% of the sample) look for online health information more frequently (but the result is not significant) [46]. On the other hand (but the contradiction is only apparent because several information sources were surveyed), the analysis of a sample of 385 individuals in the 2000 General Social Survey highlights that individuals searching for

online health information feel they are in better health (86%) than people using more ‘traditional’ sources such as a physician, the TV or radio, for instance (60%) [23]. Finally, a research study of a representative sample of the US population, addressing four health areas (concerns, information, beliefs and practices), shows that people using the Internet for health information seeking (n=979) give a higher priority to health in their lives than people who do not conduct online health information searches (n=1657) [35].

Nearly 50% of respondent US health seekers in 2000 stated that online information had improved the way they cared for themselves and/or had influenced their choice of treatment or care [14]. However, only controlled trials can provide detailed assessment of the Internet’s impact on individuals’ health behavior. Such trials (whose results are positive overall) mainly concern special support interventions or education programs [47] or various disorders and chronic diseases [48]. Most of the trials that have been rolled out over the past years concern mental health and excess weight. For instance, (American and Australian) studies assess the efficiency of websites with information on depression and/or behavioral therapies. Their use seems to have a positive effect overall, viz. depressive disorders declined compared to the control group [49]. Other studies show a more moderate effect in the decline of depressive symptoms, which is mainly explained by the individuals’ little use of the tools [50]. Weight loss programs on the Internet have also had positive results in the United Kingdom [51] or in the United States in a study on diabetes prevention for adults at risk [52]. On the other hand, a 2002 randomized controlled trial of patients at increased cardiovascular risk showed that web-based targeted nutrition counseling and social support had no effect [53].

THE SEARCH FOR HEALTH INFORMATION ON THE INTERNET IN FRANCE

Internet dissemination in France occurred later than in the United States or other European countries (Figure 1) [54]. Actually, Internet penetration rate in France was 30.1% in 2001 compared to an average 37.7% in six European countries [55] and compared to 63% in the United States the same year [13]. France is beginning to bridge the gap. Indeed, the rise of household Internet users was the highest in France, i.e., +16% from 2003 to 2004 compared to an average 12% increase in seven European countries [56].

The main figures

The first opinion polls on health information in France were conducted with representative panels of the general population, starting in 2000. Eighty percent of the French believe they are very well (17%) or fairly well (63%) informed about health [57]. There are many different sources of information: Sofres polls show, for instance, that from 2000 [57] to 2003 [58], the share of French for whom television was a source of information rose very slightly, going from 71% to 78% whereas the Internet was mentioned by 7% and then 26% of the respondents respectively.

A September 2002 *Eurobaromètre* survey of a sample of about 1,000 people in 18 European countries highlighted Europeans' main source of health information [59]. Thus 45.3% of respondents consider health professionals as their main source of information whereas the Internet is only mentioned by 3.5% of the Europeans. Generally speaking, the study shows that, on average, 23.1% of Europeans has already used the Internet to acquire information on a health issue but confirms that France is one of the least advanced countries in this area. A mere 15.3% of French respondents are concerned compared to 41.4% of Danish respondents, for example.

Health seekers' attributes

Little data is available concerning health seekers' attributes in France. A study published in 2002 on the medical Internet primarily dealt with patients' general health information seeking [60]. Health status is put forward as a related factor, in the sense that chronic disease sufferers look for this kind of information more often. Various psychological and social factors are listed and seem also to influence the importance given to health and the ability to become active patients. Only the 2002 *Eurobaromètre* study underscores that men, the young as well as adults with a higher education, who have an executive level job or students make up the largest share of people searching for health information on the Internet [59]. The results take account of all 18 European countries and do not detail any national disparities.

Characteristics of the search

Generally speaking, five types of searches are mentioned for health information search, whatever the source [60]. The information for 'knowledge' includes comprehension, management, prevention and patient follow-up while the information for 'choice' encompasses using guides or directories to find a care provider or insurance, for instance. The three other types of information searches (for 'supervision', 'production' and 'coordination') mainly concern the 'communication' facet, which we have elected not to address in this paper.

French surveys (unfortunately, they are not special to the Internet since they concern all health information sources, including physicians and other media) describe the circumstance surrounding information searches viz., "when a relative is sick" (50%), when the individual seeker is ill(49%), "whenever the occasion arises" (47%) or "to keep abreast of medical news" (29%) [58].

