

An Evaluation of Breast Cancer Website: Assessing the Readability of Breast Cancer Websites for The Public.

Mayowa Olayemi Akomolafe.
Ekiti State University Teaching Hospital, Ado Ekiti.
Email of the Author - mayorlayem@yahoo.com

As part of the Dissertation submitted for the partial fulfilment of Msc. Health Informatics in Swansea University, UK.

Abstract

Patients including breast cancer patients' participation in the management of their health is now an important practice and they need information about their condition for them to make an informed decision about their health. This information can be sought through various media and internet has been found to be the most important medium even for cancer patients. Literature has shown the recommended readability level of online health consumers to be sixth grade level.

Websites were selected by trying to mimic how the public search for breast cancer information on the internet. These websites were then evaluated using a readability tests.

This study found out that readability is poor with all the websites written above the recommended grade level for health information.

Information about breast cancer can be found on the internet by the public. The readability of online health information is a very serious issue.

Keywords: Readability, Informed patient, health information online, internet.

Background

The web is the largest and the most important source of diversified information recently (Ke *et al.*, 2006). Also, the search for health information is the second activity performed online after e-mail (Fox and Fallows, 2003). Web Information can be provided in one place and made widely accessible by people at different locations (Bowen *et al.*, 2011). However, evidence has shown that informed patient cope better with their health condition (Nilsson-Ihrfelt *et al.*, 2004) and there is increase in the number of patients relying on web information to support their health (Atienza *et al.*, 2010). Moreover, many articles have showed the increasing number of Websites as well as the varying quality of information (Wootton, 1997). It therefore becomes crucial to evaluate the readability level of information because of the vast amount of health websites available.

Cancer has become a crucial public health issue since 2004, when about 2, 886,800 people were diagnosed of cancer and about 1,711,000 death recorded (Quinn *et al.*, 2003). However, breast cancer is the most common female cancer in the United Kingdom (Cancer Research UK, 2011) and in the United States after skin cancer (American Cancer Society, 2011). It has also been tagged as the leading cause of cancer death in the world (Jemal *et al.*, 2011), with the number of women diagnosed of breast cancer increasing in economically stable nations (Glass *et al.*, 2007; Hery *et al.*, 2008) as a result of population ageing and adopting cancer prone lifestyle (Jemal *et al.*, 2011). Therefore, breast cancer has been addressed as a public health problem in Europe (Boyle & Ferlay, 2005) and many cancer resources can be found on the internet (Sharp, 2001; McHugh *et al.*, 2010). However, breast cancer women visit the internet after been diagnosed of cancer to search for information (Helft *et al.*, 2003; Nilsson-Ihrfelt *et al.*, 2004). This makes it crucial to ensure good readability of breast cancer health information on the web. Therefore the aim of this study is to evaluate the readability of breast cancer information found on the various cancer websites under review.

There is arguably an exponential growth in the use of internet to search for information in the last decade (Sharp, 2001; Cline and Haynes, 2001, Eysenbach *et al.*, 2002; Helft *et al.*, 2003; Monaco and Krills, 2003; Kaphingst *et al.*, 2006; McHugh *et al.*, 2010). The internet has been argued to provide easy accessibility to health information (Rahnavardi *et al.*, 2008), especially to young people (Borzekowski *et al.*, 2001; Rideout, 2001; Rahnavardi *et al.*, 2008). It was recorded in 2008 that about sixteen million households in the United Kingdom (UK) had internet access (Lim *et al.*, 2010). This is about 65% of the whole households in the UK (Lim *et al.*, 2010). Also, about 10 million adult seek health information online (Moore, 2005), and this population has increasing interest in lifestyle discussions (Korp, 2006).

Online health information can be used to support information got from healthcare professionals (Gilliam, et al 2003). A study conducted by Gray et al (2005) on how adolescent seek health information revealed that the internet is now a supplement to the traditional way of getting health information and it is also as important as other sources.

About 85% of adult patients seek answers to their health questions online (Bylund *et al.*, 2007). A study conducted in Japan showed that more than half of internet users seek information about pharmaceutical products on the internet (Kishimoto and Fukushima, 2011). Patients visit a lot of websites, chat room, newsgroup and blogs to seek for health information (Dickerson 2006, Flynn *et al.*, 2006, Larner 2006, Schwartz *et al.*, 2006, Ayantunde *et al.*, 2007, Bylund *et al.*, 2007, James *et al.*, 2007).

According to Pelusi (1997) breast cancer patients felt neglected after their treatment session and they needed help to continue their life as cancer survivors. Therefore, the patients and their relatives visit the internet for information relating to their disease prognosis and treatment alternatives (Chapman and Rush, 2003). However breast cancer patients have acknowledged internet as an important source of health information and also showed much interest in using it for searching for their health information needs (Cowan and Hoskins, 2007; van de Poll-Franse and van Eenbergen, 2008). Even study showed that many women without internet access showed interest in accessing the internet in the future for health information (Bowen *et al.*, 2003).

Internet use among breast cancer patients ranges from 42% to 49% (Fogel *et al.*, 2002; Satterlund *et al.*, 2003). Moreover, a study by Mills and Davidson (2002) said about ten percent of cancer patients search the internet frequently for health information. Also, Oncologists in a study said about thirty percent of their patients visit the internet for health information (Helft *et al.*, 2003).

Many studies had assessed the literacy level needed to understand information presented on many health websites (Eysenbach *et al.*, 2002; Oermann *et al.*, 2003a; b; Friedman *et al.*, 2004; Ansani *et al.*, 2005; Sutherland *et al.*, 2005; Peterlin *et al.*, 2008). Result outcome shows that web information are written at a level higher than average internet user. However Gilmour (2007) said the disparity in the level of literacy of online health information consumers can limit their understanding and use of the information.

“ Health literacy is defined as the degree to which individuals can obtain, process and understand the basic health information and services they need to make appropriate health decisions.”

(Institute of Medicine, 2004, p.1).

Studies have shown that people with low level of health literacy have poor health (Rothman *et al.*, 2002; Sudore *et al.*, 2006) and record higher mortality rate (Baker *et al.*, 2007). Davis *et al.* (2002) attributed low literacy as the reason why people do not understand written preventive measures, and management options, therefore they will not be able to discuss them with their physicians (Davis *et al.*, 2002). An institute of medicine (2004) publication said poor health literacy level is one of the major causes of the wide cancer disparities. Low health literacy was noted among older adult (Sparks and Nussbaum, 2008).

