Online nutrition information seeking among Australian primigravid women

Judith Maher*a, Catherine Robichauda, Elizabeth Swanepoela
School of Health and Sports Science, University of the Sunshine Coast, Maroochydore; Australia 90 Sippy Downs Dr, Sippy Downs, QLD 4556, Australia
Email: jmaher@usc.edu.au
Email: LSwanepo@usc.edu.au

*Corresponding author

Abstract

Background

Optimal nutrition in pregnancy is crucial for short and long term health in both mother and child. While a large proportion of pregnant women utilise the internet for informational support during pregnancy, little is known about online practices relating to food and nutrition in pregnancy.

Methods

A qualitative study; Semi-structured interviews were undertaken with 16 primigravid women to explore their approaches and preferences when accessing and engaging with pregnancy-related nutrition information online. Women who had accessed the Internet for pregnancy related nutrition and food information were recruited via snowball sampling from South East Queensland, Australia. Data were analysed in accordance with descriptive phenomenology.

Findings

Food and nutrition information-seeking practices were highly varied but followed a similar overall pathway. Six broad themes were identified “triggers”, “access and navigation”, “appraisal”, “changes in searching frequency”, “preferred features” and “engagement with communication approaches”. Women preferred online sources that were easy to navigate and presented information clearly. Experience as well as fact based communication appeared to satisfy different informational needs.

Key conclusions and implications
Women search for food and nutrition information online in similar ways to other pregnancy issues. Opportunity for engaging with women online regarding a range of food and nutrition topics may be limited to early in pregnancy unless prompted to via conversations with antenatal service providers. Health practitioners have a role to play in helping women source evidence-based web sites. There is opportunity for organisations with mandates to support women to optimise diet quality during pregnancy, to improve user experience building on key preferences identified in this study to increase appeal and engagement by pregnant women.

**Keywords:** nutrition, pregnant women, information seeking, Internet.

**Introduction**

Adequate nutrition has a vital role during pregnancy in maximising the health outcomes of the mother and infant (Abu-Saad & Fraser, 2010). An increased awareness of healthy eating can subsequently translate to improved eating habits for the mother (Huberty et al., 2013) and her family (McLeod et al., 2011; Szwajcer et al., 2007), promoting positive physical and mental health in the long term (Szwajcer et al., 2012) and minimising the incidence of chronic disease (Kunz & King, 2007). Pregnant women, especially those in their first pregnancy, appear to have increased awareness regarding the concepts of healthy eating, and have been known to actively seek nutrition-related information (Szwajcer et al., 2007; Szwajcer et al., 2009) and use of the Internet in pregnancy is high (Gao et al., 2013; Grimes et al., 2014).

Pregnant women use the Internet to educate themselves before and after antenatal appointments (Huberty et al., 2013), and to share experiences and seek support (Cohen & Raymond, 2011; Sherman & Greenfield, 2013). However the amount of information available is often overwhelming (Maher & Lowe, 2015; Koh, & Rudd, 2015). In addition, recent research suggests the accuracy of available nutrition information online is problematic (Storr, 2016). It is known that the presentation of
information and user experience factors influence user engagement with information on the internet (Al Maskari & Sanderson, 2010).

User experience features that appeal to perinatal women generally include central website for information, easy to read (Hearn et al., 2013) and websites that provided regular updates related to stage of pregnancy (Bernhardt & Felter, 2004; Hearn et al., 2013). Information online is communicated in both narrative and paradigmatic forms. Narrative forms are based around story-telling and focus on personal experience, whereas paradigmatic forms focus on relating factual information and statistical evidence instructively (Hinyard & Kreuter, 2007). Narrative communication of general pregnancy information appears to provide emotional and social support for pregnant women and mothers (Cohen & Raymond, 2011; Lagan et al., 2010; Song et al., 2012) and paradigmatic information sources are important to pregnant women (Huberty et al., 2013; Lagan et al., 2010). At present, it is unclear how narrative and paradigmatic forms of communication and content features are used in a nutrition context and which pregnant women prefer. In addition, there is limited research into how pregnant women acquire food and nutrition information online, and limited work is available about the Australian experience.

Given the importance of food and nutrition in pregnancy, and the ubiquitous nature of the Internet as an information source, it is important to explore pregnant women’s approaches and preferences regarding food and nutrition-related information when online. These insights are needed to better understand and address the food and nutrition information needs of pregnant women, and tailor support for constructive use of the Internet for informational support. Thus the aim of this study was to explore the approaches and preferences that Australian primigravid women (meaning no previous births) use when accessing and engaging with nutrition information online.

