


## Internet as a source of information and health literacy in pregnancy: a scoping review

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### Introduction

The social reconfigurations of the last few decades have changed the role of women in society, moving them away from the extended family and reducing their time to build supportive relationships, essential factors of informal support during the transition to parenthood. This new reality led to the emergence of alternative informal sources of health information, namely the internet, currently constituting one of the main sources of health information for pregnant women. However, it is not enough to have access to online information to know how to apply in health decisions, it is also necessary to evaluate, understand and interpret it, that is, it is necessary to have health literacy.

### Objective

Map the existing literature on the relationship between the internet as a source of information and the level of health literacy of pregnant women.

### Methods

Population: pregnant women; concept: health literacy; context: internet. Primary and secondary sources of qualitative and quantitative research were considered, as well as unpublished literature, as master's dissertations.

Research in three stages according to the JBI methodology, using the databases Medline, CINHALL, Web of Science, Google Scholar and Open Access Scientific Repository of Portugal. Considered articles published since 2015, in Portuguese, English, Spanish and French. Data extraction and analysis performed in a table elaborated according to the JBI methodology, 2020.

### Results

13 articles were included. Pregnant women with a higher level of health literacy conduct more online health research, resorting more to formal sources and discussing the information accessed with health professionals. Pregnant women with a lower level of health literacy have more difficulties in understanding, evaluating and applying the information accessed online, resorting more to sources such as blogs and social networks.

### Conclusion

The level of health literacy of pregnant women has a decisive influence on the use of the internet as a source of health information, being positively related to greater frequency of use, recurrence to formal sources and discussion of the information accessed with health professionals. In contrast, a lower level of health literacy is associated with greater difficulty in evaluating and understanding the information accessed, requiring support from health professionals. The level of health literacy of pregnant women should be considered for a personalized recommendation of valid and reliable online information.

### Keywords

Pregnant Women; Internet; Health Literacy.

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## Introduction

The transition to parenthood is a developmental transition caused by a major life event <sup>1</sup> that begins before or during pregnancy, leading the woman to start preparing herself essentially through the search for information and self-care. <sup>2</sup> There are several factors that contribute and influence the development of skills for the role of mother, namely social support, which is an essential source of information, understanding and emotional support. <sup>3</sup> However, society has undergone reconfigurations over the last few decades, with family networks being more distanced and women playing increasingly significant roles in the labor market, limiting the time available for the development of meaningful relationships. <sup>3</sup> This reality has led to around  $\frac{3}{4}$  of pregnant women globally resorting to alternative sources of information and support, as the internet. <sup>4</sup> The internet, defined by The Oxford English Dictionary <sup>5</sup> as a global and interconnected computer network that provides a variety of information and means of communication, is a privileged mean of obtaining health information, especially for people of reproductive age <sup>6</sup>, becoming preferred over sources of information based in interpersonal relationships, <sup>7</sup> such as the relationship between health professionals and clients. During the transition to parenthood, the main resources of pregnant women are health professionals, family, friends and, increasingly, the internet, <sup>8</sup> an information resource that is growing exponentially, offering information in a fast, accessible, personalized and anonymous way. <sup>3</sup> However, the accessibility and availability of online information raises questions related to its reliability and credibility, and even with the suitability of the information for the person searching for it. <sup>7</sup> Despite the existence of abundant health information online, the one which is based on scientific evidence, it is not easily accessible to the general public. <sup>9</sup> However, to make informed health decisions on a daily basis, it is not enough to have the ability to access information, it is also necessary to have Health Literacy, that is, the knowledge, motivation and skills to access, understand, evaluate and apply health information in different everyday situations. <sup>10</sup> Health literacy is a tool to empower people, which must be built and improved throughout the life cycle, <sup>11</sup> helping them to manage their health, enabling them to use information correctly and thus obtain gains on a personal and social level, being a means for social and human development. <sup>9</sup> It involves psychological factors, such as personal motivation and the perception of self-efficacy, social and environmental factors, which influence decision-making and health behaviors, promoting greater ability to deal with illness, more effective use of health services and better understanding and control of life situations. <sup>12</sup> The higher the level of health literacy, the greater the prevalence of information-seeking behaviors in all available means, namely the internet. <sup>6</sup> On the other hand, a low level of health literacy is associated with less competence in assessing the quality of health information that is accessed, and it is in people with a lower level of health literacy that

there is a lower incidence of preventive behaviors and a high rate of use of health services. <sup>9</sup>

