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Google and Women's Health-Related Issues: What Does the Search Engine Data Reveal?

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Mazin Baazeem, MD[1], Haim Abenhaim, MD, MPH[1,2]

[1] Department of Obstetrics and Gynecology, Jewish General Hospital, McGill University
[2] Centre for Clinical Epidemiology and Community Studies, Jewish General Hospital

Abstract

Objectives: Identifying the gaps in public knowledge of women's health related issues has always been difficult. With the increasing number of Internet users in the United States, we sought to use the Internet as a tool to help us identify such gaps and to estimate women's most prevalent health concerns by examining commonly searched health-related keywords in Google search engine.

Methods: We collected a large pool of possible search keywords from two independent practicing obstetrician/gynecologists and classified them into five main categories (obstetrics, gynecology, infertility, urogynecology/menopause and oncology), and measured the monthly average search volume within the United States for each keyword with all its possible combinations using Google AdWords tool.

Results: We found that pregnancy related keywords were less frequently searched in general compared to other categories with an average of 145,400 hits per month for the top twenty keywords. Among the most common pregnancy-related keywords was "pregnancy and sex' while pregnancy-related diseases were uncommonly searched. HPV alone was searched 305,400 times per month. Of the cancers affecting women, breast cancer was the most commonly searched with an average of 247,190 times per month, followed by cervical cancer then ovarian cancer.

Conclusion: The commonly searched keywords are often issues that are not discussed in our daily practice as well as in public health messages. The search volume is relatively related to disease prevalence with the exception of ovarian cancer which could signify a public fear.

Keywords: information seeking behavior; internet; women's health

Introduction

The use of the Internet in the United States (US) has been growing in the last ten years. As of September 2012, 81% of US adults reported using the internet, of which 72% stated to have searched for health information online in the past year. Information seeking through web search engines such as Google, Yahoo! and Ping is the most common use of the Internet. In fact, 77% of online health seekers began their query at a search engine, while 13% began their search at a site specializing in health information, such as WebMD [1]. Taking into consideration that women are more likely than men to seek health information online, we sought to evaluate women's most prevalent health concerns in the US by examining the searched volume of health-

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related keywords in the Google search engine. Our findings will improve our general understanding of online health queries pertaining to women's health and help inform health care practitioners of potential issues overlooked in daily practice.

Background

A 2012 Health Survey sponsored by the Pew Research Center's Internet & American Life Project found that certain populations in the US, such as young adults and individuals with higher education levels are more likely to report gathering health information online [1]. Socioeconomic factors such as age, gender, income and education play an important role in online health information seeking [2]. A study evaluating the demographic profile of online health information seekers found that a digital divide still exists between low and high income populations despite an overall increase in availability of computers and internet access in the US [3]. A similar strong digital divide in terms of access to online health information was also found in a study by Murray et al, however once access was achieved socioeconomic status and education was not found to predict whether patients found pertinent information online [4].

Smart phone devices are helping bridge the digital divide as mobile health information gains popularity with rising smartphone ownership [3]. Fifty two percent of smart phone owners have used their phone to search for health information [5]. A study by Jadhav et al analyzed the most frequent health searches initiated from personal computers and smart devices to evaluate how device type influences online health information seeking. Choice of device typed used was found to change online health information search behavior. Internet users asked more health questions using smart devices than personal computers. Health queries initiated by a smart device were also longer, more descriptive and had fewer spelling mistakes compared to those made from personal computers. Findings also showed that very few online health seekers searched for preventive health information, indicating a need to promote preventive health care [2].

The observed increasing number of online health seekers in the US can have an impact on the traditional physician–patient relationship. In a report about online health information seeking behavior, 80% of physicians reported patients brought printed health information they obtained online at visits [6]. While health information online can improve health literacy and inform health decisions, inaccurate or misinterpreted information can lead to negative health behaviors and outcomes [7]. In a survey studying physicians' experience of patients seeking health information on the Internet, accurate and relevant information obtained online by patients was viewed as benefiting the physician-patient relationship. A minority of physicians felt challenged by patients bringing health information to the visit [7]. Online health information seeking is shifting the way physicians practice, placing a greater responsibility on healthcare practitioners to support patients in the interpretation of information sought online.

