



What Information is Available to Women Regarding Coronavirus and Childbirth in Italy? A Mixed-methods Exploration of the Web During the COVID-19 Lockdown

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Abstract

Problem: The world is fighting against the COVID-19 pandemic and an infodemic; Italy is one of the most severely affected countries.

Background: The internet represents a popular source of health information. In Italy, its use amongst pregnant women and new mothers has increased during the lockdown. No research has examined the nationally accessible information related to childbirth in these unprecedented circumstances.

Aim: To explore online information accessible to Italian users concerning childbirth and coronavirus-related issues.

Methods: A mixed methods exploration of the web was conducted involving searches on Google, peer discussion forums and midwifery association webpages. Data were analysed both quantitatively and qualitatively. A cross-consultation analysis of themes was performed to identify macro categories of information.

Findings: A total of 720 results from free searches, 635 interventions from 97 forums and 68 posts from four midwifery association webpages were analysed. Informative/divulging sources were the most prevalent in Google; pregnancy-related topics appeared more in discussion forums and midwifery association webpages. 'Prevention'; 'risks and outcomes'; 'users' experiences' and 'reorganisation of maternity services' represent the cross-consultation categories of information.

Discussion: Google emerges as the main contributor to the infodemic; national systems of alert and ranking of web sources are needed. Women's pragmatic needs are more likely to be addressed by peer-discussion forums and midwifery association webpages during and after COVID-19.

Conclusion: This is the first study to investigate childbirth-related web information during COVID-19 in Italy; findings may impact on education, research and practice.

Keywords: Social Network; Childbirth; Midwifery; Internet; COVID-19; Information

Introduction

The World Health Organization (WHO) declared COVID-19 to be a pandemic disease in early March 2020 [1], when the spread

of the infection, positive cases and death toll related to coronavirus started to escalate in Italy. The immediate closure of many activities and services followed the announcement of the state of health

emergency in the country, also affecting education programmes at all levels of instruction. As regards midwifery programmes, the theoretical component needed to be moved online quickly to meet the requirements of the Italian government and in particular of the Ministry of Instruction, Universities and Research (MIUR) [2]. Interestingly, no national guidelines were issued for the practical components of healthcare related programmes, leaving the universities throughout the country to make their own decisions about continuing students' placements within maternity services. The University of Milan-Bicocca was one of the first organisations to deal with this issue as Lombardy was one of the northern regions most affected by the COVID-19 outbreak [3]. The decision for the midwifery programme was to ask students to temporarily interrupt their clinical placements [4] in an attempt to minimise the spread of the virus and protect individuals and their families as much as possible, in the light of the rapid escalation of COVID-19. The role of midwifery students, the potential contribution and learning that their involvement in the response to this health emergency could have offered, as the future health-care workforce [5] were considered. However, debates about limiting the presence in services to essential health care professionals, reducing exposure and promoting safety and the shortage of personal protective equipment (PPE) contributed to the final decision to suspend practice hours for students [6]. Anecdotally, this measure was adopted in the following weeks by most of the midwifery programmes in the country.

At the same time, as in other countries [7,8] health services have undergone rapid changes, with transformations of existing pathways and units into COVID-19 areas beside the establishment of new facilities, in order to address the new health care needs created by the pandemic. This led to additional pragmatic considerations of the challenges that would have arisen to guarantee placement allocations and proper mentorship to all students, and to the acknowledgement of the impracticability of ensuring these features during this health crisis.

Reorganisation of services mostly resulted in the closure of community services and a reduction in the provision of hospital outpatient clinics. Consequently, an increasing number of initiatives to support women and families by means of technology and virtual encounters have been offered by individual midwives and groups of midwives, both in the public and private sectors. Women and families have had to revisit many of their original plans and navigate this new maternity system; this has led to greater use of

the internet to access information, maintain relationships with significant others, but also to continue midwives-mother relationships.

Internet use amongst childbearing women/new mothers was already significant prior to the outbreak, as a 'very popular source of health information' [9]. The web is mostly accessed to seek childbirth-related information, answers to questions and support for choices regardless of women's demographic differences. Indeed, according to Sayakot., *et al.* [9] demographics influence behavioural aspects such as the kind of advice sought, rather than the use of the internet as a source per se. It is worth noting that the use of the internet can have a double effect by either helping reduce or increasing users' anxiety and fear around birth [10,11].

A multicentre cross-sectional study conducted by Bert., *et al.* [12] on internet use for decision-making amongst Italian childbearing women, demonstrates similarities and differences amongst the Italian users compared to pregnant women and new mothers from other countries. This includes similar higher importance given to pregnancy-related information as well as the trend for Italian women to consult the web equally before and after scheduled appointments with health professionals. Users from other countries mostly seek information before attending their bookings. However, behaviours previously observed regarding the use of the internet among pregnant women and new mothers worldwide might have changed because of the current circumstances. In this context, we decided to involve midwifery students at the University of Milan-Bicocca, and in particular those in their second year of the programme who were not engaged in theory or exam blocks, in a research project aimed at exploring the childbirth-related information accessible to women on the web during COVID-19.