In a study assessing websites readability level Berland *et al.* (2001) found out that all the English websites and 86 Spanish websites required people who have attained a high school to understand them. The average reading level for adults in the United States is eighth and ninth grade level (Monaco and Krills, 2003). However the US writing average is seventh to eighth grade level and this is the level accepted for most documents (Peterlin *et al.*, 2008). A study by Doak *et al.* (1998) said the average readability level for passing cancer information should approximately be from tenth grade to college level. Whereas a study said eighth grade is the recommended reading level for health information generally (Safeer and Keenan, 2005). Ansani *et al.* (2005) concluded that material is said to be “easy to read” only if written at a level below the sixth - grade. Though some medical terminologies cannot be expressed using simple terms (Monaco and Krills, 2003). Previous studies have shown that even very good readers have preference for reading simpler health information than reading the complex ones (Elliott and Shneker, 2009).

Patients have expressed needs for additional health information source and have found the internet as a good source for health information (Peterson and Fretz, 2003). Also, educating patient is a crucial part of health care and patients want their physicians to provide them with quality health websites (Salo *et al.*, 2004). A patient who is well informed will be able to participate in the management of his health (Peterson and Fretz, 2003). Therefore, assessing audience readability level is important in passing written information (Birru *et al.*, 2004;

Osborne 2005; Neuhauser *et al.*, 2007). Readability is important because even if the content is good the message should be passed at a level that will be understood by the reader (Peterson and Fretz, 2003).

The tenth grade level reading level recommended for cancer websites was applicable to just about thirty nine websites passing information on cancer clinical trials (Monaco and Krills, 2003). A study by Friedman *et al.* (2006) analysing readability on 100 cancer websites found out that the readability level was 10.7 and 12.9 on Flesch-Kinkaid test and SMOG respectively. In another study by Friedman *et al.* (2004) assessing readability level on some popular cancer websites, 13.7 and 10.9 was found as the average reading level using SMOG and Flesch-Kinkaid respectively. Another study on prostate cancer also showed a mean readability level of 12.9 (Friedman and Kao, 2008). 12.9 readability level was also found by Kaphingst *et al.* (2006) in his study using SMOG to evaluate colorectal screening websites. In another study by Berland *et al.* (2001), he said a minimum of tenth grade is required to read health information online. A study conducted to evaluate NHS websites observed that more than 70% were written above the recommended readability grade level which is grade level 8 (Webster and Williams, 2004). Similar result also found by Eysenbach *et al.*, (2002).

Method

The aim of this study is to know if the breast cancer information present on consumer websites written in English Language are easy to read by the public. The method adopted for this study aimed at using tools that will evaluate the websites from the public perspectives.

This study is divided into four steps. The first step involves the selection of the websites providing given health information about breast cancer. The second step, involves the choosing of the collection tool. This tool was applied in the third phase to the selected websites. The results of the website evaluation was analysed in the fourth phase of the research. Descriptive analysis was used for this study. The data generated were analysed in the Microsoft office excel 2007.

The websites providing health information about breast cancer were searched in a way that mimics the public and not the health professionals only.

Online health information seekers start by using search engines (Eysenbach and Kohler, 2002). In this study the website was searched using the commonest search engine used by majority of the online information seeker. According to Deacon *et al.* (2007) Google was the commonest and most widely used search engine in 2007, and it still remain the most commonly used search engines, used for 90.93% of market search in the UK and 65.60% in the US (Koozai intelligent digital marketing, 2011). Therefore, Google search engine was used to search for the website and the Google page was modified by clicking on the “web” therefore the search was limited to United Kingdom alone. The search was limited to Google search engine alone because results generated by Google are also found in other search engines (Spink *et al.*, 2006; Rather *et al.*, 2008) and since is the most commonly used.

Search engines are used to search for information on relevant topics by typing a key word into the search engines which generates the result (Deacon *et al.*, 2007). The commonly used terms by breast cancer patients when searching for online health information on the internet was typed into Google. These terms were chosen from a published literature about online health information provided by voluntary organisations in Britain that used cancer, breast cancer’ and ‘breast cancer information’ as the keywords (Ream *et al.*, 2009). This published study also used Google as the search engine for sampling the health information websites (Ream *et al.*, 2009). Another study identified breast cancer and breast tumour as a common search terms entered by people in United Kingdom and United State of America (McHugh *et al.*, 2010). In this study, the keywords that were entered into the Google search engine were ‘breast tumour’, ‘breast cancer’ and ‘breast cancer information’ (Ream *et al.*, 2009). The Google search was conducted three times using keywords to search for websites giving breast cancer information to patients.

Since the desired number of websites will be too many for the study to be conducted conveniently, therefore samples will be taken from the accurately listed population (websites) (Bowling and Ephraim, 2005). Therefore in this study the sample websites were taking from the available websites found online. Sampling makes research cheaper with reduced effort and more accuracy (Bowling and Ephraim, 2005). It is necessary to calculate the needed sample size accurately so that the result of the study will be generalised (Bowling and Ephraim, 2005). This size can be calculated using power calculation (Bowling and Ephraim, 2005). But because the internet

websites are numerous and changes rapidly (Rice and Katz, 2001), and there are numerous health websites (Cline and Haynes, 2001; Dearness and Tomlin, 2001; Fox, 2005), applying this calculation will not be possible. However, past studies on evaluation of health information on the internet used a non-random purposive sampling design (Eysenbach *et al.*, 2002). A non-random purposive sampling design will be used for this study since it is most reasonable option to generate the required website sample (Bowling, 2009; Neuendorf, 2002). Also link popularity is assumed to be an objective way of recognising a good websites (Eysenbach and Diepgen, 1998). Websites with popular links attracts search engines and therefore increases traffic to the site (Linkpopularity.com). Therefore, the websites will be chosen according to how the search results are ranked by Google search engine, because Google use algorithm that considers websites importance and links to the website to rank search results (Brin and Page, 1998).

Adolescent limit their health information search to the first few pages displayed in their search (Hansen *et al.*, 2003). Another study says information seekers on the internet check just the first two to five websites returned by their search engine (Peterlin *et al.*, 2007). Also Eysenbach and Kohler (2002) said most online health information seekers click on one of the results on the first page and they refined their searches by typing in new search terms. All the search engines return the most respected cancer information websites on their first page (Sharp, 2001). However previous study evaluating websites also said most online health information consumers visit the first two to five websites returned by a search engine, therefore they evaluated five websites returned by each queries on the different search engines used (Kaphingst *et al.*, 2006). Therefore the first 5 websites will be taken and the search will be refined by using all the three keywords ('breast tumour', 'breast cancer' and 'breast cancer information') shown in the literature.

The inclusion criteria will be:

1. Must be an English website
2. The website must not be restricted with password

The exclusion criteria:

1. Websites addressing mainly health professional.
2. Websites that is not addressing information about breast cancer treatment.

