

Original Article

Evaluating the Role of Digital Platforms in Disseminating Pregnancy-Related Health Information: A Systematic Review

Stavroula Toutziaraki, MW, MSc

University of West Attica, Athens, Greece

Antigoni Sarantaki, PhD

Associate Professor, University of West Attica, Athens, Greece

Kleanthi Gourounti, PhD

Associate Professor, University of West Attica, Athens, Greece

Maria Dagla, PhD

Associate Professor, University of West Attica, Athens, Greece

Maria Iliadou, PhD

Assistant Professor, University of West Attica, Athens, Greece

Angeliki Bolou, MW

Senior Lecturer in Midwifery, University of Greenwich

Petros Galanis, PhD

Assistant Professor, Clinical Epidemiology Laboratory, Faculty of Nursing, National and Kapodistrian University of Athens, Athens, Greece

Correspondence: Petros Galanis, Assistant Professor, Clinical Epidemiology Laboratory, Faculty of Nursing, National and Kapodistrian University of Athens, 123 Papadiamantopoulou street, GR-11527, Athens, Greece, e-mail: pegalan@nurs.uoa.gr, <https://orcid.org/0000-0002-1308-5782>

Abstract

Background: The Internet is a widely utilized platform for accessing health-related information and pregnant women are no different in this regard. The aim of the present study was to review and describe the use of the internet as a source of information during pregnancy. **Methods:** This systematic review was conducted by searching electronic databases such as PubMed until May 2023. The author also conducted general Internet searches using combinations of the search terms in the Google search engine. The search terms were as follows: pregnancy, “pregnancy period”, “pregnant women”, internet, network, information, “information sources”, “information resources”, “information tools”, and “information providers”. The search was limited to English language papers without limitations regarding publishing dates. Quantitative studies were sought, that reported original research and described Internet use by pregnant women and women within one year postpartum. **Results:** Fifteen articles met the inclusion criteria and were included in the review. This systematic review found that women used the Internet as a source of information during pregnancy. The most often mentioned topics of interest were fetal development, stages of delivery and nutrition. Women generally find health information on the internet as reliable and useful. Some papers included in this review found that higher education is associated with increased Internet use and the pregnant women with a university degree used the Internet more than women with less than a high school education, and that nulliparous women were more likely to seek information than multiparous women. **Conclusions:** Most of the pregnant women did not discuss the information they have retrieved from the Internet with their health providers. Consequently, healthcare providers should be prepared to support women in effectively navigating online resources, as well as interpreting and integrating the retrieved knowledge.

Key-words: pregnancy, internet, information, information sources

Introduction

The physical and emotional needs of pregnancy and childbirth are part of a major transition to motherhood (Epifanio, et al., 2015). During this period, a woman's body changes and she begins to have many questions about pregnancy, the baby, and the new lifestyle that awaits the family. Most women want reassurance that their pregnancy is normal and, therefore, they search for information online to feel safe (Bjelke, et al., 2016). Traditionally, healthcare professionals were the main providers of information, but studies show that this may be changing as women turn to the internet more for health information (Grandall, et al., 2001). This suggests that women are increasingly looking to the internet for health information, rather than relying solely on healthcare professionals. This is likely due to a number of factors, including the increasing availability of online information, the convenience of being able to access information from anywhere, and the desire to be more involved in their own health care (van Deursen, 2011; Bert, et al., 2013; Lagan, et al., 2010).

A nationwide survey in Italy revealed that almost nine (9) out of ten (10) of pregnant women turned to the Internet for information about pregnancy, fetal development and birth (Scaioli, et al., 2015). Widespread Internet searching is also reported in other countries and a study in Sweden found that the majority of pregnant women had used the internet as a source of information about their pregnancy, and the most frequently researched topics were fetal development and the stages of childbirth. Over seven in ten (79%) of the participants had searched for information about their pregnancy online in the previous month. The frequency of their Internet searches ranged from once a month to 62 times a month, indicating a widespread reliance on online resources for pregnancy information (Larsson, 2009). Despite the easy access that the Internet provides to information, during pregnancy, the important factors of judge and trust in this information and its sources, respectively, should be investigated (Larsson, 2009). Although, in several studies, women report the Internet as a reliable source of information, much of what is on the Internet is outdated or even

erroneous (Ream, et al., 2009). In two studies which conducted in Sweden, the first in 2010 and the second in 2016, it was found that the majority of women who participated in the studies felt disappointed by the information they read on the internet and a percentage considered it wrong (Lagan, et al., 2010; Bjelke, et al., 2016). In the study by Bjelke et al., eleven percent (11%) of the women who participated in the study experienced such intense feelings of anxiety that they had to contact their local healthcare services. Studies have shown that women do not share the information they received from the internet with any healthcare professional and care givers are usually not aware of the wrong information and the overwhelming feelings that mothers can have (Bert, et al., 2013; Ahmadian, et al., 2020; Kavlak, et al., 2012; Larsson, 2009; Gao, et al., 2012).

