ITALIAN JOURNAL OF PUBLIC HEALTH

# Visibility, accessibility and quality of Italian public health institutional websites

Simone Chiadò Piat[1], Maria Michela Gianino[1], Gianpiero Icardi[1], Maria Lucia Specchia[1,2], Giovanni Renga[1], Roberta Siliquini[1]

*[1]Department of Public Health, University of Torino, Italy; [2]Institute of Hygiene, Catholic University of Sacred Heart, Rome, Italy*

*Correspondence to: Simone Chiadò Piat, Department of Public Health, University of Torino, Via Santena 5/bis, 10126 Torino, Italy. E-mail: simone.chiado@unito.it*

## Abstract

**Background:** Since the large volume of health information available on the Web has the potential to improve health, Public Health institutions must represent a strong Internet presence with accessible and scientific information. The aims of the study were to verify the presence and visibility of Italian Institutions on the Web and to evaluate the accessibility and quality of the information provided.

**Methods:** In a focus group setting, 21 keywords were generated, and launched in search-engines Google and MSN. Researchers noted the first 30 results found and determined the position of institutional websites. The accessibility of 303 Public Health websites was assessed in relation to the logo presence and web validation of XHTML, CSS and WAI indicators. Regarding the quality of information, the presence of the HONcode logo in the websites' homepage was checked.

**Results:** A high percentage of the keywords selected did not lead to any institutional website in the first three pages of Google (19.0%) and MSN (42.8%). Few institutional websites presented the logo indicator and a full web validation. Considering the XHTML indicator, only for 34.0% of the websites there was concordance between the logo presence/absence and results of direct validation, 50.2% for CSS. The quality level seemed to be extremely low.

**Conclusions:**In order to achieve a larger visibility and guarantee accessibility, Public Health websites have to be correctly designed, edited and maintained. Common and strict European laws about health information on the Web have to be arranged, deeply monitored and carefully adjourned in order to guarantee and support the positive role of institutional websites.

*Key words: public health, web, visibility, accessibility, quality*

## Introduction

From the eighteenth century to the present, Public Health has developed along an evolutionary pathway from the role of frontier guardian to the enactment of policies. Initially the task of Public Health was to create a sanitary cordon between ill and healthy people (i.e. quarantine), but in time its role started to become synonymous with preventive medicine and become a reference point in all health policies [1]. Once Public Health Institutions had temporarily beaten back infectious diseases and discovered the important role of health determinants, it was only in the twentieth century that they addressed the empowerment of communities. Community empowerment was implemented by programs such as Health for All [2] and Health in All Policies [3] derived from the Ottawa Charter [4], whose commitment includes the strengthening of community actions and the development of personal skills. Whilst Public Health was trying to focus its effort on fulfilling the Ottawa Charter objectives, the community's empowerment sought by Public Health was facilitated by three conditions:

- the public lack of trust in politicians' abilities to govern the communities' health, mainly due to previous bad examples of governance, resource rationing, ethical breaches and conflicts in biomedical research [5,6];
- the 'new deal' of medicine that implicated some ethical requirements, such as formal consent of the patients and shared decision making in health care [7,8];
- the advent of new technologies, such as the Web, that allowed people to receive information and answer questions related to scientific topics with just a click [9,10].

At present, the need for information that

has been generated from the empowerment of citizens is addressed naturally by turning to the Internet. In fact the number of Web users is constantly increasing worldwide, with 273.234.619 users in the European Union (EU) in 2007 (55.7% of the population) [11]. The spreading use of the Web could indicate a very useful and suitable Public Health tool in order to achieve strengthening community actions and developing personal skills, along with improving health literacy, which is critically important when tackling health inequalities [12]. Since the large volume of health information available through the Web has the potential to improve health [13,14], we should expect Public Health Institutions to be a major presence on the Web, with accessible and scientific information readily available. Some authors already recommend investigating the accessibility of institutional websites and evaluating their accuracy and appropriateness [15,16].