Regarding the search for online information, people with a lower level of health literacy tend to be distracted by extra elements of a website (such as links), to choose the first answer to their question, not confirming its veracity. They also have difficulty in identifying the differences between high and low quality information and tend to give up the search if do not quickly find the answer to what they are looking for, disregarding information with complex and technical words that are not part of their lexicon. <sup>13</sup>

Therefore, the role played by health professionals is crucial, as seeing their traditional relationship being remodeled by new technologies, <sup>14</sup> they should promote the health literacy of those they care for, understanding which new sources of health information are used, mediating its use and taking advantage of the potential of new communication and information technologies, such as the internet, to expand people's access to reliable health information. <sup>10</sup>

Midwives have as one of their specific competences the care of women inserted in the family and community during the prenatal period, <sup>15</sup> promoting their health and well-being and individualizing care according to their specificities, as their level of health literacy. <sup>16</sup> Considering the internet as a privileged source of information for pregnant women, midwives should be familiar with the most used online resources related to pregnancy, as well as direct women to reliable sites, <sup>16</sup> enabling them to conscious and informed decision-making throughout pregnancy.

Considering the growing use of the internet as a source of health information by pregnant women, as well as the existing asymmetries in the search for online information between people with a higher and lower level of health literacy, the objective of this Scoping review is to identify in the existing literature the relationship between the level of health literacy of pregnant women and the use of the internet as a source of health information. To this end, the following initial question was defined: What is the relationship between the level of health literacy of pregnant women and the use of the internet as a source of health information?

## Methods

A review protocol was created, registered on the platform OSF Registries (<https://osf.io/k8hea>).

The following keywords were defined: pregnant women; internet; health literacy.

A preliminary search was carried out in May 9, 2022 in the systematic reviews database of the Joanna Briggs Institute (JBI) and the Cochrane Database of Systematic Reviews, and to date, no scoping reviews have been found on this topic.

## Inclusion criteria

The inclusion criteria were defined according to the methodology of the JBI. <sup>17</sup> The types of participants were

pregnant women, the concept of interest, health literacy and context, the internet as a source of information.

As sources of information, research studies of primary and secondary sources of qualitative and quantitative research

were used, as well as unpublished literature, as master's dissertations. The inclusion and exclusion criteria are systematized in chart 1.

**Chart 1 - Inclusion and exclusion criteria**

	Inclusion criteria	Exclusion criteria
Design of the study	Research studies of primary and secondary sources of qualitative, quantitative and mixed-methods research were used, as well as unpublished literature, as master's dissertations Articles published in English, Portuguese, French and Spanish Articles published since 2015	Articles published in different languages. Articles published before 2015
Population	Articles with pregnant women as population	Articles with postpartum woman or mothers of small children as population Articles with health professionals who care for pregnant women who use the internet as a source of information
Concept	Articles with the concept of health literacy	Articles about only one of the topics in study and not both simultaneously
Context	Articles about the search of health information online	

### Search Strategy

The research process aimed to identify published and unpublished primary and secondary research and it took place between 9 and 14 June 2022. For unpublished research, Google Scholar and the Open Access Scientific Repository of Portugal were used, where the terms pregnancy, internet and health literacy were searched, aggregated with the boolean operator AND.

The research strategy was carried out in three stages, as recommended in the JBI<sup>17</sup> methodology.

In the first stage, an initial search was carried out in the two most relevant databases for the subject under study, MEDLINE and CINAHL, through the EBSCOhost platform. In this research, the terms pregnancy, internet

and health literacy were used, some articles were identified, and the words included in the titles and abstracts, as well as the indexing terms, were subsequently analysed. In the second stage, an organized search was carried out in three separate databases, MEDLINE, CINHALL and Web of Science, using the set of keywords in natural language and identified indexed terms. Each concept was researched as the main one, as it was only intended to identify articles in which they appeared as the main concept under study.

For each database, the terms indexed for the selected keywords were identified and, when the existence of terms with truncation was verified, they were aggregated according to its relevance. The identified natural and indexed terms are shown in chart 2.