Considering the significance of the issues raised and their implication, this review was undertaken to assess the extent to which pregnant women use the internet as a source of health information.

Methods

The present study aimed to review and describe the use of the Internet as a source of information during pregnancy. For the purposes of the present review, a search of the literature on Internet usage among pregnant women and women up to one year postpartum seeking pregnancy-related information was conducted through PubMed, in May 2023. The author also conducted general Internet searches using combinations of the search terms in the Google search engine. The search terms were as follows: pregnancy, "pregnancy period", "pregnant women", internet, network, information, "information sources", "information resources", "information tools", and "information providers". The search was limited to English language papers without limitations regarding publishing dates. This review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews Meta-Analysis (PRISMA) statement (Page, et al., 2021) as shown in Figure 1.

We applied our inclusion and exclusion criteria according to the guidelines (Galanis 2009). The inclusion and exclusion criteria for the articles were the following:

- Papers reporting original research.
- The study population includes pregnant women or women up to one year after childbirth.
- The outcome should be information through the internet.
- Papers should be published in peer-review journals.
- Papers should be presented their results in quantitative results, such as proportions percentages or frequencies
- Papers were reported in English.

Studies were excluded if they contained recommendations or reports without a qualitative or quantitative method applied, were reviews, editorials and studies that dealt with content other than health information. This review focused on quantitative data

about Internet use by pregnant women, so qualitative papers that focused on subjective experiences or opinions were excluded.

Data from included studies was extracted into Microsoft Excel sheets including the following features: i) author(s) and date of publication, ii) aim, iii) country, iv) time of data collection, v) participants, vi) method, vii) results/findings.

Results

PubMed searching yielded 77.313 unique records (no duplicates were detected), and 77.292 articles were excluded based on title and abstract screening. Full-text versions of the remaining 21 studies were screened for eligibility. Fifteen (15) articles left which met the inclusion criteria and they are presented in Table 1.