Materials and Methods

Data collection

We conducted a mixed-methods investigation of the information available on the web by assuming the perspective of pregnant women and new mothers, considering the challenges and possible questions generated by the current circumstance.

Three different types of web information consultation were selected: 1) a Google free search; 2) a search within online peer discussion forums; 3) a search within midwifery association webpages. The language was limited to Italian and the term adopted

as a keyword in search strategies was 'coronavirus' as it appeared to be most popular at the beginning of the project; the use of the terminology 'COVID-19' became more popular later in the media.

Data were collected from 27th February to 2nd April 2020; the different web searches on different sources were all conducted in the same five-day period within the same six weeks for a total of eight consultations per search. The focus maintained by all members of the research team was on information regarding 'coronavirus' and 'pregnancy', 'labour/birth' and 'the puerperium/breast-feeding'.

The Google search was conducted by typing the following keywords and search strategies into the browser: a. "Coronavirus e Gravidanza" [coronavirus and pregnancy]; b. "Coronavirus e Parto" [coronavirus and birth]; c. "Coronavirus e Allattamento" [coronavirus and breastfeeding].

All the searches were performed by three different student researchers at the same time in order to explore possible differences and similarities in findings from different web users. Only the first 10 results on the Google page from each consultation were included in the study. Data was inserted in a specific dataset created with Excel®, with a code allocated to each researcher for anonymisation and a progressive keycode number for each consultation. Links of resulting webpages and a brief summary of related contents were recorded in the dataset.

As regards the exploration of peer discussion forums, data collection was performed after selecting relevant webpages resulting from tailored searches on Facebook and Google platforms. The keywords to identify those online resources were 'forum mamme coronavirus' [forum mums coronavirus] on both web portals.

Only discussion forum pages appearing to be relevant (with the topics of interest discussed) and active (with ≥ 1 new post per day) were explored. A keycode was assigned to anonymise the sources on the specific dataset which also reported the progressive code of the consultation. The interventions posted by users that addressed the chosen topics of 'coronavirus' and 'pregnancy', 'labour/birth' and 'the puerperium/breastfeeding' were selected and transcribed fully by four students on a Word document for analysis.

In order to investigate the information accessible to women

within associations of midwives, relevant web pages were selected from the results of specific searches on the Google, Tiscali, Bing and Yahoo browsers. The keywords adopted to identify the sources were 'associazioni ostetriche e Lombardia' [midwifery associations and Lombardy], 'case maternità e Lombardia' [maternity homes and Lombardy]. To note, maternity homes are not equivalent to birth centres in Italy; birth centres are managed by public health services while maternity homes are exclusively run by independent midwives and offer both social and maternity services (13). The search was restricted to the geographic area of Lombardy, as one of the first regions to be significantly affected by the outbreak in the study period. Besides representing the region where the university is located, this was also the region which had the most pressing need to offer updated information and alternative provision of maternity services. The maternity homes web pages were included in the search as models typically run by independent midwifery practices and most likely to discuss issues such as antenatal and postnatal home visiting and home birth options. The first four midwifery associations that recorded the highest numbers of followers on social media were selected. In this context, Facebook represented the most liked and used social network platforms for discussions compared to the same midwifery associations' accounts on Twitter or Instagram in the study period. A progressive alphabetic keycode (w, x, y and z) which graded popularity from most to least popular was used to record the midwifery association types in the dataset. This also recorded the progressive code of the consultation. The posted interventions which conveyed the chosen topics of 'coronavirus and pregnancy', 'labour/birth' and 'the puerperium/breastfeeding' were selected and transcribed fully by four student researchers on a Word document for analysis.

Data analysis

The Google free search led to the identification of several links to web pages/sites discussing the topics of interests; the possible variation in findings depending on the researcher was analysed by looking at the first 10 results shown on Google for each of the eight consultations by each student. This analysis was conducted by two separate academic researchers.

Three main types of information sources were identified: the institutional sources- web pages managed by health institutions/organisations (e.g. Ministry of Health, Istituto Superiore di Sanità (ISS) (Italian National Institute of Health)); the informative-divulg-

ing sources- including media such as press agencies, news, newspapers, newscasts; and the professional sources- provided by associations, professional bodies and scientific societies of midwives and/or obstetricians. A descriptive analysis of frequency and type of sources as well as thematic analysis of related textual content was performed for each search conducted (a., b., c.).

Results from the exploration of peer discussions forums and midwifery association webpages were described by typology and frequency and textual material was thematically analysed. Emerging themes were allocated to the categories of ‘pregnancy’, ‘birth’, ‘the puerperium/breastfeeding’ by three academic researchers. Interventions that discussed topics related to different categories were included in the analysis as many times as their categories of interest.

Finally, a cross-investigation analysis of themes was conducted to identify recurrent themes across the different information sources. This was carried out by two independent researchers who engaged in discussions and negotiations on the interpretation of findings in case of disagreement, so as to finalise agreed macro categories.