Research Methods

The first step of our study was to create subject categories that are pertinent to women's health. These included obstetrics; gynecology; urogynecology /menopause; oncology and infertility. These categories were then given to two separate obstetrical care providers working in university teaching hospitals, who created elaborate lists of keywords that may be of interest to women pertaining to the set clinical categories. These lists were then combined and the Google tool AdWords was used to determine the frequency at which the keywords were used from December

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2012 to December 2013 by internet users in the US. AdWords Google is an Internet tool designed to help corporations identify the search volume of a keyword. The Google search engine was selected as it has been dominating the Internet in the last 6 years with about 65.9% of market share [8]. A one year data collection time period allowed for the control of artificially increased search volumes of keywords as a result of external influences such as media and publicity [9].

We combined the number of hits of similar keywords for each topic. Keywords were included only if 90% or more of the content within the first 5 pages of results was relevant. For example in pregnancy and sex our search included only these two keywords in all possible combinations ("pregnancy sex", "sex pregnancy", "pregnant sex" and "sex pregnant") rendering our search more inclusive and the total number of hits were combined into one category (Pregnancy and sex). More than 90 percent of keywords were combined. Results were tabulated according to frequency in each category. Data was limited to the most commonly searched keywords in each category. Ethics approval was not required for this study as the information obtained online is publicly accessible and there is no reasonable expectation of privacy.
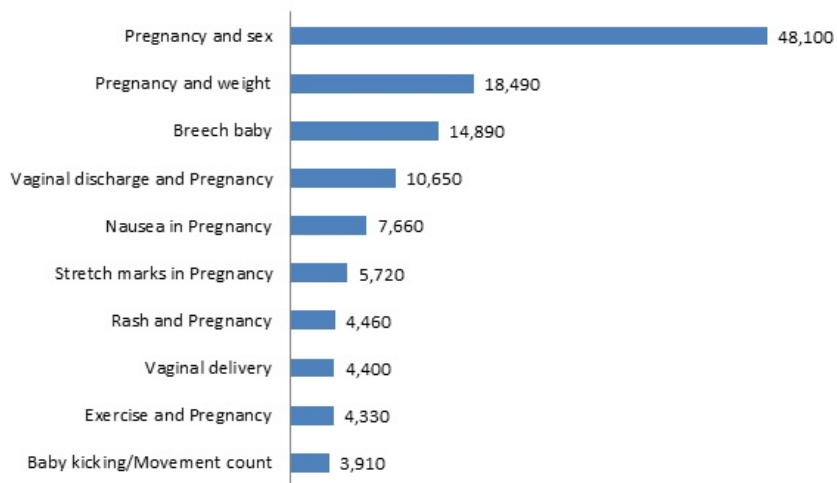
Table 1: Average top 25 monthly searched keywords of all categories from December 2012 to December 2013

Keywords	Number of hit
Pregnancy	502,000
HPV	305,400
Abortion	247,600
Breast cancer	247,190
Ovarian cyst	139,990
IUD	94,170
Cervical cancer	93,510
Ovarian cancer	91,020
Miscarriage	90,500
Pap smear	80,600
Fibroid	75,300
How to get pregnant	74,000
Colposcopy	60,500
IVF	60,200
HRT	60,200
Pregnancy sex	48,100
IUI	47,300
HPV vaccine	40,620
Tubal ligation	40,610
Uterine cancer	37,760
Contraception	27,100
Infertility	22,200
Endometrial cancer	22,200
Pregnancy weight	18,490
Vaginal dryness	17,910
HPV: Human papilloma virus IUD: Intrauterine device IVF: In vitro fertilization HRT: Hormone replacement therapy IUI: Intrauterine insemination	

