

# Accuracy and coverage of reproductive health information on the Internet accessed in English and Persian from Iran

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## Abstract

**Background and methodology** The Internet is a useful resource for obtaining information. We evaluated the accuracy and coverage of reproductive health information on the Internet in English- and Persian-language sites accessed from Iran. An expert committee decided on five reproductive health topics to be evaluated and specified a checklist of content for these (36 items in total). We employed selected keywords in search engines between February and March 2006. About one of every four screened websites ( $n = 200$ ) addressed at least one target topic and were subjected to in-depth assessment. Three medical doctors independently rated each of the selected websites. Accuracy and coverage percentages were calculated for each website.

**Results** A total of 168 English- and 32 Persian-language websites were found that addressed the specified topics. The mean accuracy and coverage percentages of the 200 websites assessed were 98.8% (95%CI 98.1–99.6) and 45.2% (95%CI 41.0–49.3), respectively. Thirty-four (17%) websites, all in English, achieved a coverage percentage

of 80% or more. Academic referencing was not present in 152 (76%) websites. 'Sexually transmitted diseases' and 'family planning' were the topics with highest coverage in both the English- and Persian-language websites studied. 'Reproductive system and puberty' had the least coverage in the Persian websites. The top 20 websites found for the general population on reproductive health are reported.

**Discussion and conclusions** Websites providing comprehensive reproductive health information are not easy to locate from Iran; in particular, Persian-language websites and those targeting young people are scarce. However, for the websites identified the accuracy of information provided was acceptable. There is a need to identify high-quality, easily accessible websites for use by both professionals and the general public and to develop new ones.

**Keywords** English, Internet, Persian, reproductive health, website

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## Introduction

It is increasingly common for patients to obtain medical information from the Internet,<sup>1</sup> and health professionals use it to communicate with their patients.<sup>2</sup> Health information has been found to influence the patient's decision about treatment,<sup>3</sup> however poor monitoring of website content causes concern about the quality of the information presented there,<sup>1,4</sup> and several reports have suggested deficiencies in Web-based health information.<sup>1,5,6</sup> Health information on the Internet is popular with young adults.<sup>7</sup> Previous studies have assessed the quality of Internet information on sexually transmitted diseases<sup>8–11</sup> and contraception,<sup>12</sup> or evaluated the sex education information available on the Internet by recruiting college students to search for relevant topics.<sup>13</sup>

We undertook this cross-sectional study to evaluate the accuracy and coverage of reproductive health information available on the Internet in English and Persian, accessed from Iran.

## Methods

An expert committee of four reproductive health experts

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### Key message points

- Comprehensive websites on reproductive health are hard to locate.
- The overall accuracy of reproductive health information on the Internet is satisfactory.
- There is a need for high-quality websites on reproductive health to be easily identified and for new ones to be developed.

and one information technologist decided on the five reproductive health topics for which information on the Internet was to be reviewed, and defined the sub-issues for each topic, giving a total of 36 items (Table 1). In February and March 2006, we used a defined set of keywords (Box 1) to search Google™ and Alta Vista™ for English- and Persian-language websites, and in addition searched Vivisimo™ for English sites and Parseek™ for Persian sites. We retrieved the first 50 links for each keyword and then excluded duplicate addresses, advertising sites and sites requiring registration. Then one of the five study doctors examined each of the remaining sites to ascertain whether it addressed at least one of the specified reproductive health topics, and could therefore be included in the study.

