Patient Safety & Quality Improvement Journal
http://psj.mums.ac.ir
PSQI

Assessment of Primiparous Pregnant Women's Knowledge about the Complications of Cesarean Section among Mothers Referred to Health Centers in Ardabil County

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ARTICLEINFO

Article type:
Original Article

***Article History*:**
Received: 22 Nov 2025
Accepted: 16 Mar 2026

Key words:
Cesarean Section, Primiparous Pregnant Women, Knowledge

ABSTRACT

Introduction:
The increasing rate of cesarean section is a major public health concern. Despite its benefits in specific conditions, this method leads to increased complications such as infection, bleeding, thromboembolism, and neonatal problems. In Iran, the cesarean rate has been reported to be 3 to 4 times higher than the WHO standard. Lack of sufficient knowledge and incorrect attitudes of pregnant women towards cesarean complications are important reasons for the unnecessary choice of this method, which further reveals the necessity of investigating the knowledge level of this group. To determine the level of knowledge about cesarean section complications among primiparous pregnant women in Ardabil County.

Materials and Methods:
This descriptive-cross-sectional study was conducted on 398 primiparous pregnant women referred to Ardabil health centers. Multi-stage cluster sampling was performed. The research tool was an 18-item questionnaire to assess knowledge. A correct answer received one point, and an incorrect or "I don't know" answer received zero points. Data analysis was performed using SPSS software version 21, using Spearman's correlation, Mann-Whitney, Kruskal-Wallis, and logistic regression tests.

Results:
The mean knowledge score of women was 11.38 ± 2.67. A significant relationship was observed between knowledge and education, occupation, income, and prenatal education, but no significant relationship was found between knowledge and age or gestational age. According to logistic regression, prenatal education was a predictor of knowledge.

Conclusion:
The study concludes that knowledge levels are insufficient. Implementing targeted prenatal educational programs is crucial to increase awareness and reduce unnecessary cesarean sections.

► ***Please cite this paper as:***
Fazlipour Sh, Asdagh Z, Jalilvand F, Amani F, Moutab Movahedi Sh. Assessment of Primiparous Pregnant Women's Knowledge about the Complications of Cesarean Section among Mothers Referred to Health Centers in Ardabil County Journal of Patient Safety and Quality Improvement. 2026; 14(2): 97-106. Doi: 10.22038/psj.2026.92990.1513

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Introduction

Natural childbirth is considered a physiological and safe method, and is the best method of birth for most pregnant women. However, in recent decades, the increasing tendency towards cesarean section has led to a decrease in the rate of natural childbirth and serious concerns in the field of public health (1). Although cesarean section was once considered a life-saving method in emergencies to preserve the lives of the mother and baby, today, the unnecessary increase in its performance has become a major challenge for the health system (2). Estimates show that about 81% to 91% of deliveries can be performed naturally without medical intervention, while the cesarean rate in Iran has been reported to be three to four times higher than the global standard (3). Numerous studies indicate that the risk of maternal mortality in cesarean section is up to seven times higher than in natural childbirth, and complications such as postoperative infections, bleeding, thromboembolism, and pelvic injuries are more prevalent in cesarean sections (4).

Also, babies born via cesarean section are at greater risk, including prematurity, respiratory problems, and physical injuries during the operation (1). The unnecessary increase in cesarean sections, in addition to clinical consequences, also imposes a significant economic burden on healthcare systems (6). According to WHO recommendations, the ideal cesarean rate should not exceed 11%, while in many countries, including Iran, this rate is significantly higher (7).

Evidence shows that the choice of cesarean section is not solely based on medical reasons, and non-medical factors such as fear of labor pain, unpleasant previous childbirth experience, cultural factors, and misconceptions play an effective role in women's decision-making (8).

Findings indicate that low knowledge levels and negative attitudes towards natural childbirth are among the most important factors increasing the tendency towards cesarean section. Targeted education can strengthen the psychological preparedness of pregnant women and ultimately reduce unnecessary cases of this procedure (9). Currently, cesarean section is considered one of the important challenges of public health because, in addition to increasing risks for the mother and baby, it also increases healthcare costs compared to natural childbirth (6). In many cases, cesarean sections are performed even at the mother's request or due to unnecessary doctor recommendations (8). Global statistics show that the incidence of complications after cesarean section is between 11% and 21%, and maternal mortality as a result of it is reported between 1 and 2 per 1,000 cases (11). Also, financial costs, length of hospital stay, and medication use in cesarean section are much higher than in natural childbirth (11).