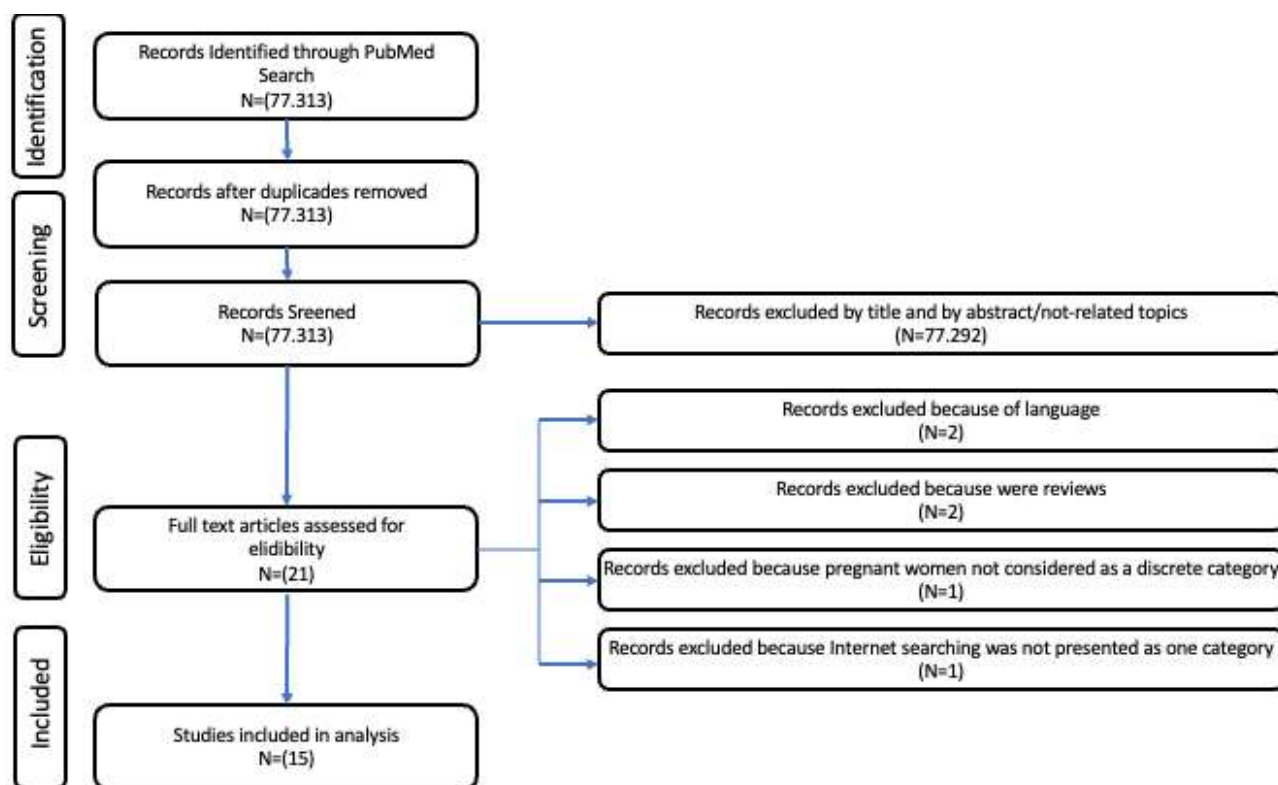


Figure 1. Flowchart of the systematic review.

Table 1. Main characteristics of the studies included in this systematic review.

Reference	Country	Data collection	Participants (n)	Aim(s)	Methods	Results
Ahmadian et. al. (2020)	Iran	2014	385 pregnant women, under 30 years old.	To investigate the use of the Internet by pregnant women to retrieved information about pregnancy and childbirth.	Questionnaire at waiting-room at the offices of obstetricians/gynecologists.	In this study, the sources of information during pregnancy were the physicians (60%), the Internet (51%) and the printed sources (41%). 54% of the pregnant women do not share the information they received from the Internet with health care professionals.
Gao et. al. (2012)	China	2011	335 Chinese pregnant women, at least 32 weeks. Mean age = 28.8 years. The participation rate was 85%.	To investigate whether, how and how often Chinese pregnant women used the Internet to retrieved pregnancy-related information.	Questionnaire at antenatal clinic at Guangzhou hospital, China.	Most of the women (88.7%) received information from the Internet. The two most common topics of interest were fetal development, nutrition and compilations of pregnancy. The criteria related to the reliability of the information were (a) consistency with other sources of information and (b) the existence of information sources. The majority of the women (75.1%) did not discuss the information they received from the internet with health care professionals.
Dorst et al. (2019)	USA	2018	100 participants: 71 pregnant women and 29 caregivers. Average gestational age = 30.8 weeks.	To determine the kind of support systems of pregnant women and their caregivers and the role of health information technologies in these support systems.	Questionnaire and a picture of the support system they received at group prenatal care clinics.	The pregnant women mentioned that the more often technology preferences were informational websites, apps and social media as parts of their support system.
Grimes et al. (2014)	Australia	2010-2011	350 who gave birth. 62% was primiparous. Mean age = 32.4 years. The participation rate was 47%.	To investigate the sources of information used during pregnancy.	Questionnaire at the Royal Women's Hospital, Melbourne, Australia	Almost half of the women (44%) used the Internet as a source of information while the majority of the women (70%) was having discussion with a midwife. Women who received antenatal care from the midwives mentioned that the best source of information was having discussions with the midwives.
Kavlak et al. (2012)	Turkey	2009	185 pregnant women in at least the 28 weeks of pregnancy.	To determine the extent of Internet usage among pregnant women for gathering information about their pregnancy.	Questionnaire at two hospitals in Izmir, Turkey (Gynecology and Maternity Hospital and Ege University Faculty of Medicine Hospital)	About 45,4% of the pregnant women had used the Internet to obtain information and 44,1% of them used it once or twice a week. The topics that were researched the most during pregnancy were fetal development, nutrition, and the stages of childbirth. A difference was observed between the use of the Internet and the age group, educational level, employment status and number of pregnancies ($p<0.05$).
Sercekus et al. (2021)	Turkey	2018-2019	162 pregnant women. Mean age = 28,2 year. Average gestational age was 32,2 weeks.	To evaluate the prevalence of pregnant women seeking childbirth information from the internet.	Questionnaire at the antenatal outpatient clinic of a University Hospital, Turkey	Most women (92.4%) used the Internet as a source of information. The most used online sources were blogs and websites (85,8%), mobile applications (75,6%) and social media (58,1%). Many women considered the information they received from the Internet to be partially beneficial and reliable.
Sharifi et al. (2021)	Iran	2018	280 pregnant women. Average gestational age was 28 weeks.	To determine the information needs and their associated factors during pregnancy among Afghan pregnant women.	Questionnaire at the prenatal clinics of selected health care centers, Tehran	The sources of information among pregnant women were healthcare professionals (65,1%), family and friends (47,5%), the Internet (32,1%) and the media (18,9%). A difference was observed between the source of information and the level of education ($p<0.01$), the number of children ($p<0.01$) the duration