Ntoulas et al (2004) said web pages are continuously changing. Capturing the website is very important because of the dynamic nature of the internet (Petch, 2004). The website was captured using HTTrack website capture. The HTTrack program stored websites pages offline. It makes it possible for website pages to be viewed from page to page in the browser after the pages have been saved on the program. It requires entering the project name, the page URLs and adjusting the setting to suit the users' choice (HTTrack websites <http://www.httrack.com/html/index.html>). The websites can be saved into a folder which can easily be accessed through the program' file menu. The website capture was done on a single day to ensure that all the websites gathered are evaluated using the same tools. Therefore there will be fair comparison between all the websites. Links to other websites were not captured.

SMOG (Simple Measure of Gobbledegook) was used for this study and it was developed by McLaughlin (1969) to evaluate websites information readability. Material written in SMOG grade 13 -16 is meant for college education, 17-18 is needed for graduate training while 19 and above is needed for a higher professional qualification (McLaughlin, 1969). The SMOG tool is valid between the ranges of grade 3 - 19. This tool has been favoured for this study, because it has been recommended to be used in revising written health information by (Ley and Florio, 1996; Headman, 2008). A study conducted on the SMOG inter-rater reliability and found it to be $r = 0.82$ (Kaphingst *et al.*, 2006).

The website evaluation was done from the perspective of the public. This was made possible by the tools selected for the evaluation and the use of Google to mimic their search behaviour. Each of the seven websites selected were evaluated. The readability test was conducted by copying and pasting thirty sentences from three different places in the website (McLaughlin, 1969). The sentences were pasted into the SMOG tool found online at http://www.online-utility.org/english/readability_test_and_improve.jsp. In a study by Walsh and Volsko (2008) thirty sentences were taking from the websites from the beginning, middle and end of the website. Ten sentences were taken from each part. In this study ten sentences were taken from each of symptoms and diagnosis, treatment and from any other part of the websites. The results were automatically generated and documented.

The population for this study were websites containing breast cancer information for the public. Therefore informed consent was not necessary to conduct this research.

The data were entered into Microsoft office excel 2007 spreadsheet.

Results

The website selection was done on 18th August, 2011. Five websites were taken from each keywords. Therefore fifteen websites were taken in all.

Three out of the fifteen websites selected were generated more than once among the first five. Two websites were excluded because they were not passing information about breast cancer treatment. Therefore seven websites were identified for evaluation. The websites were evaluated using the SMOG evaluation tool. The websites selected are

Websites and the organisation producing the websites.

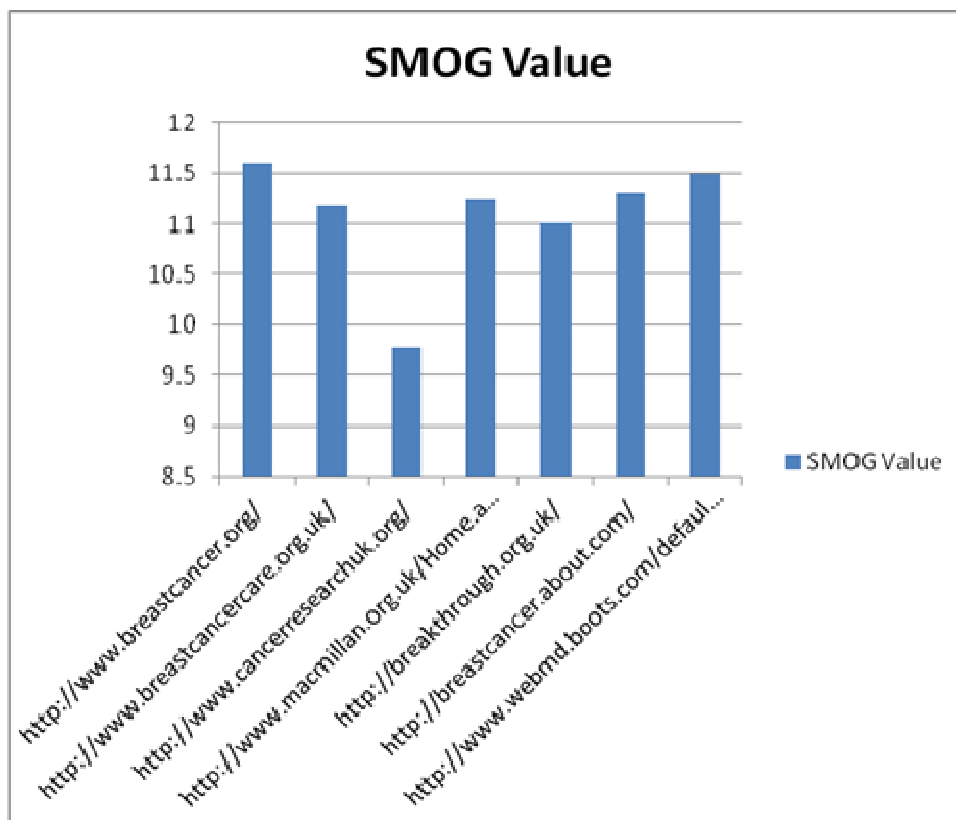
Selected Websites	Type of Website
http://www.breastcancer.org/	Non-Profit Organisation
http://www.breastcancercare.org.uk/	Charity Organisation
http://www.cancerresearchuk.org/	Charity Organisation
http://www.macmillan.org.uk/Home.aspx	Charity Organisation
http://breakthrough.org.uk/	Charity Organisation
http://breastcancer.about.com/	Advertisement
http://www.webmd.boots.com/default.htm	Advertisement

Website readability evaluation using the SMOG Fomular.

Showing websites scores according to SMOG grade level.

Website; URL	Readability SMOG (grade level)
http://www.breastcancer.org/	11.60
http://www.breastcancercare.org.uk/	11.19
http://www.cancerresearchuk.org/	9.78
http://www.macmillan.org.uk/Home.aspx	11.25
http://breakthrough.org.uk/	11.00
http://breastcancer.about.com/	11.31
http://www.webmd.boots.com/default.htm	11.49