Methods and Materials

Study design and Setting

This was a descriptive-cross-sectional study, and the statistical population included all primiparous pregnant women referred to health centers in Ardabil County during the study period. Considering the desired knowledge level of 16.1% and using the sample size determination formula based on previous studies in the field of cesarean section, the sample size was estimated to be 398 people. In this formula, n represents the sample size, Z is the critical value at the 95% confidence level (1.96), P is the estimated proportion (0.161), and d is the allowable error (0.14). Sampling was done by simple random sampling. In the first stage, urban health centers affiliated with Ardabil University of Medical Sciences were randomly selected. Then, in the second stage, from among the visitors to these centers, primiparous pregnant women were entered into the study via convenience sampling. The data collection tool was a researcher-made questionnaire consisting of three parts: demographic information (age, education, employment status, etc.), obstetric history and history of receiving childbirth-related education, and questions related to the level of knowledge about cesarean complications. The questionnaire included 18 three-choice questions (True, False, I don't know). For each correct answer, one point was given, and for an incorrect answer or the "I don't know" option, a score of zero was given. The

knowledge score range varied from zero to 18; a higher score indicated a higher level of knowledge. The validity and reliability of the tool had been examined in previous studies, and its Cronbach's alpha coefficient was reported as 0.814 in the study by Rahmanian et al., indicating acceptable reliability of the questionnaire. Participants who refused to complete the questionnaire or had education or jobs related to medical professions were excluded from the study.

Data collection and Statistical Analysis

The collected data were first recorded in a checklist and then entered into SPSS software version 21. For data analysis, descriptive statistics methods including mean, percentage, standard deviation, and frequency tables were used to describe contextual variables. In the inferential statistics section, to compare the mean of variables in different groups, parametric tests were used if the data distribution was normal, and equivalent non-parametric tests were used if it was not normal. The significance level for all tests was considered less than 0.05. Ethical principles of research were considered in all stages of the study. Participants' information remained completely confidential, and their names were not mentioned in the results report.

Ethical Consideration

The research execution license was obtained from the Ethics Committee of Ardabil University of Medical Sciences with code IR_ARUMS.MEDICINE.REC.1403.004.

Results

The mean age of the subjects was 31.63 years with a standard deviation of 1.7 years, and their age range was between 11 and 41 years. The mean gestational age (in weeks) was 19.91 weeks with a standard deviation of 7.16 weeks, and the minimum gestational age was 8 weeks and the maximum was 37 weeks. Regarding education, most women, with 161 people (41.21%), had a diploma or associate degree. Also, results showed that out of all women, 211 people (53.1%) had participated in prenatal education classes. The occupation of most women in this study was homemaker, with 219 people (55%). Based on the Kolmogorov-Smirnov test, the knowledge scores did not have a normal distribution. The mean knowledge score was 11.38 (out of a score of 20) with a standard deviation of 2.67, in the range of 2 to 18.

The results of the Spearman correlation test showed that the correlation coefficient between age and knowledge level is -0.008, which is not statistically significant. This finding indicates that there was no significant relationship between the age of the participants and their knowledge level.

