

Internet Use in Pregnancy Informs Women's Decision Making: A Web-Based Survey

Briege M. Lagan, PhD, RM, Marlene Sinclair, PhD, RM, and W. George Kernohan, BSc, PhD

ABSTRACT: **Background:** Internet access and usage is almost ubiquitous, providing new opportunities and increasing challenges for health care practitioners and users. With pregnant women reportedly turning to the Internet for information during pregnancy, a better understanding of this behavior is needed. The objective of this study was to ascertain why and how pregnant women use the Internet as a health information source, and the overall effect it had on their decision making. Kuhlthau's (1993) information-seeking model was adapted to provide the underpinning theoretical framework for the study. **Methods:** The design was exploratory and descriptive. Data were collected using a valid and reliable web-based questionnaire. Over a 12-week period, 613 women from 24 countries who had confirmed that they had used the Internet for pregnancy-related information during their pregnancy completed and submitted a questionnaire. **Results:** Most women (97%) used search engines such as Google[®] to identify online web pages to access a large variety of pregnancy-related information and to use the Internet for pregnancy-related social networking, support, and electronic commerce (i.e., e-commerce). Almost 94 percent of women used the Internet to supplement information already provided by health professionals and 83 percent used it to influence their pregnancy decision making. Nearly half of the respondents reported dissatisfaction with information given by health professionals (48.6%) and lack of time to ask health professionals questions (46.5%) as key factors influencing them to access the Internet. Statistically, women's confidence levels significantly increased with respect to making decisions about their pregnancy after Internet usage ($p < 0.05$). **Conclusions:** In this study, the Internet played a significant part in the respondents' health information seeking and decision making in pregnancy. Health professionals need to be ready to support pregnant women in online data retrieval, interpretation, and application. (BIRTH 37:2 June 2010)

Key words: decision making, information need, Internet, pregnant women, web-based questionnaire

Internet access and usage is common in our global society. With this globalization comes opportunities and increasing challenges for health care practitioners and users. Today, pregnant women have almost the same infinite access to health information as health

professionals. Pregnant women are turning more and more to the Internet for information during pregnancy (1–3). A review of the literature identified no rigorous evidence on why and how pregnant women use the Internet as a health information source or the overall

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effect it has on their decision making (1). A previous study undertaken by the authors concentrated on exploring the extent and nature of pregnant women's use of the Internet from the midwives' perspective and reported that midwives were aware of an increase in Internet use among pregnant women (2).

To build on these findings and to provide a more coherent and complete picture of Internet use among pregnant women, a study was conducted with women who had used the Internet as an information source during pregnancy. An understanding of how pregnant women use the Internet as an information tool is important to guide the work of childbirth educators and childbirth practitioners worldwide. For example, understanding the factors that influence women's decision making to seek information from the Internet and how they apply the information accessed to their pregnancy will provide necessary knowledge to facilitate the development of appropriate childbirth resources.

The aim of this study was to ascertain why and how pregnant women use the Internet as a health information source, and the overall effect it has on their decision making. The following broad research questions were selected for in-depth exploration: (a) Why do pregnant women access the Internet? (b) What type of information do they seek? (c) Do they appraise the information, the source, or both? (d) Do they value the information? (e) What is the role of the Internet in decision making? To answer these questions an exploratory descriptive design was selected. After the successful use of an online questionnaire previously validated by the researchers (2) and the desire to access a global and diverse group of potential research participants who were already Internet users, a web-based questionnaire was used for data collection.

Methods

Questionnaire Development

As women using the Internet seem to have a hunger for information, a decision was made to select an information-seeking model to develop a deeper theoretically based understanding of their behavior. After a review of models that explain information-seeking behavior, Carol Kuhlthau's information search process model, which leans mainly on information seeking, was selected as a suitable theoretical framework to guide the research (4). This model provides an understanding of "the personal meaning that the user seeks from the information ..." (4, p 361), what the information seeker does (the tasks, why they do it, and how it affects them (actions, feelings, and thoughts). The model was modified to incorporate

information seeking on the Internet, using work conducted by Kalbach (5). In addition, the "decision-making step" was incorporated into the model.