Unfortunately, European or national laws related to the accessibility of websites are not available and, in any case, single recommendations are included in broad regulations [17-19]. On the other hand, several organizations and individuals have developed criteria for assessing the quality of Web information [20, 21] and some checklists have been arranged to address concerns about the quality of health information materials, such as the Health on the Net Foundation Code of Conduct [22]. Moreover, in 2002, the EU defined the quality criteria for the scientific websites [23].

The Aims of this study were to verify the presence and visibility of Italian Public Health Institutions on the Web through the friendly availability related websites in the main web search engines, and to evaluate the accessibility and quality of the information provided through universally recognized web tools and standards.

## Methods

In order to assess the presence and visibility of institutional websites, some keywords, commonly used by citizens and related to Public Health, were identified through the focus group technique.

Participants in the focus groups were clients of the Blood Analysis Laboratory of the "San Giovanni Battista" Academic Hospital in Torino. They were randomly recruited through direct invitation and they were the first clients that agreed to participate. Three focus group sessions were held, with 8-10 participants each (28 participants in total: 16 men, 12 women; mean and median age 45, range 19-70 years), in the Department of Public Health of University of Torino during March 2008. A focus group model with a participating facilitator was applied [24-26]. Each session was facilitated by a skilled psychologist who had specific expertise in Public Health and lasted about two hours. The aim of the focus groups was to identify, through open-ended core questions flowing from general to specific, the most common health topics that the general population faces daily and the most common health issues for which the general population searches for in the Web. The focus groups sessions were audio-taped and transcribed. Two independent Public Health experts analyzed the transcripts and extracted 60 keywords in Italian, then they selected 21 from these (Table 1), following the temporal trend [27] and the volume of web search indicators [28].

For every keyword, the researchers noted the first 30 results (first three pages) appearing in Google and MSN, which are the main Italian web search engines according to current statistics [29]. In this range of results, the position of Public Health institutional websites was defined.

For assessing accessibility and quality, a list of the 303 most representative Public Health institutional websites was drawn up, including 205 (67.7%) websites of Local Health Authorities, 70 (23.1%) websites of Scientific Foundations, 20 (6.6%) websites of Public and Academic Hospitals, 6 (2%) Ministerial and Governmental, and 2 (0.7%) Regional websites.

The accessibility was assessed according to Italian Law [30], that originates from the requirements provided by the World Wide Web Consortium (W3C) recommendations [31]. Thus, the accordance with the guidelines of any institutional website was verified in relation to the following indicators:

- XHTML (HyperText Markup Language) which expresses the compliance to the characteristics of the language suitable for the World Wide Web publication [32];
- CSS (Cascading style sheets) which expresses the website accessibility according to its structural features [33];
- WAI (Web Accessibility Initiative) which expresses the effective accessibility to the website interface and content from different users in different contexts (physical disabilities or hardware/software tools limitations) [34].

Regarding XHTML and CSS indicators, the presence of the certification logo on the bottom of the homepage was checked. Moreover, we directly checked the websites' accessibility, putting the website URLs in the specific internet validation tools [35,36]. For XHTML we considered the

**Table 1. Positions of institutional websites in first three pages of web engines according to the keywords identified by Focus group.**

| Keywords | Position of institutional websites in Google | Position of institutional websites in MSN |
|---|---|---|
| Abortion | Not present | Not present |
| AIDS test | 2;3;11;30 | 7;23 |
| Alcoholism | 14;23;24 | 23 |
| Artificial insemination | 23 | 8 |
| Birth control pill | 11;30 | 19;25 |
| Breast cancer | 1 | 4;10;17;20 |
| Cholesterol | 21;28 | Not present |
| Diabetes | 5;20;28;21 | 17;23;26 |
| Down's syndrome | 17 | 9;22 |
| Drug care | Not present | Not present |
| Drug therapy | Not present | Not present |
| Flu vaccine | 1;5;7;8;17;20;21;22;24;27;29 | 5;6;14;18;19;25;28;30 |
| Impotence | Not present | Not present |
| Malaria vaccination | 1 | 12 |
| Mammography | 5;8;24 | 2;12;28 |
| Methadone | 2;3;29 | 2;17;18 |
| Mononucleosis | 13 | Not present |
| Pregnancy | 26 | Not present |
| Prostate cancer | 3;27 | Not present |
| Transplants | 1;27 | 1;19;24;29 |
| Viagra | 5;10;11;21 | Not present |