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Results

The two most commonly searched keywords were pregnancy, which was searched an average of 502,000 times per month, and HPV which was searched an average of 305,400 times per month (Table1). However, apart from "pregnancy" as a keyword, pregnancy-related keywords were less searched in general compared to those of other categories. The top 20 pregnancy-related keywords were averagely searched 145,400 times per month. Pregnancy and sex was the most commonly searched pregnancy-related keyword with an average search of 48,100 searches per month, followed by pregnancy and weight which was searched 18,490 times per month. Of the ten most searched keywords, only two were associated with possible serious adverse pregnancy outcomes (vaginal discharge and rash-pregnancy) (Figure 1).
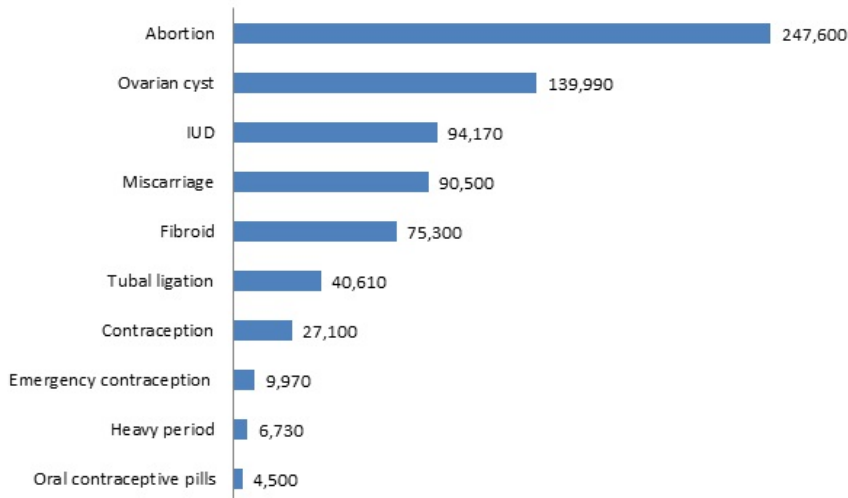
Figure 1

Figure 1: Average top 10 monthly searched pregnancy related keywords from December 2012 to December 2013

HPV, with average hits of 305,400 per month, was the most commonly searched gynecology-related keyword followed by abortion with an average search of 247,600 times per month, and then ovarian cyst. Of all the contraception methods, intra uterine device (IUD) was the most searched keyword with an average search of 94,170 times per month, followed by tubal ligation at 40,610 times per month (Figure 2).

Within the menopause and urogynecology category, hormone replacement therapy was the most searched keyword, averaging 60,200 hits per month. The question "how to get pregnant" was the most commonly searched keyword string in the fertility category with an average search of 74,000 searches per month followed by in vitro fertilization (IVF) with an average search of 60,200 times per month.

Breast cancer was the most commonly searched female cancer with an average search of 247,190 times per month. Of the gynecological cancers, cervical cancer was most commonly searched, followed by ovarian cancer related keywords, then endometrial cancer. Uterine cancer comes in 6th place with an average search of 59,960 times per month (Figure 3).

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Figure 2

Figure 2: Average top 10 monthly searched gynecology related keywords from December 2012 to December 2013

Figure 3
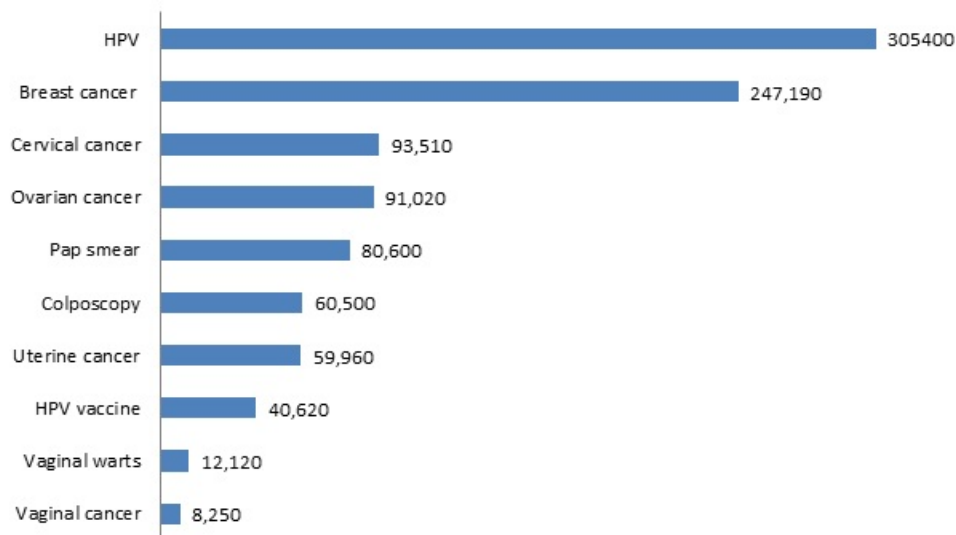
Figure 3: Average top 10 monthly searched oncology related keywords from December 2012 to December 2013

Discussion

With the increasing number of Internet users in the US, we sought to use the Internet as a tool to estimate women's most prevalent health concerns by examining commonly searched health-related keywords from five categories most important to women's health. We found that pregnancy related keywords were less frequently searched in general compared to other

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categories. According to the Centers for Disease Control and Prevention (CDC) there are about 6 million pregnant women annually in the US [10] which could explain the relatively lower number of hits. Culture and behavior differences as well as access to the Internet may change the percentage of pregnant women using the Internet for health information. 95% of pregnant women in a multicenter Italian survey used the Internet as a source of information [11] compared to an Australian study done by Grimes et al, where they found that only 44% of their cohort used the Internet as a source of information [12].

