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The impact of COVID-19-related anxiety on obstetric complications and mental health in quarantined pregnant women

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Abstract

Introduction The COVID-19 pandemic heightened anxiety among pregnant women, raising concerns about its impact on maternal and fetal health. Although prenatal anxiety is linked to adverse outcomes, the specific relationship between COVID-19-related fear and obstetric complications in quarantined populations remains understudied. This study investigated the association between COVID-19-related fear, obstetric complications, and mental health disorders among quarantined pregnant women in Tehran, Iran.

Methods This cross-sectional study (June–December 2020) 52 quarantined pregnant women were recruited via convenience sampling from a Tehran health center. Data were collected through structured telephone interviews using a validated researcher-made questionnaire. The tool assessed demographics, obstetric history, mental health symptoms (e.g., night-time anxiety, sleep disturbances), and COVID-19-related fear via a 0–10 Auditory Analog Scale (AAS). Obstetric complications (e.g., severe vaginal bleeding, chorioamnionitis) were self-reported and clinically verified. Spearman's rank correlation (non-parametric variables) and Pearson's correlation (continuous variables) were used, with significance set at $p < 0.05$.

Results Participants (mean age: 29.9 ± 6.47 years; gestational age: 30 ± 11.57 weeks) exhibited high COVID-19 fear (54.5% severe fear). Fear correlated significantly with obstetric complications ($r = 0.22$, $p = 0.007$), particularly delayed care-related outcomes such as severe vaginal bleeding (18.8%), chorioamnionitis (8.9%), and reluctance to seek hospitalization (12.5%). Fear also linked to mental health challenges ($r = 0.23$, $p = 0.005$), including night-time anxiety (28.9%) and sleep disturbances (32.2%). Weak correlations emerged with occupation ($r = 0.23$, $p = 0.01$) and education ($r = 0.24$, $p = 0.02$), though effect sizes were modest ($R^2 \approx 0.05$).

Conclusion COVID-19-related fear in quarantined pregnant women was associated with obstetric complications (e.g., care avoidance) and mental health disorders (e.g., sleep disturbances). Despite modest correlations, findings underscore the need for antenatal care integrating mental health screening, telehealth support, and culturally sensitive interventions to mitigate pandemic-driven risks to maternal-fetal health.

Keywords COVID-19, Pregnancy, Anxiety, Obstetric complications, Mental health, Quarantine

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Introduction

The COVID-19 pandemic significantly interfered with maternal care, deepening pregnant women's anxiety and fear worldwide [1]. Although pregnancy by nature comes with physiological and psychological adjustments, uncertainties brought about by the pandemic heightened vulnerabilities, sparking apprehensions for maternal and fetal well-being [2]. Research confirms that pregnant women face elevated risks of severe COVID-19 outcomes, including hospitalization, preterm birth, and ICU admission [3–5]. Concurrently, pandemic-specific anxiety has been linked to heightened depression, stress, and pregnancy-specific worries [6–8]. However, critical gaps persist in understanding how COVID-19-related fear directly contributes to specific obstetric complications and understudied mental health manifestations in quarantined populations.

Previous studies have established that generalized prenatal anxiety increases risks for complications such as preterm birth, preeclampsia, and gestational diabetes [7, 8]. Yet, the role of COVID-19-specific fear in driving complications mediated by healthcare avoidance (e.g., delayed prenatal care, reluctance to seek hospitalization) remains unexplored. For instance, while severe vaginal bleeding, chorioamnionitis, and home births due to delayed care are recognized obstetric risks [9, 10], their association with pandemic-related anxiety is poorly understood. Similarly, though mental health outcomes like depression are well-documented [7, 8], pregnancy-specific manifestations such as night-time anxiety, shortness of breath, and sleep disturbances lack focused investigation in the context of COVID-19 fear.

This study addresses these gaps by investigating COVID-19-related anxiety among quarantined pregnant women in Tehran, Iran, with two aims:

1. **Obstetric Complications**: Examine associations between fear and complications potentially linked to healthcare avoidance (e.g., severe vaginal bleeding, chorioamnionitis, delayed hospitalization despite uterine contractions).
2. **Mental Health Sequelae**: Explore understudied anxiety-driven outcomes, including night-time anxiety, decreased sexual desire, and sleep disturbances.