Summary of websites' SMOG Grade Levels

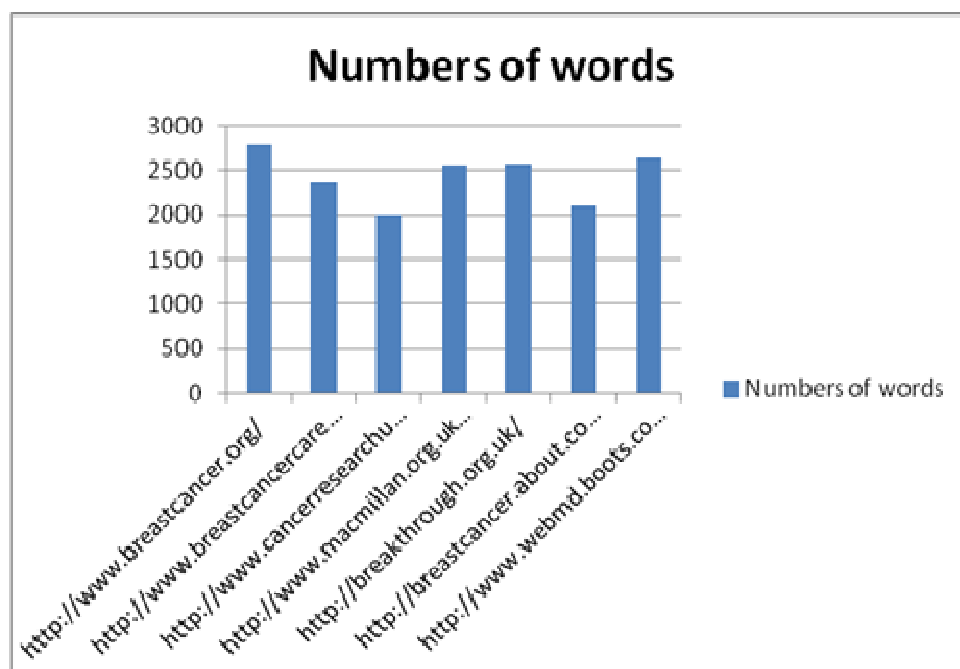


The highest SMOG value is 11.60 and the lowest SMOG value is 9.78. The mean value for the SMOG evaluation is 11.09 and the median value is 11.25. 85.1% (six) of the websites are between the 11.00 and 12.00 SMOG value and all the websites have the SMOG value less than 13.00.

Showing the breakdown of SMOG calculation figures.

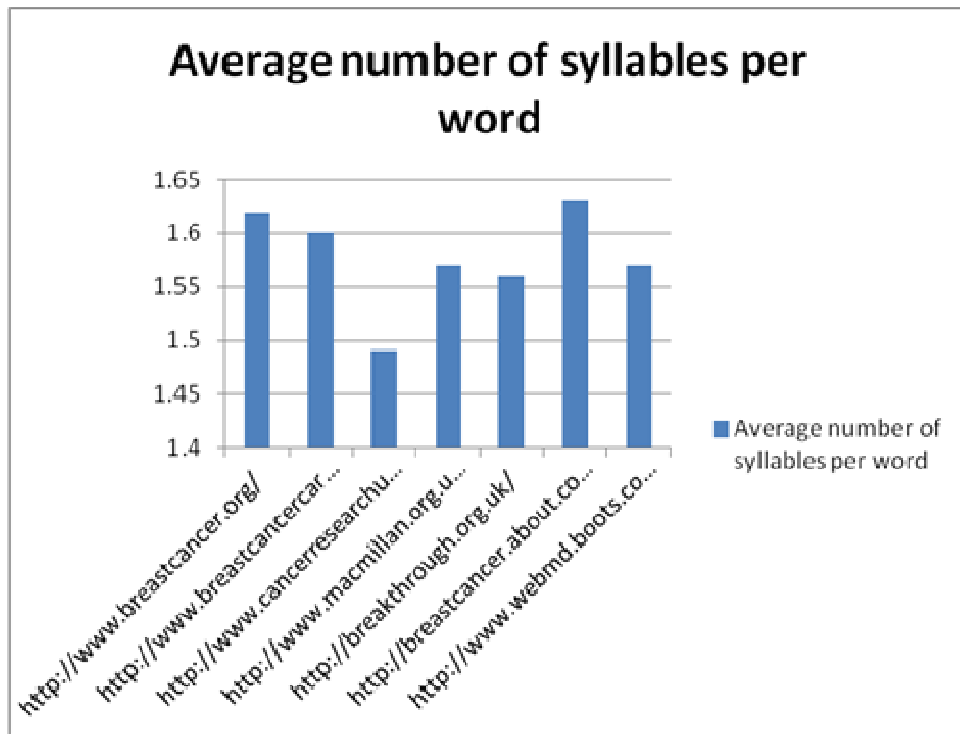
Website; URL	Numbers of words	Numbers of character without spaces	Average Number of characters per word	Average number of syllables per word	Average number of words per sentence
http://www.breastcancer.org/	2,778	578	4.81	1.62	19.27
http://www.breastcancercare.org.uk/	2,368	501	4.73	1.60	16.70
http://www.cancerresearchuk.org/	2,001	452	4.43	1.49	15.07
http://www.macmillan.org.uk/Home.aspx	2,561	571	4.49	1.57	19.00
http://breakthrough.org.uk/	2,572	540	4.76	1.56	18.00
http://breastcancer.about.com/	2,102	421	4.99	1.63	14.03
http://www.webmd.boots.com/default.htm	2,643	560	4.72	1.57	18.67

Summary of websites' showing number of words



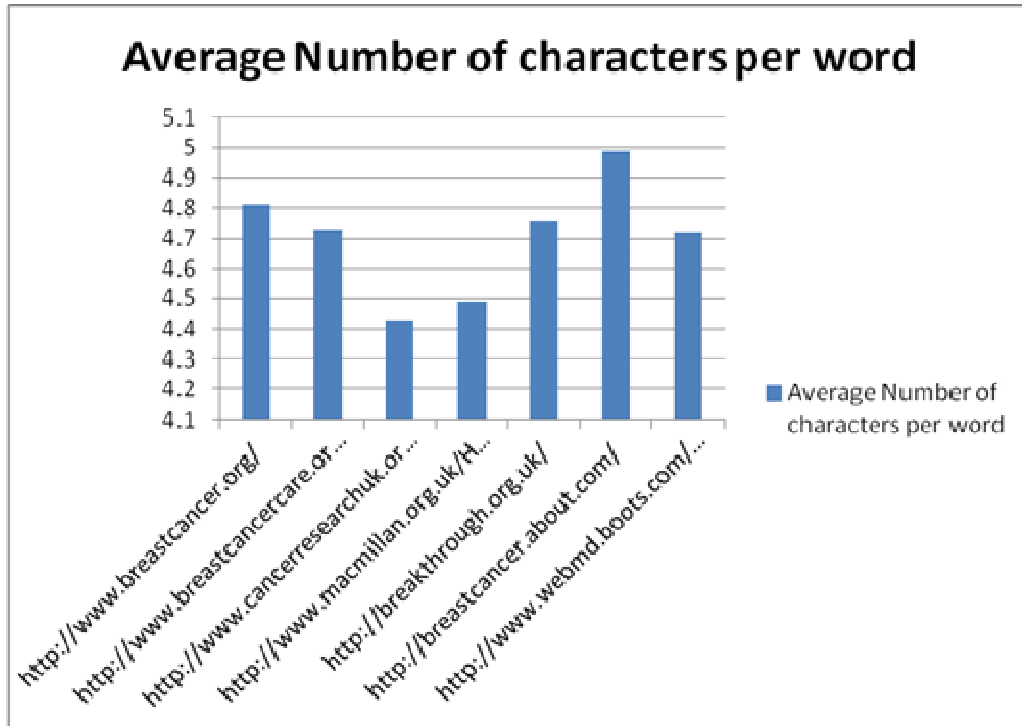
30 sentences were copied from all the websites and pasted into the readability automated tool and the the number of words ranges from 2,001 to 2,778. The website with the highest numbers of words copied is <http://www.breastcancer.org/> and the website with the lowest is <http://www.cancerresearchuk.org/>. The average number of words copied from all the website is 2,432 and the median is 2,561.

