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# Health Locus of Control, Health Literacy, and Depression in Pregnant Women: A Cross-sectional Study in Gonabad, Iran

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**Background and Objectives:** Depression in pregnant women and its negative consequences are serious issues. Health locus of control and health literacy are two essential components for the timely diagnosis of depression. This study aimed to investigate health locus of control, health literacy, and depression in pregnant women.

**Materials and Methods:** This cross-sectional study examined 216 pregnant women who referred to comprehensive health service centers. Data were collected using a stratified sampling method and questionnaires, including the Health Literacy Instrument for Adults (HELIA), the Multidimensional Health Locus of Control Scale (MHLC), and the Edinburgh Postnatal Depression Scale (EPDS). Statistical analyses were performed using R 4.5.0 software. All statistical tests were conducted at a 95% confidence level.

**Result:** The mean age of the participants was 29.04 ± 7.14 years. Significant positive correlations were found between the EPDS score and the number of pregnancies (p=0.001), number of children (p=0.003), and number of abortions (p=0.003). Higher EPDS scores were observed among illiterate mothers (p=0.020), mothers with unintended pregnancies (p=0.002) and mothers from low-income families (p<0.001). The EPDS score was significantly and negatively associated with most health literacy dimensions. The strongest correlations were observed for decision-making (r=-0.314, p<0.001) and the total HELIA Score (r=-0.311, p<0.001). Conversely, chance-related health locus of control (CHLC) was positively correlated with the EPDS score (r=0.247, p<0.001).

**Conclusion:** health literacy and a chance-related health locus of control significantly influence depressive symptoms among pregnant women. Higher health literacy was associated with a lower EPDS score, whereas CHLC showed a positive correlation. These results underscore the multifactorial nature of maternal depression and underscore the importance of educational interventions to improve health literacy and psychological control in pregnant women. Routine prenatal depression screening is recommended, especially for high-risk women.

**Keywords:** Health Literacy, Health Locus of Control, Depression, Pregnancy

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**Received:** 17 May 2026
**Accepted:** 12 September 2026
**Doi:** 10.22038/jhl.2026.95549.1970



## Introduction

Health is an essential human need for the successful functioning of individuals and societies (1). Several factors influence health, including social factors, awareness, and even personality traits (2). The World Health Organization priorities behavioral changes to improve health and a healthy lifestyle (3).

Depression is one of the most important health problems today, based on epidemiological findings (4). Depression has a prevalence rate of 13 to 20% in the general population, and is more prevalent among people with lower socioeconomic status and those with interpersonal relationship problems (5). Pregnancy is an important and special time for women (6) and depression can hurts the health of pregnant women and paves the way for postpartum depression that must be carefully addressed (7, 8). Depression in pregnancy, has significant negative consequences, ranging from adverse obstetric outcomes such as abortion to adverse neonatal outcomes such as preterm birth (9, 10).

Health literacy and health locus of control are two essential components associated with better mental health outcomes and timely diagnosis of depression (11, 12). As women may be visiting the health system for the first time due to pregnancy, it is important that they have the necessary health literacy (6). In addition to reading and writing skills, health literacy includes other skills that can affect decision-making and change in behavior (13). People with low health literacy do not completely understand the verbal or written information provided by the healthcare team and do not follow the recommendations, and have a poorer health status (14). Studies have shown that only 12% of adults in the United States have proficient health literacy, with more than one-third having basic or below-basic levels (15).

The concept of health locus of control (HLC) is one of the factors that influence self-care behaviors, and it can affect maternal and child health (16). The HLC scale measures people's beliefs about the extent to which their health is controlled by internal or external factors (17).

HLC refers to an individual's perception of their responsibility for managing health-related issues. Those with an internal HLC are characterized by a strong belief in their ability to make decisions about their health, and they perceive themselves as responsible for their overall health status (16).

Given the impact of health literacy and health locus of control on depression and the importance of depression for the health of pregnant women, this study aims to identify these factors and investigate their association in this group.

## Material and Methods

### *Study Design*

This cross-sectional study was conducted in 2024 with pregnant women who referred to comprehensive health service centers in Gonabad city, Iran.

### *Population and Sample*

The inclusion criteria were residence in Gonabad city for at least one year and confirmation of a healthy fetus by ultrasound. Exclusion criteria included documented symptoms of any mental illness in the pregnant women's health records; an interval of less than two weeks until delivery; current use of pregnancy supplements or medications; chronic physical illnesses, such as diabetes or thyroid disorders; a history of infertility; a pregnancy achieved through assisted reproductive techniques; a prior stillbirth; an abnormal body mass index (BMI); and a history of recurrent miscarriages.