The stages of the information-seeking process defined the content of the data collection instruments. The relation of the variables presented and the research objectives are outlined in Fig. 1, which illustrates the initial audit trail for the study. The dependent variables are the items within the information-seeking process and theoretical framework, which included online information seeking and offline information use. Various sources and methods were used to determine the questions to be included in the questionnaire. First, keeping a clear focus on the research objectives and using the theoretical framework, an initial literature search was undertaken to identify instruments that had been developed for exploration of Internet use (6–9) and to identify any scales for measuring decision making. Second, theoretical principles that underpin information-seeking behavior and outcomes from a previous phase were synthesized. Third, expert opinions were sought on the framing of the questionnaire. This process lent support to the content validity of the questionnaire.

Findings from the literature review demonstrated that none of the published instruments was able to meet the requirements of the research objectives; however, individual items within questionnaires were identified and selected for use with permission from the authors (6–9). The selected items were adapted to meet the requirements of the study. For example, the word "patient" was replaced with "pregnant woman." The Preparation for Decision-Making Scale was modified to suit the study population to explore the respondents' perceptions of the usefulness of the Internet in preparing them to communicate with health professionals and to determine if the Internet played a role in their decision making (10). The resultant questionnaire was piloted before the main study was conducted. The test-retest correlation for the instrument was 0.97.

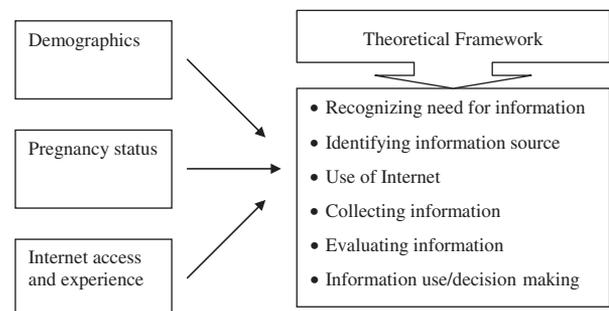


Fig. 1. Research variables following a theory of information seeking and including essential personal data.

Sample

Once finalized with the assistance of a technician the questionnaire was uploaded onto the University of Ulster server, where it had its own unique (Uniform Resource Locator, or URL) address. A total of 33 website moderators were then contacted and given details about the study and their permission sought to post study details on their specific site. Criteria for selection included sites that were primarily designed to provide general pregnancy information and did not focus on one specific aspect of pregnancy, sites that were open to an international membership, willing to support the research study, and had no membership fee or copyright clause. In total, 23 website moderators agreed for the study to be promoted on their specific site (Table 1).

Considering the aim of the study and the nature of the sample and topic under investigation, nonprobability convenience sampling was deemed to be appropriate to target pregnant women who had used the Internet during pregnancy. The Internet was the best source for contacting potential participants, because the sample could be conveniently accessed online. Only women satisfying all the following inclusion criteria were invited to participate in the study: those who were pregnant or had a baby in the last year; those who had used the Internet

during their pregnancy to seek health information, and those who could read and understand English.

Procedure

The study was advertised for a 12-week period between July and September 2006. Women who responded to the advertisement followed a multistep process. They accessed information on the study by clicking on the advertisement on the website's home page or opening up a message posted on a forum. The message provided brief details about the study, and if the respondent wished to participate she could access the study information page by clicking on a link provided within the advertisement. Once clicked, the link directed potential respondents to a web page that introduced the survey including a hyperlink to the questionnaire. This step ensured that the respondent was online when completing the web survey and therefore her responses could be properly submitted and processed.

