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Analysis of the current situation and demand for perinatal education in pregnant women in general grade A tertiary hospitals in China: a cross-sectional survey

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ABSTRACT

Objectives This study aimed to assess the factors influencing pregnant women's participation in perinatal education and their demand for educational courses.

Design A cross-sectional study.

Setting Tertiary hospital in Suzhou, China, July–September 2022.

Participants Pregnant women from a general grade A tertiary hospital in Suzhou were recruited via online survey invitations during the specified period.

Measures A self-designed scale was used to evaluate pregnant women's demand for perinatal education. Multiple response sets were employed for the assessment of multiple-choice items and analyses included frequency and cross-tabulation. Logistic regression analysis was conducted to assess the factors influencing pregnant women's participation in perinatal education.

Outcome The primary outcome measured was the demand for perinatal education among pregnant women.

Results A majority (53.8%) of pregnant women expressed a preference for a mixed teaching mode combining online and offline formats. Logistic regression analysis showed that education level significantly influenced pregnant women's participation in online learning. Specifically, women with higher education levels were more likely to participate actively in online courses. Additionally, compared with those with first-born children, pregnant women with second-born children participated less actively in online learning. Pregnant women in their second and third trimesters showed greater engagement in online learning compared with those in their first trimester.

Conclusions These findings indicate that Chinese pregnant women's preferences for perinatal education are influenced by their educational background, pregnancy history and the mode of teaching employed. The variability in educational needs underscores the importance of regularly updating course content based on participant feedback.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ The study used a cross-sectional survey to accurately capture the perinatal educational needs of pregnant women. Insights gained from this study can inform the development of educational programmes tailored to the content and learning preferences of pregnant women.
⇒ The study was conducted in a single hospital, potentially limiting the generalisability of the findings to broader populations of pregnant women.
⇒ Being a cross-sectional study, participants' assessments of course effectiveness may be influenced by recall bias and other biases inherent to this study design.
⇒ These data must be confirmed by involving samples of pregnant women belonging to other cultural contexts.

INTRODUCTION

The perinatal period encompasses the time surrounding childbirth, typically from 28 weeks of pregnancy to 1-week postdelivery and includes stages such as antepartum, intrapartum and post partum.[1] During this period, pregnant women often experience a state of suboptimal health, which is associated with various gynaecological conditions and adverse neonatal outcomes.[2–4] Globally, issues such as high maternal mortality rates, perinatal complications, fetal demise and recurrent spontaneous abortion persist and require ongoing improvement.[5 6] Research indicates a shift in the causes of pregnancy-related deaths from obstetric complications to chronic diseases of the cardiovascular system and other non-communicable illnesses. Maternal mental health, nutritional status, premature birth, abortion and birth defects have emerged as new challenges in maternal and child health.[7 8] Therefore, effective management during the perinatal period is crucial to ensuring the safety and well-being of both mothers and infants.

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Perinatal education serves as a primary method for delivering crucial health information and has been shown to promote positive health behaviours among pregnant women. Conducted primarily by healthcare professionals, it tailors content to the specific characteristics of each stage of the perinatal period. The objectives include enhancing psychological, physiological, cultural and social adaptation abilities through face-to-face teaching and interactive communication with pregnant women and their families.[9 10] This approach aims to impart knowledge about the perinatal period and family care skills.[9] Active participation in prenatal care services has been linked to improved self-care practices and reduced incidences of perinatal complications and adverse pregnancy outcomes.[11–13] Studies have confirmed that effective prenatal health education can prevent maternal and neonatal mortality, reduce the occurrence of dystocia and minimise perinatal complications.[14 15] Furthermore, it has been shown to increase breastfeeding rates and decrease maternal anxiety and depression.[16–19] Thus, effective perinatal education stands as a cornerstone for enhancing perinatal health outcomes. However, current perinatal health education often fails to align with the actual needs of pregnant women. Studies indicate that existing health education models may not suit local populations,[20] contributing to a discrepancy between standard prenatal education and women's actual requirements, thereby limiting their knowledge of maternal and child health.[21 22] Consequently, many critical issues faced by mothers and infants are overlooked in mainstream health education efforts, resulting in outdated educational materials that do not adequately address the health education needs of pregnant women.