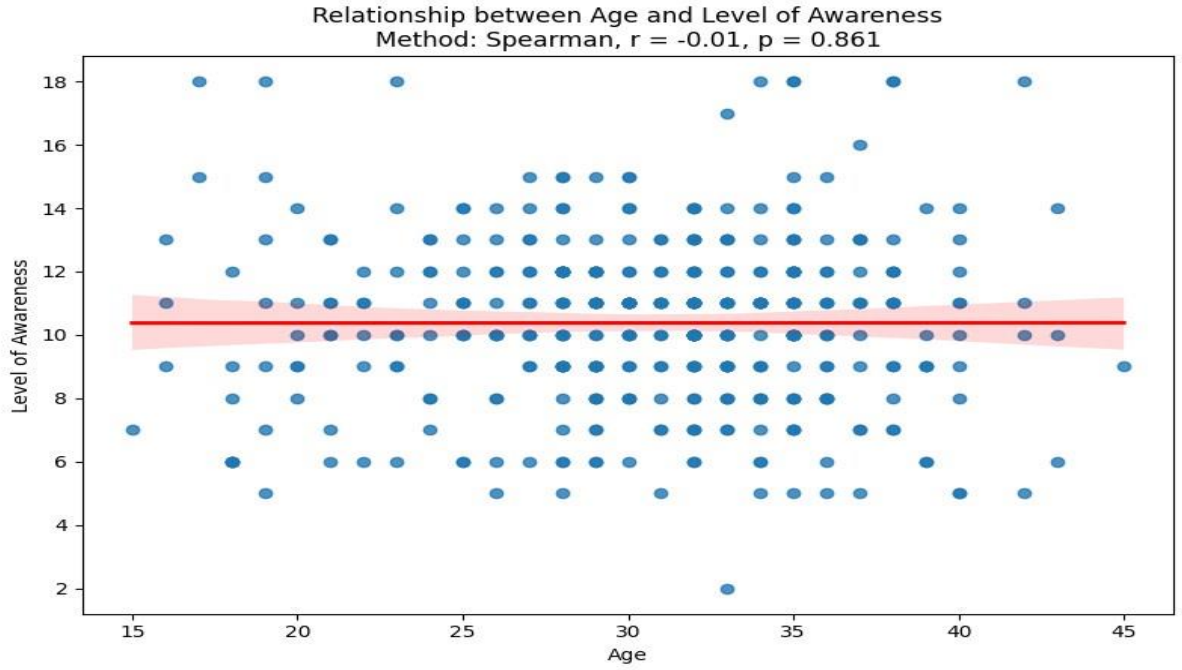

Figure 1. Relationship between Age and Knowledge

Based on the Kruskal-Wallis test, the scores obtained based on knowledge among people with different education levels had a significant difference. Also, based on the Dunn post-hoc test, the scores in people with a diploma and associate degree were significantly higher than those with below-diploma education. (Figure 1)

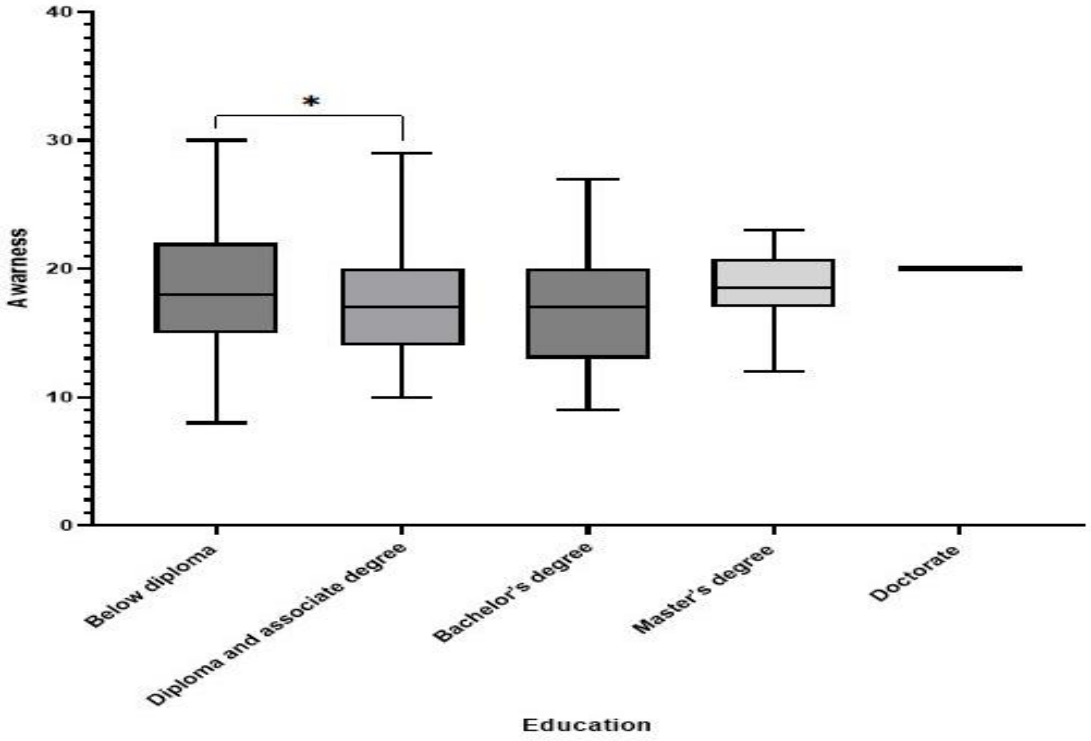

Figure 2. Knowledge Level Based on Education

Based on the Kruskal-Wallis test, the scores obtained based on knowledge among people with different occupations had a significant difference. Also, based on the Dunn post-hoc test, the scores in homemakers were significantly higher than those self-employed. (Figure 2)