Results and Discussion

Findings from the Google free search

The Google free search yielded 240 results from each search strategy (a., b., or c.) for a total of 720 webpages. The number of similar findings across different students appeared to vary depending on the topic of the search run (a. vs b. vs c.). In particular, where the search regarded ‘coronavirus and pregnancy’ (a.) 6-7 similar links across researchers appeared in every consultation. The number of similar results was more irregular for ‘coronavirus and birth’ (b.) or ‘coronavirus and breastfeeding’ (c.). In those cases, the similar findings across researches ranged respectively from 2 to 9 and from 1 to 9 per consultation. When examining the overall group of similar links/webpages, these latter mostly belonged to institutional sources of information. Two specific webpages emerged as of particular relevance: the epidemiological site of the ISS named ‘Epicentro’ -appearing in the 100% of cases of similar results- followed by the website of the Italian Ministry of Health - present in approximately 50% of similar results per consultation.

The frequency of the type of sources identified in all the Google free searches are reported in figure 1. The informative-divulging

sources represented the dominant type for all topics (a., b., and c.), although particularly evident when the information sought regarded the area of ‘coronavirus and birth’. The frequency of professional sources varied, particularly in the search for ‘coronavirus and breastfeeding’, while the institutional sources seemed to occupy an almost constant space across searches.

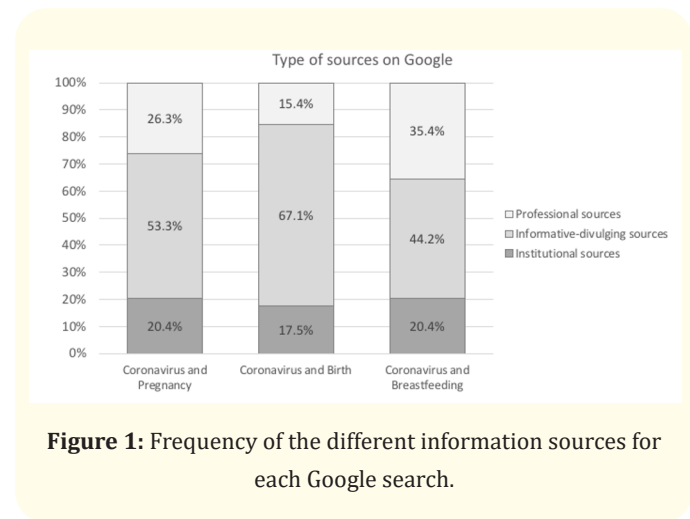


Figure 1: Frequency of the different information sources for each Google search.

The frequency of the type of sources throughout consultations was calculated and depicted in a graph (Figure 2) to illustrate the trends of those sources in the accessible information on all three areas of the Google search.

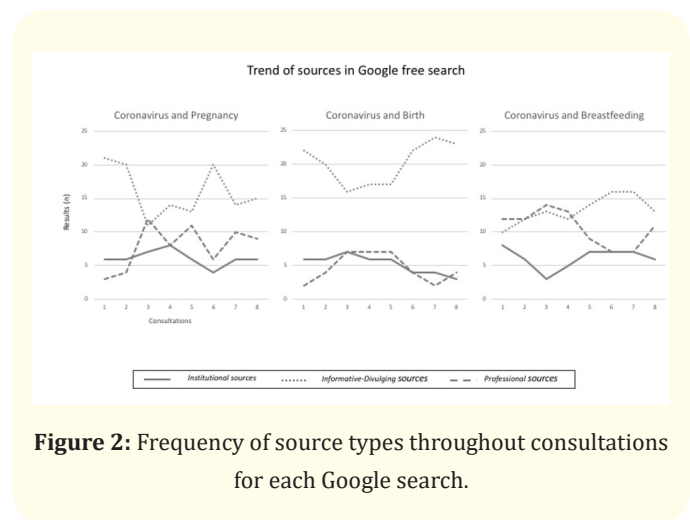


Figure 2: Frequency of source types throughout consultations for each Google search.

The number of themes emerging from each type of Google search was then analysed. Only the themes that appeared to be relevant to the specific topic of interest (a, b., or c.) and more frequent were considered, where frequency was defined as a higher presence of the theme than the average of all themes emerging from the related search. A final four main themes emerged from the search for ‘coronavirus and pregnancy’, seven for ‘coronavirus and birth’ and six for ‘coronavirus and breastfeeding’ -for a total of 17 themes (see Figure 3).

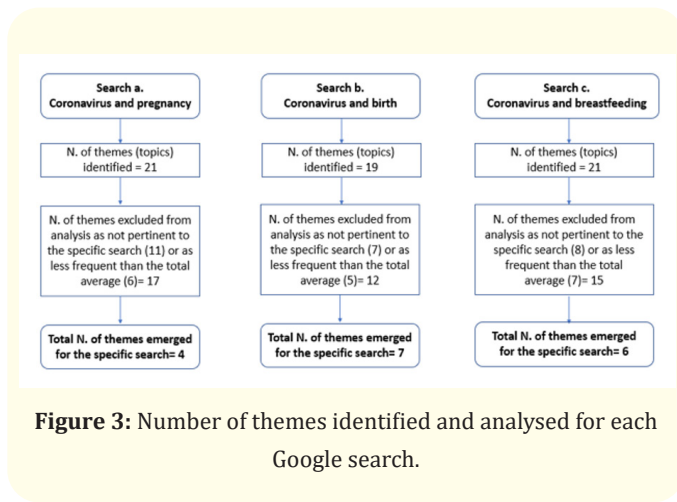


Figure 3: Number of themes identified and analysed for each Google search.