Currently, pregnancy health education predominantly occurs through offline and online modalities. Offline education necessitates simultaneous learning and teaching in the same physical space.[23] However, due to constraints in time and space, offline education encounters challenges such as low maternal compliance and limited scalability.[21 24 25] In contrast, online learning refers to both synchronous and asynchronous learning using various internet-enabled devices.[26] Online education overcomes the limitations of time and space associated with offline methods. Previous studies have demonstrated that online education positively impacts diet control, weight management and mental health among pregnant women.[27–30] Despite both methods enhancing pregnancy knowledge, pregnant women's preferred learning styles and comparative evaluations of educational effectiveness between the two approaches remain underexplored in clinical settings.

Therefore, the primary focus for pregnant women during the perinatal period has evolved, potentially rendering current perinatal education content inadequate to meet their contemporary needs. This study aims to investigate the influencing factors and educational requirements of perinatal education among pregnant women through a survey conducted at the First Affiliated Hospital of Soochow University.

METHODS AND MATERIALS

Study design, area and period

A cross-sectional survey was conducted at the First Affiliated Hospital of Soochow University. This hospital's obstetrics department offers year-round prenatal care services, with approximately 4000 pregnant women receiving antenatal care annually and about 3500 deliveries per year. Pregnant women treated in the obstetrics department between July 2022 and September 2022 were invited to participate in this study. Participants who agreed to take part were instructed to complete an online survey.

Study subjects

All pregnant women meeting the inclusion criteria and receiving care at a general grade A tertiary hospital in Suzhou City during the data collection period were included in the study.

Inclusion and exclusion criteria

Inclusion criteria: Pregnant women at ≥12 weeks of gestation. Exclusion criteria: (1) Pregnant women with a history of mental illness. (2) Pregnant women with learning disabilities. (3) Pregnant women with incomplete clinical data.

All pregnant women participated voluntarily in this study.

Sample size determination and sampling procedures

The sample size was calculated using the single population proportion formula[31]:

$$n = \frac{(Z_{1-\alpha/2})^2 P(1-P)}{d^2}$$

Where n is the sample size; $Z_{1-\alpha/2}$ is the standard normal variable corresponding to a 95% confidence level, which is 1.96. P is the estimated overall demand rate of pregnant women for perinatal health education. Based on Junqing *et al*,[32] P was assumed to be 43.3%. d (the margin of error) was 0.05. Considering a non-response rate of 20%, the calculated sample size was 453. Convenience sampling was employed to recruit participants for data collection.

Patient and public involvement

Pregnant women participated as respondents in our online survey, providing anonymised individual data (responses to survey questions) necessary for subsequent analysis. They were not involved in the study design, dissemination of study results or any other research aspect beyond data provision.

Study variables

Dependent variables included online learning status and offline learning status. Independent variables included sociodemographic characteristics (eg, age, education level, occupation, income, pregnancy and gestation history), preferred teaching methods, topics of primary concern, expected main companion during the perinatal period, anticipated online courses and evaluation of online or offline course effectiveness. Sociodemographic

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characteristics have been established as influencing factors in pregnant women's perinatal health knowledge acquisition, as indicated in previous research. The selection of other variables was tailored specifically for this study, with pregnant women choosing corresponding items based on their perinatal education experiences.

Data collection tools and procedure

After extensive literature review and consultations with obstetrical nurses and medical experts, we designed a questionnaire to assess the demands of pregnant women for perinatal education. The questionnaire consisted of two parts: general information and demands for perinatal education, totalling 41 items. These items included both single-choice and multiple-choice items. In this study, the questionnaire demonstrated good internal consistency with a Cronbach's α coefficient of 0.649. The validity of the questionnaire was evaluated using the Kaiser-Meyer-Olkin measure, yielding a value of 0.923, and Bartlett's Test of Sphericity, which was significant (p<0.001). These results indicate that the questionnaire has acceptable validity for assessing the demands of pregnant women for perinatal education in this study.