By focusing on these under-researched pathways, our findings aim to inform targeted interventions to mitigate the dual burden of pandemic-related anxiety and obstetric risks, ultimately protecting maternal and fetal well-being during public health crises. The data collected during this unique period of quarantine provides valuable insights for developing evidence-based strategies to protect maternal and fetal health during future public health emergencies.

Materials and methods

This descriptive-analytic cross-sectional study was conducted from June to December 2020 in Tehran, Iran. Data were collected through telephone interviews with 152 pregnant women in quarantine. Participants were recruited using convenience sampling from one Tehran University of Medical Sciences health center. While this approach facilitated data collection at a rapid rate with pandemic-induced logistical constraints, we are aware of potential generalizability limitations to the broader population.

Sample size considerations

A formal a priori sample size calculation was not performed due to the urgent need for data collection during the pandemic. However, a post-hoc power analysis using G*Power 3.1 indicated that with a sample size of 152, an alpha of 0.05, and a medium effect size ($\rho = 0.25$), the study achieved 80% power to detect significant correlations.

Inclusion criteria

- Pregnant women aged 15–49 years.
- In any trimester of pregnancy (first, second, or third).
- No self-reported history of acute/chronic physical (e.g., diabetes, hypertension) or mental diseases (e.g., depression, anxiety disorders).
- Willingness to participate.
- No confirmed or suspected COVID-19 infection (based on self-reported negative PCR tests or absence of symptoms such as fever, cough, or anosmia).

Exclusion criteria

- Diagnosis of any chronic mental health condition (e.g., major depressive disorder, panic disorder) confirmed by medical records or self-reported treatment history.
- Active COVID-19 infection (confirmed by positive PCR test or presence of ≥ 2 symptoms: fever, cough, and anosmia).
- Inability to complete telephone interviews due to language barriers or communication difficulties.
- Participation in other mental health intervention studies.

