Three-Level Coping Strategies for Anxiety and Depression Among Pregnant Women During the 2019-nCoV Pandemic Based on Stepwise Multiple Linear Regression Analysis

Xiaoxiao Wang[1], Jialu Li[2], and Zhiqiang Luan[2(✉)]

[1] College of Humanities and Development Studies, China Agricultural University, Beijing, People's Republic of China
2019301010312@cau.edu.cn
[2] International College Beijing, China Agricultural University, Beijing, People's Republic of China
Jialu.li@ucdenver.edu, luan@cau.edu.cn

Abstract. As a global public health emergency, the 2019-nCoV pandemic has adversely affected the mental health of the public, with anxiety and depression being the most common reactions. It is socially important to help pregnant women, a special vulnerable population, protect themselves psychologically and reduce anxiety and depression. This paper obtained demographic information and results of anxiety and depression self-rating scales of 240 maternal cases at Jingwei Women's Slimming Center in Guangrao County, Dongying City, Shandong Province, through a questionnaire survey and conducted multiple linear stepwise regression analysis to investigate which factors influence maternal SAS and SDS scores, to propose targeted strategic suggestions according to the needs of maternal groups during the 2019-nCoV pandemic period to help maternal alleviate the anxiety and depression problems during the special period.

Keywords: 2019-nCoV Pandemic · anxiety · depression · stepwise multiple linear regression analysis · mental health care · data science

1 Introduction

Since December 2019, the 2019-nCoV has been spreading in China. As of 24:00 July 15, 2022, 227,272 confirmed cases and 5,226 cumulative deaths were reported in 31 provinces (autonomous regions and municipalities directly under the Central Government) and the Xinjiang Production and Construction Corps [1]. During the 2019-nCoV pandemic, the public is under great psychological stress. Special societal groups, such as pregnant women, face greater physical and mental health risks [2] and need outside interventions to improve their poor psychological status. Therefore, the National Health

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X. Wang and J. Li—Contributed equally to this work and share first authorship.

and Wellness Commission of the People's Republic of China issued the Guidelines for Emergency Psychological Crisis Intervention in the 2019-nCoV pandemic Infection [3]. Experts also advised on psychological adjustment for the special population of pregnant women [4].

2 Aims and Objectives

This paper focus on the maternal group in the context of the 2019-nCoV pandemic, understand maternal anxiety and depression through a questionnaire survey, and analyze which factors influence the high and low maternal SAS and SDS scores through multiple linear stepwise regression, to propose targeted strategic suggestions from three different perspectives according to the needs of the maternal group, in order to help mothers alleviate their anxiety and depression problems in the special period. The results are based on the needs of the maternal population.

3 Methodology

3.1 Survey Population

From September 2021 to February 2022, women who were pregnant or gave birth during the 2019-nCoV pandemic participated in the project at Jingwei Women's Slimming Center in Guangrao County, Dongying City Shandong Province, were invited to complete the questionnaire voluntarily. Two hundred and sixty-eight questionnaires were returned, 28 invalid questionnaires were excluded, and 240 valid questionnaires were returned, with a valid return rate of 89.6%. Valid inclusion criteria: (1) women aged 18 years or older who were pregnant; (2) informed consent and able to complete the questionnaire independently; (3) response time $\geq$ 180 s. Exclusion criteria: (1) missing items in the answers; (2) logical inconsistencies between similar questions; (3) previous history of mental illness or mental illness; (4) recent major stressful events.

3.2 Research Methods

After communicating with pregnant women and obtaining the research permission, the questionnaire was distributed through the questionnaire star, which consisted of three parts: general condition questionnaire, anxiety self-assessment scale (SAS), and depression self-assessment scale (SDS) designed by the researcher. During the questionnaire completion, the researcher explained the questions that were unclear to pregnant women at any time and ensured were not leading. The scales were checked and organized uniformly after completion to ensure the validity and accuracy of the data.

SPSS26.0 statistical software was used to analyze the data, and the measurement data were expressed as $(x \pm s)$ by t-test, and the count data were expressed as cases (%) by $\chi 2$ test. The difference was considered statistically significant at $P < 0.05$. Descriptive statistics first analyzed the results of the questionnaire. The SAS and SDS scores of the sample were compared with the Chinese norm, respectively, followed by multiple linear stepwise regression analysis to screen out the factors that had significant effects on

maternal SAS and SDS scores and to explore the relationship between these independent variables and the scale scores. The dependent variables in the established regression equation were categorized concerning previous literature. Accordingly, maternal needs during the 2019-nCoV pandemic were analyzed from different perspectives, and strategic suggestions for alleviating maternal anxiety and depression were made.