The themes had different frequencies depending on the information source, as in figure 4.

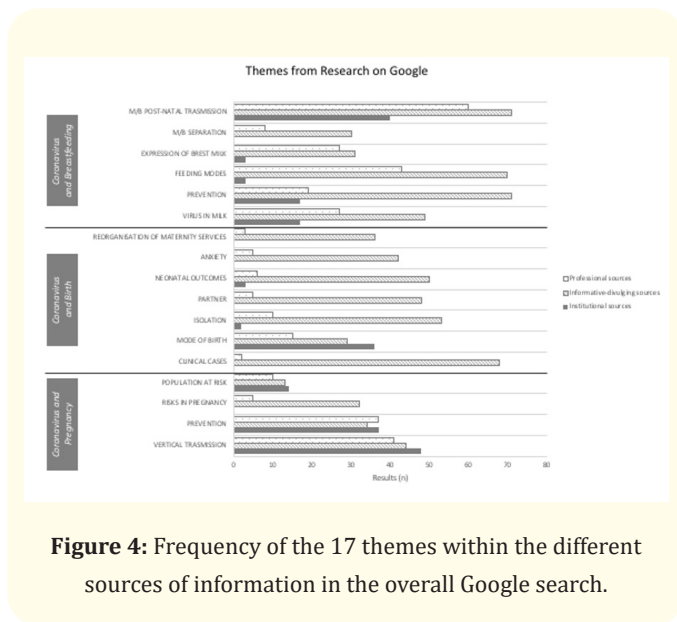


Figure 4: Frequency of the 17 themes within the different sources of information in the overall Google search.

When compared to the other searches, the search on ‘coronavirus and birth’ resulted in a higher frequency and larger variety of themes, mostly communicated by informative/ divulging sources (79%). The most prevalent theme in this group was the one on ‘mode of birth’ (33.3%), while ‘feeding modes’ dominated the area of ‘coronavirus and breastfeeding’ (48.3%) and the ‘vertical transmission’ theme occupied most of the information provided as regards ‘coronavirus and pregnancy’ (55.4%).

Interestingly, of all the 17 themes, six (35%) were never communicated through institutional sources of information and all themes that emerged from informative/divulging sources were also present in professional ones.

Findings from peer discussion forums

A total of 97 online discussions across forums (67 on Facebook pages and 30 on site pages) were found with 635 posts of interest. 35 discussions (36.1% of the total) addressed at least two of the three areas of interest (‘pregnancy’, ‘labour/birth’, ‘the puerperium/breastfeeding’ and ‘coronavirus’).

Most information within forums focused on ‘pregnancy’, i.e. 70 discussions (72.2%) for a total of 325 posts/interventions (51.2%). In 38 discussions (39.2%) including 167 interventions (26.3%) the topic pertained to birth; while slightly fewer discussions- 29 (29.8%)- with 143 interventions (22.5%) addressed the areas of ‘coronavirus’ and ‘the puerperium/breastfeeding’.

Differences were found concerning the themes which emerged from the various discussions. A treemap chart was created to aid visualisation of the frequency of the themes, and scale the variety of results, in the three areas (Figure 5). Respectively, 12, 6 and 6 themes were identified for the areas of ‘pregnancy’, ‘labour/birth’ and ‘the puerperium/breastfeeding’.

The area of ‘pregnancy and coronavirus’ was where the highest variety of topics was available. The most discussed theme in this area appeared to be the ‘suspension/interruption of maternity services’ (19.3% of interventions).

The theme of ‘presence of birth partner’ appeared to dominate the discussions related to ‘coronavirus and birth’, found in 57.3% of all interventions; while the ‘reorganisation of postnatal services’, the most prevalent in ‘the puerperium and breastfeeding’, was discussed in 28.2% of cases.

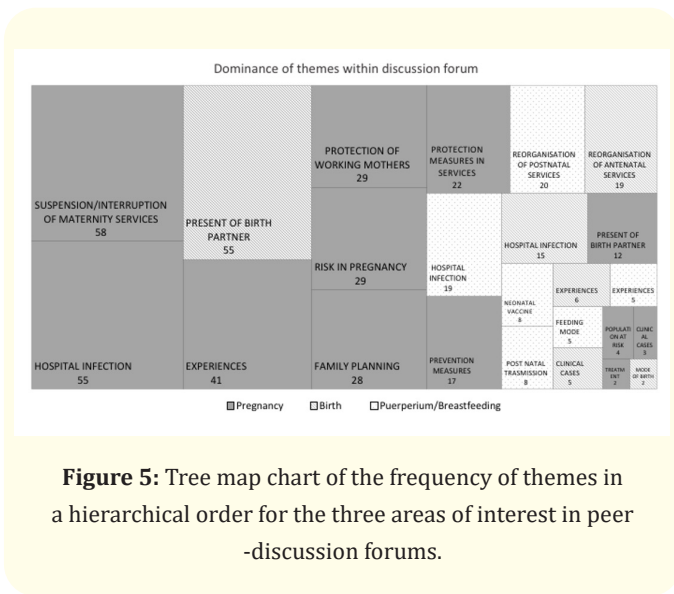


Figure 5: Tree map chart of the frequency of themes in a hierarchical order for the three areas of interest in peer-discussion forums.

