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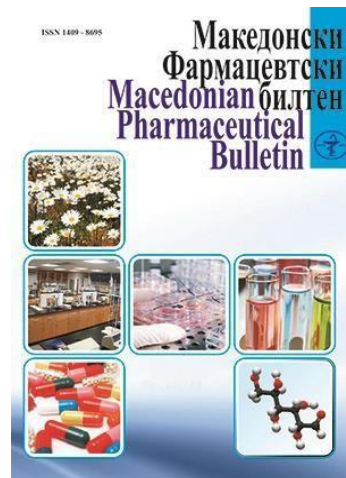
Accepted Manuscript

Title: Assessment of awareness and utilization practices of prenatal supplements use among pregnant women: a pilot study from North Macedonia

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DOI:

Received date: May 2026

Accepted date: August 2026

UDC:

Type of paper: Original scientific paper

Mac. Pharm. Bull. 73 Vol. (1) 2027

Please cite this article as:

Assessment of awareness and utilization practices of prenatal supplements use among pregnant women: a pilot study from North Macedonia

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Abstract

Prenatal supplements are essential component of maternal healthcare during pregnancy, since they help meet the increased nutritional demands of pregnant women, as well as support optimal fetal growth and development. However, their appropriate use depends on the level of awareness and the availability of relevant information. The aim of this study was to provide assessment of the practices of utilization and level of awareness regarding prenatal supplements among pregnant women. A cross-sectional, small-scale study was performed in a specialized gynecology clinic using a structured questionnaire, resulting in 96 surveys. The data were collected and analyzed using Jamovi software. The results demonstrated a high level of prenatal supplement use, in 93.75% of the cases. In addition, the most used supplement was folic acid, with 78 cases. The pregnant women presented moderate self-perceived level of awareness about the use of prenatal supplements and positive experiences regarding their uses, as well as respect to the recommended dosage. The statistical analysis did not identify a significant association between the use of prenatal supplements and participants' age, place of residence, or trimester of pregnancy, and no significant association was found in respondents' education and the use of prenatal supplements. Doctors were most consulted for advice on prenatal supplements use (82.1%). The majority of respondents also expressed the need for additional education on prenatal supplements use, that asks for institutional efforts to ensure the provision of more accurate and accessible information regarding the use of prenatal supplements.

Keywords: pregnancy, prenatal supplements, awareness, prenatal care

Introduction

Pregnancy is a period characterized by pronounced physiological changes, intensified metabolic processes, and increased requirements for vitamins, minerals, and other essential nutrients. Consequently, the use of dietary supplements during the prenatal period has attracted considerable attention from international health organizations and the scientific community over the years. Accumulating evidence suggests that the early-life environment, influenced by multiple biological, environmental, and behavioral exposures, has profound effects on health trajectories throughout life. Accordingly, optimal maternal nutrition and healthy lifestyle behaviors during the periconceptional period are key factors influencing the health of offspring from childhood into adulthood (Chapin et al., 2004). Research has shown that pregnant women use supplements, but the use does not always adhere to existing guidelines and healthcare practitioners' recommendations (Koivuniemi et al., 2022; McCarthy et al., 2024). Furthermore, inadequate knowledge of nutrition and dietary supplementation, together with limited health literacy, has been identified as a factor associated with the inappropriate use of supplements (Furness et al., 2023; Le et al., 2023; Popa et al., 2013). The World Health Organization (WHO) has repeatedly issued recommendations regarding the use of iron, folic acid, and multiple micronutrient supplements during pregnancy, emphasizing that their appropriate use may contribute to reducing the risk of certain adverse maternal and fetal outcomes (WHO, 2012; 2016; 2020). Despite the availability of numerous clinical guidelines, their implementation in everyday practice still depends on many factors, including supplement accessibility, the level of awareness, trust in healthcare professionals, and the attitudes of pregnant women.