The sample size was calculated using G-power 3.1.9.2. The mean and standard deviation reported for the depression score (mean = 7.82, SD = 2.9) in a similar study (18) were considered, as well as a 95%confidence interval and 80% power. The initial sample size was estimated at 196 participants. However, to account for potential non-response, incomplete questionnaires, or participant attrition, the sample size was increased by 10%. The final sample size was therefore calculated to be 216 participants.

### *Data Collection*

After obtaining the ethical approval and written informed consent, data were collected using stratified sampling. First, comprehensive health service centers were selected as the stratum. Then samples were randomly selected from the list of pregnant women in each center.

### *Variable and Measurement*

This study collected variables such as age, gestational age (in weeks), type of pregnancy, women's desire to terminate the pregnancy, previous delivery method (natural or cesarean section), number of previous pregnancies, number of children, abortion history, fetal gender, level of education, income status, spouse's occupation, and spouse's level of education. Additionally, health locus of control, health literacy and depression were assessed using relevant questionnaires.

***Research Instrument***

The Health Literacy Instrument for Adults (HELIA) questionnaire has 33 items across five domains: access, reading, understanding, appraisal, and decision (6, 4, 7, 4, and 12 items, respectively). The items are measured using a five-point Likert scale (1-5 score), and the final health literacy score is calculated as a number between 33 and 165.The questionnaire's validity and reliability were reported to be adequate (19, 20).

The Multidimensional Health Locus of Control (MHLC) scale includes three components: Powerful Others Health Locus of Control (PHLC) (questions 3, 5, 7, 10, 14, and 18); Chance-related Health Locus of Control (CHLC) (questions 2, 4, 9, 11, 15, and 16); and Internal Health Locus of Control (IHLC) (questions 1, 6, 8, 12, 13, and 17). The scale uses a six-point Likert scale ranging from “strongly disagree” (score 1) to “strongly agree” (score 6). To obtain a subscale score, add together the scores of all the related statements (21-23). Forms A and B measure the general health and well-being, while Form C is used for special situations, such as health or medical conditions like pregnancy, diabetes and cancer. Mirzania et al. (24) investigated and approved the validity and reliability of Form C of the Pregnancy Health Control Center in Iran.

The Edinburgh Postnatal Depression Scale (EPDS) questionnaire is a simple screening tool for depression related to a mother's feelings over the previous seven days. The questionnaire has 10 questions, each scored from0 to 3, for a total possible score of 30. A score of 13 or higher indicates a positive result for depression (25, 26). In a study by Montazeri et al., the validity and reliability of the EPDS were reported to be adequate (27).

***Data Analysis***

First, the correlation between the main factors (EPDS, HELIA and MHLC scores) and the continuous demographic variables was examined using the Pearson correlation test. Then, independent t-tests and ANOVA were used to examine the differences in the means of the

main factors with respect to categorical demographic variables. Next, the association between the HELIA score and health locus of control beliefs (IHLC, PHLC and CHLC scores) with the EPDS score was examined using a linear regression model in the crude and adjusted states. In the adjusted model, all demographic variables were entered as covariates to control for potential confounding effects. To explore potential non-linear relationships and interaction effects, we used the "glmtree" command in R to create generalized linear model trees (GLMtree), which partition the data based on demographic variables and fit a GLM at each terminal node. The best tree was selected using the Akaike information criterion (AIC). Additionally, we fitted a regression tree using the "rpart" command with the ANOVA splitting criterion (minimizing residual sum of squares) and a complexity parameter (cp) of 0.02, in order to produce simple, interpretable patterns while avoiding overfitting (28-30). All statistical analyses were performed using R version 4.5.2. Visualization was conducted using the "ggplot" command for correlation plots. All tests were two-sided, and a p-value of less than 0.05 was considered statistically significant.

## Results

The mean age of the 216 pregnant women was 29.04± 7.14 years, with a mean gestational age of 22.79± 8.40 weeks. According to the Pearson correlation coefficient test, there was a significant positive relationship between number of pregnancies (r=0.219, p-value=0.001), number of children (r=0.204, p-value=0.003), and number of abortions (r=0.201, p-value=0.003) with EPDS score. According to the ANOVA/Independent T-test, the mean EPDS score was higher for illiterate mothers than for mothers who attended university (p-value=0.020). Additionally, the mean EPDS score was higher among mothers of unintended pregnancies than among mothers of intended pregnancies (p-value=0.002). Mothers with a lower income had a higher EPDS score (p-value<0.001). Also, the EPDS score was higher for mothers whose husbands were self-employed than for mothers whose husbands were employees (p-value=0.004) **(Table 1).**