Although more represented in the discussions around pregnancy, the theme of ‘experiences’, conveying interventions where participants shared personal experiences, appeared in all three areas and specifically in 13.7% of interventions related to ‘pregnancy’, 5.2% concerning birth and 8.4% around ‘the puerperium and breastfeeding’. A different theme, ‘clinical cases’ was identified, including discussions around cases reported in the media and mostly used as a starting point for further interactions. These themes emerged only in the contexts of ‘pregnancy’ and ‘breastfeeding’.

Findings from midwifery association webpages

On the webpages of the four midwifery associations identified, three concerned associations of maternity home midwives (w, x, z) and one concerned a private sector midwifery association (y). The information in the areas of interest came from 50 online posts. The association of midwives ‘y’ was the most active in terms of number of posts (21), followed by the association ‘w’ (19), by the association ‘z’ (7) and lastly by the association ‘x’ (3). As 18 posts (36%) addressed more than one area of interest, the analysis involved a final number of 68.

Most of the information regarded the area of ‘coronavirus and pregnancy’, addressed in 31 posts (45.6%), followed by those concerning the area of ‘the puerperium/breastfeeding’ appearing in 29 posts (42.6%); information around ‘labour and birth’ was less

represented, being offered in just eight posts (11.8%).

7 themes were identified in the area of ‘coronavirus and pregnancy’, while 5 from birth-related posts and 8 from communication around the ‘puerperium and breastfeeding’. Again, a treemap chart was produced (see Figure 6).

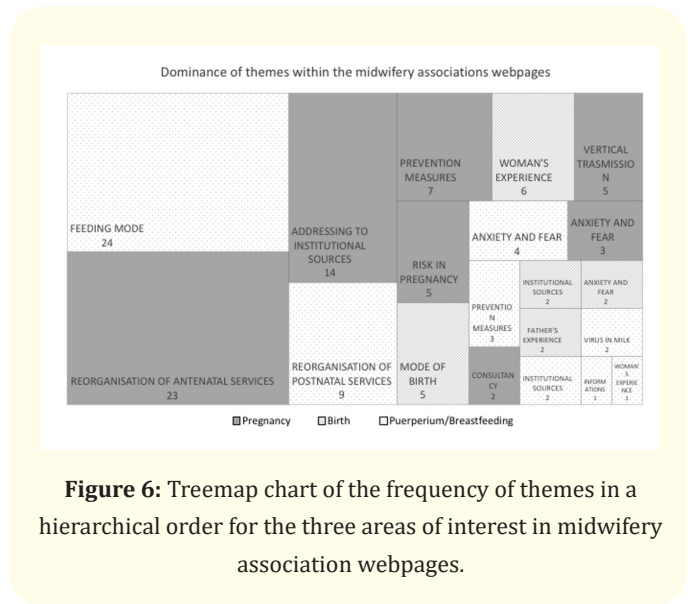


Figure 6: Treemap chart of the frequency of themes in a hierarchical order for the three areas of interest in midwifery association webpages.

The widest variety of contents was shown in the ‘coronavirus and the puerperium/breastfeeding’ area, where the dominant theme was represented by ‘feeding modes’ (found in 47.1% of all breastfeeding-related posts). The theme of ‘reorganisation of antenatal services’ was more evident in the posts about pregnancy (38.9% of all pregnancy-related posts), while information related to ‘women’s experiences’ occupied most of the virtual space in ‘birth and coronavirus’ (35.3% of all birth-related posts).

Figure 6 shows a number of themes emerged across all areas: these included ‘anxiety and fear’ - particularly prevalent in ‘the puerperium/breastfeeding’ (7.8%)- and ‘address to institutional sources/links’- mostly appearing when the focus was on ‘coronavirus and pregnancy’ (23.7%).

Findings from cross-investigation analysis

The analysis of themes performed across the three different web investigations (Google free search versus peer discussion fo-

forums versus midwifery associations webpages) led to the identification of the following four macro categories:

- ‘prevention’- including 7 cross-investigation themes
- ‘risks and outcomes’ - including 10 themes

- ‘users’ experiences’- including 5 themes
- ‘reorganisation of maternity services’- including 6 themes.

The themes included in these categories are summarised in figure a.