In North Macedonia, the only official document that partially addresses this issue is the Clinical Guideline for the Detection of High-Risk Conditions in Pregnancy, published by the Ministry of Health (MOH) in 2018, primarily focused on the identification of high-risk pregnancies rather than on the use of prenatal supplements (MOH, 2018). Therefore, this pilot study was conducted among pregnant women with the aim of assessing the awareness and utilization practices related to the use of prenatal supplements and determining the factors influencing their choice and use.

Materials and methods

The study was conducted using a survey designed to meet the purpose of the research, after literature and practice consultation. The questionnaire was face-validated by four related professionals, including a gynecology specialist, a hospital pharmacist, a toxicology specialist and academic pharmacist for content and understandability. The study was approved by the Ethics Committee of the Faculty of Medical Sciences at Goce Delcev University in Stip (No. 2005-212/4 from 11.9.2025). All participants provided informed consent prior to their inclusion in the study. The study was conducted during the period from September-November 2025 at the Specialized Hospital for Gynecology and Obstetrics “Dr. Organdziski” in Stip, Republic of North Macedonia. A total of 96 surveys were collected and analyzed using the Jamovi statistical software package (The Jamovi Project, 2024). Results were presented as frequencies and percentages, whereas associations between selected variables were assessed using the chi square (χ^2) test with using Fisher’s exact test where appropriate. The findings were compared with results from relevant international studies to facilitate scientific interpretation and contextualization.

Results and discussion

Demographic characteristics of the population

The majority of survey participants were between 25 and 35 years of age, predominantly residing in urban areas, and had either secondary or university education. Regarding pregnancy stage, most participants were in the second, followed by third trimester, and more than half respondents (55; 57.3%) were experiencing their first pregnancy. The details of the demographic structure of the survey participants are presented in Table 1.

Table 1

Assessment of practices and awareness of prenatal supplements

The survey demonstrated high prevalence of prenatal supplement use among the participants. Of the total 96 respondents, 90 (93.75%) reported using prenatal supplements during pregnancy, whereas 6 (6.25%) indicated that they did not use these types of products. This result suggests that prenatal supplementation is a widely adopted practice among the pregnant women

included in the study. In addition, the patients had moderate self-perceived level of awareness about the use of prenatal supplements, assessed by answering the question “How informed are you about the need, purpose, and importance of prenatal supplements?”. More than half of them (n=56, 58.9%) reported being partially informed, 32 participants (33.7%) stated that they were highly informed, and 2 participants (2.1%) considered themselves insufficiently informed, while 5 participants (5.3%) did not provide an answer to this question.

The surveyed pregnant women presented high awareness about the composition and type of supplements they use. Folic acid (n=78) and magnesium (n=72) were the most frequently recognized components of prenatal supplements among the respondents. Vitamin D3 was identified by 56 participants, iron by 39 participants, omega-3 fatty acids by 39 participants, calcium by 21 participants, and probiotics by 14 participants, while 7 participants reported other components. As multiple responses were permitted, the total number of responses exceeded the number of participants.

The question “What was the source of the information and/or recommendation you received prenatal supplements?”, resulted in a majority of respondents reporting recommendations from a doctor (n=78; 82.1%). Other sources of information, such as pharmacists, family members, internet sources, or various combinations thereof were represented with significantly lower frequencies, counting from 1 to 4 responses.

The surveyed pregnant women were open to additional education and information on prenatal supplements. Therefore, 63 respondents (65.6%) expressed a willingness to receive additional education, 15 respondents (15.6%) answered negatively, while 18 respondents (18.8%) remained undecided. The predominance of positive responses suggests a substantial demand for more structured and accessible information regarding the use of prenatal supplements during pregnancy.

