Medicines information needs during pregnancy: a multinational comparison

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ABSTRACT

Objectives: The aim was to assess the perceived needs of medicines information and information sources for pregnant women in various countries. Design: Cross-sectional internet-based study. Setting: Multinational. Participants: Pregnant women and women with children less than 25 weeks. Primary and secondary outcome measures: The need for information about medicines was assessed by a question: ‘Did you need information about medicines during the course of your pregnancy?’ A list of commonly used sources of information was given to explore those that are used. Results: Altogether, 7092 eligible women responded to the survey (5090 pregnant women and 2002 women with a child less than 25 weeks). Of the respondents, 57% (n=4054, range between different countries 46–77%) indicated a need for information about medicines during their pregnancy. Of average, respondents used three different information sources. The most commonly used information sources were healthcare professionals—physicians (73%), pharmacy personnel (46%) and midwives or nurses (33%)—and the internet (60%). There were distinct differences in the information needs and information sources used in different countries. Conclusions: A large proportion of pregnant women have perceived information needs about medicines during pregnancy, and they rely on healthcare professionals. The internet is also a widely used information source. Further studies are needed to evaluate the use of the internet as a medicines information source by pregnant women.

INTRODUCTION

Medicine use during pregnancy is common.1 2 Most pregnant women use at least one medication during pregnancy.3 4 There is also evidence of an increase in the use of medicines during pregnancy, from an average number of 2.5 in 1976–1978 to 4.2 in 2006–2008 in the USA.4 Pregnant women’s beliefs and risk perceptions influence their decisions on whether or not to use a medication during pregnancy.5 The availability and use of reliable information sources are therefore important to ensure safe and rational use of medicines during pregnancy. The increasing use of the internet and social media as a source of information and social support is challenging for the healthcare sector in trying to maximise its benefits and minimise its risks.

Health information needs and internet use of pregnant women have been studied more widely6–9 than the information needs concerning medicines in specific. Questions related to medicine use are among the four most important questions pregnant women have.10 Earlier studies have shown that some 40–80% of pregnant women have perceived information needs about medicine use during their pregnancy.2 11 12 The most
were advised to answer the questions related to their current or latest pregnancy.

The number of women who accessed the on-line questionnaire in the various countries was 9615. Of these women, 9483 (98.6%) accepted the participation in the study and filled in the questionnaire. Of these responses, 5090 were from pregnant women and 2002 from women with a child less than 25 weeks old. Thus, the final study population was 7092 (figure 1). The study population in each country was compared with the birthing population using national or population-based statistics (see online supplementary file 1).

The ethics approval for the study was obtained from the Norwegian Regional Ethics Committee. All data were handled and stored anonymously.

**Questionnaire**

The internet questionnaire, originally developed by researchers at the University of Oslo (AL and HN), was first translated into English and then into the respective languages of the participating countries. The study questions largely followed the ones used in the study by Nordeng et al.\(^2\)\(^5\) The questionnaire was piloted in four countries (Norway, Sweden, Finland and Italy) and only minor changes were made. The pilot responses were not included in the study dataset.

The questionnaire included the following sections: background information about the pregnant woman and her pregnancy; health disorders and use of medicines during pregnancy; needs for information; medicines for chronic diseases during pregnancy; attitudes towards using medicines in general and during the pregnancy; and perceptions of risks during pregnancy. Standardised questions about maternal factors were posed to the subjects, with emphasis on the presence of acute and long-term illnesses during pregnancy. In affirmative case, women were questioned about the use of medicines for each individual illness as free-text entry. This study analyses and reports on the data about the information needs.

**Main outcome measures**

Women were asked about their needs for information regarding the use of medicines during pregnancy and the sources of information they had used. The need for information was assessed by a question: ‘Did you need information about medicines during the course of your pregnancy?’ A list of commonly used sources of information was also given to explore the information sources used, and the respondent had a chance to mention other sources used (table 2).

**Statistical analysis**

The Statistical Package for Social Sciences, V.20 (SPSS Inc, Chicago, Illinois, USA) was used to analyse the data. Descriptive statistics were used to calculate the results, that is, frequencies, percentages and cross-tabulation.
RESULTS

Study population

The average age of the respondents was 29 years (interpercentile range 23–36; table 1). Of the respondents, 53% were primiparous, and 55% had a university or college degree. Overall, the mean age of our study populations is quite close to that of the target populations in each participating country (table 1). The percentage of primiparity was somewhat higher among our study participants than among most national populations. Likewise, our participants had a somewhat higher education when measured by the percentage of university or college graduates.

Information needs

Of the respondents, 57% (n=4054) stated having needed information about medicines during their pregnancy (figure 2). Respondents from Eastern Europe needed information the most (72%). The respondents in other regions of the world needed it less: Northern Europe 57%, Australia 56%, Western Europe 51% and North and South America 50%. The need for information varied between countries from 46% (the UK and Norway) to 77% (Finland).