websites as follows: fully validated, validated with errors, or not validated. For CSS, the websites could be validated or not validated. Regarding WAI, only the presence of the certification logo on the bottom of the homepage was checked.

Regarding the quality of information in institutional websites, the compliance to the Health On the Net code (HONcode) criteria [22] was evaluated. HONcode is the oldest and probably the best-known code of conduct for health information quality in the Web [37,38]. It was created by the HON Foundation (a non-governmental organization, internationally known for its pioneering work in the field of health information ethics) and designed mainly for the general public and the Web publisher. Moreover, the EU has suggested that HONcode be used as a tool for evaluating the quality of websites [23]. The compliance to the HONcode was evaluated through the presence or absence of the HONcode logo in the websites homepage.

Comparison between variables was done using the Chi-square test at the 0.05 significance level. Analysis was performed using STATA10.0 (Stata corp., College Station, TX, 2007).

## Results

Among the 21 keywords identified, only

**Table 2. Accessibility of Public Health institutional websites: presence of Logo and web validation of indicator (N=303).**

| Variables | Indicator | | | | | |
|---|---|---|---|---|---|---|
| | XHTML | | CSS | | WAI | |
| | *n* | *%* | *n* | *%* | *n* | *%* |
| **Logo presence** | | | | | | |
| Yes | 52 | 17.2% | 51 | 16.8% | 28 | 9.2% |
| No | 251 | 82.8% | 252 | 83.2% | 275 | 90.8% |
| **Web validation** | | | | | | |
| Yes | 31 | 10.2% | 140 | 46.2% | - | - |
| Yes with errors | 217 | 71.6% | - | - | - | - |
| No | 55 | 18.2% | 163 | 53.8% | - | - |

**Table 3. Accessibility of Public Health institutional websites: simultaneous presence of Logo and web validation of indicator (N=303).**

| Variables | Indicator | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | XHTML | | | | | CSS | | | | |
| | Logo presence | | | | | Logo presence | | | | |
| | Yes | | No | | | Yes | | No | | |
| | n | % | No. | % | p-value | n | % | n | % | p-value |
| **Web validation** | | | | | | | | | | |
| Yes | 50 | 96.2% | 198 | 78.9% | **0.003** | 20 | 39.2% | 120 | 47.6% | 0.272 |
| No | 2 | 3.8% | 53 | 21.1% | | 31 | 60.8% | 132 | 52.4.% | |
| Tot | 52 | 100.0% | 251 | 100.0% | | 51 | 100.0% | 252 | 100.0% | |

ten keywords (47.6%) were associated with institutional websites on the first page of Google and eight (38.0%) on the first page of MSN, and no significant difference between the two search engines was found. Six keywords (breast cancer, mammography, methadone, AIDS test, transplants and flu vaccine) lead to institutional websites in the first page of both engines. Respectively, four keywords (19.0%) in Google and nine (42.8%) in MSN were not associated with any institutional website in the first three pages, and no significant difference between the two search engines was noted here either. In particular, not finding institutional websites following the typing of search keywords such as abortion, impotence and drug addiction in both search engines is remarkable (Table 1).