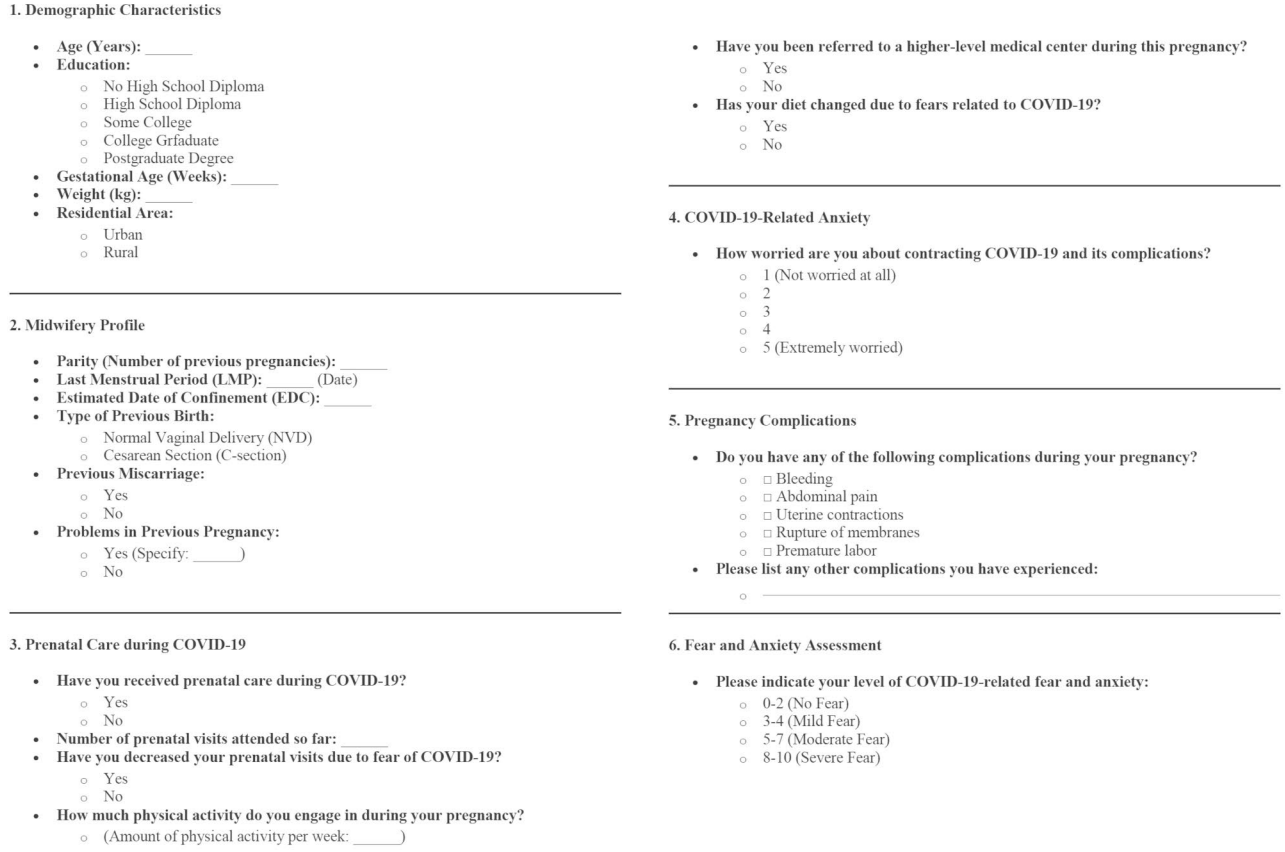
Evaluation of eligibility

Eligibility was assessed during structured telephone interviews. Responses were cross-checked with health center records where possible.

Data collection

Data were collected through structured telephone interviews using a researcher-made questionnaire designed to assess demographics, obstetric history, mental health symptoms, and COVID-19-related fear (Fig. 1). Trained midwives conducted these interviews during routine prenatal care calls to minimize participant burden. The questionnaire comprised three components:

1. **Demographic survey:**
   - Age, occupation, education level, and residential area (urban/rural).
2. **Midwifery profile:**
   - Gravidity, parity, gestational age (calculated from last menstrual period), and prenatal care attendance. A *complete prenatal care* variable was included to evaluate whether fear of COVID-19 influenced visit adherence.
3. **Researcher-Made questionnaire:**
   Developed through a four-step process:
   1. **Item Generation**: Questions were drafted based on a literature review of COVID-19-related anxiety, obstetric complications (e.g., preterm birth), and mental health outcomes (e.g., sleep disturbances) [11–13].
   2. **Expert Review**: A panel of three obstetricians and two clinical psychologists evaluated the tool for relevance, clarity, and completeness. Items were revised iteratively until consensus was achieved.
   3. **Content Validity**: Experts rated each item on a 4-point Likert scale (1 = *not relevant* to 4 = *highly relevant*). The Content Validity Index (CVI) was 0.89, indicating strong agreement [14].
   4. **Pilot Testing**: Administered to 15 pregnant women (excluded from the main study) to assess clarity and reliability. Ambiguous terms (e.g., "physical problems") were refined to specify symptoms (e.g., "vaginal bleeding"). Internal



1. Demographic Characteristics

- Age (Years): _____
- Education:
  - No High School Diploma
  - High School Diploma
  - Some College
  - College Grfaduate
  - Postgraduate Degree
- Gestational Age (Weeks): _____
- Weight (kg): _____
- Residential Area:
  - Urban
  - Rural

2. Midwifery Profile

- Parity (Number of previous pregnancies): _____
- Last Menstrual Period (LMP): _____ (Date)
- Estimated Date of Confinement (EDC): _____
- Type of Previous Birth:
  - Normal Vaginal Delivery (NVD)
  - Cesarean Section (C-section)
- Previous Miscarriage:
  - Yes
  - No
- Problems in Previous Pregnancy:
  - Yes (Specify: _____)
  - No

3. Prenatal Care during COVID-19

- Have you received prenatal care during COVID-19?
  - Yes
  - No
- Number of prenatal visits attended so far: _____
- Have you decreased your prenatal visits due to fear of COVID-19?
  - Yes
  - No
- How much physical activity do you engage in during your pregnancy?
  - (Amount of physical activity per week: _____)
- Have you been referred to a higher-level medical center during this pregnancy?
  - Yes
  - No
- Has your diet changed due to fears related to COVID-19?
  - Yes
  - No