In this study, an online questionnaire was used for data collection, facilitated by distribution through obstetric nurses. Detailed explanations regarding the study's purpose, significance and guidelines for completing the questionnaire were provided to pregnant women. Prior to participation, pregnant women were required to complete a consent form. To ensure data quality and completeness, there was no time constraint for completing the questionnaire. After data collection, rigorous measures were implemented to review and refine the dataset. Invalid entries were systematically excluded, defined as instances where all questionnaire items were answered by selecting the same option number, responses were unclear or inconsistent, or there were incomplete sections within the questionnaire. The validity of the questionnaire was independently assessed by two researchers to maintain data integrity and reliability for analysis.

Data processing and analysis

Data statistical analysis was conducted by using IBM SPSS V.25.0. Categorical data were presented as percentages (%) while continuous data were expressed as mean±SD. These descriptive statistics were used to summarise general information about pregnant women, as well as their status and needs regarding perinatal education. Multiple response sets were established for multiple-choice items and analyses included frequency distributions and cross-tabulations. Binary logistic regression analysis was performed to explore associations among relevant variables identified in single-factor analyses, incorporating factors such as education level and pregnancy history. Results were reported as adjusted ORs with 95% CIs, and statistical significance was set at p<0.05.

RESULTS

Sociodemographic characteristics of pregnant women

A total of 508 questionnaires were collected, of which 504 were deemed valid, resulting in an effective rate of 99.21%. The average age of the 504 pregnant women was 29.84 years, with an average gestational age of 31.20 weeks. Among them, 349 (69.2%) were expecting their first child, 136 (27.0%) their second child and 19 (3.8%) their third child. Additional demographic details are presented in online supplemental table 1.

Demand of pregnant women for perinatal education

Teaching methods preferred by pregnant women

All 504 pregnant women were selected among various free teaching methods, ranking their preferences as follows: online and offline mixed teaching (53.8%), online teaching only (28.4%), other methods (12.7%) and offline teaching only (5.2%). Sources through which pregnant women accessed perinatal knowledge included medical staff (19.4%), social media (18.3%), online teaching platforms (16.4%), advice from friends and relatives (15.6%), books (12.1%), other sources (9.8%), and offline teaching (8.4%).

Topic of most concern

The primary topics of concern for pregnant women were fetal growth and development (38.9%), neonatal feeding and nursing (22.4%), preparation for delivery (14.9%), postpartum rehabilitation (14.7%), antenatal care (6.5%) and other topics (2.6%).

Expected main companion and online courses in perinatal period

As significant supporters, husbands were the most anticipated companions for pregnant women (85.3%), with 47.4% of pregnant women expecting their husbands to participate throughout the entire perinatal education course. Regarding the feasibility of replacing offline courses with online alternatives, 38.7% of pregnant women and 43.1% of main companions believed that online courses could effectively substitute for offline ones. Additionally, 89.7% of pregnant women and 88.3% of main companions expressed interest in comprehensive online courses in the future.

Preferred forms of online courses among pregnant women included live webcast video courses (52.4%), network-recorded video courses (31.35%), live webcast audio courses (12.7%) and network-recorded audio courses (3.6%). Expectations and requirements for implementing online education for pregnant women included accessibility through easy, convenient and quick operation (23.5%); flexible learning schedules with the ability to replay content (22.3%); scientific, practical and engaging course content (16.4%); high interactivity of online courses (13.6%); integration of theoretical learning with practical offline training (12.6%) and establishment of a feedback mechanism to timely optimise course content (7.9%).

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Effects of online and offline courses

In this study, 30.6% of pregnant women had received offline course education while 42.5% had participated in online course education. Among the 154 pregnant women who attended offline courses, 61.0% were able to attend them punctually. Evaluation of the effects of offline courses revealed that: 96.8% of pregnant women believed offline courses improved their understanding of perinatal knowledge. 97.4% found offline courses practical to use. 94.8% felt they could actively engage in offline courses. 89% believed offline courses met their individualised needs. Among the 214 pregnant women who participated in online courses, 75.2% attended these courses on time. Evaluation of the effects of online courses showed that 97.9% of pregnant women believed online courses improved their understanding of perinatal knowledge. 98.6% found online courses practical to use. 89.7% felt they could actively participate in online courses. 84.1% believed online courses met their individualised needs.