The objectives of the study were:

- To explore the online nutrition-related information seeking practices of primigravid women
- To investigate what food and nutrition web related features women prefer
To explore what forms of communication (narrative or paradigmatic) pregnant women engage with and prefer when interacting with pregnancy nutrition-related information online

Methods
This qualitative exploratory study was based on descriptive phenomenology and borrows the techniques of constant comparison, data saturation and coding from grounded theory (Creswell, 2009; Liampittong, 2010) Qualitative research design was considered appropriate for this study due to the exploratory nature of seeking to understand pregnant women’s lived experiences of engaging with nutrition information online (Creswell, 2009; Liampittong, 2010) and is consistent with a phenomenological approach (Lopez & Willis, 2004).

Participants and Recruitment
Participants in this study were primigravid women at any stage of pregnancy, aged 18 years or older, had accessed the Internet during their pregnancy to search for pregnancy nutrition-related information, and could read and comprehend English. Purposive and snowball sampling were used to recruit through community health centres, as well as work and social networks in south Queensland, Australia. Recruitment continued until the researchers perceived that data saturation was achieved (Seidman, 2013).

Written or verbal informed consent was obtained prior to the initiation of questions during interviews. Participants received a $20 gift voucher at the conclusion of the interview as reimbursement for their time. Ethical approval (S/13/557) for the study was given by the Human Research Ethics Committee at the primary researcher’s institutional facility.

Data collection
Semi-structured interviews were conducted with participants between May and August 2014. The interviews took place either in person in a private room at the participant’s preferred location, or via Skype or telephone where distance was an issue. The interviews took between 30-60 minutes each, and were audiotaped and transcribed verbatim.
Interview questions (Table 1) were designed by the authors to answer the research questions which related directly to women’s’ subjective experiences. The flow of questioning was informed by the focus group guide used by Bernhardt & Felter (2004) in their study of online general pregnancy information seeking. Interviews were facilitated by the primary researcher (CR) and followed a semi-structured framework of topic questions using a ‘funnel’ approach, which allowed for exploration of issues of interest and to clarify any ambiguities (Liamputtong, 2010). The interview questions were pilot tested on two multiparous women given both their accessibility to the researchers and to preserve all possible participants for the study. It was determined that women who had been pregnant would relate to the questions and could also provide feedback on the wording of questions. Topic questions were subsequently altered to enhance clarity of questions and flow (Gillham, 2000). The interviewer was a non-pregnant dietetic female honours student. Participant demographics were collected via questionnaire at the close of the interview.

[INSERT Table 1 here]

Data analysis
Interviews were transcribed verbatim and de-identified. NVivo 10 (NVivo 2012) was used for electronic coding and data management. Data immersion occurred concurrently to data collection in order to develop a better understanding of the responses and manage the quantity of data (Creswell, 2009; Liamputtong, 2010). Analysis of participant narratives focused on identifying the common features in participant experiences – a key feature in descriptive phenomenology (Lopez & Willis, 2004). In addition, the research questions were used as a guide. Information on websites accessed by participants was categorised as narrative and/or paradigmatic by the primary researcher. Key characteristics which were used for categorisation of sites included: 2) Referenced, fact based health information provided by government or credentialed health care provider (paradigmatic); 2) forums (narrative); 3) Domain name extension (e.g. .com).

The first transcript was analysed inductively (Liamputtong, 2010). The codes that emerged from this transcript were then sorted into discrete categories. A codebook outlining the research questions, codes and emerging categories was established to capture information and meaning of codes and also help maintain the focus of
The remaining interview transcripts were coded deductively according to the categories established from the original transcript, as well as inductively to capture any new codes and categories (Liamputtong, 2010). Triangulation of a subset of transcripts was undertaken by the researchers to increase the rigour of analysis (Creswell, 2009). A framework to visually represent the findings was developed through peer debriefing and discussion (Anfara et al. 2002) (Figure 1). The framework reflects the commonalities of experience as major themes identified through this process of analysis. Verification of the analysis was undertaken using the framework. Transcripts and coding was checked against the framework to ensure coherence between them. Data saturation was identified where no new substantial codes emerged (Braun & Clarke, 2006). Demographic information was analysed descriptively.