4   Data Analysis

4.1   Descriptive Statistics

The mean SAS standardized score of 240 mothers was 45.62 ± 8.70 and the mean SDS standardized score was 44.98 ± 7.75, which were higher than the Chinese normative SAS and SDS scores [5], and the comparison is shown in Table 1.

Using a standard score of 50 as the symptom cut-off value, the detection rate of anxiety symptoms was 33.8%, the detection rate of depressive symptoms was 30.8%, and there were 62 pregnant women with anxiety-depression co-morbidity, accounting for 25.8% of the cases. Descriptive statistics are detailed in Table 2.

4.2   Stepwise Multiple Linear Regression Analysis

After setting dummy variables for the unordered categorical variables, a multiple stepwise linear regression analysis was conducted with the dependent variable of the 240 maternal SAS scores. Finally, 8 independent variables were selected, with the model R-squared 0.561, adjusted R-squared 0.546, DW = 2.111, and good fit. The VIF of each variable was less than 5, and there was no multicollinearity problem.

The results of regression analysis showed that pregnant women who were waiting for work had higher SAS scores than those who were working, those with higher education had higher SAS scores, those with higher gestational weeks had lower SAS scores, multigravidas had higher SAS scores than primigravidas, pregnant women with a relative or friend infected with neonatal coronary had higher SAS scores than those without a relative or friend infected with neonatal coronary had higher SAS, the SAS scores were lower for pregnant women whose birth frequency was affected by the 2019-nCoV pandemic than for those whose birth frequency was not affected by the 2019-nCoV pandemic, and higher for pregnant women with low-income family relationships than for those with harmonious family relationships. Details are shown in Table 3.

Table 1. Comparison of maternal SAS and SDS scores with the Chinese normative model (x ± s)

	Pregnant women	Chinese norm (n = 1158)	t	P
SAS(n = 240)	45.62 ± 8.79	29.78 ± 10.07	28.20	< 0.01
SDS(n = 240)	44.97 ± 7.75	33.46 ± 8.55	23.04	< 0.01

Table 2. Descriptive statistics table (n = 240)

Characteristics	Frequency	Percentage (%)/ x±s
Age	240	26.55±3.91
Occupation	240	
On-the-job	109	45.42
Awaiting employment	131	54.58
Educational qualification	240	
Elementary school and below	48	20
Junior high school	48	20
High school or secondary	48	20
school	48	20
Undergraduate or junior college	48	20
Master degree and above		
Annual household income	240	169880.83±165930.57
Week of pregnancy	240	20.61±6.35
Gravidity	240	1.15±0.42
Residence	240	
Urban	223	92.92
Rural	17	7.08

Table 3. Multiple stepwise linear regression analysis of the effect of each variable on SAS scores

Variables	Standardized β	t	p
Awaiting employment	0.342	6.264	0.000**
Educational qualification	0.126	2.281	0.023*
Week of pregnancy	-0.251	-5.622	0.000**
Gravidity	0.193	4.019	0.000**
Relatives or friends are infected with the 2019-nCoV pandemic	0.405	8.565	0.000**
Not clear whether any relatives or friends are infected with the 2019-nCoV pandemic	-0.198	-4.408	0.000**
Frequency of maternity checkups is affected by the pandemic	0.160	3.516	0.001**
Unharmonious family relationships	0.129	2.722	0.007**

* p-Values < 0.05 and ** p-value < 0.01.

The SDS scores of 240 mothers were used as the dependent variable. After setting dummy variables for the unordered categorical variables, multivariate stepwise linear regression analysis was performed, and 8 independent variables were finally selected, with a model R-squared 0.445, adjusted R-squared 0.426, DW = 1.897, and good fit. The VIF of each variables was less than 5, and multicollinearity had no problem.

Table 4. Multiple stepwise linear regression analysis of the effect of each variable on SDS scores

Variables	Standardized β	t	p
Age	-0.180	-2.584	0.010*
Awaiting employment	0.379	6.121	0.000**
Educational qualification	0.281	3.737	0.000*
Week of pregnancy	-0.226	-4.490	0.000**
Gravidity	0.386	5.880	0.000**
Relatives or friends are infected with the 2019-nCoV pandemic	0.140	2.517	0.013*
Generally unaccompanied by family	0.124	2.243	0.026**
Unharmonious family relationships	0.210	3.925	0.000**

* p-Values < 0.05 and ** p-value < 0.01.