In Table 2, data on accessibility are shown. Only 52 institutional websites out of 303 presented the XHTML logo (17.2%), 51 the CSS logo (16.8%) and 28 the WAI logo (9.2%), with a significant difference between XHTML and WAI ($p<0.05$) and between CSS and WAI ($p<0.05$). Considering different subcategories of institutional websites, a higher percentage of Local Health Authorities websites with respect to others presented the XHTML logo (20.00% vs. 12.64%, $p=0.058$), the CSS logo (25.77% vs. 10.11%, $p<0.05$) and the WAI logo (13.89% vs. 3.16%, $p<0.05$) (data not shown). The direct web validation on W3C websites showed that, regarding XHTML, the majority (71.6%) of institutional websites were validated with errors, 31 were fully validated (10.2%) and 55 were not validated at all (18.2%). Regarding CSS, the majority (53.8%) of websites were not validated. The difference between XHTML full or partial web validation and CSS validation is statistically significant ($p<0.001$).

Regarding the web validation, there were no significant differences between Local Health Authorities websites and other websites (data not shown).

Table 3 shows the simultaneous presence of the logo and direct web validation. Considering the XHTML indicator, only in 34.0% of the websites was there concordance between the logo presence/absence and results of direct validation. This percentage rises to 50.2% for CSS, with a significant difference between the two indicators ($p<0.001$). While the percentage of websites with the logo presence but without validation was negligible (3.8%) for XHTML and significantly lower with respect to the percentage of websites without the logo presence and not validated ($p<0.05$), more than 60% of websites had the CSS logo but did not reach the standard for being validated. Moreover, there was not a significant difference in validation between the websites with or without the CSS logo. On the other hand, a high percentage of websites without the logo (78.9% for XHTML and 47.6% for CSS) reached the minimum standard for being validated and therefore could show the logo on the homepage and a statistical difference between XHTML and CSS ($p<0.001$) was seen. Both Local Health Authorities websites and other websites reflected the overall results (data not shown).

The presence of the HONcode logo, used as indicator for the quality of information, was detected only in 11 websites (3.6%).

## Discussion

The goals of this study were to verify the presence of Italian Public Health institutions on the Web and to evaluate their accessibility and the quality of the information they provided.

The assessment of visibility, accessibility and quality of Public Health institutional websites in the same study is a unique strength of the present work.

When interpreting the results of this study, several limitations should be acknowledged.

Regarding the selection of the keywords, the focus group technique can limit the extent to which the results can and should be generalized. Either way, the most reliable and internationally relevant model of the focus group has been adopted [24-26].

The specific and limited period in which the focus group sessions were carried out could affect the answers of the participants and consequently bias keyword selection. To limit this issue, the open-ended core questions proposed to the participants were not referred to that specific period of the year. Moreover, as mentioned in the methods section, the final selection of keywords was performed following the long-term temporal trend [27] and the volume of web search indicators [28].

Among the plethora of recognized Web search engines [39], the position of the Public Health institutional websites had been checked only through Google and MSN. However, as mentioned before, these tools represent the predominant Italian search engines [29].

According to the keywords selected, only the first three pages displayed by the selected search engines were considered. However, it is ascertained that the majority of Web users do not persist beyond three pages of results when they conduct Internet searches [40] and other recent studies underline that only the first page of search engines' results is significantly more likely to be accessed by inexperienced health information seekers, with an exponential decline thereafter [41,42]. Thus, setting the limit at three pages (30 results), like in the present study, could be considered reliable.

The accessibility of the institutional websites was evaluated only following the Web accessibility criteria of the Italian Law [30], which refers to the recommendations of W3C. It represents the main international standards organization for the World Wide Web [31], and its indicators are universally used to evaluate the accessibility of health information websites [43-47].

The quality of Internet information is variable and often problematical, so various tools for evaluating quality and reliability can be useful [48]. In this study, the quality of Web health information was assessed using HON code criteria only, although other checklists have been developed, such as DISCERN quality criteria [49]. As mentioned above, the HON code represents the oldest and probably best-known code of conduct about Web quality [37,38], and it represents one of the main tools for assessing the quality of websites suggested by the EU [23]. However, HONcode presents several limitations, not due so much to the presence of HONcode certification, but rather to the lack of mandatory certification for institutional websites.