Data Analysis

Data from the survey package were first exported to a spreadsheet and then downloaded directly into SPSS Version 14 (11) for cleansing and data analysis, thus eliminating manual coding error. Descriptive statistics were calculated using percentage, mean, standard deviation, frequency, and cross-tabulations. Cronbach's alpha was used to indicate the reliability of the Preparation for Decision-Making Scale that was adapted for the study (10). Descriptive statistics were used to explore the sample characteristics (age, country of residence, pregnancy status, etc). Both parametric and nonparametric statistical methods were used. Differences among groups were tested using a *t* test for independent samples. Chi-square analysis was conducted to determine relationships between demographic characteristics and Internet use. The Wilcoxon two-tailed paired rank sum test was used to assess the respondents' confidence levels before and after Internet use. Significance levels were set at $p = 0.05$.

The study was reviewed and approved by the University of Ulster Research Governance Filter Committee and the Office for Research Ethics Committees in Northern Ireland. Every precaution was taken to maintain the respondent's confidentiality and anonymity. Participants were assured that any identifying data, such as Internet Protocol would be stored on a secure server and would be deleted from the database once it had been used to check for duplicate responses. Links to several support and self-help websites were provided for potential

Table 1. List of Websites Where Study Was Advertised

Websites

<http://www.ukparents.co.uk>
<http://www.midwivesonline.com>
<http://www.pregnancydaily.com>
<http://www.bounty.com>
<http://www.babyworld.co.uk>
<http://www.babywebnz.org>
<http://www.pregnancy.org>
<http://www.baby-place.com>
<http://www.pregnancy-info.net>
<http://www.justformumz.co.uk>
<http://www.pregnancyforum.co.uk>
<http://www.essentialbaby.com.au>
<http://www.everybody.co.nz>
<http://www.birth.com.au>
<http://forum.canadianparents.ca>
<http://www.pregnancy-forums.com>
<http://www.ukmother.com> (now <http://www.babynames.co.uk/community/>)
<http://www.baby-greenhouse.co.uk>
<http://www.thinkbaby.co.uk>
<http://www.vhi.ie>
<http://www.titchytots.com>
<http://www.babytalkers.com>
 (now <http://www.mamameetup.com>)
<http://talkingpoint.allaboutyou.com>

respondents from vulnerable groups such as teenagers and those subject to domestic violence.

Results

Demographics

In total, 613 questionnaires were completed and submitted over a 12-week period from women who had confirmed that they were pregnant (61.8%) or had a baby in the previous year (38.2%) and had used the Internet during pregnancy (100%). The demographic profile of the survey respondents is shown in Table 2. The respondents came from 24 different countries. Most women resided in the United Kingdom ($n = 211$, 34.4%), followed by 146 (23.8%) from Australia, 98 (16%) from the United States, 57

(9.3%) from New Zealand, 56 (9.1%) from Canada, and 23 (3.8%) from the Republic of Ireland. Two women from Argentina, France, the Netherlands, and South Africa participated. The remaining 14 respondents came from Austria, Brazil, Channel Islands, China, Denmark, Egypt, Hong Kong, Jamaica, Japan, Malaysia, Poland, Singapore, Spain, and Switzerland. As a result of the numbers from specific countries being disproportionate, the residence data were collapsed into continents (Table 2).

Pregnancy Profile of Respondents

Of the 379 (61.8%) respondents who were pregnant at the time of completing the survey, the mean gestational age of their pregnancy was 5.4 months (SD = 0.5). Antenatal care was provided by a range of health professionals. A total of 59 percent had "shared care," which included care from a midwife and general physician, midwife and consultant obstetrician, general physician and consultant obstetrician or midwife, general physician and consultant obstetrician; 18 percent had a midwife only for antenatal care, 17 percent a consultant obstetrician, and 5 percent a general practitioner. The remainder ($n = 6$, 1%) were attended by no health professional during their pregnancy.

For the purposes of assessing the level of risk in an individual pregnancy, definitions were given that were adapted from a template provided by the Department of Health and Social Services (12). Over half (59.5%) of the respondents defined their pregnancy as "normal." Less than one-third (30.2%) stated that their pregnancy had maternal problems but no fetal complications, and less than 2 percent reported fetal problems but no maternal complications. The remaining 52 (8.5%) respondents described their pregnancy as having both maternal and fetal complications.