**Results**

Sixteen women were recruited from geographically diverse locations in south Queensland. Table 2 summarises the key demographic characteristics of participants. Participants were in either their second (n=8) or third (n=7) trimester at the time of interview. One participant had been diagnosed with Gestational Diabetes Mellitus, while the remainder reported no other medical complications. Antenatal care was being provided at the time of interview by one or a combination of health practitioners: 14 had contact with a midwife, 11 with a general practitioner, 3 with an obstetrician and 1 participant with a doula. All participants were in relationships, with 11 being married and 12 with a total household income of greater than $75,000. No participants identified as being Indigenous.

Six broad themes emerged repeatedly from interview data. The themes “triggers”, “access and navigation”, “appraisal” and “changes in searching frequency” are presented in relation to research question one. “Preferred features” and “engagement with communication approaches” are themes presented in relation to research questions two and three.

**Triggers**

Participants discussed a number of factors that influenced their Internet use. The main trigger appeared to be concern for foetal development, including sourcing
explanations supporting dietary recommendations. Clarifying terminology, anticipated weight changes and a love for learning new information triggered some searching. Some women expressed the need to “double check” information to feel confident there would be minimal risk to the foetus. One participant communicated her concern following a doctor’s appointment:

“when I initially went to my doctor about being pregnant, he gave me list of the basics, no fish, no raw egg, no raw meat, no unpasteurised – so, that’s just what I’m trying to go off. But I still wanted to Google everything just to make sure.” (Participant 4, Age 20-24, Trimester 2)

Written and verbal information from others, including family, health practitioners, work colleagues and “everyone” prompted searching. Information from these sources were perceived as helpful and/or unhelpful, often creating a need to verify the accuracy of information and further explore the topic. In some cases these sources relayed “rules” that the pregnant women were expected to follow, which is demonstrated through the following quote:

“Probably work colleagues are probably the worse ones, you all sit at the lunch table together and they go, oh, what are you doing eating that, you’re not meant to be eating that, but I was like leave me alone.” (Participant 13, Age 20-24, Trimester 2)

Access and navigation

Participants reported accessing the Internet primarily on home computers and mobile phones as these were accessible and convenient. The search engine Google was most commonly utilised to explore key terms, and a variety of websites were used to access information including government issued, hospital issued, baby specific and social networking services. Web applications for smartphones were popular with most women and were often used in conjunction with one or a combination of websites.

The main search topics and key words used by participants are summarised in Table 3. Safe eating in pregnancy was a topic frequently discussed. Key terms were entered as two to three words, up to full sentences.
Women used different strategies to retrieve online information. Some developed a preference for particular web sites and applications that became their first source for information. Many participants persisted with searching knowing the required information could eventually be located, and targeted their searches to source specific information and narrow search results. In some cases this meant changing the terminology and writing the search terms differently, which is demonstrated in the following quote:

“I think I put “pregnancy weight gain,” to start off with and that brought up a lot of the Blogs and Forums and stuff like that. What did I change it to? I think I might have said, like “healthy weight gain parameters,” or something like that.” (Participant 3, Age 20-24, Trimester 3)

Inexact findings could be used to further define key terms, and reading ideas posted on sites could provide a basis for searching new and interesting topics and determining the accuracy of the information. Suggested search queries by search engines provided reassurance that the question had previously been asked, and were usually consistent with the intended topic of interest. Many participants used the links provided on web sites and applications to expand on particular topics.

The volume of online information was managed by a number of approaches. Women disregarded information already known or irrelevant, created distance and time limits to prevent feeling overwhelmed, and mainly visited sites familiar to them. Some stopped searching once their needs were satisfied, or gave up searching from frustration due to the time required to find a suitable information source and to prevent further confusion.

Appraisal

Unless participants already trusted the site or it had been recommended by a trusted source, most looked for evidence of “trustworthiness” to determine the site’s credibility. This included attributes such as government issued web sites, the domain extension such as “dot-org”, and information that looked professionally written.