Since the general population is accustomed to "surfing the Net" in their native language, this study considered only Italian keywords and Italian institutional websites. Therefore, all the conclusions refer to the Italian domain, but since there is a general lack of norms and regulations in other countries, our results could be generalized to the EU.

The results show that a high percentage of keywords selected do not lead to Italian institutional websites in the first three pages found by Web search engines. Therefore, according to the mentioned Web users' habits, probably only a minority of Italian Web users access institutional Public Health information. Thus, the population gathers health information from websites that are not controlled by scientific communities with potentially negative effects on health resulting from inaccurate information. Since every search engine answers to specific queries according to generally accepted parameters (related contents, keywords frequency, links from other websites) [50,51], the impossibility of finding institutional websites is probably due to design and structural flaws in the websites considered. A first recommendation deriving from our analysis is to carefully design and maintain the websites according to the search engines criteria.

Regarding the accessibility, only few institutional websites presented the logo indicator and a full web validation. These findings confirm the MeAC study results [52] which state that the level of accessibility of European websites is generally very modest. In particular, the absence of the logo is significantly worrying for WAI indicator,

which expresses the effective accessibility to the website interface and content from disabled users. Moreover, a clear discrepancy between the logo presence and web validation should be highlighted, in particular for CSS indicator. Some websites present the logo indicator but they are not web validated, while several others are web validated but do not present the logo. These discrepancies, probably due to the lack of accurate and timely maintenance of websites, are a public health problem because they affect mainly disabled people, thus increasing health inequalities. While the presence of the logo on an inaccessible website is misleading, the absence of the logo could prevent a disabled person from consulting an accessible website. Only a few websites that simultaneously present the logo indicator and the web validation on the homepage are completely accessible. The results for institutional websites subcategories reflected the overall trend, even if the higher presence of accessibility logos found in Local Health Authorities websites is remarkable.

Considering the HONcode logo presence, the quality of Italian institutional websites seems to be extremely low. As it is well known that those websites comply with the scientific quality criteria mentioned in the HONcode statement, the recommendation is to pay more attention to the formal aspect of quality acknowledgement.

As Web "surfing" has become a common source of health information:

- just as the EU has endorsed the role of Public Health on the Web as giving the right to the EU population to receive simple, clear and scientifically sound information on health [53], Public Health, whose efforts are addressed towards enhancing health literacy and developing personal skills, should not ignore the Web's relevance;
- in order to achieve a larger visibility and guarantee an increased and equal accessibility, Public Health websites have to be correctly designed, developed, edited and updated, in accordance with search engines' criteria and W3C recommendations. In fact, if access barriers are overcome, there is reason to believe that disadvantaged people can benefit more from Web information than the general population [54];
- in order to guarantee and support the positive role of Public Health institutional websites, common and strict European laws about health information on the Web have to be arranged, thoroughly monitored and carefully attended.

**Acknowledgements**

We want to thank Francesca Matricoti for helping in carrying out the research and Anna Pianzola for helping in the language revision.

**References**

1) Rosen G. A History of Public Health (expanded Edition). Baltimore: Johns Hopkins University Press, 1993.
2) WHO Regional Office for Europe. Health for All database (HFA-DB). Available from: http://www.euro.who.int/hfadb [Accessed July 16, 2009].
3) Ståhl T, Wismar M, Ollila E, Lahtinen E, Leppo K. Health in All Policies. Prospects and Potentials. Helsinki: Ministry of Social Affairs and Health, 2006.
4) Health and Welfare. Ottawa Charter for Health Promotion. Canada, 1986. Available from: http://www.who.int/hpr/nph/docs/ottawa-charter-hp.pdf [Accessed July 16, 2009].
5) McKee M. A crisis of governance? J Public Health (Oxf) 2006;29(1):3-8.
6) Kahn JP. Beyond disclosure: The necessity of trust in biomedical research. Cleve Clin J Med 2007;74(2 Suppl):49S-50S.
7) Pieterse AH, Baas-Thijssen MCM, Marijnen CAM, Stiggelbout AM. Clinician and cancer patient views on patient participation in treatment decision-making: a quantitative and qualitative exploration. Br J Cancer 2008;99(6):875-82.