**Table 1. Description of demographic variables among pregnant women**

| Variables | EPDS score | | | |
|---|---|---|---|---|
| | Total Mean±Sd | Pearson correlation Test | | |
| | | r | Effect size $r^2$ | p-value |
| Age (13-46 yr) | 29.04±7.14 | 0.067 | 0.004 | 0.326 |
| Pregnancy Time (5-50 Weeks) | 22.79±8.40 | -0.067 | 0.004 | 0.498 |
| Number of pregnancies (0-11) | 2.07±1.72 | **0.219** | **0.064** | **0.001*** |

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| | | | | |
|---|---|---|---|---|
| Number of children (0-8) | 1.68±1.42 | **0.204** | **0.042** | **0.003*** |
| Number of abortion (0-5) | 1.01±0.80 | **0.201** | **0.040** | **0.003*** |
| **Variables** | **Total N (%)** | **ANOVA** | | |
| | | **Mean±Sd** | **Effect size $\eta^2$** | **p-value** |
| **Education** | | | | |
| Illiterate | 16 (7.4) | 13.68±5.34$^{(b)}$ | **0.036** | **0.020*** |
| Non-university | 120 (55.6) | 11.54±5.09$^{(c)}$ | | |
| University | 80 (37.0) | 10.26±4.86$^{(ab)}$ | | |
| **Income status** | | | | |
| Low | 86 (39.8) | 12.86±4.81$^{(ab)}$ | **0.076** | **<0.001*** |
| Moderate | 121 (56.0) | 10.20±4.28$^{(b)}$ | | |
| High | 9 (4.2) | 9.33±8.07$^{(c)}$ | | |
| **Husband's Job** | | | | |
| Unemployed | 20 (9.3) | 10.05±3.77$^{(c)}$ | **0.051** | **0.004*** |
| Employed | 44 (20.4) | 9.34±4.57$^{(b)}$ | | |
| Freelance (Self-employed) | 152 (70.4) | 11.92±4.91$^{(ab)}$ | | |
| **Husband's Education** | | | | |
| Illiterate | 12 (5.6) | 12.25±5.58 | 0.024 | 0.073 |
| Non-university | 139 (64.4) | 11.67±5.02 | | |
| University | 65 (30.1) | 10.09±4.22 | | |
| **Variables** | **Total N (%)** | **Independent T-test** | | |
| | | **Mean±Sd** | **Effect size cohens'd** | **p-value** |
| **Pregnancy** | | | | |
| Wanted (Intended) | 141 (65.3) | 10.49±4.64 | **-0.441** | **0.002*** |
| Unwanted (Unintended) | 75 (34.7) | 12.60±5.00 | | |
| **Mother's desire** | | | | |
| Natural birth | 125 (57.9) | 10.96±4.73 | -0.130 | 0.346 |
| Cesarean section | 91(42.1) | 11.59±5.03 | | |
| **Previous abortion** | | | | |
| Yes | 87 (40.3) | 11.44±4.93 | -0.141 | 0.884 |
| No | 129 (59.7) | 11.08±4.82 | | |
| **Sex of fetus** | | | | |
| Boy | 106 (49.1) | 11.50±5.09 | 0.110 | 0.419 |
| Girl | 110 (50.9) | 10.96±4.63 | | |

- **The significance level of P-value < 0.05**
- **For the ANOVA, post-hoc pairwise comparisons were performed using the Bonferroni correction to adjust for multiple comparisons $^{(abc)}$**

**Figure 1** shows a description of the dimensions of health locus of control beliefs (IHLC, PHLC and CHLC scores), health literacy, and EPDS scores. The mean EPDS score for pregnant women was 11.22± 4.86. The mean of HELIA score was also 121.95± 23.46. The mean scores for health locus of control beliefs were as follows: Internal Health Locus of Control (24.03 ± 4.16), Powerful Others Health Locus of Control (28.79 ± 4.49), and Chance Health Locus of Control (20.13 ± 5.27).