Internet Access and Skills

The great majority of women ($n = 592$, 96.6%) had Internet access at home and many ($n = 371$, 60.5%) had access at work. Most women ($n = 517$, 84%) mainly accessed the Internet at home with a small proportion ($n = 92$, 15%) accessing it at work. Four women accessed it for pregnancy-related information from a friend's or relative's computer. No respondents used a public computer in an Internet cafe or library. Almost three-quarters of the respondent ($n = 453$) had received no formal Internet training. However, half (51.1%) rated their Internet skills as "expert user" and 48 percent as an "intermediate user"; only seven respondents (1%) classified themselves as a beginner.

Table 2. Demographic Profile of Respondents

<i>Characteristics</i>	<i>No. (%)</i>
Age (yr)	
Mean (SD), range	29.3 (5.04), 17–49
Marital status	
Married	492 (80.3)
Single	12 (2.0)
Single but in steady relationship	102 (16.6)
Divorced	3 (0.5)
Separated	4 (0.7)
Highest level of education completed	
Primary school	2 (0.3)
Grammar/secondary/high school	136 (22.2)
Technical college/diploma	160 (26.1)
Undergraduate degree	208 (33.9)
(associate or bachelor's)	
Postgraduate degree	107 (17.5)
Pregnancy status	
Pregnant at present	379 (61.8)
Pregnant within last year	234 (38.2)
Trimester period of pregnant women ($n = 379$)	
First	79 (20.8)
Second	178 (47.0)
Third	122 (32.2)
Was/is first pregnancy	
Yes	335 (54.6)
No	278 (45.4)
Continent of residence	
Africa	2 (0.3)
Asia	6 (1.0)
Europe	244 (40.0)
North America	154 (25.0)
Oceania	203 (33.0)
South America	4 (0.7)

Recognizing a Need for Information

The most frequent reasons the women gave for searching the Internet during pregnancy were to find out information “on their own” (99.3%); to acquire additional information to that already provided by health professionals (93.8%); to check for information about specific symptoms (88.7%); and to have more control over decisions affecting their pregnancy (83%). Approximately half of the respondents also reported using the Internet as a source of information to gain confidence to speak to a health professional about a concern (49.1%), because of lack of time to ask a health professional questions (46.5%), or because the information provided by a health professional was not clear (48.8%) or not satisfactory (48.6%). Two-thirds of the women identified a need to search for information before and after antenatal visits (409/413, respectively, 67%), but most (80%) also reported that their need to search for online pregnancy information was unrelated to antenatal appointments.

Selecting the Internet as an Information Source

Thirteen percent ($n = 81$) of the women stated the Internet was the only source they used when they wanted to seek information about their pregnancy. Before seeking

information online, two-thirds (69.8%) sought information from at least one health professional, one-half (49.6%) from family and friends, less than one-third from magazines or newspapers (30.2%), less than one-fourth (22.3%) from leaflets, and 11.9 percent from books. Although general search engines (e.g., Yahoo, Google, and MSN) were the most commonly used sources of Internet (97.4%) by women in their search for pregnancy-related information, less than half (44%) reported trusting information from such portals (Table 3). Sixty-one percent of those who initiated their online search using a search engine also reported using websites managed by health professionals. Although government sites were cited as the least used Internet source for information (45.5%) compared with other sources, women identified them as the most trustworthy websites (Table 3).

Using the Internet for Information

The number of times women reported using the Internet for specific reasons varied widely (Table 4). However, all respondents used the Internet to search at least once for general pregnancy information and nearly all (97%) reported going online at least once to search for information on pregnancy products and two-thirds (67.4%) to

Table 3. Respondents' Use of Internet Resources for Information and the Proportion who Regard the Source as Trustworthy

Internet Resource	Used	Not Used	Trust	Do Not Trust	Do Not Know
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
General search engine	597 (97.4)	16 (2.6)	270 (44.0)	66 (10.8)	276 (45.2)
Site run by health professional(s)	378 (61.7)	235 (38.3)	376 (61.3)	33 (5.4)	204 (33.3)
Links to medical journals	307 (50.1)	306 (49.9)	360 (58.7)	29 (4.7)	224 (36.5)
Local health service site	290 (47.3)	323 (52.7)	399 (65.1)	24 (3.9)	190 (31.0)
Government sites	279 (45.5)	334 (54.5)	407 (66.4)	34 (5.5)	172 (28.1)