Websites with average number of syllables per word.



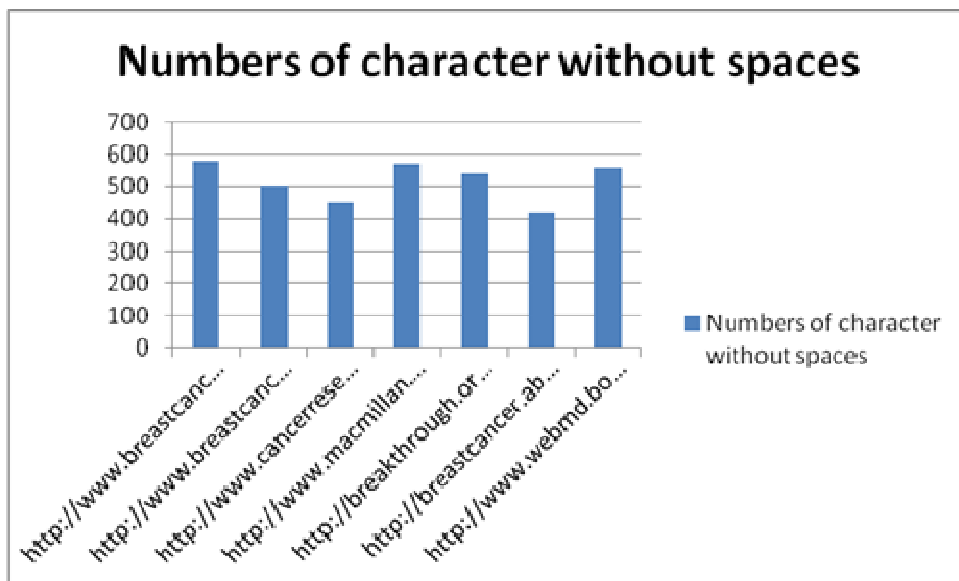
The highest value for average number of syllables per word is 1.63 and the lowest value is 1.49. The website with the highest is <http://breastcancer.about.com/> and the website with the lowest value is <http://www.cancerresearchuk.org/>. The mean and the median value of average number of syllables per word is 1.58 and 1.57 respectively.

Websites with average number of characters per word.



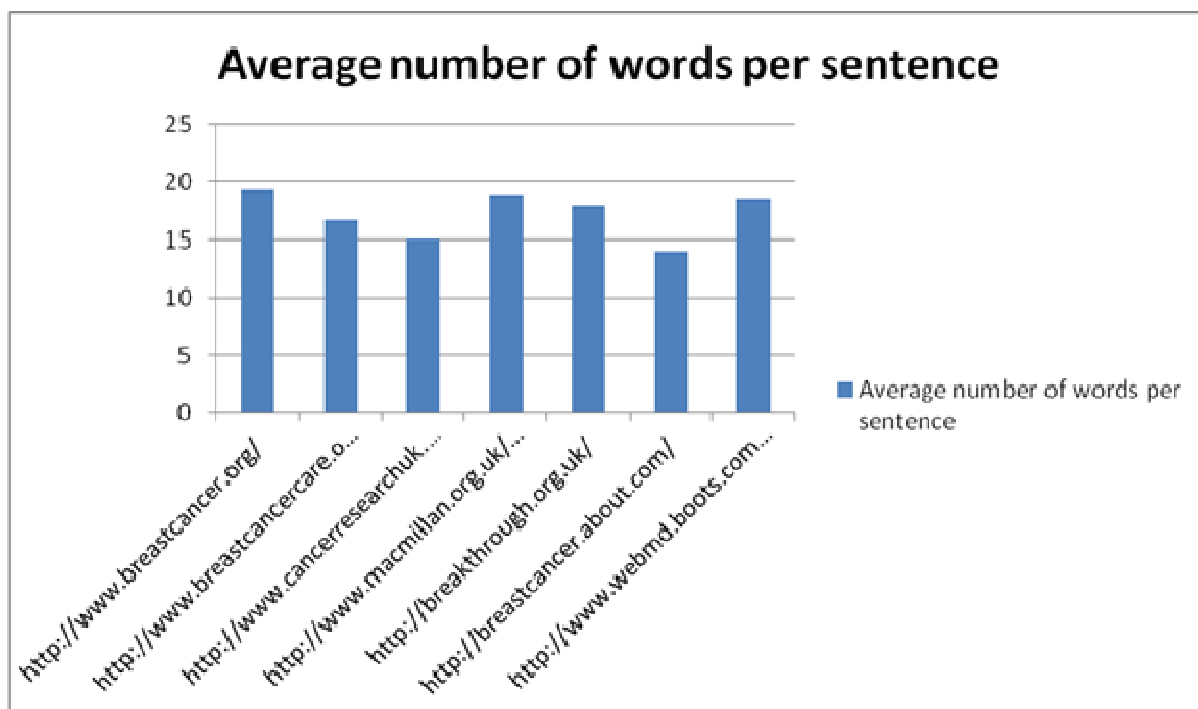
The highest value for website with the average number of characters per word 4.99 and the lowest value is 4.43. The website with the highest average number of words is <http://breastcancer.about.com/> and the website with the lowest number of words is <http://www.cancerresearchuk.org/>. The mean and the median value is 4.70 and 4.73 respectively.

Websites with number of characters without spaces.



The highest number of character without spaces is 578.00 and the lowest is 421.00. the website with highest is <http://www.breastcancer.org/> and the website with the lowest is <http://breastcancer.about.com/> . The mean and the median respectively is 517.57 and 540.00

Websites with average number of words per sentences.



The value for the highest number of words per sentence is 19.27 and the lowest is 14.03. The website with the highest value is <http://www.breastcancer.org/> and the website with the lowest value is <http://breastcancer.about.com/>. The mean is 17.25 and the median is 18.00.