The SDS scores were higher for pregnant women whose family members were usually unaccompanied than for those whose family members were usually accompanied, and for pregnant women whose family relationships were not harmonious than those whose family relationships were harmonious. See Table 4 for details.

Combining maternal socio-demographic characteristics, it can be found that the investigators' subjects, in addition to significant differences in their circumstances, faced varying degrees of external stress, such as the 2019-nCoV pandemic affecting maternity checkups, low-income family relationships, and inadequate family accompaniment, which caused a greater negative impact on maternity than usual during the special period of the 2019-nCoV pandemic, resulting in higher anxiety and depression detection rates in the sample than normal in previous studies [6].

5 Countermeasures and Suggestions

Based on the results of the data analysis of the valid questionnaires collected and concerning the literature on maternal anxiety and depression care by scholars at home and abroad, this paper found that the variables that had an impact on maternal SAS and SDS scores belonged to the three levels of maternal individual, family, and social and medical security, so this paper proposed strategies to alleviate maternal anxiety and depression from these three levels [7].

Combined with the data analysis, researchers constructed a model of factors influencing anxiety mood of pregnant women and a model of factors influencing depression mood of pregnant women. Subsequently, the research offers recommendations to hospitals and healthcare professionals, family members of pregnant women, and pregnant women themselves to alleviate anxiety and depression in pregnant women.

5.1 Recommendations for Hospitals and Medical Staff

Hospitals Establish Appointment and Triage Systems

The linear regression model in this paper showed that pregnant women whose maternity visits were affected by the 2019-nCoV pandemic had higher SAS scores than those whose frequency of maternity visits was not affected by the 2019-nCoV pandemic. The results of this data analysis imply that pregnant women still have a great demand for pregnancy and delivery checkups during the 2019-nCoV pandemic. The hospital, as a high infection-prone area, should work to ensure the safety of pregnant women. According to Wang Shanlin et al.'s clinical trial, hospitals can try to adopt a "three-level prevention management of maternity" model during the 2019-nCoV pandemic [8].

First, the core of primary management is the need for initial screening and triage. During the 2019-nCoV pandemic, hospitals should set up a special file for pregnant women and have special staff to communicate with them in a standardized way through cell phone WeChat, hospital app or WeChat applet, and telephone communication to understand their situation and record it in advance.

Secondly, the core of secondary prevention management lies in outpatient maternity checkups. All pregnant women who want to enter the hospital for offline outpatient or maternity checkups should make online appointments in advance through the hospital's designated channels. The hospital should also set up a green channel for pregnant women to facilitate their visits and prevent cross-infection. Before entering the clinic, pregnant women and their accompanying relatives must fill in the epidemiological history of the 2019-nCoV pandemic and enter the waiting area if their body temperature is within the normal range. Pregnant women, doctors and other health care workers should wear masks throughout the visit. Medical staff should be given rubber gloves and protective masks as much as possible if conditions permit. After examining a pregnant woman, medical staff needs to disinfect the room strictly.

Strict Disinfection and Sterilization Management in Hospital Wards

During the 2019-nCoV pandemic, hospitals should hire special medical staff to accompany inpatient obstetrics and gynecology wards. Hospitals should adopt staggered visits for relatives of pregnant women and advocate telephone or video visits between pregnant women and their relatives. This approach can ensure the safety of pregnant women while making them feel peaceful and stable, thus reducing the probability of anxiety and depression. At the same time, hospital wards should be ventilated at least three times a day for half an hour each time, and the air should be strictly disinfected with ultraviolet lamps or air disinfection machines, especially during the 2019-nCoV pandemic [9]. Hospitals should disinfect the facilities and equipment in consultation rooms, examination rooms and wards that pregnant women are likely to enter during hospitalization, as well as beds, cabinets, floors and walls, at least twice a day. Such disinfection management not only reduces the probability of pregnant women contracting the 2019-nCoV but also gives pregnant women confidence and trust in the hospital in terms of the seriousness of disinfection management during the 2019-nCoV pandemic, thus enabling them to maintain a stable psychological state and reducing the probability of anxiety and depression.