Table 4. How Often Internet Was Used During Pregnancy

Use of the Internet During Pregnancy to:	Never	1–5 Times	6–10 Times	More Than 10 Times
	No. (%)	No. (%)	No. (%)	No. (%)
Search for general pregnancy information	0 (0)	28 (4.6)	45 (7.3)	540 (88.1)
Search for information on pregnancy product	21 (3.4)	73 (11.9)	75 (12.2)	444 (72.4)
Search for information about a specific pregnancy condition	36 (5.9)	223 (36.4)	108 (17.6)	246 (40.1)
Participate in pregnancy discussion group	64 (10.4)	39 (6.4)	19 (3.1)	491 (80.1)
Purchase items for pregnancy	125 (20.4)	249 (40.6)	103 (16.8)	136 (22.2)
Participate in online support group	135 (22.0)	56 (9.1)	21 (3.4)	401 (65.4)
Seek second opinion	200 (32.6)	215 (35.1)	65 (10.6)	133 (21.7)
Search for information about a treatment prescribed	251 (40.9)	251 (40.9)	47 (7.7)	64 (10.4)
Bring information to a health professional	387 (63.1)	184 (30.0)	21 (3.4)	21 (3.4)

seek a second opinion. The least frequently cited purpose given for searching the Internet was to bring information to a health professional (36.8%). Women used the Internet for information on a wide range of pregnancy-related topics (Table 5).

Collecting Information

When asked about finding information online, most women reported they either “always” or “most of the time” found the information they needed; none reported “never” finding information on the topic they were searching. Just over 90 percent of the women found it “very easy” or “somewhat easy” to locate information on the specific topic they were searching; 79 percent “bookmarked web pages” or “saved specific sites to become my favorite” for later reference. However, only a small proportion printed the information and brought it to an antenatal visit (14%).

Evaluating Information

Less than one-fifth of the respondents ($n = 117$) said they believed more than 80 percent of the information provided on the Internet was accurate. Although two-thirds (68.7%) stated that they had visited a website and thought the information was wrong or misleading, 83 percent considered the quality of online information they retrieved to be “excellent” or “good.” In the absence of a validated assessment tool for online health information (13), women’s assessment of the quality of health information sourced from the Internet was based on criteria that were similar across several published assessment guides (14–16). Most women (81%) stated they would look and see what company or organization pro-

vided the information. However, only 69 (11.3%) were aware of the presence of any quality standards pertaining to health information sites and only 48 of the 69 could name at least one accreditation standard. The awareness of quality indicators was significantly high among the women who had achieved a higher academic qualification ($p = 0.002$) and depended on where the woman resided ($p = 0.001$). Women in North America ($n = 30/69$) were more aware of such indicators than those from any other continents. The most common quality indicator mentioned for evaluating information was checking who the author of the site was (33/48), followed by noting the URL of the site (22/48). Only 15 of the 48 women mentioned checking how current the information was, and only 6 referred to the accuracy of the information.

Information Use and Decision Making

The great majority of the respondents considered the information they located on the Internet to be “useful” (96.2%). The Preparation for Decision-Making Scale met acceptable standards of reliability and validity to explore respondents’ perceptions of the usefulness of the Internet in preparing them to communicate with health professionals and to determine if the Internet played a role in their decision making (Table 6). Almost 50 percent of the women felt that the Internet helped them “quite a bit” or “a great deal” to be involved in the decision-making process. Over two-thirds thought that using the Internet for information had “little” or “no” effect on their relationship with their lead professional. The feedback scores (1–5 Likert scale, with 1 = “not at all” to 5 = “a great deal”) were highest for antenatal visit preparation (mean = 3.47, SD = 1.04) and involvement in decision-making process (mean = 3.47, SD = 1.02), whereas making the follow-up antenatal visit run more smoothly received the lowest score (mean = 2.07, SD = 1.15). Compared with “nonexpert users,” the Internet helped the “expert users” more to identify questions they wanted to ask a health professional ($p = 0.016$); helped them to be more involved in the decision-making process ($p = 0.017$); to make better decisions ($p = 0.023$); and to have more control over their decisions ($p = 0.012$).