	FREE SEARCH ON GOOGLE	SEARCH WITHIN ONLINE DISCUSSION FORUMS OF PEER	SEARCH WITHIN PAGES OF PROFESSIONAL ASSOCIATIONS
PREVENTION (7)	<ul style="list-style-type: none"> ✓ PREVENTION IN PREGNANCY ✓ PREVENTION IN BREASTFEEDING 	<ul style="list-style-type: none"> ✓ PREVENTION IN PREGNANCY ✓ PROTECTION OF WORKING MOTHERS ✓ HOSPITAL INFECTION IN PREGNANCY ✓ PROTECTION MEASURES IN SERVICES ✓ TREATMENT ✓ HOSPITAL INFECTION AT BIRTH ✓ HOSPITAL INFECTION IN BREASTFEEDING 	<ul style="list-style-type: none"> ✓ PREVENTION IN PREGNANCY ✓ PREVENTION IN BREASTFEEDING ✓ INFORMATIONS ✓ RULES
RISKS AND OUTCOMES (10)	<ul style="list-style-type: none"> ✓ VERTICAL TRASMISSION ✓ RISK IN PREGNANCY ✓ POPULATION AT RISK ✓ MODE OF BIRTH ✓ NEONATAL OUTCOMES ✓ VIRUS IN MILK ✓ FEEDING MODE ✓ M/B POST NATAL TRASMISSION 	<ul style="list-style-type: none"> ✓ FAMILY PLANNING ✓ RISKS IN PREGNANCY ✓ POPULATION AT RISK ✓ MODE OF BIRTH ✓ FEEDING MODE ✓ VACCINE ✓ POSTNATAL TRASMISSION ✓ VERTICALTRASMISSION 	<ul style="list-style-type: none"> ✓ VERTICAL TRASMISSION ✓ RISK IN PREGNANCY ✓ MODE OF BIRTH ✓ VIRUS IN MILK ✓ FEEDING MODE
EXPERIENCES	<ul style="list-style-type: none"> ✓ CLINICAL CASES ✓ ANXIETY 	<ul style="list-style-type: none"> ✓ CLINICAL CASES IN PREGNANCY ✓ EXPERIENCES IN PREGNANCY ✓ EXPERIENCES AT BIRTH ✓ EXPERIENCES IN BREASTFEEDING ✓ CLINICAL CASES IN BREASTFEEDING 	<ul style="list-style-type: none"> ✓ ANXIETY IN PREGNANCY ✓ ANXIETY AT BIRTH ✓ ANXIETY IN BREASTFEEDING ✓ WOMEN'S BIRTH EXPERIENCE ✓ FATHER'S BIRTH EXPERIENCE ✓ EXPERIENCE IN BREASTFEEDING
REORGANISATION	<ul style="list-style-type: none"> ✓ ISOLATION ✓ PARTNER ✓ REORGANISATION OF MATERNITY SERVICES ✓ EXPRESSION OF BREAST MILK ✓ M/B SEPARATION 	<ul style="list-style-type: none"> ✓ BIRTH PARTNER ✓ REORGANISATION IN PREGNANCY ✓ SUSPENSION/INTERRUPTION OF SERVICES ✓ REORGANISATION IN BRESTFEEDING 	<ul style="list-style-type: none"> ✓ BIRTH PARTNER ✓ REORGANISATION IN PREGNANCY ✓ SUSPENSION/INTERRUPTION OF SERVICES ✓ REORGANISATION IN BRESTFEEDING

Figure a

These represented the information macro areas that appeared to be accessible to women. The relevance of each category within the different type of web searches/investigations is reported in figure 7.

Discussion

This research offers insights into accessible online information and the characteristics of different communication vehicles related to childbirth and coronavirus for pregnant women and new mothers, with a specific focus on the Italian context. The three different types of investigations conducted were identified in the light of extant literature on women’s use of the internet to meet their information needs [14] and reflected the attempt to access some of the complexity that underpins consultations during this COVID-19 lockdown.

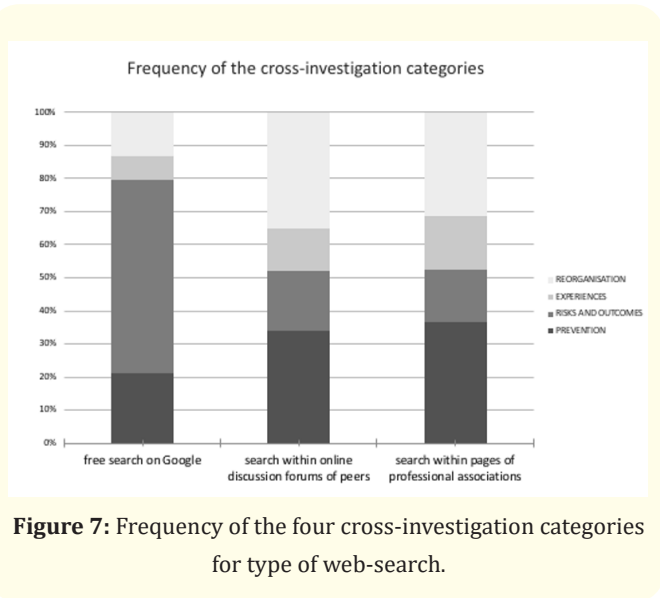


Figure 7: Frequency of the four cross-investigation categories for type of web-search.