4. COVID-19-Related Anxiety

- How worried are you about contracting COVID-19 and its complications?
  - 1 (Not worried at all)
  - 2
  - 3
  - 4
  - 5 (Extremely worried)

5. Pregnancy Complications

- Do you have any of the following complications during your pregnancy?
  - □ Bleeding
  - □ Abdominal pain
  - □ Uterine contractions
  - □ Rupture of membranes
  - □ Premature labor
- Please list any other complications you have experienced:
  - _____

6. Fear and Anxiety Assessment

- Please indicate your level of COVID-19-related fear and anxiety:
  - 0-2 (No Fear)
  - 3-4 (Mild Fear)
  - 5-7 (Moderate Fear)
  - 8-10 (Severe Fear)

Fig. 1 COVID-19-Related Anxiety and Pregnancy Complications Questionnaire

Table 1 Frequency and percentage of fear levels among pregnant women

Fear Level	Frequency	Percentage
Severe	83	54.5%
Moderate	47	30.9%
Mild	20	13.3%
No Fear	2	1.3%
Total	**152**	**100%**

consistency for the fear/anxiety subscale was acceptable (Cronbach's α = 0.78).

Operational definitions for all variables, including demographic, midwifery, and COVID-19-related measures, are detailed in Supplementary Table S1.

Fear and anxiety assessment

COVID-19-related fear was assessed using a single-item auditory analog scale (AAS; 0–10), where participants verbally rated their fear level from 0 (*no fear*) to 10 (*extreme fear*). Scores were categorized as: 0–2: No fear, 3–4: Mild fear, 5–7: Moderate fear, 8–10: Severe fear.

This approach aligns with studies using pragmatic thresholds for clinical interpretability in pandemic research [15, 16]. While validated multi-item tools (e.g., Fear of COVID-19 Scale, FCV-19 S [13]) offer greater precision, the AAS prioritized brevity and feasibility during telephone interviews.

Data analysis

Categorical variables (e.g., education, fear levels) were analyzed as frequencies and percentages, while continuous variables (e.g., age, gestational age) were reported as mean ± standard deviation. Spearman's rank correlation assessed associations involving ordinal/dichotomous variables, and Pearson's correlation evaluated relationships between continuous variables. Normality assumptions were verified via Shapiro-Wilk tests ($p < 0.05$). Missing data were minimal (< 1%), and no imputation was performed. Statistical significance was set at $p < 0.05$ (IBM SPSS Statistics v23.0).

Results

This study included 152 pregnant women with a mean age of 29.9 ± 6.47 years and a mean gestational age of 30 ± 11.57 weeks. The majority (85.1%) were homemakers, while 14.9% were employed. Regarding educational level, 30.5% had no high school diploma, 44.8% had a high school diploma, and 24.7% were university graduates. Most (65.6%) resided in urban areas, and 34.4% lived in rural areas.

Fear of COVID-19

As shown in Table 1, over half of participants (54.5%) reported severe fear of COVID-19, with only 1.3% reporting no fear.

Table 2 Correlation between fear of COVID-19 and pregnancy complication

Variable	Frequency (%)	Correlation Coefficient	*p*-value	Correlation Test
Physical problems	18.8%	0.16	0.49	Spearman
Mental problems	35.3%	0.23	**0.005**	Spearman
Obstetrics problems	15%	0.22	**0.007**	Spearman
Medical problems	5.7%	0.06	0.50	Spearman
Complete prenatal care	25.2%	0.08	0.34	Spearman

Table 3 Correlation between fear of COVID-19 and demographic characteristics

Variable	Correlation Coefficient	*p*-value	Correlation Test
Residential Area	0.06	0.58	Spearman
Age	0.08	0.30	Pearson
Occupation	0.23	**0.01**	Spearman
Education	0.24	**0.02**	Spearman
Gestational Age	0.06	0.50	Pearson

Associations between COVID-19 fear, obstetric complications, and mental health

Fear of COVID-19 showed weak but significant correlations with obstetric complications ($r = 0.22$, $p = 0.007$) and mental health issues ($r = 0.23$, $p = 0.005$) (Table 2). Key complications linked to fear included delayed care-seeking (e.g., severe vaginal bleeding, chorioamnionitis) and mental health manifestations (e.g., night-time anxiety, sleep disturbances). No significant associations were found between fear and physical/medical problems or prenatal care attendance.