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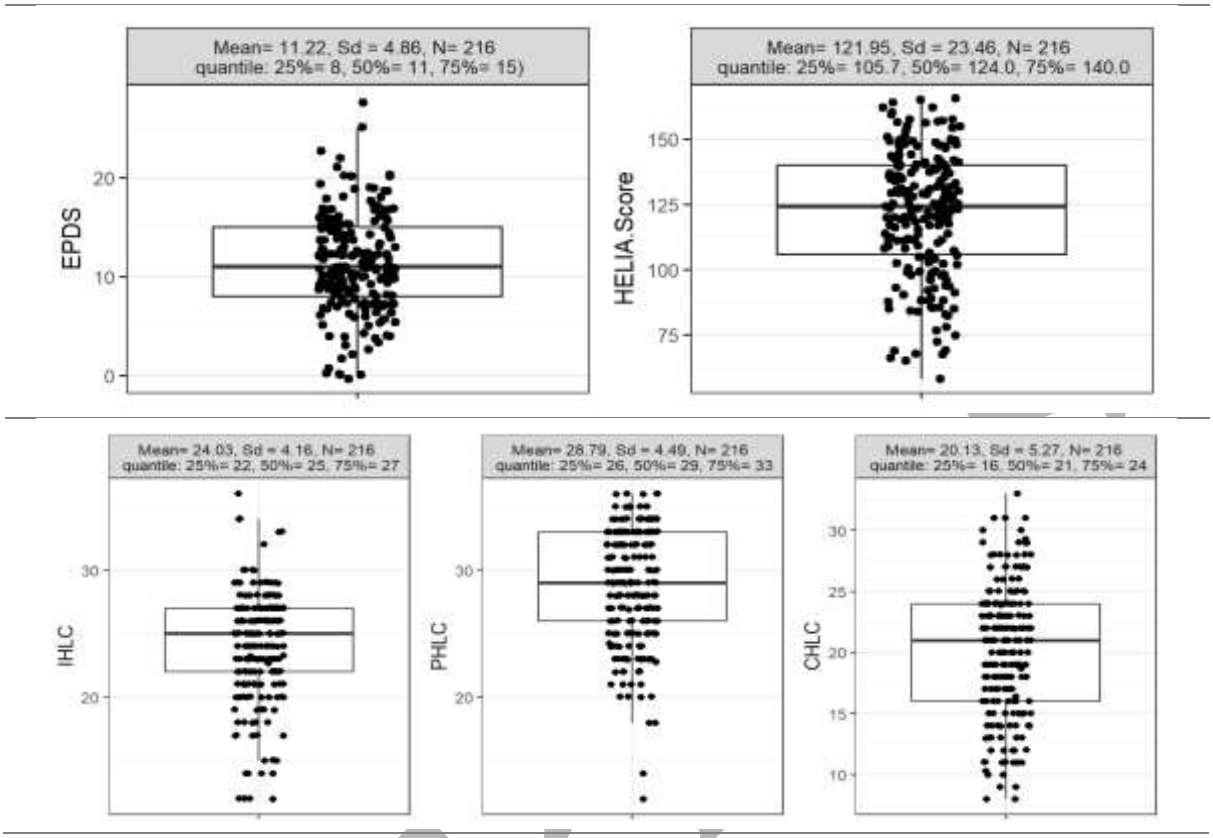



**Figure 1. Description of the health locus of control beliefs (IHLC, PHLC and CHLC scores), HELIA score, and EPDS score**

**Figure 2** shows the correlations between dimensions of health locus of control beliefs (IHLC, PHLC and CHLC scores), health literacy, and the EPDS score. Pearson correlation analysis revealed significant negative correlations between the EPDS score and most dimensions of health literacy, indicating that higher health literacy is associated with lower depression levels among pregnant women. The strongest negative associations were observed between decision-making (Decision) and EPDS score ($r=-0.314$, $r^2=0.1$, $p<0.001$), and between the total HELIA score and EPDS score ($r=-0.311$, $r^2=0.1$, $p<0.001$). Higher health literacy was associated with lower depression scores among pregnant women. Other dimensions of health literacy, such as understanding ($r=-0.293$, $p<0.001$), appraisal ($r=-0.285$, $p<0.001$), reading ($r=-0.189$, $p=0.005$), and access ($r=-0.155$, $p=0.023$), also showed significant negative correlations with EPDS scores. However, the Chance-related Health Locus of Control (CHLC) scale showed a significant positive correlation with the EPDS score ($r=0.247$, $p<0.001$), suggesting that

women who believe that chance or external factors influence their health more tend to report higher depression scores.