**Chart 2 - Systematization of keywords in Medline and CINHAL databases**

	Natural term	Indexed term Medline	Truncation terms	Indexed term CINHAL	Truncation terms
Population	Pregnant	Pregnant women		Expectant mother	
Concept	Health Literacy	Health Literacy		Health Literacy	
Context	Internet	Internet	Web archives as topic Internet based intervention Internet of things Internet access Social media	Internet	Social media World Wide Web Email Gopher Internet access Internet connections Internet protocols Internet based intervention

After identifying all relevant natural, indexed and truncation terms for each keyword, they were aggregated using the boolean operator OR. In the end, among all the

keywords already aggregated, their association was performed with the Boolean operator AND. Database search procedures are provided in Appendix I

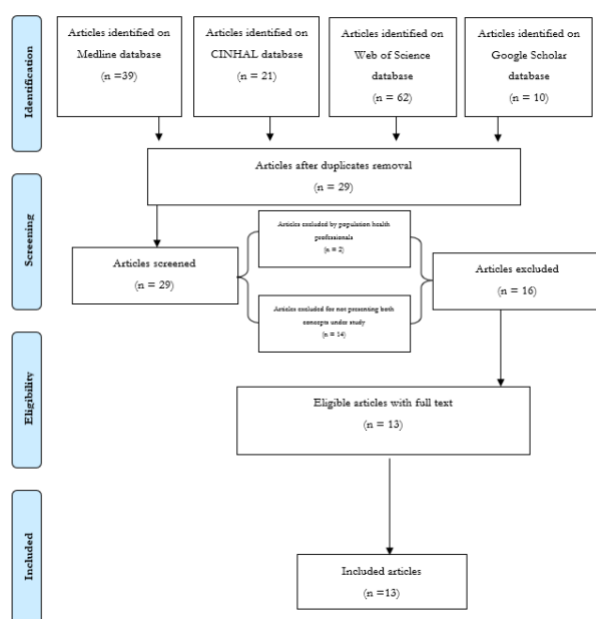
(MEDLINE), Appendix II (CINHAL) and Appendix III (Web of Science).

Articles published in English, Portuguese, French and Spanish were considered. As time limits, evidence published since 2015 was considered, given that the topic of using new information technologies as a source of health information is relatively recent.

In the third stage, the list of references of the selected articles was analysed, in order to identify any interesting articles for the subject under study.

### Source of evidence screening and selection

The process of evidence screening and selection is outlined in the following flowchart:



**Figure 1** – Flowchart of the scoping review process. Adapted from: Moher, D; Liberati, A; Tetzlaff, J & Altman, D. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *Ann Intern Med*. [Internet]. 2009,151 (4), 264-269. Available from: <https://doi.org/10.1371/journal.pmed.1000097>.

The search to identify unpublished literature carried out in the database of the Open Access Scientific Repository of

Portugal, did not identify any results. In the databases used after the initial identification of articles through the search for the defined keywords, the title, abstract and keywords were read and analysed. Duplicate articles were then screened, resulting in a total of 29 articles. Subsequently, the list of references of the identified articles was analysed, and no article was identified that met all the selection criteria. The articles to be included in the scoping review were then selected according to their relevance to the subject under study, through the analysis of the title and abstract. In articles whose relevance was not clear by reading the abstract, an analysis of the full text was performed.

During the evidence source selection stage, 16 articles were excluded for not meeting the defined selection criteria; two articles were excluded because their population was health professionals who care for pregnant women who use the internet, and the rest were excluded because they only presented one concept and not both simultaneously.

Then, both authors, independently, selected thirteen articles to be included in this scoping review.

### Data extraction

The extraction of data from the selected articles was done through a table, elaborated according to the JBI<sup>17</sup> methodology, with the objective of extracting relevant data from the identified articles, mapping the existing evidence on the relationship between the use of the internet as a source of health information and the level of health literacy of pregnant women. Ethical aspects were preserved throughout the data extraction process, with all authors duly referenced and the content of the included articles presented in a reliable manner.