There are previous studies supporting the opinion that pregnant women prefer receiving information from a health care provider [13]. Women receiving care from midwives are less frequently searching information elsewhere compared to women who are receiving care from a doctor [12]. This difference could be because women who receive midwifery care have more opportunities to discuss their concerns and have their questions answered due to differences in practice style and work load compared to physicians [14]. In recent studies, the Internet is beginning to exert a significant impact on the decision process during pregnancy [11,12,15]. Some of the top searched pregnancy related issues are often not discussed in daily practice. Two of the top six searched pregnancy keywords were purely cosmetic (weight and stretch marks) which points out some of the non-medical concerns for pregnant women which are not often addressed in our daily practice. Moreover it suggests the need for better Internet web sites addressing these issues.

HPV was the most commonly searched term in the gynecology category, which could be related to the age group that is affected as young women are more frequent users of the Internet [16]. Likewise the incidence of the HPV infection among the young population could play a role in this high search volume. It has been estimated that 75 to 80% of sexually active adults will acquire a genital tract HPV infection before the age of 50 [17]. However, this search volume could suggest a change in the low awareness of HPV among US women that has been described before in the literature [18-20] (Figure 3).

The Internet has been reported as a frequent source of information for infertility patients [21,22], with a growing usage of Internet-based support groups by infertile men and women [21,23,24]. The search volume for fertility related terms averaged 204,320 hits per month reflecting an increasing demand of fertility related topics.

The most common cancer affecting women is breast cancer which accounts for over 230,000 cases each year [25]. In our study we found it to be the most searched female cancer with about 247,190 average searches per month. Although ovarian cancer (approximately 22,000 new cases annually [25]) is less prevalent than endometrial cancer (about 50,000 new cases each year [25]) it was searched more frequently with an average search of 91,020 times per month. This could reflect a public fear as ovarian malignancy carries the worst prognosis, and is the most common cause of gynecologic cancer death [25].

In the menopause and urogynecology category, the low searched frequency of menopause symptoms could be correlated to the age group of the Internet users [26]. The most frequently searched keyword was Hormone Replacement Therapy (HRT) with about 60,200 searches per month, followed by vaginal dryness, which is not unique to women going through menopause.

A total of 765,651 abortions were reported to the CDC in 2010, with an abortion rate of 14.6 abortions per 1,000 women aged 15–44 years [27]. Abortion was the most commonly searched keyword in the gynecology category. There is some evidence suggesting an increasing demand

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for online information about abortion, highlighting potential legal ambiguities, or concerns regarding accessibility and cost about the legal status [28]. This search volume might also be related to the sensitivity of the subject as patients may not feel comfortable addressing such issues with their physician. Ovarian cyst was the second most commonly searched gynecological keyword, although we are uncertain of the reason, this frequency could be explained by the age group that is most commonly affected (25-40), the long treatment course, or the fear of malignancy [26,29].

Limitations

This study was limited to user search queries about women's health issues in the US from 2012 to 2013. A major limitation of this study is the inherent search bias associated with using a major search engine such as Google. Paid advertisers sponsoring search engine companies may influence the ranking of sites in the search results [30]. In addition to online advertising strategies, numerous organizations currently use certain technology to manipulate the results of user search queries in order to achieve higher rankings [31]. Google was selected for our study as it is one of the most commonly used and the only search engine that provides the AdWords tool [8]. Only search queries in English were included, thereby excluding the growing number of non-English speakers residing in the United States. In its latest report, The US Department of Commerce had estimated that about 60.6 million Americans (21% of the population) spoke a language other than English at home. Of those 60.6 million only 7% did not speak English at all [32].