8) Rotar-Pavli D, Švab I, Wetzels R. How do older patients and their GPs evaluate shared decision-making in healthcare? BMC Geriatr 2008;8:9.
9) Ullrich PF, Vaccaro AR. Patient Education on the Internet. Opportunities and Pitfalls. Spine 2002;27(7):185–8.
10) Wang Z, Walther JB, Pingree S, Hawkins RP. Health Information, Credibility, Homophily, and Influence via the Internet: Web Sites Versus Discussion Groups. Health Commun 2008;23(4):358–68.
11) Internet World Stats. Available from: http://www.internetworldstats.com [Accessed July 16, 2009].
12) Nielsen-Bohlman L, Panzer AM, Kindig DA. Health literacy: a prescription to end confusion. Washington DC: National Academies Press, 2004.
13) Eng TR, Maxfield A, Patrick K, Deering MJ, Ratzan S, Gustafson D. Access to health information and support: a public highway or a private road? JAMA 1998;280(15):1371–5.
14) Kim P, Eng T, Deering MJ, Maxfield A. Published criteria for evaluating health related web sites: review. BMJ 1999;318(7184):647-9.
15) Wyatt JC. Commentary: measuring quality and impact of the world wide web. BMJ 1997;314(7098):1879–81.
16) Rigby M, Forstrom J, Roberts R, Wyatt JC. Verifying quality and safety in health informatics service. BMJ 2001; 323(7312):552-6.
17) Disability Discrimination Act: Chapter 50. Great Britain, 1995.
18) De igualdad de oportunidades, no discriminación y accesibilidad universal de las personas con discapacidad [Equal opportunities, no discrimination and universal accessibility of people with disabilities]. Spanish Law 2 n. 51, BOE 289:43187-195, 2003.
19) L'égalité des droits et des chances, la participation et la citoyenneté des personnes handicapées [The equality in rights and opportunities, the participation and the citizenship of disabled people]. French Law n° 2005-102:2353.
20) Currò V, Buonuomo PS, Onesimo R, de Rose P, Vituzzi A, di Tanna GL, D'Atri A. A quality evaluation methodology of health web-pages for non-professionals. Med Inform Internet Med 2004;29(2):95-107.
21) Sutherland LA, Wildemuth B, Campbell MK, Haines PS. Unravelling the web: an evaluation of the content quality, usability, and readability of nutrition web sites. J Nutr Educ Behav 2005;37(6):300-5.
22) Health on the Net Foudation. HON Code of Conduct (HONcode) for medical and health web sites. Available from: http://www.hon.ch/HONcode/Conduct.html [Accessed July 16, 2009].
23) Commission of the European Communities, Brussels. eEurope 2002: Quality Criteria for Health Related Websites. J Med Internet Res 2002, 4(3):E15.
24) Morgan DL. Focus group as qualitative research. London: Sage Publication, 1988.
25) Kruege RA, Casey MA. Focus groups: A Practical Guide for Applied Research 3rd edition. Thousand Oaks, Calif.: Sage, 2000.
26) Grudens-Schuck N, Allen BL, Larson K. Focus group fundamentals. Ames, Iowa: Iowa State University, University Extension, Departments of Agriculture Education and Studies and Sociology, 2004.
27) Google Trends, USA. Available from: http://www.google.com/trends [Accessed July 16, 2009].
28.Google Adwords, USA. Available from: https://adwords.google.it/select/KeywordToolExternal [Accessed July 16, 2009].
29) Lorusso G, Italy. Available from: http://www.gplorusso.it/motori-di-ricerca.htm [Accessed July 16, 2009].
30) Disposizioni per favorire l'accesso dei soggetti disabili agli strumenti informatici. [Norms in order to support the accessibility of disabled people towards electronic resources]. Italian Law n. 4 GU. 13, 2004.
31) World Wide Web Consortium. Available from: http://www.w3.org/TR [Accessed July 16, 2009].