Influencing factors of online and offline perinatal education

Influencing factors of offline education

Among the 154 pregnant women who participated in offline courses, the perceived advantages included better integration of theory and practice (23.4%), ability to receive timely answers to questions and provide personal feedback (19.9%), more opportunities for hands-on practice (19.6%), facilitation of personal participation through good interaction (19.6%) and timely adjustment of course content to meet individual needs (14.2%).

Disadvantages of offline courses as perceived by participants included limitations in time and space (46.6%), restriction to a single learning method without the ability to replay or review courses (25.6%) and lack of flexibility in course selection due to fixed course themes (19.7%).

In addition, 350 pregnant women provided reasons for not participating in offline courses, including lack of time (36%), other personal reasons (21.5%), perception that offline courses are more time-consuming (17%), lack of a companion course attendance (9.6%), unavailability of offline courses from their obstetric care provider (7.2%), needing only regular obstetric examinations (3.8%), hiring of full-time maternity matrons/nursery teachers for postpartum care (3.4%) and already possessing sufficient knowledge of perinatal care (1.5%).

Influencing factors of online education

Among the 214 pregnant women who participated in online courses, perceived advantages of online education included freedom from time and location constraints (29.75%), flexibility in course selection unaffected by physical conditions or travel inconvenience (25.3%), ability to choose courses based on personal interests (22.3%), option to replay and review course materials (21.0%) and other perceived advantages (1.7%).

Disadvantages of online courses as perceived by participants were lack of classroom interaction (26.3%), limited opportunities for personal practical experience (24.9%), inability to immediately resolve personal doubts and problems (23.6%), difficulty for teachers to gauge participants' comprehension and engagement in real-time (18.3%) and other disadvantages (6.9%).

Additionally, 290 pregnant women provided reasons for not participating in online education, including lack of time (37.5%), other personal reasons (33.8%), unavailability of online courses from their obstetric care provider (11.5%), needing only regular obstetric examinations (6.6%), cumbersome network operation procedures (4.6%), hiring of full-time maternity matrons/nursery teachers for postpartum care (3.4%) and already possessing sufficient knowledge of perinatal care (2.6%).

Influencing factors of pregnant women's participation in perinatal education

The results presented in online supplemental table 2 indicated that age, nationality, education level, occupation, income, pregnancy and gestation history showed no correlation with pregnant women's participation in offline courses. However, online supplemental table 3 shows that education level (χ^2 = 23.681, p<0.001), pregnancy (χ^2=9.157, p=0.01) and gestation history (χ^2=19.552, p<0.001) were significantly correlated with participation in online courses.

Further binary logistic regression analyses (online supplemental tables 4 and 5) confirmed that education level, pregnancy and gestation history had statistically significant effects on pregnant women's participation in online courses.

DISCUSSION

The study results indicated that education level, pregnancy and gestation history significantly influenced pregnant women's participation in online courses. Education level was found to be a positive contributing factor (OR=1.618, p=0.001), suggesting that higher education levels correlated with more active participation in online courses. This is likely because women with higher educational attainment often possess stronger self-learning abilities and are more receptive to new knowledge.[33 34] Conversely, gestation history was identified as a barrier to online course participation, with experienced mothers showing less inclination to engage in perinatal education online, possibly due to their perceived familiarity with the pregnancy process and associated care.[35 36] In contrast, first-time mothers, lacking prior experience, displayed greater initiative in seeking expert guidance through perinatal courses.[35 36] The most prevalent concerns among pregnant women in this study centred around fetal growth and development (38.9%), followed by neonatal feeding and nursing (22.4%). This contrasts with previous surveys where neonatal nursing and postpartum rehabilitation were primary concerns. This difference may be attributed to the current sample being predominantly in the third trimester, suggesting that course content aligned closely with their immediate needs for perinatal education.[37–39]

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It underscores the variability in pregnant women's educational needs and the importance of regularly assessing and updating course content to ensure it meets their evolving needs. Medical staff were identified as the primary source of perinatal knowledge for pregnant women (19.4%), indicating a high level of trust in information provided by healthcare professionals.[36 40 41] These findings underscore the pivotal role of medical staff in shaping perinatal education programmes.