Perception and assessment of health information on the Internet

The (too few) French studies attempt to describe the different advantages and inconveniences of using the Internet, as they are perceived and related by consumers. In more than 60% of the cases, respondents think that the websites should provide information on the type of specialist to see, rapidly supply the requisite information, and deliver reliable information [61].

Similar to international research, in-depth studies have been conducted on the quality and credibility of the information disseminated on French language websites. Overall, the quality of the information on special topics is fairly poor, whether it deals with female urinary incontinence [62] or brain tumors in children [63], for instance. The latter study (conducted by British researchers on French language websites) exposes issues of readability and the use of fairly complex vocabulary. CNIL (the French Data Protection Authority), which is committed foremost to the protection of the citizens' rights in France, also denounces the lack of information on the sources of the documents and information provided by health websites [64]. As early as 2002, the *Conseil Économique et Social* (Economic and Social Council) suggested that provisions be drawn up to protect as well as to train Internet health seekers [65]. Quality criteria for health websites are mainly rolled out on the European level (Net Scoring, European Commission [66]).

Several French teams have set up tools making it easier for consumers (but also professionals) to acquire the information they want, ensuring information quality and validity. Instances of these efforts are the ARIANE project in Marseilles [67] or CISMéF (*Catalogue et Index des Sites Médicaux Francophones*, catalogue and index of French language medical websites) project [68] by the Rouen CHU (University Hospital Center) and its search engine Doc'CISMéF [69].

DISCUSSION

This inventory of current knowledge on the ‘informational’ facet of consumers’ online search for health information highlights the heterogeneity (especially between France and the United States) of the amount of research studies. In France, the advances in the medical Internet can mainly be seen in the supply side or from the standpoint of health professionals. Work is underway to legislate the practice of medicine on the Internet [70] or to develop the use of NICT in the world of health to improve information and care [65, 70]. Nevertheless, overall, similar characteristics on the digital divide [71] and the impact of the Internet on physician-patient relationship [72] are manifest in France and in the United States.

Our review of international literature reports descriptively but analytically as well on the different characteristics of health seekers. However, the interpretation of the results should be nuanced. Actually, in the various statistical analyses, the reference groups with which health seekers are compared are sometimes different (Internet users, general population or health seekers of information on all the media taken together). More specifically, the very definition of Internet-based health users differs from one study to the next. Questions asked in the surveys are seldom standardized in one country, not to mention standardized with a view to making international comparisons. When some ask respondents if they have “already looked for health information on the Internet”, others offer up a list of health topics or special diseases. The term health information itself may be interpreted differently depending on the individual. In truth, not everyone perceives ‘health’ in the same way. For some individuals, symptoms or queries (about nutrition, physical condition, psychology, and so on) do not come under their definition of health whereas for others these issues are health-related. Generally speaking, the different studies report identical factors even though their schemas differ at various levels, such as survey protocols, the authors’

institutional origin, field and way of addressing the issues, the sample size, or statistical analyses. However, one can reasonably ask whether some of these factors are specifically associated with the health information seeking on the Internet, as the authors conclude, or whether these are (potentially) confusing factors in the sense that they may concern either the health information seeking in general, or the access to NICT. Concerning gender, the explanation can also probably be found in the fact that women are mainly in charge of health issues in the family, they have done so before and since the development of the Internet. Other factors such as age, level of education, income or other socioeconomic characteristics should be correlated with the digital divide rather than with the specific use of the Internet for health purposes [71, 73].

Although describing health seekers' attributes is quite easy, this is not true at all for the uses of the Internet for health information. Uses are very diverse either in terms of objectives, methodology, skills, context and relationship with health, physicians, or healthcare system. Broadly speaking, very general uses may be distinguished (for want of a detailed, quantitative description). First, people faced with illness (their own or that of a relative) seem to search for information for diagnostic or curative purposes (whatever the stage of the disease and its management, i.e., symptoms, diagnosis, treatment, and so on). These searches are among the most frequent and most 'comprehensive' in the sense that several (online as well as offline) sources of information are examined and compared.

Furthermore, people who are not ill may search for information for strictly informational purposes or even involuntarily ('coming across' the information by chance, while 'surfing' on the Internet), infrequently and expeditiously. However the search may also be made with a well-defined purpose in mind (prevention, to care for a 'benign' ailment, to improve well-being or to stay healthy). In this case, the characteristics of the search may well be comparable to the above-described search characteristics for people dealing with disease.