Previous knowledge and training such as tertiary education were recalled by some participants to determine if sources were credible and reputable.
Some women cross-checked information to determine its reliability by exploring the same topic across different web sites. A ‘majority rules’ approach was taken by some women as in the following quote:

“So yeah, but if you find a heap of people posting the same feedback, then it's like, okay, this might be on the right track.” (Participant 16, Age 30-34, Trimester 2)

Trustworthiness could be established for some participants if the site was identified as Australian. Information and products perceived as relevant to the Australian culture instilled greater faith in and use of those web sites compared to non-Australian sites. Participants expressed confidence in the quality of Australian-based food products and standards, and consistently found that the information provided across Australian-based web sites was similar:

“You look at it, and it's like, well what are they talking about. How is this applied? Then you realise it's not an Australian website and you're like, oh damn it. … Oh, it's not Australian. Because things are so different in different countries as well, like what they recommend and stuff” (Participant 16, Age 30-34, Trimester 2)

Information provided on web sites generated by familiar baby-related brands gave women confidence due to the brands’ perceived accountability and the perceived high usage of those web sites by others. It was felt that providing inaccurate information would be too much of a risk to the reputation of the company, as can be demonstrated in the following quote:

“They’ve got such an extensive baby range and it’s like, well, imagine if they got in a court case or something from having terrible information on there.” (Participant 1, Age 25-29, Trimester 2)

Online information was often verified with outside sources. These included health practitioners, friends, family and generally “other people” who were perceived to have appropriate knowledge and experience. This served to provide reassurance by normalising pregnancy-related concerns and resolving ambiguities.

Changes in searching frequency
Searching frequency often decreased over the duration of the pregnancy, with most women reporting the highest amount of searching in the first trimester and lessening as their knowledge base grew and anxiety decreased. The nature of the topics searched changed across the pregnancy in conjunction with the women’s needs.

Preferred features

Participants described a range of features that characterised the web sites and applications they used. Participants indicated why features were liked, and disliked, and how they were utilised.

When asked about favourite online sources, women reported a variety of combinations of preferences that the web sites and applications specifically offered (Table 4). Associated costs and the commitment to joining up, sites that were “too busy” and insufficient depth of information were reported as deterrents to locating favourite sources.

Engagement with communication approaches

Narrative, paradigmatic and a combination of those communication methods were reported to be used in different ways to enrich knowledge and satisfy different needs. All women reported active, passive or both forms of engagement with narrative communication in the form of Facebook, Twitter, blogs and online forums. Views on social media were mixed, with the majority of women criticising different aspects of it for being opinionated, not supported by scientific evidence, inaccurate and scare-mongering. Posts were generally accepted as personal experiences and not necessarily relatable to all pregnancies. One participant expressed the erroneous side of the Internet:

“Blogs can be a lot of—that's when a lot of “Chinese whispers” can come into play and not getting accurate information.” (Participant 1, Age 25-29, Trimester 2)

Social media was viewed positively by some, describing the useful tips, “mummy talk” and emotions elicited from personal stories that were a feature of the
information provided. The following quote was from a participant who identified an unforeseen benefit of forums:

“they do a lot of good tips and things like that that you wouldn't know if you didn’t pop on these forums.” (Participant 13, Age 20-24, Trimester 2)

Some women actively participated in online conversations for the purposes of one or a combination of: stating an opinion, sharing an experience, asking questions, and helping others. Most women chose not to actively participate, however found it useful to compare and normalise, and were reassured by reading relatable experiences. This connection was discussed by one participant who expressed an enjoyment for reading blogs:

“They’re written more from somebody else’s personal experience. So I feel like the person who is writing it actually understands what I’m going through” (Participant 15, Age 25-39, Trimester 3)

Most women engaged with paradigmatic web sites. Paradigmatic information was often utilised as a user-friendly guide that provided options and tips for meeting nutritional requirements, especially in regards to food safety. Core information was often located on one page and presented in a format that was clear and simple to follow, such as a table. Specific information with links to detailed explanations and importance of the listed recommendations were appreciated. One participant expressed her relief in having options to consume foods that were a food safety concern:

“It’s clear, it’s all there and it was giving me options. It wasn’t just writing stuff off, it was saying, “Yeah, have some of this but maybe make sure you wash it thoroughly or cook it.”” (Participant 7, Age 25-29, Trimester 3)

Some participants commented on the lack of explanation accompanying information such as food safety recommendations. The information was too brief and insufficient to meet the women’s needs, in some cases making it difficult to ascertain the extent of associated risk. The following quote demonstrates the inadequacy of information sourced:
“Alright, well you should avoid these foods,” but if I can know “why” then that would allow me to make a better judgement call on things, to really know the risk. Like, is it a hard fast “No, this is terribly bad for you,” or is it a, “Avoid this because the risk is this and it’s from this.”? (Participant 1, Age 25-29, Trimester 2)

Discussion

This study aimed to explore how Australian primigravid women access and engage with nutrition information online. Using a qualitative approach, we were able to identify the commonalities in pregnant women’s experiences. We found that although information seeking practices were varied, all participants followed a similar process to increase their nutrition/food related knowledge through their use of the Internet. Women preferred online sources that were easy to navigate and presented information clearly, and narrative and paradigmatic forms of communication appeared to satisfy different needs.