Pregnant women in this study showed a preference for the online and offline mixed teaching methods (53.8%). They identified the main advantage of offline courses as the opportunity to apply theory into practice through practical sessions (23.4%) while the primary disadvantage was the limitation of time and space (46.6%). Nearly 90% of pregnant women and their main companions expressed expectations for more integrated online courses in the future, although only a portion believed that online courses could fully replace offline ones (38.7% of pregnant women and 43.1% of main companions). Key expectations for online courses included convenient operation (23.5%), flexibility in scheduling (22.3%) and scientifically rigorous content (16.4%). These results suggest that the strengths and weaknesses of online and offline courses complement each other.[28 42] Pregnant women also articulated specific expectations regarding internet usability, course functionalities and teaching quality.[30 43] Therefore, it is recommended that perinatal course designers accommodate pregnant women less familiar with internet use by offering offline options. It is also beneficial to integrate both teaching methods strategically, prioritising online theory with supplementary offline practical interactions and ensuring the content of both formats is well coordinated.[42 44 45]

Overall, the study findings confirmed the existing demand for perinatal education among pregnant women. Comparing preferences for online and offline education revealed that pregnant women prioritised ease of use in the operational process, followed by content expectations. This underscores the importance for scholars to consider pregnant women's experiences and preferences, continuously updating perinatal education content and diversifying educational formats. These insights could optimise antenatal health education, provide practical support during pregnancy, enhance engagement in learning and potentially mitigate adverse outcomes like gestational diabetes, hypertension and postpartum haemorrhage.

While this study has notable strengths, several limitations should be acknowledged. First, being a cross-sectional study, participants may have experienced recall bias when assessing the effectiveness of courses they attended, given the time lapse between participation and evaluation. Second, despite the prevalence of perinatal education in many hospitals, variations in environmental factors and cultural contexts can lead to different results. This study was carried out in a Chinese hospital context and, therefore, the data obtained refer exclusively to the social context of this country. Consequently, new research is necessary involving pregnant women from other cultural contexts and those who benefit from differently configured and differently accessible perinatal services. Additionally, conducting follow-up surveys with pregnant women who have undergone perinatal education could assess its actual impact on pregnancy outcomes. Finally, considering the context of the COVID-19 pandemic, it is important to note that this factor might have influenced participants' responses regarding their preferences for online versus offline education. Therefore, while the study provides valuable insights into educational preferences during the pandemic, caution is warranted due to these potential limitations.

CONCLUSIONS

This study investigated the perinatal education needs of 504 Chinese pregnant women, identified factors influencing their participation and documented their expectations regarding teaching methods, course content and internet operation complexity. The study emphasises that the platform serves as the foundation, course content as the core and a scientifically managed perinatal education approach as crucial for engaging pregnant women and enhancing their health literacy. Future endeavours in pregnant women's health education should involve regular assessments of their needs, continuous optimisation of educational content, integration of skilled team resources and accelerated development and implementation of a concise, scientifically robust management system. Furthermore, new research is necessary involving pregnant women from other cultural contexts to verify the conclusion.

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Contributors All authors have made substantial contributions to this study in the various sections described below. JS and YZ are the guarantor. YZ, JS, MQ, MN and AJ originated the study, conceptualisation, design, supervised implementation. JX, SW and YC acquired the data. JS, MQ and AJ interpreted the data and performed statistical analysis. YZ wrote the draft of the manuscript. QH and JS reviewed the draft. All authors contributed to the critical revision of the manuscript and gave their final approval for the manuscript to be published.

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Patient and public involvement Patients and/or the public were involved in the design, or conduct, or reporting, or dissemination plans of this research. Refer to the Methods section for further details.

Patient consent for publication Consent obtained directly from patient(s).

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Ethics approval This study involves human participants and ethical clearance (No.2022362) was obtained from the Ethical Review Committee of The First Affiliated Hospital of Soochow University. Participants gave informed consent to participate in the study before taking part.

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