For the younger women (17–25 yr), use of the Internet made their antenatal appointments run significantly more smoothly ($p = 0.004$). The level of education, level of pregnancy risk, or Internet access did not significantly affect the extent of the role played by the Internet in decision making. Overall, the Preparation for Decision-Making Scale showed that the Internet prepared pregnant women to communicate with health professionals and played a role in decision making

Table 5. Most Common Internet Topics Accessed by Pregnant Women

<i>Topics</i>	<i>No. (%)</i>
Antenatal complications	504 (82.2)
Intranatal issues	228 (37.2)
General pregnancy ailments and symptoms	206 (33.6)
Health promotion/lifestyle issues	128 (20.9)
Fetal development	113 (18.4)
Medications in pregnancy	96 (15.7)
Pregnancy products	96 (15.7)
Antenatal investigations and screening	86 (14.0)
Antenatal schedule	58 (9.5)
Medical conditions and pregnancy	49 (8.0)
Preconception/infertility	29 (4.7)
Parenting information	19 (3.1)

Table 6. The Role of the Internet in Preparation for Decision Making

<i>To What Extent Did the Use of Internet:</i>	<i>Not at All</i>	<i>Very Little</i>	<i>Somewhat</i>	<i>Quite a Bit</i>	<i>A Great Deal</i>
	<i>No. (%)</i>	<i>No. (%)</i>	<i>No. (%)</i>	<i>No. (%)</i>	<i>No. (%)</i>
Help you identify a question you wanted to ask a health professional	32 (5.2)	60 (9.8)	272 (44.4)	188 (30.7)	61 (10.0)
Prepare you for your next antenatal visit	39 (6.4)	74 (12.1)	269 (43.9)	180 (29.4)	51 (8.3)
Help you to be involved in the decision-making process as you wanted	36 (5.9)	45 (7.3)	228 (37.2)	203 (33.1)	101 (16.5)
Help you to make a better decision	34 (5.5)	42 (6.9)	240 (39.2)	197 (32.1)	100 (16.3)
Help health professional(s) to be more aware of your questions and concerns	124 (20.2)	116 (18.9)	255 (41.6)	79 (12.9)	39 (6.4)
Gave you more control over decisions affecting your pregnancy	29 (4.7)	69 (11.3)	238 (38.8)	181 (29.5)	96 (15.7)
Help your lead professional to understand your preference for involvement in the decision-making process	110 (17.9)	126 (20.4)	230 (37.5)	108 (17.6)	40 (6.5)
Make the follow-up antenatal visit run more smoothly	106 (17.3)	131 (21.4)	232 (37.8)	115 (18.8)	29 (4.7)
Affect your relationship with your lead professional	261 (42.6)	151 (24.6)	129 (21.0)	44 (7.2)	28 (4.6)
Improve the way time was spent during the follow-up antenatal visit	161 (26.6)	126 (20.6)	195 (31.8)	106 (17.3)	23 (3.8)
Improve the quality of the antenatal visit	162 (26.4)	149 (24.3)	209 (34.1)	75 (12.2)	18 (2.9)

Note: Cronbach's alpha reliability coefficient is 0.91.

(mean = 2.90, SD = 0.78). The women were asked to rate their perceived confidence (scale of 0–10) with respect to making decisions about their pregnancy before and after using the Internet. A significant increase was observed in the mean confidence for this scale, from 5.15 before to 8.04 after using the Internet for information (Wilcoxon paired-sample test $z = -19.17$, $p < 0.05$).