A scoring system was established for any sub-issue information found. Each item was scored as follows: –1 = incorrect/misleading information, 0 = no available information, 1 = accurate information. Inaccurate/misleading information was defined as information that is

### Box 1: Keywords/terms used for the Internet searches

Reproductive health, sexual health, youth health, teen health, women's health, family planning, contraception, oral contraceptive pills, condom, vasectomy, sexually transmitted disease, sexually transmitted infection, pregnancy, complications of pregnancy, child bearing, delivery, puberty, reproductive organ, menstruation, violence against women, sexual rights

**Table 1** The topics (and sub-issues) defined for the study checklist and the number of Persian and English websites that attempted to cover each issue, irrespective of accuracy

Topics/sub-issues	Websites [ <i>n</i> (%)]		
	Persian ( <i>n</i> = 32)	English ( <i>n</i> = 168)	All ( <i>n</i> = 200)
Family planning			
Goals and benefits of family planning	10 (31.3)	105 (62.5)	115 (57.5)
Guide for choosing the best method	11 (34.4)	102 (60.7)	113 (56.5)
Oral contraceptive pills	9 (28.1)	98 (58.3)	107 (53.5)
Condoms	5 (15.6)	86 (51.2)	91 (45.5)
Intrauterine device (IUD)	6 (18.8)	88 (52.4)	94 (47.0)
Diaphragm	6 (18.8)	87 (51.8)	93 (46.5)
Norplant®	6 (18.8)	79 (47.0)	85 (42.5)
Tubal ligation	9 (28.1)	107 (63.7)	116 (58.0)
Vasectomy	6 (18.8)	81 (48.2)	87 (43.5)
Emergency contraception	7 (21.9)	106 (63.1)	113 (56.5)
Sexually transmitted diseases			
Importance and epidemiology	17 (53.1)	127 (75.6)	144 (72.0)
Common preventive measures	18 (56.3)	130 (77.4)	148 (74.0)
HIV/AIDS transmission	19 (59.4)	125 (74.4)	144 (72.0)
HIV/AIDS prevention	19 (59.4)	125 (74.4)	144 (72.0)
Treatment measures	15 (46.9)	108 (64.3)	123 (61.5)
Definition of the partners' responsibility	14 (43.8)	96 (57.1)	110 (55.0)
Pregnancy and delivery			
Natural pregnancy	6 (18.8)	54 (32.3)	60 (30.2)
Proper timing to get pregnant	4 (12.5)	43 (25.6)	47 (23.5)
Pregnancy symptoms/laboratory tests	7 (21.9)	81 (48.2)	88 (44.0)
Prenatal care	12 (37.5)	64 (38.1)	76 (38.0)
Complications of pregnancy/symptoms	9 (28.1)	60 (35.7)	69 (34.5)
Information on delivery methods	6 (18.8)	48 (28.6)	54 (27.0)
Post-abortion concerns	3 (9.4)	80 (47.6)	83 (41.5)
Reproductive system and puberty			
Male reproductive system	5 (15.6)	67 (39.9)	72 (36.0)
Female reproductive system	3 (9.4)	58 (34.5)	61 (30.5)
Puberty in the male	2 (6.3)	60 (35.7)	62 (31.0)
Puberty in the female	3 (9.4)	70 (41.7)	73 (36.5)
Menstrual period	6 (18.8)	83 (49.4)	89 (44.5)
Menstrual disturbances	6 (18.8)	78 (46.4)	84 (42.0)
Reproductive diseases in the male (brief guide)	5 (15.6)	60 (35.7)	65 (32.5)
Reproductive diseases in the female (brief guide)	5 (15.6)	49 (29.2)	54 (27.0)
Sex and sexual rights			
Healthy sexual intercourse	8 (25.0)	69 (41.1)	77 (38.5)
Partners' responsibilities	6 (18.8)	74 (44.0)	80 (40.0)
Sexual rights	7 (21.9)	73 (43.5)	80 (40.0)
Violence against women	8 (25.0)	73 (43.5)	81 (40.5)
Unwanted pregnancy	2 (6.3)	80 (47.6)	82 (41.0)