Information sources

The most commonly used information sources were healthcare professionals, especially physicians (73%), pharmacy personnel (46%), midwives or nurses (33%) and the internet (60%; table 2). On average, the respondents used three different information sources. There were differences in the information sources used in different countries. Midwives and nurses were often asked for information in Northern Europe (50%), but they were rarely contacted in Eastern Europe (14%). On the other hand, the internet was most commonly used in Eastern Europe (75%). Pregnant women in Northern Europe (49%) used drug handbooks and information leaflets more often than women in other parts of the world. Drug information centres were commonly used in Australia (24%) and the USA (24%), but they were very rarely used in Eastern Europe (1%).

Table 1 Characteristics of the study population (n=7092), and comparative national population data (see online supplementary file 1)

<table>
<thead>
<tr>
<th></th>
<th>Age of mother Mean age (IPR)*</th>
<th>National data on age Mean age</th>
<th>Mother primiparous Per cent</th>
<th>National data on primiparity Per cent</th>
<th>Education, university/college Per cent</th>
<th>National data on education Per cent</th>
</tr>
</thead>
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<td>55</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Eastern Europe</td>
<td>1532 28 (22 to 34)</td>
<td>55</td>
<td>67</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>56</td>
<td>NA</td>
<td>72</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Croatia</td>
<td>174 30 (24 to 36)</td>
<td>59</td>
<td>47</td>
<td>62</td>
<td>44</td>
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</tr>
<tr>
<td>Poland</td>
<td>500 27 (21 to 32)</td>
<td>55</td>
<td>50</td>
<td>63</td>
<td>42</td>
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</tr>
<tr>
<td>Serbia</td>
<td>131 29 (25 to 34)</td>
<td>53</td>
<td>51</td>
<td>59</td>
<td>29</td>
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<tr>
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<td>50</td>
<td>49</td>
<td>71</td>
<td>43</td>
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<tr>
<td>Northern Europe</td>
<td>2184 29 (23 to 35)‡</td>
<td>52</td>
<td>54</td>
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<tr>
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<td>42</td>
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<td>49</td>
<td>42</td>
<td>48</td>
<td>48</td>
<td>55</td>
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<td>49</td>
<td>62</td>
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<td>Western Europe</td>
<td>2519 31 (25 to 37)</td>
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<td></td>
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<tr>
<td>The USA</td>
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<td>65</td>
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<td>52</td>
<td>43</td>
<td>68</td>
<td>70</td>
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<tr>
<td>South-American Countries</td>
<td>265 27 (20 to 34)</td>
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<td>42</td>
<td>NA</td>
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</table>

*Interpercentile range (IPR) calculated 10th to 90th percentile.
†Calculated based on 7028 values, because 64 values from Iceland were not available.
‡Calculated based on 2120 values, because 64 values from Iceland were not available.
§Not shown because 64 values were not available.
and complementary medicine personnel. On average, one-fourth of the respondents discussed medicine use with their family and friends.

DISCUSSION

This is the first study to assess women’s needs for medicine information during pregnancy on a multinational level. Over half of the pregnant women who responded to the internet survey in different countries indicated a need for information related to medicine use during pregnancy. Pregnant women used multiple information sources, however, healthcare professionals, especially physicians, being the most common. The internet was also a widely used information source for pregnant women. There were distinct differences in the perceived needs for information and sources of information used in different countries.

The fact that most of the pregnant women in this as well as previous studies report using healthcare professionals as a source is reassuring. Physicians are the key persons when counselling pregnant women on medicine use. However, our results show that the internet is also commonly used today in different regions of the world (ranging from 45% to 90%) by pregnant women. This is consistent with some previous studies. The differences in information sources used between different countries most probably reflect different situations in terms of antenatal care as well as available information sources in the countries. For example, in Eastern Europe, where women did not

**Table 2** Medicines information sources used by pregnant women (n=4054)

<table>
<thead>
<tr>
<th>Region</th>
<th>Physician, gynaecologist, specialist (%)</th>
<th>Internet (%)</th>
<th>Pharmacy personnel (%)</th>
<th>Drug handbook, information leaflet (%)</th>
<th>Midwife, nurse (%)</th>
<th>Family, friends (%)</th>
<th>Drug information centre (%)*</th>
<th>Other (%)†</th>
</tr>
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<tr>
<td>Total (n=4054)</td>
<td>73</td>
<td>60</td>
<td>46</td>
<td>35</td>
<td>33</td>
<td>24</td>
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<td>7</td>
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<td>Eastern Europe (n=1095)</td>
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<td>75</td>
<td>46</td>
<td>32</td>
<td>14</td>
<td>29</td>
<td>10</td>
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<td>34</td>
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<td>30</td>
<td>3</td>
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<td>Serbia (n=88)</td>
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<td>7</td>
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<td>54</td>
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<td>23</td>
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<td>The USA (n=124)</td>
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<tr>
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<td>23</td>
<td>16</td>
<td>9</td>
<td>31</td>
<td>3</td>
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</tbody>
</table>

*Poison information centres, teratology information services and national centres of information on medicines.
†Herbal shop personnel, complementary medicine personnel, magazines, media and books.
often use midwives or nurses as information sources, the
use of the internet was most common. On the other
hand, in Australia the use of drug information centres
was high, most probably because of the availability of
such centres. The prevalent use of the internet is chal-
lenging for healthcare professionals. Increased aware-
ness and readiness to accept this is necessary to ensure a
rational approach towards the use of the internet in
health contexts.