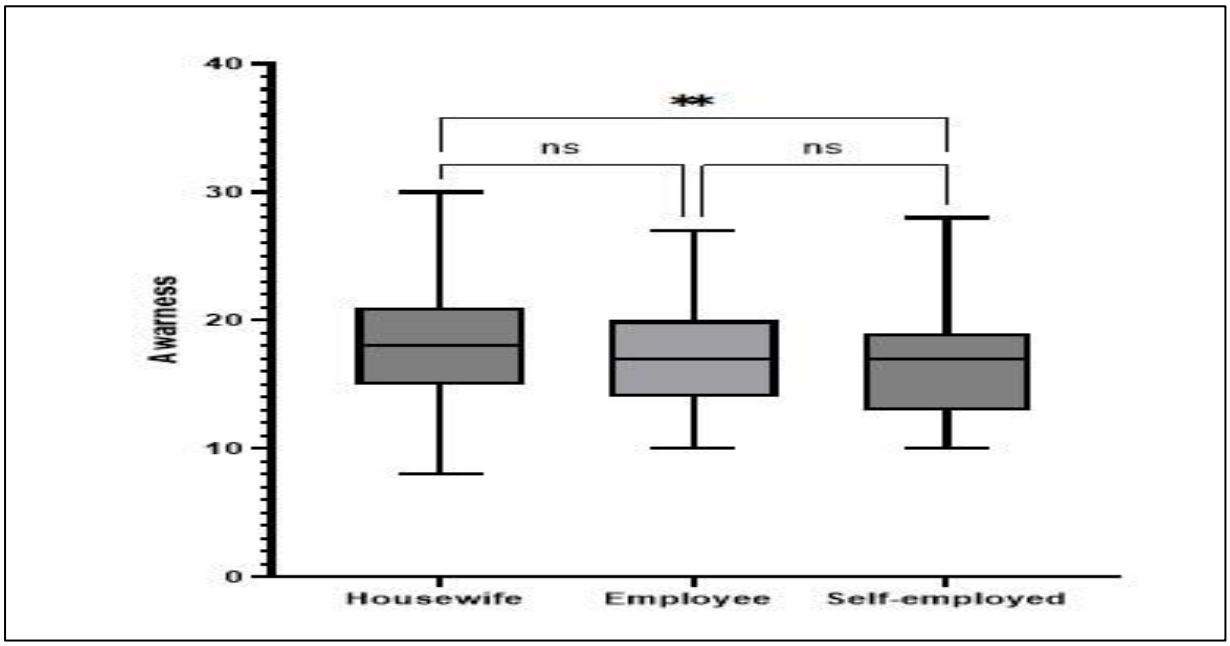

Figure 3. Knowledge Level Based on Occupation

The results of the Spearman correlation test showed that the correlation coefficient between income and knowledge level is 0.1, which is statistically significant. This finding indicates that with an increase in income level, the knowledge level of the participants relatively increases.

A detailed examination based on income categories showed that people with low monthly income had the lowest mean knowledge score, while groups with medium and high income reported higher levels of knowledge, respectively.

This trend shows that improving economic conditions can play a positive role in promoting knowledge by increasing access to educational and informational resources. (Figure 3)