in conflict with current scientific evidence. For example, quotations that “vasectomy is a reversible contraceptive method”, “the IUD is a good option for nulliparous women”, “after unprotected sex you would be better tested for HIV to be sure about your HIV status” [without advising the proper time for testing], “pregnancy should be avoided for 3 months after immunisation against rubella”, “systolic blood pressure above 120 mmHg is abnormal in pregnant women” or “women should tolerate a bit of violence from their husbands to save their marriage” were all rated as inaccurate. ‘Coverage’ for each topic was calculated as the total number of items covered, either with accurate information (scored 1) or inaccurately (scored -1), expressed as a percentage of the number of possible items within that topic. The ‘total coverage’ of a website was calculated as the percentage of the total number of items covered (across all five topics) divided by 36 (the maximum possible number of items). The ‘accuracy’ of the information presented on a topic was calculated as the total number of the topic’s sub-issues accurately addressed (scored 1), divided by the total number of sub-issues in that topic, as ‘covered’ by that website, expressed as a percentage. The overall accuracy of the website was calculated as a percentage of the total number of

items ‘covered’ by that website. The provision of academic referencing was also checked for each sub-issue addressed. Academic referencing of a website was summarised as the total number of items referenced, divided by the total number of items ‘covered’ in that website, expressed as a percentage.

Three independent doctors separately scored the content of the websites included in the study. Differences of more than 20 percentage points between scores were resolved by consensus between the evaluators and the committee.

### Statistical analysis

Means and confidence intervals (CI) were used for the quantitative variables. Absolute and relative frequencies were used for the description of the categorical data. The non-parametric Mann-Whitney U-test was used to compare the quantitative variables. For accuracy and coverage percentages, the consistency of performance within sites across the five topics was assessed using the non-parametric Friedman test for repeated measures. A *p* value <0.05 was considered indicative of a statistically significant difference in performance across topics.

**Table 2** Characteristics of the reproductive health websites included in the study

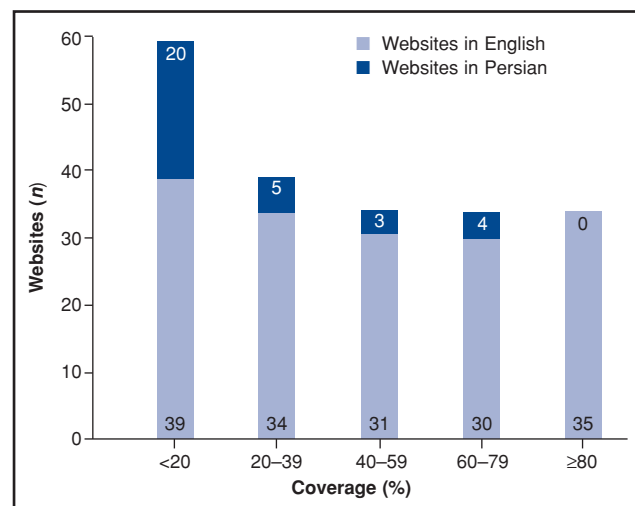
Characteristic	Websites [n (%)]		
	Persian (n = 32)	English (n = 168)	All (n = 200)
Target group			
General population mainly	26 (81)	128 (76)	154 (77)
Health professionals mainly	1 (3)	5 (3)	6 (3)
Both groups	5 (16)	35 (21)	40 (20)
Target age group			
Teen/youth mainly	3 (9)	37 (22)	40 (20)
Distinct age groups	2 (6)	30 (18)	32 (16)
No differentiation	27 (84)	101 (60)	128 (64)
Website affiliation			
Scientific/university institutes	8 (25)	69 (41)	77 (39)
International institutes	0 (0)	9 (5)	9 (5)
Other	24 (75)	90 (54)	114 (57)

## Results

Approximately one-quarter of the screened websites covered at least one of the specified topics on reproductive health (200/796 for all websites, 32/116 Persian websites, 168/680 English websites). Table 2 summarises the characteristics of the reproductive health websites that were evaluated.

At least one piece of incorrect or misleading information was observed in 11 (5.5%) websites, however the mean accuracy percentage was 98.8% (95%CI 98.1–99.6). Table 3 shows the accuracy percentage by topic and by language of the evaluated websites.