Data related to experiences following prenatal supplement use revealed generally positive outcomes among the respondents. Changes following supplement use, were perceived beneficial by 46 respondents (47.9%), whereas experience of adverse effects was reported by only one respondent (1.1%). A total of 73 respondents (76.8%) reported being satisfied with the observed effects 17 (17.9%) reported being highly satisfied, and only 5 (5.3%) not satisfied. Almost all respondents, namely 94 (97.9%), stated that they would not increase the dosage on their own

initiative, suggesting a responsible approach to supplement use and adherence to professional recommendations.

In order to determine whether prenatal supplement use differed according to selected sociodemographic and pregnancy-related characteristics, further statistical analysis was performed. The analysis confirmed that there were no statistically significant differences in supplement use with respect to age ($\chi^2=2.95$; $p=0.229$), place of residence ($\chi^2=1.00$; $p=0.317$), and trimester of pregnancy ($\chi^2=1.89$; $p=0.389$). These findings suggest that prenatal supplement use was common across different groups of pregnant women and was not significantly associated with the examined demographic and obstetric characteristics.

Regarding educational level (Figure 1), the chi-square test indicated a statistically significant association ($\chi^2=6.85$; $p=0.032$) of the level of education and the use of supplements. However, having respect to low frequencies and binary answer (yes/no), Fisher's exact test was also performed, revealing no significant association ($p=0.145$).

These findings suggest that the observed relationship should be interpreted with caution and further studies involving larger samples are needed to determine more accurately whether educational attainment influences prenatal supplement use during pregnancy.

Fig. 1

The recommendations of the World Health Organization, emphasize the importance of iron and folic acid supplementation during pregnancy for reducing the risk of maternal anemia and supporting appropriate fetal development, particularly in populations at increased risk of nutrient deficiencies (WHO, 2012; WHO, 2016). The reported use of prenatal supplements in North Macedonia was considerably higher in comparison with reports from other countries (93,75%). For example, in Ethiopia, the registered very low use of supplements during pregnancy (87.5%) has been associated with limited awareness, reduced access to healthcare services, and economic barriers (Mekuriaw et al., 2025). Nevertheless, variable results on this subject were reported from around the globe (Harrison et al., 2024; Koivuniemi et al., 2022; McCarthy et al., 2024; Ramírez-Vélez et al., 2018), exploring different factors that influence prenatal supplement consumption. The higher prevalence observed in the present study may be related to better access to gynecological care and prenatal supplements. International organizations also highlight that the

regular and appropriate use of prenatal supplements is influenced by women's awareness, supplement accessibility, and the guidance provided by healthcare professionals (WHO, 2020).

Frequent supplement use does not necessarily indicate adequate knowledge regarding their composition, purpose, recommended dosage, and possible adverse effects. The respondents from this study, indicated "partially informed" as most frequent answer, suggesting that the majority of respondents possess a certain level of awareness regarding the need for and importance of prenatal supplements, but without full confidence that they have sufficient information. This result reveals a distinction between having basic knowledge and achieving a complete understanding of their application during pregnancy. At the same time, one third of the respondents reported being highly informed, revealing the presence of a group of women who are actively interested in pregnancy-related issues and regularly seek information regarding their own health. Regarding the received healthcare professional guidance, the respondents from this study indicated 82,1% of the women consulting their doctor regarding supplementation, which indicates using relevant source of information. Respondents from studies performed in other countries, reported using most advice from their midwife/nurse 80.4% and 74.4% in Finland and the UK respectively, and doctor/general physician 66.9% 76.2% in Italy, and Poland, respectively (Koivuniemi et al., 2022). The use of prenatal supplements was shown to be closely associated with continuous information and regular counseling during pregnancy, which enables women to better understand their purpose, significance, and proper use (Funnell et al., 2018). These results are also interesting from a national context perspective. In North Macedonia there is no specifically dedicated document that comprehensively addresses the use of prenatal supplements. Under such circumstances, pregnant women's knowledge largely depends on information obtained during medical visits and from sources they independently use. In addition, this result reveals a high level of trust in professional medical advice, which is expected given that the selection and use of these supplements often depend on the course of pregnancy and the woman's health status. It is interesting to note that information found online presented considerably lower share of answers as a standalone source of information/recommendation, although in some other studies it is reported as most commonly used source of information on supplementation during pregnancy (Limbu et al., 2021). This finding is particularly relevant considering that the quality of information available on the internet is not always consistent, and social media and forums often contain incomplete or contradictory content, and in many cases even incorrect information (Skowrońska et al., 2024). The presence of combined