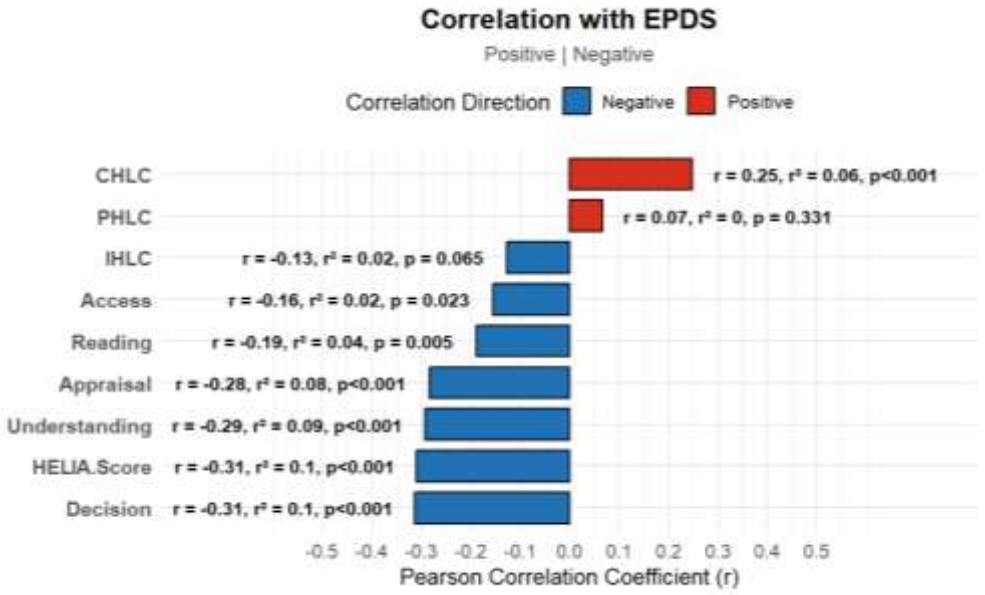



**Figure 2. Correlation between dimensions of health locus of control beliefs (IHLC, PHLC and CHLC scores), HELIA score with EPDS score**

**Table 2** shows the association between health locus of control beliefs (IHLC, PHLC and CHLC scores) and HELIA score with EPDS score, using a linear regression model. In both models, health literacy, understanding, appraisal, decision, and CHLC were significantly associated with depression. In the crude model, however, access (B=-0.14, p-value=0.021) and reading (B=-0.19, p-value=0.005) were also significant, in addition to these factors.

**Table 2. Association between health locus of control beliefs and health literacy factors with EPDS score using a linear regression model.**

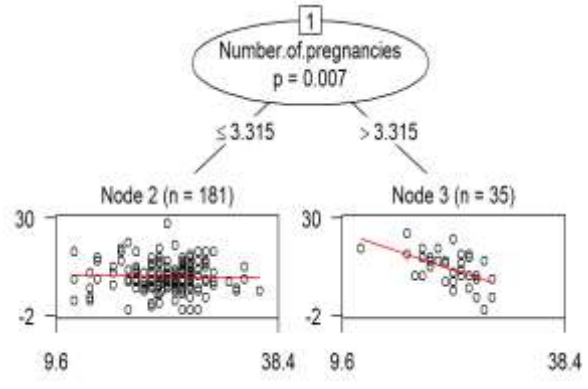
| | Crude Model | | Adjusted Model | |
|---|---|---|---|---|
| | β(SE) | p-value | β(SE) | p-value |
| Health literacy | -0.06(0.01) | <0.001* | -0.06(0.02) | 0.001* |
| Access | -0.14(0.06) | 0.021* | -0.02 (0.07) | 0.748 |
| Reading | -0.19(0.07) | 0.005* | -0.07(0.09) | 0.411 |
| Understanding | -0.21(0.04) | <0.001* | -0.16(0.06) | 0.008* |
| Appraisal | -0.34(0.07) | <0.001* | -0.28(0.09) | 0.002* |
| Decision | -0.19(0.03) | <0.001* | -0.18(0.04) | <0.001* |
| IHLC | -0.14(0.08) | 0.069 | -0.12(0.08) | 0.117 |
| PHLC | -0.08(0.07) | 0.263 | 0.10(0.08) | 0.197 |
| CHLC | -0.22(0.06) | <0.001* | 0.19(0.06) | 0.001* |

In both models, the Response variable was EPDS.
In the crude model, only the main factor was entered as an independent variable.

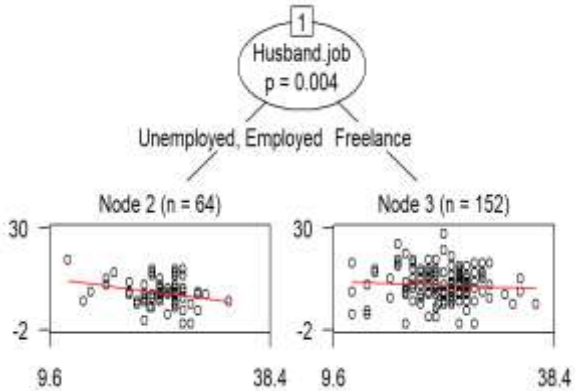
In the adjusted model, in addition to the main factor, all demographic variables (to eliminate their effect) were entered as independent variables.
β: unstandardized coefficient
SE: Standard Error