Conclusion

The Internet has changed the way people deal with their own health issues, providing them with unlimited access to health-related information. Our study attempted to identify those issues reflective of women's health concerns. Physicians may consider introducing subjects of particular interest to patients routinely during visits as well as provide pamphlets to patients in their offices on such issues. This study also points out the need for further research on the gap in knowledge regarding women's health-related issues between patient and physician. Bridging this gap will help inform public health messages and could improve the quality and quantity of information available on the Internet.

Conflicts of Interest

The authors declare no conflicts of interest.

References

1. FOX S. Duggan M. Health Online 2013. Pew internet & American Life Project. 2013. Available at http://www.pewinternet.org/2013/01/15/health-online-2013/. Accessed 29/11/2013.

2. Jadhav A, Andrews D, Fiksdal A, Kumbamu A, McCormick JB, et al. 2014. Comparative analysis of online health queries originating from personal computers and smart devices on a consumer health information portal [PUBMED]. *J Med Internet Res*. 16(7), e160. PubMed http://dx.doi.org/10.2196/jmir.3186

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3. Lorence DP, Park H, Fox S. 2006. Assessing health consumerism on the Web: a demographic profile of information seeking behaviors. *J Med Syst*. 30(4), 251-58. PubMed http://dx.doi.org/10.1007/s10916-005-9004-x

4. Murray E, Lo B, Pollack L, Donelan K, Catania J, et al. 2003. The impact of health information on the internet on the physician-patient relationship: patient perceptions [PUBMED]. *Arch Intern Med*. 163(14), 1727-34. PubMed http://dx.doi.org/10.1001/archinte.163.14.1727

5. FOX S. Duggan M. Mobile Health 2012. Pew internet & American Life Project. 2012. Available at http://www.pewinternet.org/2012/11/08/mobile-health-2012/. Accessed 29/11/2013.

6. Higgins O, Sixsmith J, Barry MM, Domegan C. A literature review on health information seeking behaviour on the web: a health consumer and health professional perspective. Stockholm: ECDC; 2011.

7. Murray E, Lo B, Pollack L, Donelan K, Catania J, et al. 2003. The impact of health information on the Internet on health care and the physician-patient relationship: national U.S. survey among 1.050 U.S. physicians [PUBMED]. *J Med Internet Res*. 5(3), e17. PubMed http://dx.doi.org/10.2196/jmir.5.3.e17

8. Lipsman ASR. 2012 U.S. Digital Future in Focus. Available from: http://www.comscore.com/Insights/Presentations_and_Whitepapers/2012/2012_US_Digital _Future_in_Focus Accessed 26/11/2014.

9. Richardson CG, Hamadani LG, Gotay C. 2013. Quantifying Canadians' use of the Internet as a source of information on behavioural risk factor modifications related to cancer prevention [PUBMED]. *Chronic Dis Inj Can*. 33(3), 123-28. PubMed

10. World Bank. Internet users (per 100 people). World Bank Open Data. Available at http://data.worldbank.org/indicator/IT.NET.USER.P2 Accessed 25/11/2013.

11. Bert F, Gualano MR, Brusaferro S, De Vito E, de Waure C, et al. 2013. Pregnancy e-health: a multicenter Italian cross-sectional study on Internet use and decision-making among pregnant women [PUBMED]. *J Epidemiol Community Health*. 67(12), 1013-18. PubMed

12. Grimes HA, Forster DA, Newton MS. 2014. Sources of information used by women during pregnancy to meet their information needs [PUBMED]. *Midwifery*. 30(1), e26-33. PubMed http://dx.doi.org/10.1016/j.midw.2013.10.007

13. Risica PM, Phipps MG. 2006. Educational Perferences in a Prenatal Clinic. *Int J Childbirth Educ*. 21(4), 4.

14. Singh D, Newburn M, Smith N, Wiggins M. 2002. The information needs of first-time pregnant mothers. *British Journal of Midwifery*. 10(1), 54-58. http://dx.doi.org/10.12968/bjom.2002.10.1.10054

15. Lagan BM, Sinclair M, Kernohan WG. 2011. What is the impact of the Internet on decision-making in pregnancy? A global study [PUBMED]. *Birth*. 38(4), 336-45. PubMed http://dx.doi.org/10.1111/j.1523-536X.2011.00488.x

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16. File T. 2013. Computer and Internet Use in the United States. Current Population Survery Reports, P20-568. U.S. Census Bureau, Washington, DC. Available at https://www.survata.com/docs/Census_Internet.pdf Accessed 25/11/2013.