Demographic correlations

Fear of COVID-19 was weakly associated with occupation ($r = 0.23$, $p = 0.01$) and education ($r = 0.24$, $p = 0.02$) but not with residential area, age, or gestational age (Table 3). No demographic variables significantly predicted pregnancy complications (Table 4).

Discussion

This study explored associations between COVID-19-related fear and both obstetric complications and mental health outcomes among quarantined pregnant women in Tehran, Iran. Our findings revealed statistically significant but weak positive correlations between COVID-19 fear and obstetric complications ($r \approx 0.22$) and mental health disturbances ($r \approx 0.23$). These lesser correlations, which explain little variance ($R^2 \approx 5\%$), suggest that fear is associated with these outcomes and is likely to be one of the contributors among many. Graphically depicted in Fig. 2, they point to the importance of addressing pandemic anxieties as much as broadly addressing mental health services.

Table 4 Correlation between demographic characteristics and pregnancy complications

Variable	Physical Problems (*r*/*p*)	Mental Problems (*r*/*p*)	Obstetric Problems (*r*/*p*)	Medical Problems (*r*/*p*)	Complete Prenatal Care (*r*/*p*)
Residential area	0.11 / 0.18	0.20 / 0.07	0.03 / 0.20	0.08 / 0.32	0.01 / 0.80
Age	0.06 / 0.44	0.02 / 0.80	0.10 / 0.24	0.08 / 0.30	0.15 / 0.06
Occupation	0.06 / 0.42	0.01 / 0.06	0.02 / 0.80	0.05 / 0.55	0.01 / 0.06
Education	0.02 / 0.80	0.01 / 0.70	0.05 / 0.05	0.10 / 0.20	0.03 / 0.08
Gestational age	0.09 / 0.82	0.30 / 0.20	0.18 / 0.30	0.60 / 0.50	0.30 / 0.30

Footnote: r: Correlation coefficient; p: *p*-value; Tests: Spearman (non-parametric) or Pearson (parametric)