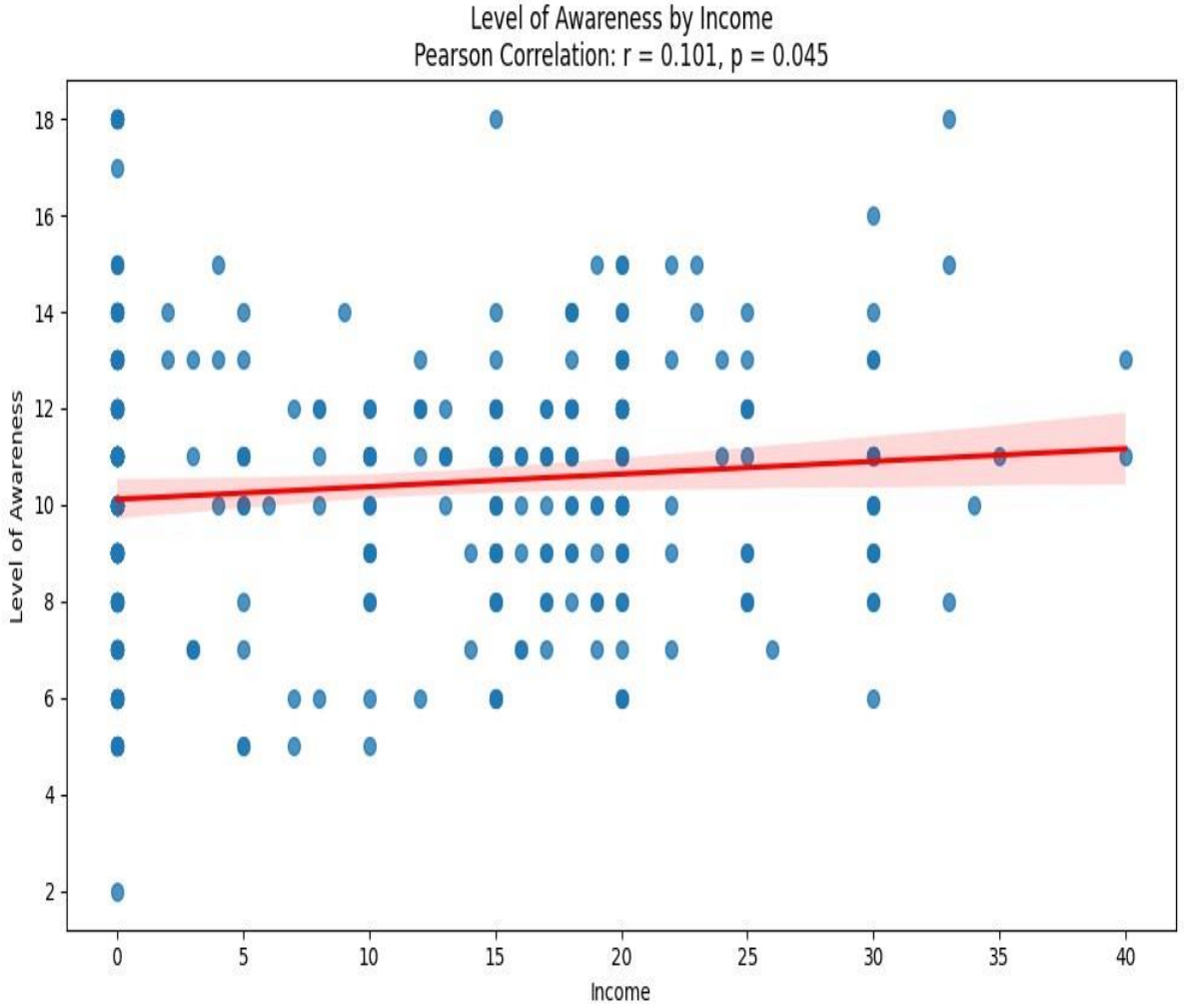

Figure 4. Relationship between Income and Knowledge Level

The results of the Spearman correlation test showed that the correlation coefficient between gestational age and knowledge level is 0.077, which was not statistically significant. This finding indicates that no significant relationship was observed between gestational age and the knowledge level of the participants. (Figure 4)

Based on the Mann-Whitney U test; individuals who had participated in prenatal education classes had significantly higher knowledge than those who had not participated in these classes.

Based on logistic regression analysis, the variable of education had a significant effect on the knowledge level; such that individuals who had received prenatal education had a higher chance of having more knowledge. Other variables including education, occupation, age, and gestational age in weeks did not show a significant relationship with the knowledge level.