The mean coverage score for the evaluated websites was 45.2% (95%CI 41.0–49.3). Thirty-four (17%) websites, all in English, achieved a coverage percentage of 80% or more (Figure 1). Mean coverage percentages by topic and the language of the website are summarised in Table 3. When assessing the performance of the websites across the five reproductive health topics it was found that, unlike the coverage percentage, the accuracy percentage was not significantly different across topics ( $p < 0.001$ ). ‘Sexually transmitted diseases’ was the most covered topic followed by ‘family planning’ in both the English and Persian

**Figure 1** English- and Persian-language websites assessed by coverage percentage (n = 200)

websites studied. ‘Reproductive system and puberty’ and ‘pregnancy and delivery’ were the topics with the least coverage percentages in Persian and English websites, respectively (Table 3). There were only a few Persian websites available that posted information on ‘puberty in male and female’ and on various contraceptive methods (Table 1). The top 20 websites that had the greatest overall coverage of reproductive health information for the general population with complete accuracy are listed in Table 4.

Academic referencing was absent in 152 (76%) websites, whereas 35 (17.5%) websites (33 in English, 2 in Persian) referenced 50% or more of the content presented. The websites targeting health professionals, or both professional and general populations, had more referencing compared to those that only targeted the general population (43.6% vs 7.9%;  $p < 0.001$ ). The websites targeting only young people provided significantly less referencing (4.4% vs 19.1%;  $p < 0.01$ ) compared to all the other websites. Nevertheless, the coverage and accuracy scores were not significantly different between websites that targeted professional and general populations, nor between websites that targeted young people compared to non-specific-for-age websites.

**Table 3** Mean ‘accuracy’ and ‘coverage’ percentages of the evaluated websites

Reproductive health topic	Accuracy (%)			Coverage (%)		
	Websites			Websites		
	Persian	English	All	Persian (n <sup>a</sup> = 32)	English (n = 168)	All (n = 200)
Family planning	92.3 (n <sup>b</sup> = 12)	99.9 (n = 128)	99.2 (n = 140)	23.1	55.9	50.6
Sexually transmitted diseases	94.2 (n = 20)	99.8 (n = 131)	99.1 (n = 151)	53.1	70.6	67.8
Pregnancy and delivery	91.1 (n = 13)	99.4 (n = 97)	98.3 (n = 110)	20.0	36.5	33.9
Reproductive system and puberty	100.0 (n = 8)	100.0 (n = 88)	100.0 (n = 96)	13.8	39.2	35.1
Sex and sexual rights	100.0 (n = 10)	99.5 (n = 103)	99.6 (n = 113)	20.3	43.7	40.2
Overall	95.4 (n = 32)	99.5 (n = 168)	98.8 (n = 200)	25.2	49.0	45.2

<sup>a</sup>For all websites in the study, overall coverage and coverage by topic could be calculated, even for an omitted topic (which would thus achieve a topic coverage percentage for that topic of zero). Thus for coverage the n provided at the top of the column applies to all the coverage means listed below it.

<sup>b</sup>Accuracy, however, can only be calculated when there is some coverage of a topic, so the number of websites contributing data will vary across the topics and sub-issues. Therefore values of n are provided separately with each averaged accuracy percentage.

**Table 4** Top 20 English language websites aimed at the general population on reproductive health topics reflecting complete accuracy and the highest coverage percentages