**Figure 3** shows the association between health locus of control beliefs and health literacy factors with depression score while accounting for the effects of demographic variables using the GLMtree model. All models were fitted considering all subgroups, and only significant model results are reported. There was an inverse relationship between the EPDS score and the IHLC only among mothers with more than three pregnancies ($\beta_{\mathrm{IHLC}} = -0.85(\mathrm{SE} = 0.21), \mathrm{p} = 0.001$). Additionally, there was an inverse relationship only among pregnant women whose spouses were employed (except self-employed) and unemployed ($\beta_{\mathrm{IHLC}} = -0.31(\mathrm{SE} = 0.14), \mathrm{p} = 0.027$). The relationship between the EPDS score and the PHLC was stronger in wanted pregnancies, though it was not significant ($\beta_{\mathrm{PHLC}} = 0.17(\mathrm{SE} = 0.13), \mathrm{p} = 0.192$). The relationship between the EPDS score and the CHLC score was direct and significant, only among mothers who had undergone a cesarean section ($\beta_{\mathrm{CHLC}} = 0.42(\mathrm{SE} = 0.09), \mathrm{p} < 0.001$). This relationship was not significant among mothers who had a natural delivery (Natural: $\beta_{\mathrm{CHLC}} = 0.09(\mathrm{SE} = 0.08), \mathrm{p} = 0.266$).

**EPDS ~ IHLC:**
Number of pregnancies (<3.315): $\beta_{\mathrm{IHLC}} = -0.04(SE = 0.08), \mathrm{p} = 0.626$
Number of pregnancies (>3.315): $\boldsymbol{\beta_{\mathrm{IHLC}}} = \mathbf{-0.85(SE = 0.21), p = 0.001}$




**EPDS ~ IHLC:**
Husband job(unemployed, employed): $\boldsymbol{\beta_{\mathrm{IHLC}}} = \mathbf{-0.31(SE = 0.14), p = 0.027}$
Husband job (Freelance): $\beta_{\mathrm{IHLC}} = 0.08(\mathrm{SE} = 0.09), \mathrm{p} = 0.394$ )




**EPDS ~ PHLC:**
Wanted: $\beta_{\mathrm{PHLC}} = 0.01(\mathrm{SE} = 0.09), \mathrm{p} = 0.887$
Unwanted: $\beta_{\mathrm{PHLC}} = 0.17(\mathrm{SE} = 0.13), \mathrm{p} = 0.192$

**EPDS ~ CHLC:**
Natural: $\beta_{\mathrm{CHLC}} = 0.09(\mathrm{SE} = 0.08), \mathrm{p} = 0.266$
Cesarean: $\boldsymbol{\beta_{\mathrm{CHLC}}} = \mathbf{0.42(SE = 0.09), p < 0.001}$

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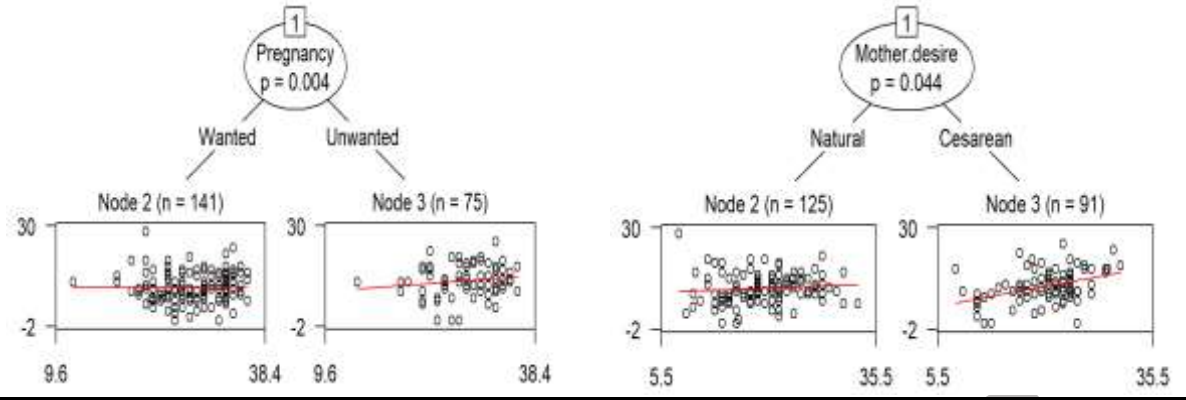
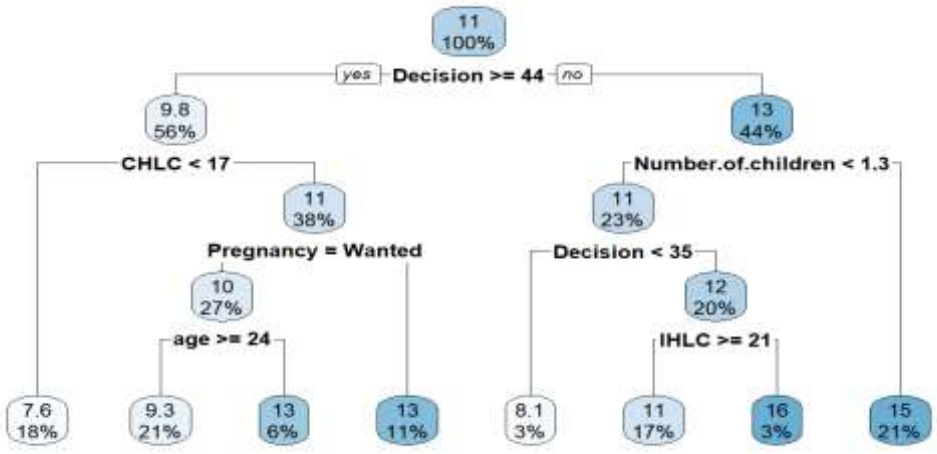