Findings show a greater amount of information available on Google free searches compared to other web-consultations (peer-discussion forums; midwifery association webpages); this might indicate a potential for women's information overload through this channel/platform. This overload may be exacerbated by the fact that, as results demonstrated, even when information on a specific topic was sought (e.g. 'coronavirus and pregnancy'), material on other areas ('birth', 'the puerperium and breastfeeding') also appeared a number of times. Furthermore, although Google searches conducted by different women can lead to different results, this study suggests that there may be information channels that are universally accessible so as to represent possible 'authoritative' sources in media communication.

As seen in Figure 2, when seeking childbirth and coronavirus-related topics in Google, informative/divulging sources represented the most frequent type of information source offered, although its relevance in overall communication and professional-mediated sources varied significantly throughout the study period. Conversely, institutional sources, although less dominant, occupied an almost constant space in the web. Interestingly, against this fixed role of institutional sources, the behaviour of the informative/divulging and professional sources appeared to mirror the trend, rising whilst the other declined and vice versa. The greatest distance between the curves of informative and professional sources occurred in searches related to 'birth'. In particular, the higher number of divulging sources in this area indicates the strong impact of the birth event on the communication offered by the media. Given the mirrored behaviour of the two sources, the communication by professional bodies, organisations and institutions might play a strategic role in influencing the kind of information and messages available online to the public. An improvement in the accuracy and quality of health related-online contents, by increasing the 'voice' of professional sources, appears to be pivotal provided that, as Heather [14] stated, 'access volumes of information does not necessarily equate with understanding and comprehension' of topics. This seems far more important considering that even when users perceived the unreliability of online sources, they made use of the available web information anyway [10].

The fact that during this outbreak people are exposed equally to a pandemic and an infodemic has been highlighted by WHO since the early stages of this global emergency. Control measures on the

quality of information have started to be put in place by WHO, for instance by introducing alerts on Google and social networks to direct users to official and reliable webpages [15].

However, a possible limit of the above mentioned strategies may lie in the fact that they were created for the six official UN languages, which do not include Italian. Including Italian would have been beneficial since Italy has been one of the most severely affected countries after China.

The constant presence of the Epicentro website in our results offers reassurance for the quality of online information. This epidemiological resource, created by ISS, represents a nationally recognised channel of accurate, up to date evidence-based information with a comprehensive coverage of topics related to perinatal issues and care during COVID-19 for both public users and health care professionals, to redress the COVID-19 infodemic in Italy [16].

In addition, a national system of ranking, at the side of accessible links arising from internet searches, and based on professionals' evaluations of content and language, might represent a way of orienting the public users to high quality information. Slomina, *et al.* [10] actually argued that the provision of systems aimed at promoting the reliability of web information should be seen as a Public Health action. Health providers are in a position to guide pregnant women's internet searching, by providing reputable website information and by warning women about the confusing and inaccurate information that is widely available on the internet [9,17,18].

The cross-consultation findings revealed that the area around 'labour and birth' during COVID-19 had less weight within all discussions/debates/statements. This might be due to the fact that labour and birth represent more time bound events, occurring in a shorter period of time compared to pregnancy or the puerperium. Moreover, the time that women can dedicate for online research might be variable throughout childbirth and more likely to be longer and less-pressured in the antenatal period.

The greater focus on pregnancy-related information is supported by Sayakhot, *et al.* [9] in their systematic review, but contrasts with what was found by other authors prior to the outbreak [19] where birth, and in particular sharing experiences around birth, represented the most important focus of communication. A possible explanation may be found in the limited number of women that could share birth experiences in this time; however, further inves-

tigations might help understanding as to whether these different results can be ascribed to the specific period of global health crisis.

The greater number and variety of themes emerging from the search on peer-discussion forums and midwifery association web pages compared to a Google free search, seems to reflect the different levels of interaction permitted by these sources. Especially within peer-discussion forums, the opportunity of posing direct questions and starting a flow of conversation based on the answers allows debate on a greater number of topics. The opportunity for women to influence the discussions may facilitate them in addressing their individual needs [20]. Nevertheless, the quality and trustworthiness of information other than accounts of personal experiences might be questionable and complex to assess, which represents a limitation of discussion forums.

The selected midwifery association webpages were mostly used by professionals to post information, with a limited number of topics that they considered to be relevant, rather than as a platform for answering users' questions directly. The level of interaction offered by this resource, hence, might appear to be similar to a Google free search. However, unlike the latter, the quality of the information differs. The characteristics of the selection of contents undertaken by midwives, with frequent reference to links of reliable institutional sources related to maternity care, represents added value. It might also be argued that in choosing the topics, midwives were guided by their current practice with women, collating themes that appeared to be of most interest to their clients. Moreover, midwifery associations usually posted general information together with specific indications about their specific offer of support and services (or reorganisation of services) to address issues related to the presented theme/topic. Women could then enhance their knowledge and understanding of an issue and inform themselves of the appropriate service or available help in case of need at the same time.

An interesting difference emerged regarding the quantity and kind of themes between the diverse types of web-investigation. Themes around 'birth' were more likely to appear in the Google free search; those around pregnancy in peer-discussion forums while breastfeeding-related contents tended to be located in the midwifery association web pages. This further supports the idea that the birth represents the most attractive media worthy event in

the perinatal journey and a more powerful phenomenon to capture public attention.