Website name	Website URL <sup>a</sup>
Centers for Disease Control and Prevention (CDC) – Reproductive Health	<a href="http://www.cdc.gov/reproductivehealth/index.htm">http://www.cdc.gov/reproductivehealth/index.htm</a>
MedlinePlus – Reproductive Health	<a href="http://www.nlm.nih.gov/medlineplus/reproductivehealth.html">http://www.nlm.nih.gov/medlineplus/reproductivehealth.html</a>
Canadian Women's Health Network	<a href="http://www.cwhn.ca/indexeng.html">http://www.cwhn.ca/indexeng.html</a>
WebMD	<a href="http://www.webmd.com">http://www.webmd.com</a>
New York Online Access to Health	<a href="http://www.noah-health.org">http://www.noah-health.org</a>
Our Bodies Ourselves	<a href="http://www.ourbodiesourselves.org/book">http://www.ourbodiesourselves.org/book</a>
MayoClinic.com	<a href="http://www.mayoclinic.com">http://www.mayoclinic.com</a>
Healthopedia.com	<a href="http://www.healthopedia.com/diseases.html">http://www.healthopedia.com/diseases.html</a>
Cool Nurse	<a href="http://www.coolnurse.com/index.htm">http://www.coolnurse.com/index.htm</a>
Planned Parenthood	<a href="http://www.plannedparenthood.org">http://www.plannedparenthood.org</a>
Medem – Medical Library	<a href="http://www.medem.com/medlb/medlib_entry.cfm">http://www.medem.com/medlb/medlib_entry.cfm</a>
Women's Health Matters	<a href="http://www.womenshealthmatters.ca/index.cfm">http://www.womenshealthmatters.ca/index.cfm</a>
Sexual Health Network	<a href="http://www.sexualhealth.com">http://www.sexualhealth.com</a>
familydoctor.org	<a href="http://familydoctor.org">http://familydoctor.org</a>
fpa (Family Planning Association)	<a href="http://www.fpa.org.uk">http://www.fpa.org.uk</a>
KidsHealth – TeensHealth	<a href="http://www.kidshealth.com/teen">http://www.kidshealth.com/teen</a>
National Women's Health Resource Center	<a href="http://www.healthywomen.org">http://www.healthywomen.org</a>
Go Ask Alice!	<a href="http://www.goaskalice.columbia.edu">http://www.goaskalice.columbia.edu</a>
Estronaut	<a href="http://www.womenshealth.org">http://www.womenshealth.org</a>
IVillage	<a href="http://www.ivillage.com">http://www.ivillage.com</a>

<sup>a</sup>Websites were accessed and evaluated by the authors in March 2006 and the URLs rechecked in May 2008.

Although websites affiliated with scientific organisations or university institutes did not differ from other websites as regards accuracy or coverage percentages, the information they provided was more often referenced (38.1% vs 14.1%;  $p < 0.01$ ).

## Discussion

This study would appear to be the first to evaluate the accuracy and coverage of information on specified reproductive health topics provided on the Internet and accessible by means of search engines in common use by the public. Although the websites assessed had low coverage (i.e. fewer than half the key sub-issues specified), the information posted was in most cases accurate. This is contrary to reports claiming poor quality of information on various health topics,<sup>14–16</sup> and a systematic review of studies assessing health information on the World Wide Web,<sup>17</sup> which reported that 70% of websites contained poor quality information. Conversely, some authors report positively on the quality of information available on the Internet.<sup>4,18</sup> Perhaps the explanation for this diversity in judgement is the variety in the topics surveyed, the search strategies used, changes across time, and the methods used for assessment. Cline and Haynes<sup>1</sup> identified as 'hazardous conditions' a lack of peer review and inaccurate, misleading or dangerous information. Using reputable Internet sources (Table 4) can protect users from harmful misinformation. Promoting to users the advantages of Health on the Net accreditation might also be a way forward ([www.hon.ch/home.html](http://www.hon.ch/home.html)).

Some authors<sup>19,20</sup> have suggested that more accurate information is available on academic websites. About 75% of the websites we assessed lacked any academic referencing, which might prevent users, especially professionals, evaluating their content. However, apart from whether or not there was academic referencing, neither accuracy nor coverage was better in websites supported by academic institutes.