17. Workowski KA, Berman SM. 2006. Sexually transmitted diseases treatment guidelines, 2006 [PUBMED]. *MMWR Recomm Rep*. 55(RR-11), 1-94. PubMed

18. Friedman AL, Shepeard H. 2007. Exploring the knowledge, attitudes, beliefs, and communication preferences of the general public regarding HPV: findings from CDC focus group research and implications for practice [PUBMED]. *Health Educ Behav*. 34(3), 471-85. PubMed http://dx.doi.org/10.1177/1090198106292022

19. Walsh CD, Gera A, Shah M, Sharma A, Powell JE, et al. 2008. Public knowledge and attitudes towards Human Papilloma Virus (HPV) vaccination [PUBMED]. *BMC Public Health*. 8, 368. PubMed http://dx.doi.org/10.1186/1471-2458-8-368

20. Tiro JA, Meissner HI, Kobrin S, Chollette V. 2007. What do women in the US know about human papillomavirus and cervical cancer? [PUBMED]. *Cancer Epidemiol Biomarkers Prev*. 16(2), 288-94. PubMed http://dx.doi.org/10.1158/1055-9965.EPI-06-0756

21. Kahlor L, Mackert M. 2009. Perceptions of infertility information and support sources among female patients who access the Internet [PUBMED]. *Fertil Steril*. 91(1), 83-90. PubMed http://dx.doi.org/10.1016/j.fertnstert.2007.11.005

22. Talarczyk J, Hauke J, Poniewaz M, Serdyńska-Szuster M, Pawelczyk L, et al. 2012. Internet as a source of information about infertility among infertile patients [In Polish] [PUBMED]. *Ginekol Pol*. 83(4), 250-54. PubMed

23. Malik SH, Coulson NS. 2010. Coping with infertility online: an examination of self-help mechanisms in an online infertility support group [PUBMED]. *Patient Educ Couns*. 81(2), 315-18. PubMed http://dx.doi.org/10.1016/j.pec.2010.01.007

24. Huang JY, Al-Fozan H, Tan SL, Tulandi T. 2003. Internet use by patients seeking infertility treatment [PUBMED]. *Int J Gynaecol Obstet*. 83(1), 75-76. PubMed http://dx.doi.org/10.1016/S0020-7292(03)00253-4

25. Siegel R, Naishadham D, Jemal A. 2013. Cancer statistics, 2013 [PUBMED]. *CA Cancer J Clin*. 63(1), 11-30. PubMed http://dx.doi.org/10.3322/caac.21166

26. Pew Research Internet Project. Change in Internet access by age group, 2000-2010. Available at http://www.pewinternet.org/2010/09/10/updated-change-in-internet-access-by-age-group-2000-2010/ Accessed 27/11/2013.

27. Pazol K, Creanga AA, Burley KD, Hayes B, Jamieson DJ, & Centers for Disease Control and Prevention (CDC). 2013. Abortion surveillance - United States, 2010 [PUBMED]. *MMWR Surveill Summ*. 62(8), 1-44. PubMed

28. Foster AM, Wynn LL, Trussell J. Evidence of global demand for medication abortion information: An analysis of http://www.medicationabortion.com. Contraception, 89(3): 174-180. [PUBMED]

29. Borgfeldt C, Andolf E. 1999. Transvaginal sonographic ovarian findings in a random sample of women 25-40 years old [PUBMED]. *Ultrasound Obstet Gynecol*. 13(5), 345-50. PubMed http://dx.doi.org/10.1046/j.1469-0705.1999.13050345.x

30. Elgesem D. 2008. Search engines and the public use of reason. *Ethics Inf Technol*. 10, 233-42. http://dx.doi.org/10.1007/s10676-008-9177-3

31. Spink A, Yang Y, Jansen J, Nykanen P, Lorence DP, et al. 2004. A study of medical and health queries to web search engines [PUBMED]. *Health Info Libr J*. 21(1), 44-51. PubMed http://dx.doi.org/10.1111/j.1471-1842.2004.00481.x

32. Ryan C. Language Use in the United States: 2011. American Community Survey Reports. U.S. Department of Commerce. Available at http://www.census.gov/prod/2013pubs/acs-22.pdf Accessed 29/11/2013.