						stay in Iran ($p<0.01$), the place of birth ($p<0.01$) and the insurance status ($p<0.008$).
Scaiola-Bert- Galis et al. (2015)	Italy	2011-2012	1347 pregnant women. The participation rate was 80%.	To evaluate the sociodemographic and geographic variations in the web-based pregnancy information by Italian pregnant women.	Questionnaires through medical doctors at outpatient waiting rooms at seven Italian cities, Italy	86% of pregnant women received information from the Internet. The topics that were searched more often were fetal development (51,3%), general and specific advice during pregnancy (37,2%) and breastfeeding (36,8%).
Bert et al. (2013)	Italy	2011-2012	790 primiparous and 516 multiparous women. The participation rate was 83%.	To estimate the proportion of pregnant women who seek pregnancy-related information online in a large Italian sample.	Questionnaire through medical doctors at outpatient waiting rooms at seven Italian cities, Italy	Most of the women (97.6%) used the Internet to obtain information related to pregnancy. The reasons for using the Internet were the quick results and the need of further knowledge on pregnancy-related topic.
Lagan et al. (2010)	Web study based in UK	2006	613 women who were pregnant or had a baby in the last year. Women were from 24 countries. Mean age = 29.3 years.	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.	Web-based questionnaire which uploaded onto the University of Ulster server and 23 website moderators agreed for the study to be promoted on their specific site.	97% of women used search engines such as Google to identify online web pages to access a large variety of pregnancy-related information. 93.8% used the Internet to obtain additional information from those which had received from healthcare professionals and 83% used the Internet to make decisions about their pregnancy. Women's levels of confidence in their ability to make decisions about their pregnancy increased significantly after using the internet
Bjelke et al. (2016)	Sweden	2015	193 Swedish women. Mean age = 30 years. Average gestational age was 36.6 weeks. Response rate was 94%.	To identify how women use the Internet as a source of information during their pregnancy and how it affects them.	Questionnaire at antenatal clinics in the southern Sweden.	95% of women in this study used the Internet as a source of information. The main reason for using the Internet is to find other people in the same situation. More than a half (65,6%) mentioned feelings of anxiety after reading information on the Internet about pregnancy.
Larsson et al. (2009)	Sweden	2004	182 pregnant women. Mean age = 31 years Average gestational age was 32 weeks. The participation rate was 85%.	To explore whether pregnant women sought pregnancy-related information online, their perception of the reliability of the information and their communication of this knowledge with their midwives during prenatal care appointments.	Questionnaire at waiting-room from 11 antenatal clinics in mid-Sweden during two weeks in 2004	95% of women had access to the Internet and 84% used it to obtain pregnancy-related information. Fetal development and the stages of childbirth were the two most frequently searched topics on the Internet. Most participants considered the information to be reliable. Most of the women did not discuss the information they had retrieved from the Internet with their midwife.
O'Higgins et al. (2014)	Ireland	2012-2013	522 pregnant women. Average gestational age: 31.5 weeks. Response rate was 94.9%.	To examine the use of digital media by women to access pregnancy information.	Questionnaire at a large maternity hospital	95% of women reported using the Internet to obtain information related to pregnancy or infant care. More than a half used an application about pregnancy. The Internet usage included forums, social media, videos, e-books, etc.
Lima-Pereira et al. (2012)	Spain	2009	114 women and 21 men. Average gestational age was 32 weeks.	To describe the pattern of use of the Internet as a source of health information by participants of antenatal classes.	Questionnaire at antenatal classes at health centers run by the Andalusian Health Service in Granada, Spain	95.3% of the women used the Internet on a regular basis. 26.9% of them had used the Internet during the past 24 hours. Internet was the most popular source of information about pregnancy issues among women (18.5%) after the physician.
Huberty et al. (2013)	USA	2011	293 pregnant women, or up to 1 year postpartum. Mean age = 28.5 years.	To examine how pregnant women use the Internet for health information during pregnancy including information related to physical activity and nutrition.	Online survey and paper questionnaires at a web study based in USA	94% of the women use the Internet to obtain information about pregnancy. Women reported using the Internet from six to ten times for general health information about pregnancy. Half of the women used the Internet for information related to physical activity during pregnancy and some increased their physical activity as a result of this.