### Results

In order to present the synthesis of the main characteristics of the included studies, a table was elaborated, presented in Appendix IV. Considering the existing asymmetries between different levels of Health Literacy (HL) and the use of the internet as a source of information<sup>6,9,13</sup>, the key results of the present scoping review were coded into higher and lower levels of health literacy, and are presented in the following chart:

Chart 3 - Coding of the key results of the scoping review

Author	Objective	Results		
		Relationship between Health Literacy (HL) level and internet as a source of information		
		Lower level of health literacy	Higher level of health literacy	Implications for practice / for health professionals
Hussey, L.; Frazer, C. & Kopulos, M. (2016)	Analyse the impact of the HL level of millennial pregnant women on health decision-making during pregnancy.	Less ability to understand and apply the information accessed online; Require support from health professionals to understand and apply the health information they access online.	-	The level of HL must be assessed with validated instruments to personalize the information.
Fredriksen, E.; Harris, J. & Moland, K. (2016)	Understand how online discussion forums influence maternal HL.	Interactions between pregnant women in online forums influence their level of HL, increasing their knowledge and health skills and giving guidance in using the health system.	-	-
Sayakhot, P. & Carolan-Olah, M. (2016)	Investigate how pregnant women use the internet to obtain information related to pregnancy.	Empowerment is needed through the promotion of information search skills.	Greater propensity to search for information online.	Should warn that the information available online does not replace contact with health professionals.
Guendelman, S.; Broderick, A.; Mlo, M.; Gemmill, A. & Lindeman, D. (2017)	Understand the extent of adoption and use of digital tools; to identify the main psychological factors that motivate the use of technology among disadvantaged primiparous pregnant women.	Less use of digital tools.	Increased number of online searches on health information; Greater use of digital tools for managing health issues.	Should inquire about online health information search behaviours and assess skills in using online tools that require HL; Should define strategies to eliminate inequalities between women with different levels of digital HL.
Vamos, C.; Merrel, L.; Detman, L.; Louis, J. & Daley, E. (2019)	Explore pregnant women's experiences in accessing, understanding, evaluating, communicating and using health information during pregnancy.	3 components of HL were assessed: Comprehension: information in current language; audio-visual elements and personalized information; Evaluation: multiple references; credibility of the source and presence of sponsorships; Application: conducting prior search online allows the formulation of questions before the contact with health professionals and making health decisions on topics such as nutrition and physical exercise during pregnancy.		Pregnancy is a privileged period for promoting HL; Prenatal health education interventions should be developed according to the level of health literacy, ensuring their accessibility, understanding and applicability.
Arcia, A.; Stonbraker, S. & Warner, E. (2019)	Understand how disadvantaged pregnant women characterize their digital information needs and search processes; Identify the inhibiting and facilitating factors in this process.	It is a barrier to the correct interpretation of health information that is accessed online; It is associated with a lower propensity to search for information online; It is associated with the need for support to access reliable online information.	-	Should reference online formal sources of information, especially for women with a lower level of HL.
Chung, K.; Cho, H.; Kim, Y.; Jhung, K.; Koo, H. & Park, J. (2020)	Determine associations between pregnant women's medical help-seeking strategies, changes in medical decision-making, and use of online health information with a focus on the mediating effect of self-efficacy on literacy.	-	Online search for information in formal sources; Greater intention to discuss with health professionals about the information accessed online.	-
Šoštaric, M. & Jokić-Begić, N. (2020)	Understand the phenomenon of health information search online by pregnant women.	It is associated with greater difficulty in obtaining information online.	It is associated with more online research; Increased skills in assessing the accuracy of online information.	-
Bäckström, C.; Chamoun, S.; Tejani, S. & Larsson, V. (2021)	Explore parents perceptions of digital parenting support	Online support tools should be able to be individualized at different levels of HL;		Must be actively present in online support tools,