responses indicates that some women use multiple sources to verify or better understand the recommendations they receive, a finding also reported in other studies (Millan et al., 2022). This distribution of responses suggests that the doctor remains the primary source of information and the person in whom women place the greatest trust when making decisions related to prenatal supplementation, while regular counseling contributes to higher adherence to recommendations (Funnell et al., 2018). The expressed interest in additional education reported in this study accounting for 65.6% is particularly relevant considering that appropriate nutritional care and supplementation during pregnancy have been associated with improved maternal health and a lower risk of adverse neonatal outcomes (Oh et al., 2020).

Knowledge of product composition represents one of the fundamental prerequisites for appropriate and informed use when it comes of prenatal supplements. The ability of pregnant women to recognize the key components of the supplements they use can be considered an important indicator of health literacy and informed decision-making during pregnancy. Folic acid was the most frequently recognized component, likely due to its long-standing inclusion in recommendations issued by international health organizations as an essential element of prenatal care (EFSA, 2017; WHO, 2012; 2016). The high frequency of this response suggests that a substantial proportion of participants were aware of one of the most widely recommended ingredients in prenatal supplements. Although iron is among the nutrients that are also frequently recommended by the WHO during pregnancy (WHO, 2012; 2016), its recognition among participants was considerably lower than that of folic acid and magnesium. This finding may indicate that awareness of certain prenatal nutrients varies substantially and is influenced by the extent to which they are emphasized during health education and counseling provided throughout pregnancy.

Prenatal supplement use was highly prevalent among the respondents, accompanied by a relatively good level of awareness, positive personal experiences, and trust in recommendations provided by healthcare professionals. The low frequency of perceived adverse effects, and the high level of satisfaction reported by participants, along with the adherence to recommended dosages, suggest that supplement use has become a common and well-established practice during pregnancy. Particularly interesting is the fact that these findings were obtained in a setting where clearly defined national guidelines, standardized educational programs, and continuous institutional activities related to prenatal supplementation remain limited. Nevertheless, the results

received in this small-scale study indicate that opportunities remain for improving the availability and consistency of information provided to pregnant women, especially in the form of structured information, despite the widespread use of prenatal supplements. The development of national guidelines, accessible educational materials, and consistent recommendations across healthcare institutions could contribute to a better understanding of prenatal supplementation and support more informed decisions regarding supplement use during pregnancy.

Conclusion

The findings obtained through this research provided interesting insights into this insufficiently explored topic and establish a basis for further investigations, as well as for the development of appropriate public health policies and evidence-based recommendations regarding the use of prenatal supplements during pregnancy. In the absence of structured national guidelines and scarce presence of organized educational programs, pregnant women demonstrated a relatively good level of awareness and a responsible approach to prenatal supplement use, consulting primarily their doctors as their primary source of information. Looking ahead, strengthening national recommendations and adopting a more structured approach to prenatal supplementation education would help ensure that pregnant women have equitable access to reliable, evidence-based information, thus improving overall public health.

Acknowledgement

The authors acknowledge the support of Specialized Hospital for Gynecology and Obstetrics “Dr. Organdziski” in Stip, Republic of North Macedonia for providing the premises where this research was conducted.