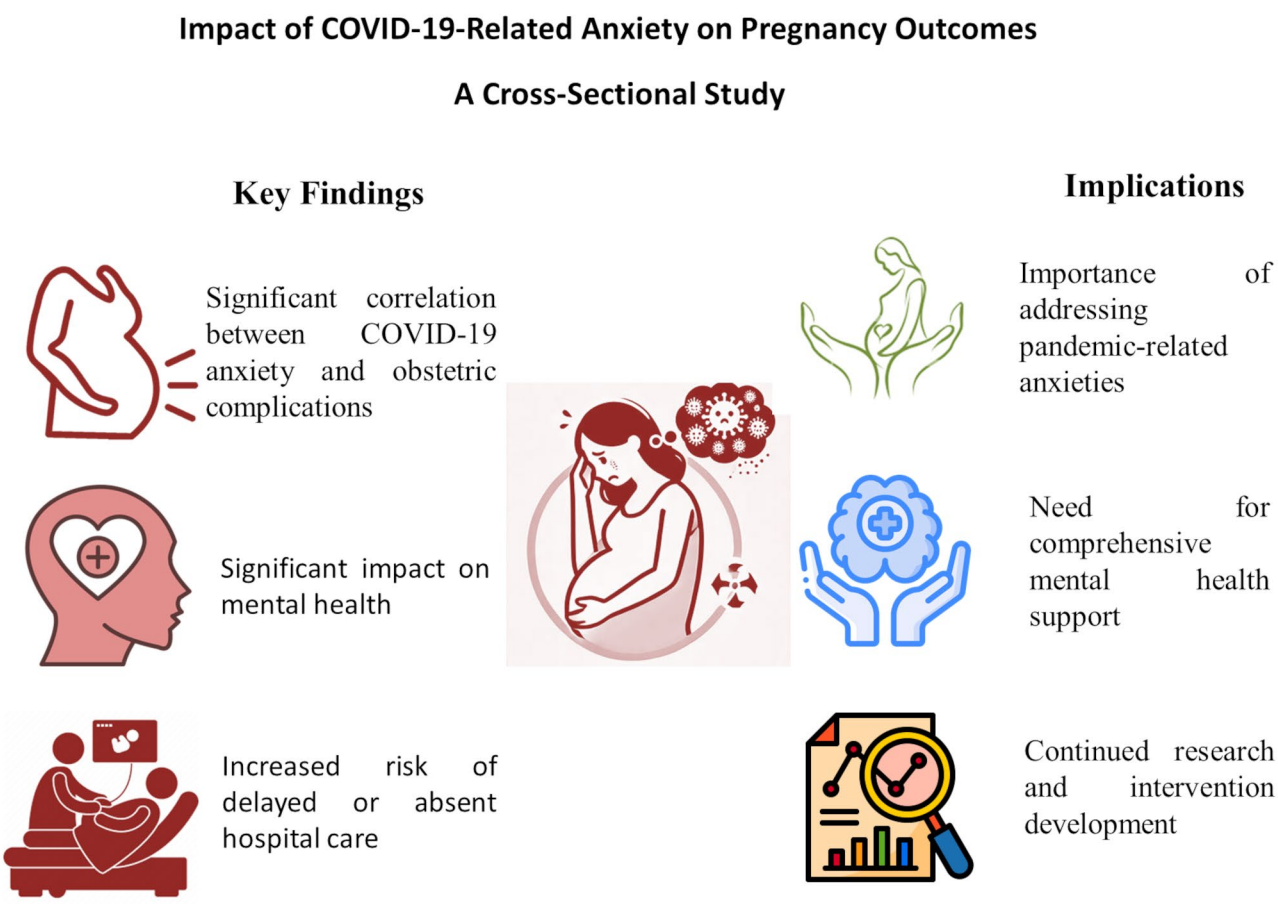


Fig. 2 Key Findings and Implications of COVID-19-Related Anxiety on Pregnancy Outcomes

The observed link between COVID-19 fear and obstetric complications aligns with existing literature on prenatal stress and anxiety. General prenatal anxiety is a known risk factor for adverse outcomes [9, 10, 17], potentially mediated by stress hormones impacting fetal development [18]. Our study highlights how pandemic-specific fear may contribute to complications through healthcare avoidance [19], as evidenced by reluctance to seek hospitalization despite symptoms. The weak correlation, however, emphasizes that fear is part of a complex interplay of factors influencing obstetric outcomes during a pandemic.

Similarly, the correlation between COVID-19 fear and mental health issues, such as night-time anxiety and sleep disturbances [20, 21], explains the need for comprehensive mental healthcare during pandemics. These findings are consistent with larger studies such as Worrall et al. (2025) [22], wherein high rates of undiagnosed depression and anxiety were discovered among pregnant women during the lockdown in the UK. The convergence of findings across different settings suggests a considerable psychological toll of the pandemic among pregnant women globally.

We also observed weak, statistically significant correlations between fear and demographic variables like occupation and education that may suggest socioeconomic determinants of levels of fear. The factors were not,

however, predictive of pregnancy complications, highlighting the potential direct effect of pandemic psychological determinants like fear.

Clinical and public health implications

Our findings have significant public health and clinical significance. Firstly, active screening for pandemic-related anxiety and fear is significant as self-reported diagnosis is a recognized underestimation of distress. Secondly, having accessible and safe antenatal and mental health services, including telehealth and open communication, is significant to counter healthcare avoidance. Thirdly, psychoeducational interventions specifically designed for pregnant women are important to address anxieties and facilitate help-seeking. Finally, healthcare providers need training to manage the psychological demands of pregnant patients in times of crisis.

Strengths and limitations

This study provides a rich understanding of the quarantined pregnant women's experience amid a new crisis. Time-sensitive research became feasible through data collection using telephone interviews. However, several limitations must be acknowledged.