Whether or not people are dealing with disease, it would be useful to study (and ask users) in an unbiased manner what goals are being sought; is it to acquire ‘general culture’ or information for decision-making purposes? Is it for reassurance, for knowledge sharing, for changing one’s behavior? Is it to help make a decision to resort to the healthcare system? etc.

At the same time, divergent interests in (one’s own) health, according to various psychological and sociological factors, are known to exist. These factors are little explored in the studies on the uses of the Internet [60]. Indeed, the living conditions or earlier personal and family experience of illness and care as well as coping resources, self-esteem, degree of projection into the future, etc. are the building blocks of health norms – and through them, of health concerns – that are different from one individual (and/or social group) to the next. Different outlooks on the possibility of searching on one’s own for information about a health problem (and any benefits) probably also stem from these norms. For some, only healthcare professionals are qualified to provide satisfactory answers while for others comparing several data sources is essential.

Finally, any attempt to classify health information searches on the Internet seems impossible if a certain ‘temporal’ dimension is not considered. Actually, practices change according to the stage of the disease, the degree of personal involvement or the importance given to the search topic, as well as according to factors such as the accumulation of knowledge from other (specifically medical) sources, the personal perception of one’s own ability to care for oneself (therefore, indirectly the place given to healthcare professionals) or the changing websites and tools made available to health information seekers. Health information seeking on the Internet is not a fixed phenomenon but, like any other experience, ever changing.

Add ‘digital divide’ determinants (involving the access to NICT as much as the skills

required for their use) [74] and it is easy to understand that every individual does not have the same possibility, desire, abilities or even the idea of searching for health information on the Internet. Some of the individual characteristics raised in this paper can be categorized by applying the 'health literacy' concept to the area of health information on the Internet. According to this concept, three individual facets have to be taken into consideration in the health information search [32]. The first is the so-called 'functional' facet and concerns one's ability to read and write. Indeed, several studies effectively expose the need for a certain level of education and literacy to be able to read and understand the texts available on the Internet [32, 33, 39-42]. Add to this that the websites are designed for different publics (patients, healthcare professionals and the general public): problems with comprehension may appear according to the degree of vulgarization. Moreover, the barrier of the language (for non-English speakers and non-French speakers) may further increase differences. Finally, disseminated information does not seem to be either comprehensible or accessible to everyone. A 'critical' facet is also highlighted, which concerns one's ability to assess the collected information. The analysis of several studies on the perception, judgment and validation of the information acquired on the Internet shows that, at the end of the day, individuals know little about quality criteria and but seldom run the most commonplace checks [16, 28, 29]. However, many studies show that a serious quality problem affects Web-based information. As a result, some authors insist on the need for patients to acquire a certain expertise [45, 75-77]. Even though there are more and more codes and lists of criteria and tools worldwide, their large-scale dissemination and use would have to be promoted with the main people concerned. Finally, an 'interactivity' facet has to be considered. This is the ability to retrieve knowledge and then implement it within a given healthcare system. Indeed, even if the information found on the Internet is understood and validated, it must also be applicable to the user's healthcare system. A US,

British or French Canadian website may provide information that cannot be used as such in the French system. But a French website may also provide recommendations too remote from the uses and habitual use mode of the user's healthcare system for said user to implement the recommendations (recourse to a gynecologist or to preventive care, for instance). The point is to be able to improve our assessment of the extent to which health behaviors are altered following the health information search on the Internet and whether or not differences exist between the Internet and other health information sources with regards to the processes leading from information to practical use.

CONCLUSION

Many of the behaviors, uses or limits addressed in this paper pertain to any information search on the Internet but other problems or differences also occur in the specific area of health. Specifically with a view to public health, the central issue is still to determine how (and for whom) the Internet alters information seeking behaviors and, *in fine*, to what extent this affects health behaviors and healthcare utilization.

Broader investigations are still needed to study in-depth the different uses of health information services on the Internet and chiefly to assess their impact on recourse to healthcare behaviors. A few randomized trials have already answered some of these questions but on very specific subjects. From our standpoint, we believe that more detailed studies on the psychosocial determinants of the uses of the Internet for health information are necessary. Longitudinal investigations are needed, specifically to gain deeper insight into the impacts we have addressed, while rolling out a comprehensive approach to the temporal evolution of user practices and experiences.

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Figure 1: Households with access to the Internet, percentage of all households from 2001 to 2003 – Source OECD. [54]