Table 1. The frequency distribution of response to questionnaire items

Questionnaire Item	Don't Know % (Count)	Incorrect % (Count)	Correct % (Count)
The probability of bleeding and need for blood transfusion is higher in cesarean delivery compared to natural delivery.	14.8% (19)	8.8% (31)	76.4% (314)
The probability of infection is higher in cesarean delivery compared to natural delivery.	13.6% (14)	28.1% (112)	18.3% (232)
The probability of urinary tract infection after cesarean delivery is higher than after natural delivery.	11.9% (43)	28.4% (112)	61.8% (241)
Mothers with cesarean delivery experience longer pain and disability compared to mothers with natural delivery.	1.6% (22)	21.1% (79)	74.4% (293)
The risk of maternal mortality is higher in cesarean delivery compared to natural delivery.	18.4% (73)	21.1% (81)	61.1% (238)
The risk of neonatal mortality is higher in cesarean-born babies compared to natural delivery.	21.2% (81)	27.1% (117)	12.8% (219)
The risk of infant asthma is higher in cesarean-born babies compared to natural delivery babies.	34.8% (138)	16.9% (67)	48.2% (191)
The risk of preterm birth in subsequent pregnancies is higher in mothers with previous cesarean.	33.2% (131)	11.7% (46)	11.1% (217)
Financial costs of cesarean delivery are higher than natural delivery.	12.3% (49)	9.8% (39)	77.8% (319)
The risk of ectopic pregnancy in subsequent pregnancies is higher in mothers with previous natural delivery.	27.3% (118)	24.7% (98)	48.1% (191)
The risk of adhesions and infertility is higher in mothers with previous natural delivery.	28.8% (114)	31.8% (126)	39.4% (116)
The risk of uterine rupture in subsequent pregnancies is higher in mothers with previous natural delivery compared to cesarean mothers.	21.1% (111)	26.3% (114)	48.2% (191)
Absence of natural delivery in subsequent pregnancies is a complication of cesarean.	28.7% (114)	14.9% (19)	16.4% (224)
The risk of bladder and bowel injury and reduced bowel movement is higher in cesarean delivery compared to natural.	18.1% (72)	16.6% (66)	61.2% (219)
The risk of pulmonary embolism is higher in cesarean delivery compared to natural delivery.	22.1% (87)	14.9% (19)	63.1% (211)
Mothers and babies born by cesarean require more care compared to natural delivery.	6.9% (27)	22.6% (88)	71.4% (274)
The risk of respiratory problems in cesarean-born babies is higher than in natural delivery babies.	16.9% (67)	28.1% (111)	11.2% (219)
The risk of placental problems in subsequent pregnancies is higher in mothers with prior natural delivery.	31.3% (124)	34.6% (137)	34.1% (131)

This table captures the percentages and counts of respondents who answered "Don't know," "Incorrect," or "Correct" for each statement related to cesarean versus natural delivery risks and outcomes. The data reflect perceptions and knowledge in the questionnaire context.

Discussion

Cesarean section is one of the common methods of childbirth worldwide and in Iran, which has seen a significant increase in recent decades. Although this method is life-saving in specific cases, complications such as infection, bleeding, delayed recovery, and neonatal respiratory problems highlight the need for educating pregnant women. Knowledge about cesarean complications plays a decisive role in making an informed decision about the choice of delivery method. This study was designed and implemented to investigate the level of knowledge of primiparous pregnant women about cesarean complications in Ardabil

County and its related factors, including age, education, occupation, income, gestational age, and history of education.

The mean knowledge score among 398 participants was 11.38 ± 2.67, indicating a moderate level of knowledge. The score range was between 2 and 18, and the median knowledge was 11. This value was higher in the study by Rahmanian et al. (12.23 ± 4) than in the present research (12).

Spearman's correlation analysis did not show a statistically significant relationship between age and knowledge level (P=0.880, r=-0.860). This finding is consistent with the results of Rydahl et al. (2019) (13) and Richards et al. (2016) (14), who did not consider age a direct influencing factor on knowledge. In contrast, studies such as Hochler et al. (2023) (15) and Rademaker et al. (2021) (16) reported that with increasing age, concern and knowledge about cesarean complications increase. This discrepancy may be due to differences in study designs and education levels in different countries.

The results of the Kruskal-Wallis test showed that education level has a significant relationship with knowledge level (P<0.05). Women with a diploma and associate degree had higher knowledge than women with below-diploma education. This finding is consistent with studies by Lee et al. (2021) (17) and Sun et al. (2019) (18). In contrast, Richards et al. (2016) (14) and Rydahl et al. (2019) (13) considered the effect of education to be diminished in the presence of cultural factors and the structure of the health system.