32) HyperText Markup Language - XHTML. Available from: http://www.w3.org/TR/xhtml1/ [Accessed July 16, 2009].
33) Cascading style sheets – CSS. Available from: http://www.w3.org/Style/CSS/ [Accessed July 16, 2009].
34) Web Accessibility Initiative – WAI. Available from: http://www.w3.org/WAI/ [Accessed July 16, 2009].
35) W3C Markup Validator, v0.8.3. Available from: http://validator.w3.org [Accessed July 16, 2009].
36) W3C CSS Validation Service. Available from: http://jigsaw.w3.org/css-validator [Accessed July 16, 2009].
37) Gattoni F, Sicola C. How to evaluate the quality of health related websites. Radiol Med 2005;109(3):280-7.
38) Adams SA, de Bont AA. More than just a mouse click: research into work practices behind the assignment of medical trust marks on the World Wide Web. Int J Med Inform 2007;76 Suppl 1:S14-20.
39) Shafi SM, Rafiq A. Rather Precision and recall of five search engines for retrieval of scholarly information in the field of biotechnology. Webology 2005; 2(2).
40) iProspect Search Engine User Behavior Study 2006. Available from: http://www.iprospect.com [Accessed July 16, 2009].
41) Eysenbach G, Köhler C. How do consumers search for and appraise health information on the World Wide Web? Qualitative study using focus groups, usability tests, and in-depth interviews. BMJ 2002;324(7337):573–7.
42) Hansen DL, Derry HA, Resnick PJ, Richardson CR. Adolescents searching for health information on the internet: An observational study. J Med Internet Res 2003;5(4):e25.
43) Zeng X, Parmanto B. Evaluation of web accessibility of consumer health information websites. AMIA Annu Symp Proc 2003:743-7.
44) Zeng X, Parmanto B. Web content accessibility of consumer health information web sites for people with disabilities: a cross sectional evaluation. J Med Internet Res 2004;6(2):e19.
45) Chiang MF, Starren J. Evaluation of consumer health website accessibility by users with sensory and physical disabilities. Stud Health Technol Inform 2004;107(Pt 2):1128-32.
46) Mancini C, Zedda M, Barbaro A. Health information in Italian public health websites: moving from inaccessibility to accessibility. Health Info Libr J 2005;22(4):276-85.
47) Whitbeck C. Desirable attributes of public educational websites. Sci Eng Ethics 2005;11(3):463-76. Review.
48) Eysenbach G, Powell J, Kuss O, Sa ER. Empirical studies assessing the quality of health information for consumers on the World Wide Web: a systematic review. JAMA 2002;287(20):2691-700.
49) DISCERN quality criteria for consumer health information. Available from: http://www.discern.org.uk [Accessed July 16, 2009].
50) Greenberg L, D'Andrea G, Lorence D. Setting the public agenda for online health search: A white paper and action agenda. J Med Internet Res 2004;6(2):e18.
51) Bar-Ilan J. Web links and Search Engine Ranking: The case of Google and the Query "Jew". J Am Soc Inf Sci Technol 2006;57(12):1581-6.
52) MaEC study "Measuring progress of eAccessibility in Europe". Available from: http://ec.europa.eu/information_society/activities/einclusion/library/studies/meac_study/index_en.htm [Accessed July 16, 2009].
53) Health EU, the Public Health Portal of the European Union. Available from: http://ec.europa.eu/health-eu/index_en.htm [Accessed December 3, 2009].
54) Gustafson DH, Hawkins RP, Boberg EW, McTavish F, Owens B, Wise M, Berhe H, Pingree S. CHESS: 10 years of research and development in consumer health informatics for broad populations, including the underserved. Int J Med Inform 2002;65(3):169-77.