Common triggers for searching for online nutrition information included concern for foetal development and to ‘check’ for additional information to allay fears, confirm advice received from health professionals and gain reassurance. A mother’s concern for her baby and knowing the right thing to do have previously been identified as motivators for pregnant women to engage in a whole range of behaviours – including triggering searching the Internet for informational support (Maher & Lowe, 2015).

The Internet appears to provide women with a ‘go to’ place for nutrition information yet research suggests women do not discuss the information they find with their health care provider (Sayakhot & Carolan-Olah, 2016). Health professionals need to be aware of potential triggers of nutrition information searching and opportunistically provide information to women about reliable websites or applications that provides follow up advice and explanation on topics addressed during occasions of antenatal care.

Nutrition information on the Internet was most frequently accessed via home computers and smartphones and mirrors findings from previous research which investigated general online pregnancy health information seeking (Huberty et al. 2013; Lagan et al. 2010; Rodger et al. 2013). The Internet and smart devices have allowed, in an unprecedented manner, access to a highly convenient source of
information however in our study, strategies were needed so women could manage
the sheer volume of nutrition information available online.

Although other studies have identified that nutrition in pregnancy is commonly
searched by pregnant women (Sayakhot & Carolan-Olah, 2016), in our study we
were able to identify more specifically what nutrition topics were important to
women. Food safety was a key concern which is similar to studies investigating
pregnant women’s general nutrition seeking practices and knowledge (Szwaiccer et al.
2009; Charlton et al. 2010). We also identified particular interest in weight gain,
healthy eating and recipe ideas. In addition, women were not only seeking
information on ‘what’ i.e. what to eat or not to eat, but in some instances they also
desired explanation and a more personal connection to the diversity of pregnancy
experiences. These findings are consistent with other qualitative studies showing
women often perceive information provided by governments and health professionals
as lacking specificity (Ferrari et al., 2013; Wood et al., 2010), the ‘why’ explanation
(Athearn et al. 2004) and sometimes perceived as unrealistic or idealistic (Ferrari et
al., 2013). Based on this and our study, there appears to be opportunities to improve
the way nutrition information is communicated with women, ensuring adequate
explanation with a focus on empowering self-care.

Our results indicate women have developed strategies to help them determine what
information is accurate and trustworthy and are similar to those described by other
authors investigating general pregnancy online information seeking (Gao et al.,
2013; Lagan et al., 2011; Larsson, 2009). It is not known however if these strategies
actually result in women locating accurate, evidence based information. Concern has
been raised in previous research regarding the quality of information available on the
Internet and the ability of lay folk to adequately appraise information (Gao et al.,
2013; Grimes et al., 2014; Lagan et al., 2010). Information on nutrition and food is
particularly complex with many schools of thought, philosophies and sources of
information complicating the act of accessing and appraising it. A recent study which
assessed the quality and accuracy of information (compared to Australian guidelines
for nutrition in pregnancy) from a sample of 693 webpages on pregnancy nutrition,
found accuracy varied considerably (39.7% assessed as accurate) (Storr et al., 2016).

Given there is a significant amount of inaccurate information, the opportunity for
misinformation is likely considerable. There are opportunities for health
professionals and health organisations to work with websites that are highly accessed to review and ensure nutrition information for pregnancy is accessible, accurate and current.

Diet, while important through pregnancy, is particularly important in the first trimester when women may not have access to a health professional. As has been previously found, women in our study used the Internet in their first trimester in particular for nutrition information and support, and after this time reliance on the Internet declined (Larsson, 2009; Szwajcer et al., 2009). Opportunity for engaging with women online regarding a range of food and nutrition topics may be limited to early in pregnancy unless prompted to via conversations with antenatal service providers. During pregnancy, particular web sites and applications became preferred ‘go to’ sites to resolve nutrition questions and concerns, potentially being another reason for decreased search frequency.