A significant difference was observed between occupation and knowledge level. Homemakers had a higher level of knowledge than women self-employed in freelance jobs. This difference may be due to more opportunities for homemakers to attend educational classes or access information resources. This result is consistent with the findings of Lee et al. (2021) (17) and Eide et al. (2019) (19). In contrast, Richards et al. (2016) (14) and Harrison (2016) (20) did not find the effect of occupation on knowledge to be significant.

A positive and significant relationship was observed between income level and knowledge level (P<0.05). Women with higher income had more access to information resources and counseling services. This finding is consistent with the results of Singh et al. (2018) (21) and Janati et al. (2019) (22). In contrast, Faisal-Cury et al. (2017) (23) and Maher et al. (2023) (24) considered the role of income to be limited compared to clinical and social factors.

No significant relationship was observed between gestational age and knowledge level (P=0.12, r=0.076). This result is consistent with the findings of Rydahl et al. (2019) (13) and Zhang et al. (2016) (25). In contrast, Breintoft et al. (2021) (26) and Jiang et al. (2024) (27) reported that knowledge increases in the third trimester of pregnancy due to psychological preparation and access to counseling.

Participation in prenatal education classes was significantly associated with increased knowledge level (P<0.001). This finding is consistent with the results of Zaman et al. (2021) (28) and Ayalew et al. (2021) (29). However, Rutayisire et al. (2016) (30) and Kan (2021) (31) emphasized that cultural factors and doctors' recommendations can have a greater impact on the final decision.

This research has limitations that somewhat affect the generalizability of the findings. First, the study design was cross-sectional, and therefore, causal inference regarding the relationship between different factors and knowledge level is not possible. Second, the use of a self-report questionnaire tool to assess knowledge may lead to bias in the results due to respondents' tendency to provide socially desirable answers or insufficient accuracy. The reliability of the questionnaire was calculated with a Cronbach's alpha coefficient of 0.74, which is relatively low and can reduce measurement accuracy. Also, sampling was only done from urban health centers in Ardabil County, and therefore, generalizing the results to rural areas or other cities with different cultural and social contexts should be done with caution. On the other hand, variables such as attitude and personal beliefs, which can affect knowledge, were not investigated in this research. Finally, the use of cluster and stratified sampling methods may cause some groups of the target population to be less represented in the study, which can also affect the accuracy of the final results.

Conclusion

Based on the findings of the present study, the knowledge level of primiparous pregnant women in Ardabil County about the complications of cesarean section was assessed as moderate. Data analysis showed that factors such as education, occupation, income, and participation in educational classes have a significant impact on the knowledge level. It was found that women who participated in prenatal education classes had higher knowledge than the group without education, which emphasizes the importance of targeted prenatal education. Also, women with a diploma and associate degree showed more knowledge about cesarean complications compared to those with lower education levels. In terms of occupation, homemakers had more knowledge than women self-employed in freelance jobs, which may be due to their greater opportunity to use educational and counseling resources. However, no significant relationship was observed between age and gestational age with knowledge level. The results of this study indicate that improving women's access to reliable educational resources and providing targeted educational programs during the prenatal period can promote their knowledge and ultimately reduce the complications resulting from cesarean section.

Considering the results and limitations of the present study, it is suggested that future research be conducted longitudinally and with larger samples in different urban and rural areas to allow for more accurate conclusions and better generalizability. It is also suggested that in future studies, in addition to assessing the level of knowledge, the attitude and practice of pregnant women should also be measured to determine a more precise relationship between these three variables and their impact on the choice of delivery method. Furthermore, given the relatively low reliability of the questionnaire used, it is suggested that the knowledge assessment tool be designed and validated more accurately, and if possible, methods such as interviews be used to increase measurement accuracy. Also, investigating the role of media and different information resources in promoting the knowledge of pregnant women is suggested. Considering the positive relationship between income and knowledge level, conducting qualitative studies to accurately identify the information resources used by women in different income groups can help design and implement more effective educational interventions in the future. Finally, investigating the impact of direct educational interventions and comparing their effectiveness with other educational methods is also recommended.

Acknowledgments

We express our sincere gratitude to everybody who devoted their time, effort, and expertise to assure the success of this study.

Conflict of interest: All authors declare no conflict of interest.

Data availability: The study data may be acquired from the relevant author upon a reasonable request. Authors' contributions: Each author made an equal contribution to this research work.

Funding: Not applicable

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