The numerous and varied themes around pregnancy dominating the peer discussion forums may be due, again, to a longer time available to women during pregnancy to interact on social media; though also the puerperium period is not short per se, the time dedicated to social networking might be shorter than in pregnancy given the care and demands which characterise life with newborns. The focus on pregnancy-related topics in discussion forums was also reported by other authors [9].

The prevalence of 'puerperium' and 'breastfeeding'-related themes within midwifery association sites might indicate a professionals' perception of women's higher need for support in the puerperium, and a subsequent necessity of increasing the offer of services in this area.

The current study determined macro categories on information based on the cross-investigation findings; amongst all, the area of risks and outcomes associated with coronavirus in all phases of the motherhood journey occupied the largest space in the information overall. This might be a reflection of the general preoccupation in the population related to the COVID-19 health emergency as well as of the culture of fear and risks that have characterised the birth culture in Italy [21].

The area of prevention seems to have similar weight in the available information from Google and midwifery associations, while it appears to play a greater role in the context of peer-discussion forums. This suggests that women are mostly seeking information on measures for protecting themselves and their babies from COVID-19, but also sharing useful tips on pragmatic aspects based on real daily-life, via interaction with their peers.

The macro area related to the reorganisation of maternity services is similarly represented in peer forums and midwifery association webpages. These platforms represent a quick way of accessing information [11] especially for such a crucial problem as the reorganisation of services during COVID-19 [22].

The category of 'users' experiences' collected themes with different values across the different investigations. The contribution to this category from discussion forums and midwifery association

webpages was mainly represented by the sharing of individuals' experiences. Amongst themes emerging from Google, the main contributor was that of 'clinical cases'; that is, a description of facts and not of experiences. This is unsurprising, considering that Google is not aimed at giving voice to personal experiences per se. This is also apparent from the other significant theme of 'fear and anxiety' emerging from the Google searches; this theme was mostly identified from the information about relaxation techniques and other coping strategies for managing those feelings, rather than from people's accounts of their perception of these emotions during the pandemic.

Finally, this study offered a new opportunity for knowledge, understanding and development for midwifery students, educators and professionals in unprecedented times. The temporary suspension of clinical placements was used in the midwifery programme as a time for strengthening academic learning but also fostering students' research skills by involving them in research projects where current phenomena could be explored. This represented a different yet relevant way to offer their contribution to the professional community for the benefit of women's care during this lockdown. They were able to understand more of the research process by being directly involved in a project at an early stage of their student journey, implement their expertise with information technology and critical reading by keeping themselves updated on topics of interest and the evidence available. Moreover, especially when investigating discussion forums and midwives' communication, they had to work as observers and listeners to women's stories, as well as considering their needs and examining ways of meeting them instead of assuming to know what is important for users; all qualities that are crucial in midwifery. The opportunity for students to work on a project in small groups and directly with academics helped them to engage even more strongly with the university network of relationships and maintain contact with the programme. This was seen as a positive factor for reducing possible feelings of isolation, lack of support or frustration for not being able to contribute to the midwifery community because of the requirement to work from home. The research project, hence, also served as a way of empowering students in challenging circumstances.

Limitations of this study

This research is grounded in the authors' interest in understanding women's needs and what is offered, during this challeng-

ing period of COVID-19. The investigation conducted in mothers' discussion forums allowed insights into women's questions and issues in real life; however, real web consultations undertaken by pregnant women and new mothers during the outbreak have not been explored, and women were not directly involved as participants in this project.

Further research might be particularly helpful in illuminating how women during or after pregnancy are seeking information on the internet. For instance, our findings on the Google browser are based on the analysis of all the first 10 results for the same search performed by different people over the study period. However, we acknowledge that in daily life women are unlikely to access all results and would rather pick just those which seem to capture their interest. Additionally, stakeholders might possess particular publishing conditions for their web sites so as to influence their position on the results list and thus the users' choices. Further exploration of women's behaviour and other influential factors related to web information choices would be beneficial.

Conclusion

This is the first study during COVID-19 that investigates the information offered to childbearing women and new mothers on the internet concerning coronavirus and related issues in perinatal care. In the light of our findings, there is the potential to positively impact the information and communication available online for women during the COVID-19 pandemic (and beyond). This may be achieved by increasing the online 'voice' of midwifery associations and by creating a system of ranking of sources of information that takes into account the quality of the contents offered so as to be more mother-baby and family-friendly. Further research, including women as participants, will illuminate the preferred means of information for women during the pandemic and on related issues. Explorations in different countries could provide insights into similarities and differences. The assumption of the use of the internet as the main vehicle for advice and information might not reflect the real circumstances of women in low-income countries. This study may also impact on education, given the role of media and the web in influencing the culture around birth and the increased access to online resources. Midwifery programmes would benefit from including specific sessions where women's behaviour in relation to information search and decision-making and the role of midwives in internet communication could be explored in depth.

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Conflict of Interest

This project was self-funded and no conflicts of interest were involved.

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