Web sites and applications that had prioritised the user experience including easy navigation, engaging content and interactivity were well received, findings consistent with research into general preferences of pregnant women (Hearn et al., 2013). Study findings provide some guidance for e-mediated pregnancy nutrition promotion and online engagement. Targeted online nutrition informational support, which builds in ‘push’ strategies among other features as identified in our work and in others’ research (Bernhardt & Felter, 2004; Hearn et al., 2013), may attract a wider audience and help to support better nutrition early in and throughout pregnancy.

We were interested in finding out how the way information is communicated is experienced by women. Story based nutrition information is very common online and is a powerful way to share information (Bruner, 1986; Strange, 2002). We found our participants to be somewhat wary of this type of information however these findings may also reflect some desirability bias. When directly studied in the US, women used anecdote based forums more readily than other perhaps more reliable informational support sources (Herman et al. 2005). It would be of interest to discover whether these findings are common to other pregnant women or particular to our sample. Knowing better the appeal of narrative versus paradigmatic based communication for women of varying education levels, culture and so on would be beneficial in order to better target how information is disseminated by health
professionals/organisations for broad readership/readability. It is known that readability of online pregnancy-related nutrition information is currently rated as ‘fairly difficult to read’ (Storr 2016).

Strengths and Limitations

Using a qualitative exploratory approach was a key strength of this study as there is limited research on food and nutrition online engagement by pregnant women. Despite the small sample size, confirmatory findings indicate we have captured similar insights into a number of areas as other researchers, despite a focus on diet and nutrition. The participant sample although ranging in demographic characteristics was relatively culturally homogenous. Future research could target key minority groups helping to determine difference/similarities to ultimately improve care and support provided to this important group of women.

In addition, early in pregnancy is reported as being a key time for early/greater access to food related information online (Olson, 2005; Szwajcer et al., 2009). There were difficulties engaging women in their first trimester, as frequently women are not making pregnancy public knowledge until they are passed 12 weeks, thus a greater level of recall was relied upon. The extent of understanding and actual accuracy of information viewed was not explored in this study. Observation of searching and engagement practices may have provided real time insight into access and engagement processes/experience.

Implications

There are a range of triggers that prompt pregnant women to search for food and nutrition information online. Our results indicate that women may be ‘double checking’ information via the Internet following antenatal visits. Health professionals can anticipate this and opportunistically provide guidance/additional information to their clients on topics covered during their consultations; as well as directing them to informative, accurate and engaging websites and applications. To do this well, health professionals, in particular midwives, need to be regularly engaging with the online environment, appraising available and popular food and nutrition pregnancy sites/popular issues whilst also being aware of site attributes that appeal to women, such as those identified in this study.
Although searching was reported as mainly occurring in the early stages of pregnancy, there may also be opportunity to facilitate greater engagement with food and nutrition topics throughout pregnancy given the importance of optimal diet quality for short and long term outcomes. Health professionals, in regular contact with pregnant women should encourage their clients to explore questions online prior to antenatal visits to prompt discussion within a women-centred care framework (Australian College of Midwives, 2014).

Finally, there appears to be a need for health professionals and organisations with a mandate to support women through pregnancy, to engage with commercial web site providers to ensure the accuracy and currency of food and nutrition information being accessed early in pregnancy, and encourage provision of health promoting food and nutrition information through their regular push strategies (weekly emails and so on). In addition, findings from this study could be used to guide the development of nutrition focused websites, applications and appraisal tools that address the needs and user experience expectations of this population group.

Conclusion

Due to the ubiquitous nature of the Internet and the convenience to connect almost anywhere, anytime, web sites and applications offering nutrition-related information are increasingly being used as complementary avenues to that provided in person by health practitioners. Findings from this study suggest that primigravid women’s online nutrition information seeking practices are varied and complex. The emphasis that women placed on the importance of acquiring information that they perceived to be trustworthy, suggests that women are aware of the potential for information inaccuracies. However, approaches to appraising nutrition information were based on lay logic, and due to the vast size and unregulated nature of the Internet, the opportunity for misinformation is considerable. This places onus on health practitioners to take a more active role in helping to ensure that women are viewing current and accurate information, so that the decisions made as a result of sought information are in the best interests of the health of the woman and her foetus. Future research should seek to expand on the findings of this study with more diverse populations of primigravid women, further build upon the most effective approaches
to support women sourcing nutrition-related information online, and determine how information obtained online affects behaviour and health outcomes.