**Figure 3. The relationship between health locus of control beliefs and health literacy factors with EPDS score, by effect of demographic variables**

According to the decision tree results **(Figure 4),** the most important factors affecting EPDS score among pregnant women were decision-making ability (Decision≥ or <43.5), followed by chance-related health locus of control (CHLC), number of children, internal health locus of control (IHLC), pregnancy intention (intended/unintended), and maternal age. Women with lower decision-making scores (<44) generally showed higher depression score, particularly those with a greater number of children (≥1.33). In addition, lower internal health locus of control (IHLC<21), unwanted pregnancy, higher CHLC (≥17), and younger age (<24 years) were associated with increased EPDS scores. The highest mean EPDS scores were observed among women with IHLC<21 (mean=16) and those with a higher number of children (mean=15), whereas the lowest mean scores were found in women with CHLC <17 (mean=7.60) and those with very low decision scores (<35; mean=8.1).




The "**anova**" method was used, and the **CP** value was set to **0.02**.

**Figure 4. Examining the importance of factors affecting EPDS score among pregnant women**

## Discussion

Health literacy and health locus of control are associated with depression in pregnancy. In other words, lower literacy and a reduced health locus of control may result in higher depression scores. Decision-making ability was found to be the factor most closely associated with depressive symptoms. This was followed by chance-related health locus of control, the number of children, internal health locus of control, pregnancy intention (intended/unintended) and maternal age.

The findings reveal significant associations between various factors and EPDS scores. For instance, having more pregnancies, children and abortions may result in higher EPDS scores. Pregnant women with unintended pregnancies, from lower-income backgrounds, or with lower levels of education showed higher depression scores. Furthermore, husband's occupation appeared to be relevant, with higher depressive symptoms observed among pregnant women whose husbands were self-employed.

Our study found a positive correlation between EPDS score and the number of pregnancies, children, and abortions, indicating that a greater reproductive history can be linked to higher depressive symptoms during pregnancy. This finding is consistent with previous research (31, 32), which revealed that multiparous women exhibited different depression risk patterns compared to primiparous women, and that coping strategies also influenced EPDS scores. Studies show that depression in pregnancy tends to increase with having more than three pregnancies (33), and there is an inverse relationship between depression and internal control score (34). The higher levels of depression observed in women with a greater number of pregnancies may be related to the cumulative physical and emotional challenges they experience during childbirth. Therefore, higher internal control scores in mothers with more than three pregnancies may be linked to lower depression scores. Additionally, systematic reviews have shown that repeated pregnancies and a history of abortion can lead to maternal psychological distress due to hormonal, physical, and psychosocial factors, thereby increasing the risk of perinatal depression (35). To mitigate these effects, healthcare providers must regularly screen pregnant women with such reproductive histories regularly for depression and offer targeted psychosocial support, including counselling and education about mental

health during pregnancy. Strengthening social support networks and making mental health resources more accessible can help to reduce the depressive symptoms and improve the well-being of this high-risk group (36).

The results suggest that women who have experienced unintended pregnancies face a greater likelihood of exhibiting heightened depressive symptoms. This finding is consistent with previous studies (37, 38). This association is often explained by factors such as reduced social and familial support, lower marital satisfaction, and increased anxiety about the pregnancy and motherhood transition (39). Our results also show that women who have had cesarean section deliveries are more prone to experiencing higher levels of depressive symptoms. This observation aligns with findings from earlier research (25, 40).One plausible mechanism is the increased likelihood of negative childbirth experiences or post-traumatic stress disorder related to emergency surgical delivery, which may mediate the development of postpartum depression (41).