First, the cross-sectional design prevents causality from being established. We witnessed correlations but not causation. Second, convenience sampling from a single health center limits generalizability. Third, self-report use can cause recall and social desirability biases. Fourth, the single-item auditory analog scale (AAS) provides a less precise measure of fear than validated multi-item measures. Fifth, the exclusion of women with pre-existing mental health conditions may underestimate psychological distress. Lastly, the absence of pre-pandemic baseline data hinders the isolation of the impact of the pandemic.

Furthermore, we acknowledge that the study did not control for potential confounders, such as socioeconomic status, pre-existing health conditions, and availability of medical care, which can impact both fear levels and pregnancy outcomes.

Future directions

Although the acute phase of the pandemic has now passed, the psychological burden imposed by pregnant women during this period may have long-term consequences. Our findings highlight the necessity for continued follow-up and care for this vulnerable group even after the current crisis.

The data collected during this historic time of quarantine can be valuable for informing evidence-based policy to protect maternal and fetal health in the event of future public health emergencies. Understanding the challenges pregnant women face during COVID-19 can inform the development of stronger healthcare systems and interventions.

The psychological processes linking fear and anxiety to adverse pregnancy outcomes observed in this research are not unique to the COVID-19 pandemic. These findings are generalizable to other situations where pregnant women experience stress, e.g., natural disasters, conflict, or economic instability.

Future research must employ longitudinal designs to untangle causal processes and long-term effects. Mixed-method studies could facilitate a more in-depth examination of women's lives. Comparative studies on cultural and socioeconomic contexts are critical in identifying mediating variables. Trials of interventions to evaluate models of psychosocial support are most important. Exploration of biological mechanisms linking fear and obstetric complications would also be useful. Collaborative multi-site studies can strengthen the evidence base and highlight global inequalities.

Lastly, information collected during this time is priceless to historical applications, and future investigators will be capable of performing meta-analysis or other research based on data collected from prior studies. Information here allows scientists to get a better understanding of how the pandemic is impacting pregnant women.

Conclusion

This study provides empirical evidence that fear of COVID-19 quarantine was associated with obstetric complications and mental disturbance among pregnant women in Tehran, Iran. The correlations were modest, but the findings support the need for priority intervention against pandemic-related concerns within comprehensive antenatal care. Longitudinal designs, psychometrically supported instruments, and ethnically diverse samples should be highly prioritized in future research to unravel the multifactorial determinants of maternal health risk during public health emergencies. By integrating mental health services into obstetrics and encouraging evidence-based practice, health systems are better able to safeguard maternal and fetal health under crisis.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12879-025-11073-4.

Supplementary Material 1

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Author contributions
S.H.: Conceptualization, Project Administration. M.K. & S.H.: Methodology. N.K.: Methodology Validation, Writing - Review & Editing. M.K. Writing - Original Draft, Writing - Review & Editing. All authors reviewed and approved the final article.

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Data availability
The data that support the findings of this study are available from the corresponding author, [M.Kh], upon reasonable request. Restrictions apply to the availability of these data due to privacy and confidentiality concerns.

Declarations

Ethics approval and consent to participate
This study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki and was approved by the Research Ethics Committee of Tehran University of Medical Sciences (TUMS) (Ethical code: IR. TUMS.VCR.REC. 1399.446 updated 1403.446). Written and verbal informed consent was obtained from all participants prior to their enrollment in the study.

Consent for publication
Written informed consent for publication was obtained from all participants in this study.

Competing interests
The authors declare no competing interests.

Clinical trial registration
Not applicable.

Artificial intelligence use declaration
During the preparation of this work, the authors utilized DeepSeek—an AI-powered editing tool designed to assist with language refinement—exclusively for non-substantive copy editing. This included minor adjustments to sentence structure, grammar, punctuation, and readability to align with formal academic standards. DeepSeek was not employed at any stage for conceptual content generation, data analysis, interpretation of results, or formulation of conclusions. The tool's role was strictly limited to enhancing clarity and coherence of pre-existing, human-authored text. All AI-assisted edits were reviewed, modified where necessary, and approved by the authors to ensure fidelity to the original scientific content, accuracy of terminology, and preservation of the study's intent. This use complies with BMC's guidelines for AI-assisted editing and does not involve generative AI applications.

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