5.2   Recommendations for Families of Pregnant Women Home Environment

Encourage Family Members to Spend More Time with the Mother, Especially the Husband
In order to better alleviate maternal anxiety and depression, family members should accompany mothers as much as possible and improve communication with them. Regarding the family environment, the care and companionship from the husband's role are indispensable for the mother. In today's society, "widowed parenting" has become a buzzword, indicating that many "husbands" are absent during pregnancy and delivery. The absence of a husband during pregnancy and childbirth is undoubtedly detrimental to maternal mental health. Based on previous results and available data, researchers suggest that husbands of pregnant women should pay more attention to the overall condition of their wives and use a variety of methods to participate in their wives' labor and delivery process, as well as communicate with them remotely online if they are affected by the 2019-nCoV pandemic [10].

Family Members Should Correctly Perceive the Mother's New "Mother" Status
After delivery, mothers will inevitably face interpersonal discussions about their "motherhood" role during interpersonal communication. Due to the misconceptions and stigmatization of mental illnesses (including postpartum depression) in China, mothers may have a strong sense of stigma about their anxiety and depression and even self-denial, considering themselves failed mother figures [11]. Although the mass media is responsible for creating a favorable communication environment for maternity, the interpersonal interactions from the family level are more frequent and concrete for maternity, and many mothers with anxiety or depression conditions are also more or less disturbed by the family atmosphere. Family members should create a more positive family atmosphere for the mother, accepting her negative emotions and helping her to develop a comprehensive understanding of her identity as a mother. At a deeper level, family members can learn more scientific ways to deal with maternal anxiety and depression and seek help from a counselor or psychiatrist if necessary.

5.3   Recommendations for Pregnant Women

Positive Self-Psychological Regulation, Acceptance of bad Emotions and Reasonable Response
According to scientific studies, women's psychological state during pregnancy is in a vulnerable period, and pregnant women are often prone to emotional instability [12]. As the 2019-nCoV pandemic intensifies, pregnant women should try to distract themselves from the 2019-nCoV pandemic by focusing more on themselves and the fetus. Pregnant women can try exercises designed for them, such as yoga, which can help relieve their moods or try to develop hobbies that can soothe their minds and bodies, such as making pottery or listening to soft music. At the same time, pregnant women can also take the initiative to communicate and confide in their family members and friends when their moods fluctuate so that they can tell what they are thinking and get the company

and encouragement of their loved ones. This can also make pregnant women feel more secure, which is conducive to their emotional stability of pregnant women.

Minimize Information Exposure and Prevent Information Overload

If the individual can receive more direct and effective information with higher scientific and authoritative validity, it is more conducive to the individual's emotional relief at the moment [13]. However, the amount of information should be controlled within a reasonable interval. When individuals receive too much information in a given period, they may experience negative emotions of stress and anxiety [13]. Therefore, pregnant women should minimize their exposure to information about the 2019-nCoV pandemic to prevent information overload. Pregnant women can browse information released by major official media at regular times of the day. The time spent on browsing should be limited to no more than half an hour per day [4]. Because the iteration of information is very fast, especially in today's increasingly advanced science and technology, the implementation of the 2019-nCoV pandemic may be good and bad, and the research and prevention of the 2019-nCoV pandemic are changing daily. Living in this era, human beings cannot avoid being exposed to this information. Pregnant women should try to pay attention to relatively more authoritative and professional information when they are emotionally unstable. This will at least enable them to find certainty in uncertainty and understand the relatively new and known parts of the unknown [14]. This will also give pregnant women a sense of security and control, stabilizing their emotions.

6   Conclusion

The 2019-nCoV pandemic has affected everyone's life to a greater or lesser extent, and pregnant women, as a special vulnerable group, are more likely to experience anxiety and depression. Based on the scaling survey and multiple linear stepwise regression analysis, it is clear that the emergence of anxiety and depression among pregnant women is influenced by the frequency of pregnancy tests, family care and their situation. According to the results of the survey and analysis, hospitals and health care workers should establish a triage system for the 2019-nCoV pandemic, implement a strict sterilization system within the hospital and follow up with pregnant women after delivery; family members of pregnant women should always pay attention to the physical and mental health of pregnant women, encourage and accompany them and help them to accept their new identity under the 2019-nCoV pandemic. At the same time, pregnant women themselves should engage in positive self-regulation, plan their time to receive information from the outside world, and maintain a regular life as much as possible. Only by working together can the anxiety and depression of pregnant women be minimized during the 2019-nCoV pandemic.

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