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Резиме**Проценка на информираноста и практиките на употреба на пренатални суплементи кај бремени жени: пилот-истражување од Северна Македонија**

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Клучни зборови: бременост, пренатални суплементи, информираност, пренатална грижа

Пренаталните суплементи претставуваат суштински дел од здравствената грижа за мајката во текот на бременоста, бидејќи придонесуваат кон обезбедување на дополнителен внес на неопходни нутриенти при зголемените потреби во бременоста, како и кон поддршка на оптималниот раст и развој на плодот. Сепак, нивната соодветна употреба зависи од нивото на информираност и достапноста на релевантни информации. Целта на ова истражување беше да се проценат практиките на употреба и нивото на информираност во однос на пренаталните суплементи кај бремени жени. Спроведено е пилот-истражување во специјализирана гинеколошка здравствена установа, со примена на структуриран прашалник, при што беа опфатени 96 испитанички. Податоците беа собрани и анализирани со помош на статистичкиот софтвер Jamovi. Резултатите покажаа висока застапеност на употребата на пренатални суплементи, односно кај 93,75% од испитаничките. Најчесто употребуван суплемент била фолната киселина, пријавена кај 78 испитанички. Бремените жени покажаа умерено ниво на информираност за употребата на пренаталните суплементи, при што најголем дел од нив се изјасниле дека се делумно информирани, но исто така пријавиле претежно позитивни искуства во однос на нивната употреба и придржување кон препорачаното дозирање. Статистичката анализа не покажа значајна поврзаност помеѓу употребата на пренатални суплементи и возраста, местото на живеење или триместарот на

бременоста, ниту значајна поврзаност помеѓу степенот на образование и употребата на пренатални суплементи. Докторот претставува најчесто консултиран извор на совети во однос на употребата на пренатални суплементи (82,1%). Поголемиот дел од испитаничките, исто така, изразија потреба од дополнителна едукација за употребата на пренаталните суплементи, што укажува на потребата од институционални активности насочени кон обезбедување на попрецизни и подостапни информации за нивната соодветна употреба.

Table 1. Demographic characteristics of the studied population

Variable	Category	N (%)
Total		96
Age distribution		
	< 25	4 (4.2%)
	25-35	83 (86.5%)
	35-45	9 (9.4%)
	> 45	/
Residence		
	Rural	13 (13.5%)
	Urban	83 (86.5%)
Education level		
	Primary education	2 (2.1%)
	Secondary education	47 (49.0%)
	University degree	47 (49.0%)
Pregnancy trimester		
	First	21 (21.9%)
	Second	39 (40.6%)
	Third	36 (37.5%)

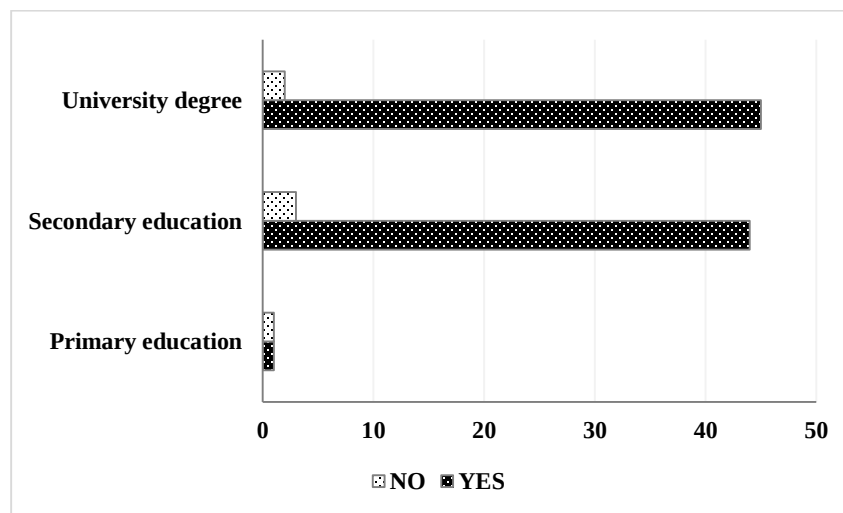


Fig. 1. Association of the level of education and use of prenatal supplements.