Overview of included studies

All fifteen studies aimed to investigate how often pregnant women searched on the Internet, what information women searched for, and how they evaluated the credibility of the information they found online. Thirteen out of fifteen studies (Ahmadian, et al., 2020; Sercekus, et al., 2021; Scaioli, et al., 2015; Bert, et al., 2013; Bjelke, et al., 2016; Lima-Pereira, et al., 2012; Gao, et al., 2012; Dorst, et al., 2019; Grimes, et al., 2014; Kavlak, et al., 2012; Sharifi, et al., 2020; Larsson, 2009; O'Higgins, et al., 2014) used paper questionnaires and two studies (Lagan, et al., 2010; Huberty, et al., 2013) used online surveys. The characteristics of each study are presented in Table 1.

Seven studies were conducted in Europe: two in Italy (Scaioli, et al., 2015; Bert, et al., 2013) two in Sweden (Larsson, 2009; Bjelke, et al., 2016) one in Ireland (O'Higgins, et al., 2014), one in Spain (Lima-Pereira, et al., 2012) and one in the UK (Lagan, et al., 2010). Two studies conducted in the United States (Dorst, et al., 2019; Huberty, et al., 2013) two studies in Iran (Ahmadian, et al., 2020; Sharifi, et al., 2020), two studies in Turkey (Sercekus, et al., 2021; Kavlak, et al., 2012) and one study each in Australia (Grimes, et al., 2014) and China (Gao, et al., 2012). No studies were found in Greece that explored the determinants of internet use as a source of information during pregnancy. Thirteen studies recruited participants from waiting rooms of outpatient antenatal clinics at multiple hospitals (Bjelke, et al., 2016; Dorst, et al., 2019; Gao, et al., 2012; Grimes, et al., 2014; Kavlak, et al., 2012; Larsson, 2009; Lima-Pereira, et al., 2012; O'Higgins, et al., 2014; Sharifi, et al., 2020).

Participants in each study were pregnant while the study conducted or up to one year postpartum. Most of the participants were pregnant women who actively sought pregnancy-related information online.

Ten studies (Ahmadian, et al., 2020; Gao, et al., 2012; Dorst, et al., 2019; Grimes, et al., 2014; Sharifi, et al., 2020; Scaioli, et al., 2015; Bert, et al., 2013; Bjelke, et al., 2016; O'Higgins, et al., 2014; Lima-Pereira, et al., 2012) investigated the use of the internet as a source of information during pregnancy as the outcome, while five studies (Kavlak, et al.,

2012; Sercekus, et al., 2021; Lagan, et al., 2010; Larsson, 2009; Huberty, et al., 2013) investigated the use of the internet as a source of information during pregnancy and conducted an evaluation of the information as the outcome.

Results of the data fell under four (4) main themes, including (1) socio-demographic and midwifery characteristics of women who searched the internet, (2) the rate of internet use by pregnant women, (3) type of information sought, and (4) women's evaluation of the validity and usefulness of retrieved health information. These five themes are presented below.

Socio-demographic and midwifery characteristics of women who searched the Internet