Most women (96.2%) discussed the information they retrieved from the Internet with their husband or partner. Of the 434 (70.8%) who discussed the information with at least one health professional, 279 (45.5%) discussed the information with a midwife; 204 (33.3%) with an obstetrician; 212 (34.6%) with a general practitioner; 59 (9.6%) with a dentist; 119 (19.4%) with a pharmacist; and 46 (7.5%) with a physiotherapist. No significant difference was found among those who discussed information with a health professional in relation to age ($p = 0.24$) or level of education ($p = 0.72$); however, a significant difference was found among women from different continents ($p = 0.033$). European women were more likely to discuss information with a health professional than those from other continents. Of the 434 women who discussed the information with a health professional, almost 90 percent reported the information was welcomed and openly discussed. Only 23 women (3.8%) said the information was not welcomed: they were advised not to use the Internet for advice. Five women stated their health professional completely ignored the information they found.

Almost two-thirds of women (62.8%) provided evidence that the Internet influenced how they thought their pregnancy, or birth, or both should be managed. No association was found between perceived influence of the Internet and age ($p = 0.218$), continent of residence ($p = 0.217$), or pregnancy risk status ($p = 0.613$). Those who had a university education were more influenced by the Internet than others ($p = 0.012$). Most women (89.6%) were of the opinion that health professionals should suggest suitable Internet sites where pregnant women could find relevant information about their pregnancy.

Discussion

Women access the Internet during pregnancy because of “information need” and for want of more control over decisions affecting their pregnancy. Although most women in this study sought information from their health practitioners, almost one-half of the women used the Internet because the information they received from their health professional was not clear; to reinforce a decision they had already made; or to confirm current knowledge. Pregnant women are used to getting pregnancy information from health professionals and other sources such as leaflets (17), but only a small proportion of the study women (22%) used this source of information before searching the Internet. The benefit of leaflets as part of consumer’s decision-making process has been debated. Previous research findings (18,19) found that

leaflets and professional consultations are essential for assisting patients in the decision-making process, whereas others (20) found that the distribution of pregnancy information leaflets to pregnant women did not facilitate decision making. These results support the latter conclusion among Internet users.

Most study women searched the Internet more than 10 times in their pregnancy for general pregnancy information and much data are available for retrieval. They sought information on a wide variety of pregnancy-related topics and used the Internet for pregnancy-related support and e-commerce. Most information sought by women focused on antenatal or intrapartum events, which is consistent with previous findings (21,22). On further analysis the most frequently searched topic reported by women was antenatal pregnancy complications, which would be in keeping with the most popular topic reported in the Pew Research Center Project on Internet health information seekers (23), that is, "specific disease or conditions." Other studies (24–26) reported that women search the Internet when they experience pregnancy complications. A recent study reported fetal development as the most cited online searched topic of interest (22).

Most study women used a general search engine when looking for information online. These findings mirrored other studies that have explored online health information seekers (23,27,28). Al-Ubaydli pointed out that "Search engines can provide quickly enough an answer that is good enough" (29, p 1). Although many reported visiting websites where the information was misleading, in general women considered the information available online to be "good" and "useful," and normally were able to find the information they were looking for.

Although most women rated their Internet skills as "intermediate" or "expert," many did not have the appropriate knowledge to evaluate the quality of the information they sourced from the Internet. Previous studies have shown that although people are usually capable of finding Internet-based health information, they generally did not review the credentials of the websites and few could later remember the names of the organizations sponsoring the sites from which they retrieved the information (30). It was interesting to note that most study women (81%) reported that they looked at what company or organization was supplying the online information. This finding was more than three times higher in the Pew Research Center Internet project (23), in which three-quarters of "health seekers" stated that they did not consistently check the source or date of the online information. However, although most study women viewed themselves as "expert users," few were aware of any quality indicators for determining the credibility of online health information. Even fewer were able to mention at least one indicator that could be used

to evaluate web-based information. Looking at the government or professional organization endorsements or checking the author of the website credentials were the main indicators of quality mentioned.

The results from our study are in agreement with those of Shashank et al (28). When they asked patients attending a clinic about surfing the Internet, of the 281 patients only 7 percent were aware of quality standards, but none was able to name a standard for assessing the quality of online information. This finding could have serious implications because it could mean that women who view themselves as "expert users" may believe erroneous information that may influence them to make inappropriate decisions about their management of care, which could have serious implications for the health of themselves and their fetus or baby.