Discussion

Readability is very important when presenting health information. A website with a good content quality but poor readability will not be useful for many readers. The findings of the study is also in line with study on content quality and readability of fibromylgia websites that said good content quality websites can also have poor readability (Daraz *et al.*, 2011).The findings of this study revealed that all the breast cancer websites evaluated are written above six grade level which is the recommended readability level for health information. This shows that breast cancer websites viewers need high level of education to be able to understand the information on breast cancer websites. Therefore people with low literacy level cannot benefit from cancer websites despite of the good content quality. This is consistent with previous studies on readability of health information, which revealed that the readability of health information on the web are written at a level higher than an average adult readability level (Eysenbach *et al.*, 2002; Oermann *et al.*, 2003a; b; Friedman *et al.*, 2004; Ansani *et al.*, 2005; Suntherland *et al.*, 2005; Peterlin *et al.*, 2008). Therefore even with good quality of information on breast cancer websites, visitors with low education level less than 9th grade will still have problem understanding the information. Adult readability is an important reference point because studies have shown their interest in searching for health information. This knowledge will be used to care for themselves and their children. The websites written at the lowest grade was written above grade 9. The mean SMOG readability value in this study is 12.09. Also, more than 80% of the websites is written above the recommended readability level (10th grade) by Doak *et al.* (1998) and Berland *et al.* (2001) for cancer patients and for health information

generally. Therefore, it is easy to conclude that sample of breast cancer websites are written at a level higher than the readability level of the target audience. The mean readability value is higher than the recommended value for cancer websites and this is consistent with other studies evaluating readability on cancer websites. Experts in health literacy should be involved in developing health websites (Daraz *et al.*, 2011). These studies found readability level using SMOG grade level as 12.9 (Friedman *et al.*, 2006) 13.7 (Friedman *et al.*, 2004), 12.9 (Friedman and Kao, 2008) and 12.9 (Kaphingst *et al.*, 2006). These past studies and this study found the readability of health information on the web to be poor.

The findings in the result also showed that because a website has high quality does not make it readable. Therefore health professionals, websites developers and health organisations should understand the importance of readability in passing health information to improve the understanding of the public about breast cancer information, treatment options and many other information needed by cancer patients and their relatives.

The fact that one of the websites had a readability grade less than 10th grade shows that it is possible to meet the recommended grade level for cancer information.

Directions for future research

Improvement has been noticed over time with the different cross sectional researches on breast cancer websites. However, there is need for a longitudinal research to study if the individual websites studied adhere to the findings and recommendations of the various research in their new designs. Also due to the constant changing nature of the internet another research is needed in this area before this study becomes out dated.

CONCLUSIONS, CONTRIBUTIONS OF THIS STUDY AND RECOMMENDATIONS.

The literature review has shown breast cancer patients' use of internet for health information and information on breast cancer are found on the internet. This study has been able to mimic the public in search for health information and these websites provided information regarding breast cancer for the public.

Readability still poses a serious challenge to online healthcare information on cancer websites. This is consistent with other studies evaluating readability level on health websites. Therefore breast cancer websites is not an exception with the poor readability found online.

Even if a website holds high quality information that is relevant to users, if it is not at a low reading level it may not be accessible to the target audience.

This study has found breast cancer websites searched from the public perspective to be of poor readability. However previous studies on breast cancer websites did not emphasise on the public perspective. Therefore this study has shown an indication that website search that mimic the public search still have readability challenge.

This study recommends that people seeking breast cancer information can find them online. However, there is a serious problem with breast cancer information readability. Therefore effort should be made by breast cancer websites developer to improve information readability. This may involve inviting health literacy experts in improving this.

Breast cancer website providers should mimic public readability needs while providing information on the websites for it to get adequate and relevant information accessible to the public.

Health information is desirable in this age of information technology and personal health decision making, specifically about breast cancer information. There is the need to pay more attention on low readability level and information needs from public perspective while providing information on the breast cancer websites.

The readability is still a problem on breast cancer websites that needs solution. The websites are all written above the recommended readability level for health information and only one was written below the recommended readability level for cancer information.

References

- Atienza, A. , Hesse, B., Gustafson, D., Croyle, R. (2010) 'E-health research and patient-centered care examining theory, methods, and application' *American journal of preventive medicine*. Vol 38 issue 1 pg 85-8.
- American Cancer Society (2011): 'Cancer Facts and Figures', Atlanta, GA.
<http://www.cancer.org/downloads/STT/500809web.Pdf>
- Ansani, N., Vogt, M., Fedutes Henderson, B. (2005): 'Quality of arthritis information on the internet' *Am J Health-Syst Pharm*;62:1184-1189