(1) Conflict of Interest
None declared

(2) Ethical Approval
Ethical approval was granted by the University of the Sunshine Coast Human Ethics Research Committee.

(3) Funding Sources
None declared

(4) Clinical Trial Registry and Registration number
Not Applicable

References


**Figure 1.** Analytical framework developed from and informing analysis. This figure describes visually the general pathway of online nutrition information seeking that
emerged in the initial analysis of transcripts. This then formed the framework which further shaped analysis.

Table 1. Primary interview questions.

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Corresponding questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forms of communication utilised; Practices applied to access and engage</td>
<td>What food or nutrition-related searching or browsing online have you undertaken since</td>
</tr>
<tr>
<td>online information</td>
<td>becoming pregnant?</td>
</tr>
<tr>
<td>Practices applied to access and engage online information</td>
<td>How have you used the Internet to search for or obtain food and nutrition information</td>
</tr>
<tr>
<td></td>
<td>during pregnancy?</td>
</tr>
<tr>
<td></td>
<td>Can you recall some of the words you used when searching for food and nutrition-related</td>
</tr>
<tr>
<td></td>
<td>information on the Internet?</td>
</tr>
<tr>
<td></td>
<td>How have you found the quality of pregnancy food and nutrition-related information</td>
</tr>
<tr>
<td></td>
<td>online?</td>
</tr>
<tr>
<td>Preferred web related features</td>
<td>Can you comment on the detail and level of explanation of food and nutrition-related</td>
</tr>
<tr>
<td></td>
<td>pregnancy information online?</td>
</tr>
</tbody>
</table>
Can you recall some of your preferred/most visited pregnancy web sites? [Favourite sites were located on a computer and questions were asked to prompt discussion of impressions (Bernhardt & Felter 2004) and preferences.]

Table 2. Socio-demographic profile of participants.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Number (n=16)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age bracket (yr.)</td>
<td></td>
</tr>
<tr>
<td>20-24</td>
<td>3</td>
</tr>
<tr>
<td>25-29</td>
<td>7</td>
</tr>
<tr>
<td>30-34</td>
<td>4</td>
</tr>
<tr>
<td>35-39</td>
<td>1</td>
</tr>
<tr>
<td>Highest level of education completed</td>
<td></td>
</tr>
<tr>
<td>Secondary/High School</td>
<td>1</td>
</tr>
<tr>
<td>Community college/College of further education</td>
<td>6</td>
</tr>
<tr>
<td>Bachelor degree or higher</td>
<td>8</td>
</tr>
<tr>
<td>Employment status</td>
<td></td>
</tr>
<tr>
<td>Not in the labour force</td>
<td>1</td>
</tr>
<tr>
<td>Employed part-time (&lt;35 hrs/wk)</td>
<td>3</td>
</tr>
<tr>
<td>Employed full-time (35+ hrs/wk)</td>
<td>11</td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
</tr>
<tr>
<td>Manager</td>
<td>3</td>
</tr>
<tr>
<td>Practitioner</td>
<td>6</td>
</tr>
<tr>
<td>Technician and trade worker</td>
<td>1</td>
</tr>
<tr>
<td>Community and personal service worker</td>
<td>1</td>
</tr>
<tr>
<td>Clerical and administration personnel</td>
<td>2</td>
</tr>
<tr>
<td>Labourer</td>
<td>1</td>
</tr>
<tr>
<td>Student</td>
<td>1</td>
</tr>
<tr>
<td>Level of remoteness (see footnote 1)</td>
<td></td>
</tr>
<tr>
<td>RA1 Major Cities</td>
<td>7</td>
</tr>
<tr>
<td>RA2 Inner Regional</td>
<td>2</td>
</tr>
<tr>
<td>RA3 Outer Regional</td>
<td>6</td>
</tr>
</tbody>
</table>
Location most frequently situated when accessing the Internet

<table>
<thead>
<tr>
<th>Location</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home</td>
<td>14</td>
</tr>
<tr>
<td>Work</td>
<td>5</td>
</tr>
<tr>
<td>Missing data</td>
<td>1</td>
</tr>
</tbody>
</table>

1. The Australian Standard Geographic Classification used to classify Australia into major regions. Each Remoteness Area (RA) represents a collection of unconnected geographical areas that share common characteristics of remoteness (ABS 2013).

2. The participant did not return her demographic.

Table 3. Main categories of key words and nutrition and food topics used online.