Our findings may reflect that pregnancy is a special
time when the need for information is great, but the
findings could also be a more general cohort effect
reflecting the generations of young women today. The
societal change in the information society is concretised
by Palfrey and Gasser’s definitions of ‘Digital Natives’
as those generations born after 1980 and ‘Digital
Immigrants’ as those born before 1980. Thus, the new
generations internalise new forms of information and
communications technologies from childhood in a way
that has not happened before. Information about medi-
cines is readily available for everyone and Digital Natives
find it and use it particularly easily. In this study, the
average age of the respondents was 29 years, indicating
that most of them were Digital Natives, and thus natural
internet users.

The development of the information society and
eHealth initiatives is aimed at empowering the consumer
and client. This is also in line with current trends in
healthcare from paternalism towards concordance. At the
same time, the role of healthcare professionals
should expand from a mere information provider to a
supporter of care of an empowered patient. Healthcare
professionals need to be ready to discuss any topics
raised on health and medicines information although
there are some reports indicating that pregnant women
are not very prone to discuss information retrieved from
internet with their midwife. Healthcare professionals
need to discuss with their clients about what information
sources they use, interpret health information and tailor
it to specific needs. Moreover, there is also a growing
need to assess the quality of information with clients. It
is important to promote the use of tools such as the
DARTS checklist for the assessment of the quality of
online medicines information.

eHealth functions are much broader than just medi-
cines information, as they include functions such as
health information networks, electronic health records,
health portals and all kinds of tools to assist prevention,
diagnosis, treatment, health monitoring and lifestyle
management. As such, this major change in the

Figure 2  Women’s perceived need for information about medicines during pregnancy.

Medicines information needs during pregnancy

healthcare sector also changes the way the medicines information is delivered to medicine users. In fact, there is a need for being prepared to increase visibility and participation of healthcare professionals on the internet and social media to balance lay views on issues related to health and medicines. In the European Union, an eHealth action plan was adopted in 200418 aimed at facilitating a more harmonious and complementary European approach to eHealth. The action plan is currently being revised.19

One limitation of our study is the fact that the questionnaire was only available through internet websites used by pregnant women. Using this kind of approach, a conventional response rate cannot be calculated. However, epidemiological studies using web-based recruitment methods have shown reasonable validity.20–22 Internet use is relatively high among individuals aged 25–34 years in Europe, ranging from 48% in Russia to 100% in Iceland.23 The internet penetration rates in other parts of the world vary, being highest in the USA, Australia, and Canada (80–94%) and lowest in South America (48%).24–26 Thus, the degree to which our findings can be extrapolated to the target population is based on the representativeness of the respondents to the general birthing populations in each country. Overall, the age structure of our study population match quite well with the target population in each participating country. However, as in most questionnaire-based studies, the participating women had somewhat higher educational level than the general birthing populations in each country. It is commonly known that more resourceful individuals tend to be more favourable to participate in questionnaire-based studies.27 This is likely the case for this study as well since the study population is better educated than the general birthing population. As women with higher education tend to seek information and to a larger degree use several sources,28,30 we might have overestimated the need for information about medicines during pregnancy. Among our study population, we had also somewhat more primiparous women indicating a higher need for medicines information in this subgroup. Finally, we do not know which internet websites the respondents have used. Some of the information used may be highly reliable and relevant, while others may be unreliable or biased.

In conclusion, a large proportion of pregnant women report the need for information about medicines during pregnancy, and they rely on healthcare professionals. The internet is also a widely used information source across the countries in this study. Further studies are needed in order to evaluate internet use as a medicines information source by pregnant women.

Contributors HN and AL conceived and collected data for the main study ‘Medication Use in Pregnancy—an International study’. KH-A, JJ, HE, HN and AL conceived this substudy. EK performed the statistical analysis and KH-A wrote the first draft of the manuscript. All the authors contributed to the interpretation of the results and to the final manuscript. All the authors read and approved the final manuscript.

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Data sharing statement No additional data are available. Researchers can apply for data access for subprojects within the overall aims of the main study ‘Medication Use in Pregnancy—an International Study’.

REFERENCES

19. Commission of the European Communities. eHealth action plan was adopted in 2004 aimed at facilitating a more harmonious and complementary European approach to eHealth. The action plan is currently being revised.