Smith and colleagues<sup>13</sup> found general information on sex education difficult to locate on the Internet. In another survey, using three search engines with six keywords on sexual health, only 3% of 87 180 results were educational websites.<sup>9</sup> In our study, it took about four hits to find at least one relevant topic, so finding information on

reproductive health might be as inefficient as finding general health information on the Internet.<sup>5</sup>

This study suggests an imbalance in the information provided across reproductive health topics. Although 'sexually transmitted diseases' followed by 'family planning' were the topics covered best, the mean coverage percentage for Persian-language websites on the latter topic was below 25%. Furthermore, only a few websites provided information on contraceptive methods. 'Reproductive system and puberty', the most pertinent topic for teenagers, has the lowest coverage by Persian websites. This might be due to cultural taboos in Iran on disseminating information on sexual biology. However, Smith and colleagues reported similar results from English-language sites.<sup>13</sup> Although 32% of Internet users are in the 18–24 years age range,<sup>13</sup> only 20% of the websites assessed specifically addressed the needs of this age group. Benigeri and Pluye<sup>21</sup> suggested that it should be the responsibility of health professionals to design web-based health and medical information specifically for young people.

Accessing the Internet from Iran is subject to a non-specific, word-sensitive, filtering that aims to prevent users accessing obscene or immoral material. For example, searching a keyword such as 'teen', 'sex' (in Persian or English), or 'oral' (in English) would be blocked. The poor coverage percentages of the Persian websites, as found in this study, are a further obstacle for Iranians in their efforts to gain access to comprehensive information on reproductive health in their native language. The authors, in co-operation with others, have therefore developed a Persian website on reproductive health that is funded by the United Nations Population Fund, Tehran, Iran and supervised by the Ministry of Health and Medical Education of Iran. This website (<http://www.javanesalem.ir>), which targets teenagers and young adults, began its trial phase July 2007.

Our study has some limitations. The search strategy implemented in this study could not sample all websites on reproductive health. However, we tried to assess the accuracy and coverage of the information that an ordinary consumer would retrieve. We minimised subjectivity by having an expert committee develop an assessment checklist and by having three independent scorers evaluate each site.



Health information sites should be judged not only by the quality of the information, but also by the ease of retrieval of relevant information.<sup>1</sup> However, evaluation of other probable predictors of performance, such as readability of website content, was beyond the scope of this survey. Nor was our study design able to ascertain the experiences of actual users searching for information, nor knowledge gained, nor impact on attitude/practice.

Furthermore, coverage across the five selected topics might not be as important as a website containing, in a way that is accessible and understandable to the user, the specific information sought in that visit. Nor did we evaluate for each website the amount of information available on each sub-issue. We assumed that the ideal website should contain some trustworthy information on all reproductive health topics. Foster and colleagues<sup>22</sup> have shown that users of an Arabic website on emergency contraception were also interested in general reproductive health issues. To limit bias by this assumption, we presented the accuracy and coverage percentages for each of the five defined topics of the reproductive health separately, as well as for the websites overall.

## Conclusions

In conclusion, the Internet offers a convenient means for obtaining health information<sup>1,23</sup> and has been found to be a practical and accessible route for providing health education to young people<sup>7</sup> which may reduce risk.<sup>24,25</sup> The fact that this information search is private makes it particularly suitable for reproductive health topics, which are of importance to the majority of the population of any country. However, good websites on reproductive health are difficult to find. Despite acceptable accuracy, the overall coverage of reproductive health-related information on the Internet is below what we would expect for the sites in the English language and was worse for those in the Persian language. There is a need to develop high-quality, easily accessible, specific websites for teenagers and adolescents, especially on poorly covered topics. Local academic institutes should take an active part in identifying and developing public educational websites that will provide accurate, age-specific, culturally appropriate, comprehensive reproductive health information. National policymakers may take advantage of the successful technology-assisted frameworks for integrated reproductive health training implemented in some developing countries.<sup>26</sup> Non-governmental organisations, as well as international and United Nations-backed foundations, could use the Internet to disseminate accurate and accessible reproductive health information in developing countries.

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