<table>
<thead>
<tr>
<th>Central categories</th>
<th>Common topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food safety</td>
<td>Cheese</td>
</tr>
<tr>
<td>Seafood</td>
<td>Foods to avoid</td>
</tr>
<tr>
<td>Listeria</td>
<td>Safe foods</td>
</tr>
<tr>
<td>Listeria</td>
<td>Mercury</td>
</tr>
<tr>
<td>Guidelines for healthy eating and vitamins and mineral requirements</td>
<td>Pregnancy nutrition guidelines</td>
</tr>
<tr>
<td>Iron</td>
<td>Calcium</td>
</tr>
<tr>
<td>Weight gain</td>
<td>Iron</td>
</tr>
<tr>
<td>Body mass index</td>
<td>Folate</td>
</tr>
<tr>
<td>Healthy weight gain during pregnancy</td>
<td>Serve size</td>
</tr>
<tr>
<td>Recipes and meal plans</td>
<td>Serve size</td>
</tr>
<tr>
<td>Menus</td>
<td>Serve size recommendations</td>
</tr>
<tr>
<td>Recipes</td>
<td>Serve size recommendations</td>
</tr>
<tr>
<td>Recipes</td>
<td>Meal planners</td>
</tr>
</tbody>
</table>

Table 4. Preferred features of favoured web sites and applications.

<table>
<thead>
<tr>
<th>Preferred features</th>
<th>Illustrative quote</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Feature</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>User-friendly and easy to navigate</td>
<td>“I like the idiot guide ones, the ones that are really easy to navigate. So if they're complicated and … just too hard to use, or too hard to find stuff on, I just get straight out of the site and go and find an easier one.” (Participant 14, Age 35-39, Trimester 2)</td>
</tr>
<tr>
<td>Simplistic with information presented clearly</td>
<td>“I think it’s good if the site’s not too busy. There’s not too many things on it so you can see clearly where you want to go.” (Participant 2, Age 25-29, Trimester 3)</td>
</tr>
<tr>
<td>All information on the main page</td>
<td>“I just like things to be right in front of me” (Participant 7, Age 25-29, Trimester 3)</td>
</tr>
<tr>
<td>Provides links to additional information</td>
<td>“So then you could go into like a fact sheet about that and it would have links to that.” (Participant 1, Age 25-29, Trimester 2)</td>
</tr>
<tr>
<td>Provides weekly emails and reminders</td>
<td>“So it reminds you as well and you can even put your appointments in and it sends you reminders for when you're obstetric appointments are and it helps you with baby brain” (Participant 14, Age 35-39, Trimester 2)</td>
</tr>
<tr>
<td>Personalisation</td>
<td>“it would sort of remember that it was you” (Participant 8, Age 30-34, Trimester 3)</td>
</tr>
<tr>
<td>Provides relevant and helpful tips and recommendations</td>
<td>“for this stage you have to – for some of the food maybe you should pay much more attention too I think. It’s good to eat this kind of thing during this stage” (Participant 11, Age 25-29, Trimester 3)</td>
</tr>
<tr>
<td>Availability of forums</td>
<td>“the best part is when you can have the little blogs down the bottom where people can add their comments and you can read over what their thoughts were.” (Participant 6, Age 30-34, Trimester 2)</td>
</tr>
<tr>
<td>Ability to share with partner</td>
<td>“everything that I put up, he automatically got and everything he put up, I automatically got and it worked – it was like a family schedule thing.” (Participant 4, Age 20-24, Trimester 2)</td>
</tr>
</tbody>
</table>
Appealing language and terminology

“the terminology of that positive encouragement and making you feel that they understood what you were going through”

( Participant 8, Age 30-34, Trimester 3)

Provides relevant pictures and movie clips

“They do have little movies in there that explain how the baby gets nutrition, what nutrition’s best. … But the movies are great.”

( Participant 12, Age unknown, Trimester 3)

Colours

“Yeah, I like the orange. I do like the orange, it’s kind of calming. I don’t like the blue and the pink because it’s too – I don’t know what I’m having and I don’t want to know”

( Participant 14, Age 35-39, Trimester 2)

Highlights

• Online nutrition information used to allay fears, confirm advice, gain reassurance
• Not just concerned with ‘what’ to do/eat but ‘why’
• Lay strategies used to appraise reliability and credibility of web-based information
• Desired user experience features: ‘push’ strategies and personalisation