The findings from this web survey confirmed that women were using the Internet to help make decisions about their pregnancy. Decision making is defined as the cognitive process of reaching a decision (31). When the Fellows of the Royal Australian and New Zealand College of Obstetricians and Gynaecologists were asked if they thought websites had an influence on "their patients'" attitudes to epidural, induction, or cesarean section, 72 percent thought that it did (32). In our study, almost two-thirds of the women (63%) reported that the information they retrieved from the Internet influenced how they thought their pregnancy and birth should be managed.

Choice is about being in control. One of the main misconceptions about the "informed patient" is that he or she is widely accessing health information to become an expert in their own condition and thereby challenge the health professionals' authority. This misconception was not apparent among the women in this study, who reported that health professionals welcomed and openly discussed the information. Almost one-half (42%) reported that use of the Internet had no effect on their relationship with their lead health professional, and most women stated that they would like health professionals to suggest suitable Internet sites where pregnant women could access relevant pregnancy-related information.

An essential element of good care is not only the provision of information but also the sharing of information (33). In our study, most women discussed their retrieved information with a health professional. However, some women do search for information in isolation without referring to a health professional.

Study Strengths and Limitations

We believe that this study is the first to explore women's use of the Internet during pregnancy in relation to decision making and, as such, provides important base-

line data for future surveys and the building blocks for more research in this area. Web-based questionnaires are able to reach large numbers of pregnant women globally who use the Internet during pregnancy, and this study offers a validated instrument for further use by researchers across the world. Types of information needed by women change during pregnancy; the authors made no attempt to standardize the response timing so that their broad descriptive data would cover pregnancy needs as defined by women themselves.

This survey used nonprobability sampling, and therefore the researchers cannot ensure that participants are representative of all pregnant women who use the Internet during pregnancy. However, by using a variety of websites, it was possible to target a large number of pregnant women. The conclusions drawn from the study can therefore be suggestive of likely findings from other populations of women who use the Internet for health information during pregnancy. It was not possible to record the number of nonrespondents to the survey as ‘‘hits’’ (number of times a web page is accessed). Although nonresponse error is not conceptually equivalent to response rate, the higher the proportion of sampled respondents who respond to a questionnaire, the greater is the likelihood that the nonresponse error is small (34).

This exploratory descriptive study ascertained why women used the Internet as an information source during pregnancy, identified what types of information they sought, how they appraised and valued it, and explored the role of the Internet in decision making. The method of data collection provided an understanding of the issues pertaining to women seeking information online and the essential structure of the information-seeking and subsequent decision-making process. A deeper understanding would require a more qualitative approach.

Conclusions

In this study, the Internet played a significant part in the respondents’ health information seeking and decision making in pregnancy. All health professionals need to be aware of this activity and accept that some women will require more information than they are able to provide and that many women are sourcing and downloading information online to meet their information needs. Health professionals need to be ready to support pregnant women in online data retrieval, interpretation, and application. They need to possess core skills in Internet use so that they can work in partnership with pregnant women and be able to direct women and offer information that will enable women to access accredited websites. In addition, they require knowledge on how to

assess the usability and reliability of the online information that women bring to consultations and how to use it as a component of decision making. In response to women’s information-seeking activities, we encourage health professionals to engage more fully with web-based information sources.

The increased availability of health information online may have a positive or negative effect on the relationship between women and health professionals. For women who have searched and accessed information from trustworthy sites, and for health professionals who are at ease with women going online and professing their autonomy, this relationship could be enhanced. Health professionals must not look at women bringing information to consultations as a threat to their professional standing but as a positive step that indicates women who are motivated to learn about their pregnancy and play an active role in their decision making. Based on the ethical principles of informed choice, whether the woman decides to use information retrieved from the Internet or not, health professionals still have a duty of care to provide women with evidence and appropriate unbiased information to assist them in making well-informed decisions.

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