- Ayantunde, A., Welch, N., Parsons, S. (2007) 'A survey of patient satisfaction and use of the Internet for health information. International' *Journal of Clinical Practice* 61, 458–462.
- Baker, D., Wolf, M., Feinglass, J., Thompson, J., Gazmararian, J., Huang J. (2007) 'Health literacy and mortality among elderly persons' *Archives of Internal Medicine*;167(14):1503-9.
- Berland, G., Elliott, M., Morales, L., Algazy, J., Kravitz, R., Broder, M., Kanouse, D., Munoz, J., Puyol, J., Lara, M., Watkins, K., Yang, H., McGlynn, E. (2001) 'Health information on the internet: accessibility, quality, and readability in English and Spanish' *J Am Med*;285:2612–21.
- Birru, M., Monaco, V., Charles, L., Drew, H., Njie, V., Bierria, T. (2004) 'Internet usage by low-literacy adults seeking health information: an observational analysis' *J Med Internet Res*;6:e25.
- Borzekowski, D. and Rickert, V. (2001) 'Adolescent cybersurfing for health information: a new resource that crosses barriers' *Arch Pediatr Adolesc Med*. 155(7):813–7.
- Bowen, D., Meischke, H., Bush, N., Ludwig, A., Wooldridge, J., Robbins, R. (2003) 'Predictors of women's internet access and internet health seeking' *Health care women intl* 24, 940-951.
- Bowen, D., Robbins, R., Bush, N., Meischke, H., Ludwig, A., Wooldridge, J. (2011) 'Effects of a Web-based intervention on women's breast health behaviors' *Translational behavioral medicine* vol 1 issue 1 pg 155-164.
- Bowling, A and Ebrahim, S. (2005) *Handbook of Health Research Methods, Investigation, Measurement and Analysis*. Maidenhead: Open University Press.
- Bowling, A. (2009) *Reserch methods in health investigating health and health service*. Buckingham: Open University Press.
- Boyle, P. and Ferlay, J. (2005) Cancer incidence and mortality in Europe, 2004. *Annals of oncology : official journal of the European Society for Medical Oncology / ESMO* vol 19 issue 3 pg 481-8
- Bylund, C., Gueguen, J., Sabee, C., Imes, R., Li, Y. Sanford, A. (2007) 'Provider-patient dialogue about internet health information: an exploration of strategies to improve the provider-patient relationship. *Patient Education and Counseling* 66, 346–352.
- Cancer Research UK. <http://info.cancerresearchuk.org/cancerstats/incidence/commoncancers/>. Accessed online 10th August, 2011.
- Chapman, K. and Rush, K. (2003) 'Patient and family satisfaction with cancer information: pamphlet evaluation' *Can Oncol Nurs J* 13(3):164-175.
- Cline, R. and Haynes, K. (2001) 'Consumer health information seeking on the Internet: the state of the art' *Health Educ Res* 6:671-692.
- Cowan, C., and Hoskins, R. (2007) Information preferences of women receiving chemotherapy for breast cancer. *Eur J Cancer*;16:543–50.
- Davis, T.C., Williams, M.V., Marin, E., Parker, R.M., Glass, J. (2002) 'Health literacy and cancer communication' *CA Cancer J Clin* 52:134–49.
- Dearness, K.L. and Tomlin, A. (2001) 'Development of the national electronic library for mental health: providing evidence-based information for all', *Health Info Libr J* 18(3), pp. 167-74.
- Deacon, D., Pickering, M., Golding, P. and Murdock, G. (2007) *Researching Communications: A Practical Guide to Methods in Media and Cultural Analysis*. London: Hodder Arnold.
- Dickerson, S.S. (2006) 'Women's use of the Internet: what nurses need to know' *Journal of Obstetric, Gynecologic & Neonatal Nursing* 35, 151–156.
- Doak, C., Doak, L., Friedell, G., Meade, C. (1998) 'Improving comprehension for cancer patients with low literacy skills: strategies for clinicians' *CA Cancer J Clin* ;48:151–62.
- Elliott, J.O. and Shneker, B.F. (2009) 'A health literacy assessment of the epilepsy.com website. *Seizure*' *journal of the British Epilepsy Association*. Vol 18 issue 6 pg 434-9
- Eysenbach, G. and Diepgen, T. L. (1998). "Towards quality management of medical information on the internet: evaluation, labelling, and filtering of information". *British Medical Journal*, 317 (7171), 1496-1500.
- Eysenbach G, Powell J, Kuss O, (2002) 'Empirical studies assessing the quality of health information for consumers on the world wide web: a systematic review' *JAMA*, **287**:2691–2700.
- Eysenbach, G. and Köhler, C. (2002) '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*. 9;324 <http://bmj.bmjournals.com/cgi/content/full/324/7337/573>.
- Flynn, K.E., Smith, M.A., Freese, J. (2006) 'When do older adults turn to the internet for health information? Findings from the Wisconsin Longitudinal Study' *Journal of General Internal Medicine* 21, 1295–1301.
- Fogel, J., Albert, S., Schnabel, F. (2002a) 'Use of the internet by women with breast cancer' *J Med Internet Res* 4(2)

- Fogel, J., Albert, S., Schnabel, F., Ditkoff, B., Neugut. (2002b) 'Internet use and social support in women with breast cancer' *Health Psychol* 21:398–404.
- Fox, S. and Fallows, D. (2003) *Health searches and email have become more commonplace, but there is room for improvement in searches and overall Internet access.* PEW INTERNET & AMERICAN LIFE PROJECT. Available at: <http://www.pewinternet.org/Reports/2003/Internet-Health-Resources.aspx?r=1> (Accessed 19/07/2011).
- Fox, S. (2005) *Health Information Online.* Pew internet & american life project. Available at: http://www.pewinternet.org/~media/Files/Reports/2005/PIP_Healthtopics_May05.pdf.pdf
- Friedman, D.B. and Kao, E.K. (2008) 'A comprehensive assessment of the difficulty level and cultural sensitivity of online cancer prevention resources for older minority men. *Prev Chronic Dis* 5.
http://www.cdc.gov/pcd/issues/2008/jan/07_0146.htm. Accessed July 4th, 2011.
- Friedman, D.B., Hoffman-Goetz, L., Arocha, J.F. (2004) 'Readability of cancer information on the Internet; *J Cancer Educ* 19:117–22.
- Friedman, D. B., Hoffman-Goetz, L., Arocha, J. F. (2006) 'Health literacy and the World Wide Web: comparing the readability of leading incident cancers on the Internet' *Med Inform Internet Med* 31:67–87.
- Gilliam, A.D., Speake, W.J., Scholefield, J.H. (2003) 'Finding the best from the rest: valuation of the quality of patient information on the Internet' *Ann R Coll Surg Engl* 5(1):44–46
- Gilmour, J. (2007) 'Reducing disparities in the access and use of Internet health information. a discussion paper' *International journal of nursing studies* Vol 44 issue 7 pg. 1270-8
- Glass, A., Lacey, J., Carreon, J., Hoover, R. (2007) 'Breast cancer incidence, 1980-2006: combined roles of menopausal hormone therapy, screening mammography, and estrogen receptor status' *Journal of the National Cancer Institute.* Vol 99 issue 15 pg. 1152-61.
- Gray, N., Klein, J., Noyce, P., Sesselberg, T., Cantrill, J. (2005) 'Health information-seeking behaviour in adolescence : the place of the internet' *Social Science & Medicine.* Vol 60 pg. 1467-1478
- Hedman, A.S. (2008) 'Using the SMOG Formula to Revise a Health-Related Document', *American Journal of Health Education* 39 pp. 61-64.
- Helft, P.R., Hlubocky, F., Daugherty, C.K.(2003) 'American oncologists' views of internet use by cancer patients: a mail survey of American Society of Clinical Oncology members. *J Clin Oncol*;21:942–947.
- Héry, C., Ferlay, J., Boniol, M., Autier, P. (2008) 'Changes in breast cancer incidence and mortality in middle-aged and elderly women in 28 countries with Caucasian majority populations' *Annals of oncology : official journal of the European Society for Medical Oncology / ESMO.* Vol 19 issue 5 pg 1009-18.
- Institute of Medicine (2004) *Health literacy: a prescription to end confusion.* Washington: National Academies Press.
- Jemal, A., Bray, F., Ferlay, J. (2011) Global Cancer Statistics. World. Vol 16 issue 2 pg. 69-90.
- Kaphingst, K., Zanfini, C., Emmons, K. (2006) Accessibility of web sites containing colorectal cancer information to adults with limited literacy (United States). *Cancer Causes Control* 17:147–51.
- Ke, Y. Deng, L., Ng, W., Lee, D. (2006) 'Web dynamics and their ramifications for the development of Web search engines'. *Computer Networks.* Vol 50 issue 10 pg 1430-1447.
- Kishimoto, K. and Fukushima, N., (2011) 'Use of anonymous web communities and websites by medical consumers in Japan to research drug information' The pharmaceutical society of Japan. *Yakugaku Zasshi* 131 (5) 685 – 695.
- Koozai intelligent digital marketing (2011). <http://www.koozai.com/blog/search-engine-news/google/search-engine-market-share-statistics---february-2011-18271/>
- Korp, P. (2006) Health on the Internet: implication for health promotion. *Health Educ Res Theory Pract* 21:78–86.
- Larner, A.J. (2006) 'Searching the Internet for medical information: frequency over time and by age and gender in an outpatient population in the UK' *Journal of Telemedicine and Telecare* 12, 186–188.
- Ley, P. and Florio, T. (1996) 'The use of readability formulas in health care', *Psychology, Health & Medicine* 1(1), pp. 7 - 28.
- Lim, J., Phillips, A., Sayeed, R. (2010) Use of the world wide web by cardiac surgery patients. *Interact Cardiovasc Thorac Surg* 10(5):719–720
- McHugh, S., Morney, M., Sheikh, A., Lehane, E., Hill, A. (2010). 'A Quantitative Assessment of Changing Trends in Internet Usage for Cancer Information' *World J Surg.* 35:253–257 DOI 10.1007/s00268-010-0830-8
- McLaughlin, H. (1969) SMOG grading: a new readability formula. *J Reading* 12: 639-646.
- Mills, M. and Davidson, R. (2002) 'Cancer patients' sources of information: use & quality issues' *Psycho Oncol* 11:371–8.
- Monaco, V. and Krills, S.K. (2003) 'On-line information about cancer clinical trials: evaluating the Web sites of comprehensive cancer centers' *AMIA Annu Symp Proc* 470–4.
- Moore, G.A. (2005) 'On-line communities: helping "senior surfers" find health information on the web' *J Gerontol Nurs* 31:42–8.