Our findings suggest that socioeconomic and educational disparities may influence depression scores. As in previous studies (42, 43), pregnant women who experienced an unintended pregnancy, those from lower-income households, and those with no education or with lower levels of education reported higher EPDS scores. This increased probability of depression may be due to heightened stress levels and reduced access to mental health resources(44). A lack of education can limit awareness of mental health issues and reduce help-seeking behaviors. Therefore, to address these disparities, healthcare systems should incorporate routine mental health screening during prenatal visits, especially for vulnerable populations, and implement educational programs to raise awareness about depression.

In the present study, that pregnant women whose husbands were self-employed reported greater depressive scores compared to others. This finding is consistent with a study by Cabeza de Baca et al.(45), which found that stable partner employment is linked to better maternal mental health outcomes. It suggests that husbands with insecure or freelance employment may contribute to household financial instability and stress, thereby increasing the risk of perinatal depression among pregnant women(46). Furthermore, partner involvement and support during the prenatal and postnatal periods are critical protective factors against maternal depression (47). Unstable or freelance employment may limit a

husband's availability and ability to provide emotional, practical, or financial support, which can exacerbate depressive symptoms in pregnancy. To address this, interventions should include couple-focused counseling and social support programs aimed at enhancing partner involvement regardless of employment type. As part of comprehensive prenatal care, healthcare providers should assess both maternal mental health and partner employment status as part of comprehensive prenatal care to identify at-risk families early and offer targeted support.

One of the main findings of our study is that lower health literacy and reduced perceived control over health are associated with higher EPDS score, which aligns with existing studies which have demonstrated the critical role of health literacy in maternal mental health. These studies demonstrate that inadequate health literacy impairs a mother's ability to recognize and manage depressive symptoms, thereby increasing her vulnerability to postpartum depression (5, 48). Furthermore, low health locus of control beliefs, reflecting a sense of helplessness over health outcomes, have been found to contribute to higher stress and depressive symptoms among pregnant women (49).

To address this issue, health literacy interventions should be integrated into prenatal and postnatal care. These interventions should focus on empowering women by educating them about mental health, self-care, and the support services available. Programs that enhance perceived health locus of control and self-efficacy may also reduce depressive symptoms and improve overall pregnancy outcomes, particularly among populations with lower education levels or limited access to healthcare.

One of the strengths of this study may lies in its methodological framework, which incorporates advanced statistical techniques such as GLMtree and regression trees analysis. These sophisticated methods, enabled us to overcome the limitations of traditional linear modelling and identify complex interactions and non-linear relationships between health literacy, health locus of control, and depression.

This study has some limitations. The cross-sectional design means that we cannot establish temporal relationships or causality between variables, so our findings reflect associations rather than definitive causal pathways. Additionally, since the data were collected via self-

report questionnaires, there is a risk that social desirability bias may have affected the accuracy of participants' responses.

## Conclusion

Health literacy and health locus of control may be associated with depression during pregnancy. Lower health literacy and a reduced health locus of control may lead to higher depression score in pregnant women. Other factors that can increase depression scores include a higher number of pregnancies, children and abortions; unintended pregnancy; a lower income or education level; and a spouse's self-employment. Therefore, policymakers and healthcare providers are recommended to implement prenatal depression screening targeting more vulnerable groups. Interventions could also be implemented to increase health literacy and empower pregnant women in relation to their health locus of control, for example through targeted educational counseling and community-based support.

***Acknowledgments:*** The authors express their gratitude to all the women who participated in the study.

***Availability of Data and Materials:*** The data that support the findings of this study are available from the corresponding author upon reasonable request.

***Conflicts of interest:*** The authors have no financial or other relationships that could be perceived as a potential conflict of interest.

***Consent for publication:*** Not applicable

***Ethical Approval and consent to participate:*** This study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. The study process was explained to all participants and informed consent forms were completed prior to participation in the study. This study was also approved by the Ethics Committee at Gonabad University of Medical Sciences under the code IR.GMU.REC.1401.155.

***Funding:*** The authors declare that the funding sources for this study had no involvement in the study design; collection, analysis, or interpretation of data; writing of the report; or the Decision to submit the manuscript for publication.

***Authors' Contribution:*** All authors have read and approved the final version of the manuscript. Study concept and design: AM.M, M. M. Acquisition of data: AM.M, SM. H. Analysis and interpretation of data: M.E., R.RB, AM.M., M. M. Drafting of the manuscript: M.E., R.RB., AM.M., M. M., SM. H. Critical revision of the manuscript for important intellectual content: M.E., R.RB., AM.M. Statistical analysis: M.E, AM.M. Administrative, technical, and material support: AM.M, M. M. Study supervision: AM.M, M. M.

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