In all fifteen papers reviewed that most of the women relied on the Internet as a primary source of information about their pregnancy. Eight papers found associations between demographic characteristics and the use of the Internet during pregnancy. Especially, it was found that higher education is associated with increased Internet use (Ahmadian, et al., 2020; Grimes, et al., 2014; Kavlak, et al., 2012; Lagan, et al., 2010; Sharifi, et al., 2020; Scaioli, et al., 2015) and the pregnant women with a university degree used the Internet more than women with less than a high school education (Grimes, et al., 2014). Moreover, age was found to affect the use of the Internet to retrieve information about pregnancy. Specifically, increasing age appeared to be associated with greater internet use (Scaioli, et al., 2015). Women aged 25-34 years reported using the internet more frequently than women aged 18-24 and ≥ 35 years old (Kavlak, et al., 2012; Ahmadian, et al., 2020). Moreover, a significant association was found between the number of pregnancies and the use of the Internet as a source of information. The number of women who used the internet in their first pregnancy was higher than the women who had one or more pregnancies (Ahmadian, et al., 2020; Kavlak, et al., 2012; Sharifi, et al., 2020). Moreover, conflicting results were found regarding employment status as in two studies (Ahmadian, et al., 2020; Dorst, et al., 2019) the number of unemployed women who use the internet is higher than employed women, while in

another study, it was found that women who were employed reported using the internet more frequently than women who do not work (Kavlak, et al., 2012).

Internet use by pregnant women

The rate of internet usage by pregnant women varied widely. A review of the studies found that women's use of the internet ranged from 32.1% to 97.6% (Sharifi, et al., 2020; Bert, et al., 2013). The most recent paper (Sercekus, et al., 2021) reports that 92.4% of pregnant women had used the internet to retrieve health-related information during pregnancy. Moreover, two other papers, one in Sweden (Bjelke, et al., 2016) and the other in the UK (Lagan, et al., 2010) found that 95% of pregnant women searched the internet to obtain information about their pregnancy and women's levels of confidence in their ability to make decisions about their pregnancy increased.

Type of information

Pregnancy-related topics that sparked the most interest included fetal development, nutrition during pregnancy, use of medication, pregnancy complications, and antenatal care (Gao, et al., 2012; Larsson, 2009; Bert, et al., 2013; Kavlak, et al., 2012; Huberty, et al., 2013; Lima-Pereira, et al., 2012; Bjelke, et al., 2016; Sharifi, et al., 2020; Ahmadian, et al., 2020). Ahmadian et al. study found that the majority of pregnant women (81%) reported nutrition in pregnancy as the most searched topic, followed by fetal development (67%) and compilations of pregnancy (49%) respectively (Ahmadian, et al., 2020). Kavlak et al. study found that most of pregnant women (92.8%) reported the stages of birth to be the most searched topic, followed by fetal development (81%) and nutrition in pregnancy (58.3%) respectively (Kavlak, et al., 2012). Sharifi et al. study found that women sought information on fetal care (83.3%), management of complications (83%), use of medication (82%), nutrition (80%) and physical activity (77%) (Sharifi, et al., 2020). Larsson, Gao and Bert et al. all found that pregnant women expressed interest in fetal development (Larsson, 2009; Gao, et al., 2012; Bert, et al., 2013). Gao et al. also found that women were intensely interested in nutrition during pregnancy (Gao, et al., 2012). Huberty et al. study, additionally, found that

pregnant women searched the internet for information related to physical activity and nutrition during pregnancy (Huberty, et al., 2013).

Women's evaluation of the reliability and usefulness of retrieved health information

Seven studies reported that women generally find health information on the Internet reliable and useful (Sercekus, et al., 2021; Bjelke, et al., 2016; Bert, et al., 2013; Huberty, et al., 2013; Gao, et al., 2012; Lagan et al., 2010; Larsson, 2009). The most recent study (Sercekus, et al., 2021), reported that 69.5% of the women who searched information from the internet found the information partially useful and 75% thought that this information is partially reliable. Bjelke et al. (Bjelke, et al., 2016) study reported that reading pregnancy-related information on the internet was seen as positive. The main reasons for searching on the internet were to find information and to read about people in the same situation. Although 65.6% of the women reported that they felt worried after reading pregnancy-related information on the internet. Forum webpages were identified as the ones that included the most anxiety. Bert et al. (Bert, et al., 2013) study reported that the main reason for seeking information on the Internet was to gain further information on pregnancy-related topics. This was more important than the other key advantages of the web, such as anonymity, simplicity, and rapidity. Huberty et al. (Huberty, et al., 2013) reported that half of the women who used the Internet searched for information related to physical activity during their pregnancy and some increased their physical activity as a result.

Women also reported that they had an increase in their confidence in making decisions related to physical activity during pregnancy, after using the Internet. Lagan et al. (Lagan, et al., 2010) study reported that almost all women (96.2%) found the information on the internet to be "useful" Larson, (2009) reported that a significant proportion of participants considered the information they found online to be reliable. The two key factors for judging the trustworthiness of web-based information were consistency with information from other sources and if the information was supported by references.