- Neuhauser, L., Rothschild, R., Rodriguez, F. (2007) 'MyPyramid.gov: assessment of literacy, cultural and linguistic factors in the USDA Food Pyramid Web site' *J Nutr Educ Behav* 39:219–25.
- Nilsson-Ihrfelt, E., Fjallskog, M.L., Blomqvist, C., Ahlgren, J., Edlund, P., Hansen, J., Malmberg, L., Villman, K., Andersson, G. (2004) 'Breast cancer on the internet: the quality of Swedish breast cancer websites' *Breast* 13:376–82.
- Oermann, M.H., Gerich, J., Ostosh, L., Zaleski, S. (2003a) 'Evaluation of asthma websites for patient and parent education. *Journal of Pediatric Nursing* 18, 389–396.
- Oermann, M.H., Lowery, N.F. & Thornley, J. (2003b). "Evaluation of web sites on management of pain in children". *Pain Management Nursing*, 4(3), 99-105.
- Osborne, H. (2005) *Health literacy from A to Z: practical ways to communicate your health message*. Sudbury, MA: Jones and Bartlett Publishers.
- Pelusi, J. (1997) 'The lived experience of surviving breast cancer' *Oncology Nursing forum* 24, 1343-1353.
- Petch, T. (2004) *Content Analysis of Selected Health Information Websites Final Report*. Action for Health. Available at: www.sfu.ca/act4hlth/pub/working/Content%20Analysis.pdf (Accessed 12th June, 2011).
- Peterlin, B.L., Gambini-Suarez, E., Lidicker, J. (2008) An analysis of cluster headache information provided on internet websites. *Headache* 48:378–384
- Peterson, M.W. and Fretz, P.C. (2003) 'Patient use of the Internet for information in a lung cancer clinic' *Chest*;123:452–457.
- Quinn, M.J. (2003) 'Cancer mortality trends in the EU and acceding countries up to 2015. *Annals of Oncology*. Vol 14 issue 7 pg. *Annals of Oncology*.
- Rahnavardi, M., Arabi, MSM., Ardalan, G., Zamani, N., Jahanbin, M. Sohani, F., Dowlatshahi, S., (2008) 'Accuracy and coverage of reproductive health information on the Internet accessed in English and Persian from Iran' *J Fam Plann Reprod Health Care* 2008; 34(3): 153–157 ©FSRH *J Fam Plann Reprod Health Care* 34(3)
- Rather, R.A., Lone, F.A. and Shah, G.J. (2008) *Overlap in Web Search Results: A Study of Five Search Engines*. Library Philosophy and Practice. Available at: <http://www.webpages.uidaho.edu/~mbolin/rather-lone-shah.pdf> Accessed 11 June, 2011.
- Ream, E., Blows, E., Scanlon, K. (2008) 'An investigation of the quality of breast cancer information provided on the internet by voluntary organisations in Great Britain' *Patient Educ Couns* 76(1):10–15
- Rice, R. and Katz, J. (2001) *The Internet and health communication: experiences and expectations*. Thousands Oaks: SAGE.
- Rideout, V. (2001) *Generation RX.com: how young people use the Internet for health information*. Menlo Park, CA: Henry J. Kaiser Family Foundation. Accessed 9th July, 2011 <http://www.kff.org/content/2001/20011211a/GenerationRx.pdf>.
- Rothman, R., Malone, R., Bryant, B., DeWalt, D., Pignone, M. (2002) 'Health literacy and diabetic control' *JAMA*. 288(21):2687-8.
- Safeer, R.S. and Keenan, J. (2005) 'Health literacy: The gap between physicians and patients', *American Family Physician* 72(3), pp. 463-468.
- Salo, D., Perez, C., Lavery, R., Malankar, A., Bernstein, S. (2004). 'Patient education and the internet : do patients want us to provide them with medical web sites to learn more about their medical problems ?' *Journal of emergency medicine*. vol 26 issue 3 pg. 293-300.
- Satterlund, M., McCaul, K., Sandgren, A. (2003) 'Information gathering over time by breast cancer patients' *J Med Internet Res* 2003;5:e15.
- Schwartz, K., Roe, T., Northrup, J., Meza J, Seifeldin, R. and Neale, A. (2006) 'Family medicine patients' use of the Internet for health information: a MetroNet study' *Journal of the American Board of Family Medicine : JABFM* 19, 39–45.
- Sharp, J.W. (2001). 'Locating and Evaluating Cancer Information on the Internet How Directories and Search Engines Work' *Cancer Practice*. Pg 151-154.
- Sparks, L, and Nussbaum, J. (2008) 'Health literacy and cancer communication with older men' *Patient Educ Couns* 71:345–50.
- Spink, A., Jansen, B., Kathuria, V., Koshman, S. (2006) 'Overlap among major web search engines' *Internet Research* vol 16 issue 4 pg 419-426.
- Sudore, R., Mehta, K., Simonsick, E., Harris, T., Newman, A., Satterfield, S. (2006) 'Limited literacy in older people and disparities in health and healthcare access' *JAmGeriatrSoc*. (5):770-6.
- Sutherland, L., Wildemuth, B., Campbell, MK., Haines, PS. (2005) 'Unraveling the web: an evaluation of the content quality, usability, and readability of nutrition web sites'