	during pregnancy and the first 18 months of parenting.		supporting people with critical levels of HL; Should enhance critical and analytical skills, promoting HL.
Donelle, L.; Hall, J.; Hiebert, B.; Jackson, K.; Stoyanovich, E.; LaChance, J. & Facca, D. (2021)	To understand how digital technologies contribute to the experience of transition to parenthood.	The overwhelming amount of information available online makes it difficult to understand; Pregnant women need to raise their HL level to know how to identify reliable online sources.	Should promote digital HL skills; Should know to reference reliable online sources.
Álvarez-Pérez, Y.; Perestelo-Pérez, L.; Rivero-Santana, A.; Torres-Castanõ, A.; Toledo-Chávarri, A.; Duarte-Díaz, A.; Mahtani-Chugani, V.; Marrero-Díaz, M.; Montanari, A.; Tangerini, S.; González, C.; Perello, M.; Serrano-Aguilar, P. (2022)	To determine the influence of creating online courses on improving the digital health literacy of pregnant and breastfeeding women.	Lesser use of online information sources of reference and greater use of sources such as blogs and social networks.	It is potentiated by taking online courses.
Bäckström, C.; Carlén, K.; Larsson, V.; Mårtensson, L.; Thorstenson, S.; Berglund, M.; Larsson, T.; Bouwmeester, B.; Wilhsson, M. & Larsson, M. (2022)	To explore the use of digital information sources by expecting parents and how their health during pregnancy its influenced.	Lower level of HL is related to individual difficulties in searching for online information.	-
Lu, Y.; Barret, L.; Lin, R.; Amith, M.; Tao, C. & He, Z. (2022)	To identify research gaps in information needs related to pregnancy and information available from different sources.	Is associated with less online searches; Associated with more difficulties in accessing health information available online.	-
			Should promote skills to assess the quality and accuracy of information available online; Online courses can be a tool to empower pregnant women, allowing access to valid and reliable information. Should consider the level of HL to provide personalized support; Should develop online information adapted to different levels of HL. The health information available online should be formulated for a basic level of understanding, in order to be comprehensible to all levels of HL.

**Discussion**

This scoping review allowed mapping the existing scientific evidence on the relationship between the two concepts under study: internet and health literacy in the defined population, pregnant women, concluding that the level of health literacy of pregnant women has a decisive influence on the use of the internet as a source of information. The authors state that it is in pregnant women with a lower level of HL that is verified less use of digital tools to search for health information, <sup>18, 19, 20</sup> possessing less ability to understand and apply the information accessed online, as well as individual difficulties in search for information, <sup>21, 22</sup> requiring support from health professionals. <sup>18, 23</sup> It is also in pregnant women with a lower level of HL that there is less use of online formal sources and greater use of sources such as blogs and social networks. <sup>24</sup>

On the other hand, pregnant women with a higher level of HL, carry out more searches for online health information, <sup>19, 22, 25</sup> having better skills in assessing the accuracy of the information they access. <sup>22</sup> They tend to resort to formal online sources and have greater intention of discussion with health professionals about the health information they have accessed. <sup>26</sup>

Towards the existing asymmetries between pregnant women with different levels of HL, strategies must be defined by health professionals to eliminate the inequalities that emerge in the use of the internet as a source of health information. <sup>19</sup> In the first instance, they should assess the level of HL with validated instruments to provide personalized support <sup>21, 23</sup> and ask questions about online health information search behaviours of pregnant women whom they care for. <sup>19</sup> They should promote skills for evaluating the quality and accuracy of information available

online <sup>21, 24, 27</sup> and be actively present in online support tools, <sup>21</sup> developing health information in current language and with audiovisual elements, <sup>18</sup> which is adapted to different levels of HL. <sup>21</sup>

As a limitation of the present scoping review, the location of most of the included articles emerges, which come from studies carried out in the United States of America, with a smaller number of studies carried out in Europe, emphasizing the lack of studies carried out in Portugal. Given the relevance and timeliness of the topic, research on the use of the internet as a source of health information and the level of health literacy of pregnant Portuguese women emerges as a need.

**Conclusions**

The articles included in this scoping review allowed mapping the existing scientific evidence on the relationship between the use of the internet as a source of health information and the level of health literacy of pregnant women, something that should not be overlooked by health professionals who provide care for this population. The level of health literacy of pregnant women has a decisive influence on the use of the internet as a source of information, being positively related to greater frequency of use, recurrence to formal sources and discussion of the information accessed with health professionals. In contrast, a lower level of health literacy is associated with less use of digital tools to search for health information, greater use of informal online sources and greater difficulty in evaluating and understanding the information accessed, requiring support from health professionals. The level of health literacy of pregnant women should be considered for the personalized recommendation of valid and reliable online

information. Considering the relevance of the subject, there is an urgent need to carry out further research, with the aim of guiding health professionals to provide care that is sensitive to the specificities of pregnant women in the 21<sup>st</sup> century.

### Authors' contributions

IND: Conception and design of the study; Data collection; Data analysis and interpretation; Drafting the manuscript.

MHBF: Critical review of the manuscript.

### Conflicts of interest

The authors declare that there is no conflict of interest.

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