Discussion

The internet has become an important source of information and advice for a majority of people, including women during pregnancy and postpartum. With the proven increase in internet access and the extended use of electronic devices, women now can search for information about pregnancy, childbirth, and postpartum care, as well as for infant care, on the Internet. However, the reliability of the information provided on the Internet is not always guaranteed.

The present review examines the extent to which pregnant women (Ahmadian, et al., 2020) utilize the internet and investigates how often pregnant women searched the internet, the type of information they sought, and women's evaluation of the validity and usefulness of retrieved health information. The results of this review demonstrate that the vast majority of pregnant women had internet access and used it to retrieve information regarding the stages of pregnancy, childbirth, and the expected child. The majority of the women were satisfied with the information they received from the internet and it was reported that information about pregnancy and childbirth is considered reliable and useful. Most of the women did not discuss the information they retrieved from the Internet with their midwives or physicians (Ahmadian, et al., 2020; Kavlak, et al., 2012; Larsson, 2009; Gao, et al., 2012). Two of these studies (Gao, et al., 2021; Larsson, 2009) reported that the percentage of women who did not share the information they received from the Internet was about 70%.

Also, reviewing the studies was found that the main reasons for searching on the Internet during pregnancy were that women wanted to meet their information needs (Gao, et al., 2012; Huberty, et al., 2013) to add to the information provided by their healthcare professional and to have more control over the decisions that affect their pregnancy. Also, the women mentioned that they turned to the internet to find information because their healthcare providers did not have enough time to provide them with the information they needed (Lagan, et al., 2010) and statistically, women's levels of confidence in making decisions about their pregnancy increased significantly after using the internet ($p < 0.05$).

Women in several studies have expressed the need for healthcare providers to recommend appropriate websites on the internet for information (Lagan, et al., 2010; McMullan, 2006). Given that women visit their physician or midwife on a regular basis and that they would like healthcare professionals to recommend appropriate websites, referrals from doctors or midwives could represent a simpler approach to help women obtain information on the internet from reliable sources. For example, studies in pediatric and adult populations aimed at increasing knowledge and changing health behavior have used lists in which healthcare providers provide patients with reliable websites to encourage them to seek additional information. Such strategies have shown to be well-accepted by patients and their families, improve communication between healthcare providers and patients in future visits, and ultimately improve overall patient knowledge (Neelapala, et al., 2008; D'Alessandro, et al., 2004).

Marzieh Javanmardi and co-workers in their systematic review that was titled "Internet usage among pregnant women for seeking health information: A review article" in 2018 reviewed published articles over 16 years (from 2000 to 2016) and reported the results of 16 articles, from them 13 were qualitative and 3 were quantitative and being published in English and Farsi languages. The researchers reported that most of pregnant women often turn to the Internet for health information, which can ease their anxieties about the unknown and empower them to make informed decisions about their pregnancy. However, several of the women neglect to discuss this online information with their healthcare providers, potentially missing out on valuable guidance and personalized advice (Javanmardi, et al., 2018). During prenatal visits, the gynecologist, midwife and nurses should not only provide information about pregnancy but should also provide guidance on how to use the internet to access reliable sources of information and should create a friendly environment for discussing the possible misinformation that pregnant women have already received.

Similar to earlier study (Kavlak, et al., 2012) observed that a pregnant woman's age group, education level, work status, and the number

of pregnancies affect Internet use and access. This review found that women between ages 25 – 34 were more likely to search information than others ages group ($p < 0.01$); women with high education level were more likely to seek health-related information than women with less than a high school education ($p \leq 0.001$); employed women were more likely to seek pieces of advice on the internet than unemployed women status ($p \leq 0.001$); first time pregnant women were more likely to obtain information from the internet than multiparous women ($p < 0.01$). A recent study conducted by Sharifi and co-workers (Sharifi, et al., 2021) found that there was a significant relationship between women who used the Internet as a source of information and those who did not in terms of the number of pregnancies, their education level, birthplace, the period residing in Iran, type of previous birth and insurance status.

This systematic review found that eight studies found associations between demographic characteristics and internet use during pregnancy. Specifically, it was found that a higher educational level is associated with increased internet usage (Ahmadian, et al., 2020; Grimes, et al., 2014; Kavlak, et al., 2012; Lagan, et al., 2010; Sharifi, et al., 2020; Scaioli, et al., 2015) and that pregnant women who had a university degree, used the internet more compared to women who did not have a university degree (Grimes, et al., 2014). Additionally, pregnant women from non-English-speaking backgrounds were less likely to use online sources for pregnancy information, while midwives were their main source of information (Grimes, et al., 2014; Sharifi, et al., 2020). Furthermore, educational level may influence the type of information sought on the internet, with women with low educational levels being less interested in seeking information related to pregnancy physiology compared to those with high educational levels (Sharifi, et al., 2020).

Age was found to influence internet usage for obtaining pregnancy-related information. Specifically, increasing age was associated with higher internet usage (Scaioli, et al., 2015). More specifically, older pregnant women used the internet more frequently compared to younger ones and found the information they received online more useful regarding pregnancy (Grimes, et al., 2014).

Additionally, two studies found that specific age groups, 25-34 years old and 20-29 years old, made higher use of the internet (Kavlak, et al., 2012; Ahmadian, et al., 2020). Therefore, women with higher education are more likely to use the internet as a source of information during pregnancy to quickly obtain information or to delve deeper into a topic of interest, compared to women with lower levels of education. Additionally, age was found to be related to internet usage, although not significantly different in all studies of the literature review.

In terms of the number of pregnancies and Internet usage as a source of information found that the number of women who used the Internet in their first pregnancy was higher compared to women who had two or more than two pregnancies (Ahmadian, et al., 2020; Kavlak, et al., 2012; Sharifi, et al., 2020). Additionally, there was no correlation found between the week of pregnancy and internet usage among pregnant women (Ahmadian, et al., 2020). Furthermore, it was found that the number of pregnancies also influences information sources beyond the Internet (Sharifi, et al., 2020). In two additional studies, it was found that women tended to search for information on the internet once a month or more, mainly at the beginning of their pregnancy (Gao, et al., 2012; Larsson, 2009). This specific finding is not surprising, as pregnant women have stronger demands for information during the early stages of their pregnancy when they have entered into a new situation in their lives (Larsson, 2009).

Regarding professional characteristics, three studies found associations with internet usage as a source of information during pregnancy. More specifically, conflicting results were found regarding employment status in two studies (Ahmadian, et al., 2020; Dorst, et al., 2019) the number of unemployed women using the Internet was higher compared to those who are employed, while in another study (Kavlak, et al., 2012) the number of employed women was found to make greater use of the internet compared to women who are not employed. This could possibly be attributed to the cost of internet access for unemployed women. Another study (Diaz, et al., 2002) suggested that internet usage is associated with being under 60 years old, being a college graduate, and having an

annual income above \$50,000. However, the Internet is no longer available only to high-income individuals but has become a technology accessible to low or middle-income groups, alongside the widespread dissemination of rapidly developing cheaper technologies (Kavlak, et al., 2012)

Conclusions: This systematic review highlighted the significant role of the Internet as a vital source of information for pregnant women, underscoring its utility in meeting their informational needs during pregnancy, childbirth, and postpartum care. The findings demonstrate that a majority of pregnant women leverage internet access to acquire knowledge on various stages of pregnancy and infant care, with a notable portion expressing satisfaction with the quality and reliability of the information obtained. This satisfaction aligns with the perceived utility and reliability of online resources regarding pregnancy and childbirth. However, the review also identifies a concerning gap in communication between pregnant women and healthcare professionals, as a substantial number of women do not discuss the online information they find with their healthcare providers. This gap underscores the potential for misinformation and the missed opportunity for healthcare professionals to guide or correct misconceptions derived from internet sources.

Addressing the identified gap necessitates a proactive approach by healthcare providers to integrate discussions about Internet use and reliable online resources into prenatal care. The review suggests that healthcare providers recommending trusted websites could bridge the information gap, ensuring pregnant women access accurate and useful information. Furthermore, the review reveals demographic factors influencing internet use for pregnancy-related information, highlighting the need for targeted strategies to ensure equitable access to reliable information across different age groups, educational levels, and employment statuses.

Encouragingly, the review points to internet usage as a means to empower women, enhancing their confidence in making informed decisions regarding their pregnancy. Therefore, integrating internet-based resources into prenatal care, coupled with

healthcare providers' guidance, could significantly enhance patient knowledge, improve healthcare outcomes, and foster a more collaborative and informed pregnancy care experience.

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