



Anxiety among Pregnant Women in Rural-Urban Area Indonesia during the COVID-19 Pandemic in Semarang, Indonesia

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Abstract

BACKGROUND: About 10% of pregnant women worldwide experience emotional changes. Several alterations during the pandemic might induce anxiety, including in pregnant women.

AIM: This study aimed to analyze factors associated with anxiety levels in pregnant women during the COVID-19 pandemic in Semarang, Indonesia.

METHODS: This study was an observational study with a cross-sectional design. This study incorporates a cluster sampling technique involving 238 pregnant women as the study subjects. Moreover, the study variables include the mother's characteristics, hemoglobin level, nutrition and COVID-19-related knowledge, and anxiety. Anxiety levels were measured using the Hamilton Rating Scale for Anxiety questionnaire. The bivariate analysis was performed using Chi-square and independent t-test followed by multiple logistic regression for multivariate analysis.

RESULTS: This study showed that 20.2% (n = 48) of subjects had moderate-to-severe anxiety levels. The results of the multivariate analysis showed that subjects with low COVID-19 knowledge had higher odds of anxiety levels (OR 2.407; 95% CI: 1.202–4.820; p = 0.042), and subjects with gravida in the 1st time or ≥4th times had higher odds of anxiety levels (OR 2.366; 95% CI 1.199–4.670; p = 0.013).

CONCLUSIONS: Pregnant women with low COVID-19 knowledge and gravida for the 1st time or ≥4th time are found to be associated with anxiety during the COVID-19 pandemic in Semarang, Indonesia.

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Introduction

Anxiety is a response to an unpleasant experience that is characterized by feelings of restlessness. Fear is induced by previously experienced threats by an individual and accompanied by physiological stimuli [1]. If the anxiety continues in pregnant women, especially during the third trimester, it might negatively impact the mother and fetus during labor and after delivery [2]. Moreover, various effects of anxiety can increase the risk of low birth weight and premature birth [2].

The negative impacts also involved weakening uterine muscle contractions during labor due to the release of catecholamines and adrenaline hormones, which further inhibit the release of oxytocin hormone [3]. The weakening of uterine muscle contractions can induce prolonged labor, which further increases the incidence of infection and fatigue in pregnant mothers [4]. In addition, the anxiety experienced by pregnant women is also related to postpartum depression due to unstable maternal emotional disorders, both before and after delivery [5]. Anxiety that continues during pregnancy

can also affect the relationship between pregnant women and the surrounding environment, including the fetus [2]. Therefore, the relationship between the mother and the fetus must be profound during pregnancy because it can positively impact the mother and fetus during and after delivery [6]. This profound relationship is known as prenatal attachment [6]. Prenatal attachment is a relationship shown in the form of concrete actions by the interaction between mother and fetus, usually characterized by the ability to describe the characteristics of the fetus, avoid behaviors that can harm the fetus, and meet all the fetus's needs [6], [7].

According to the World Health Organization (2018), the maternal mortality ratio in the developing countries is 239 per 100,000 live births. On the other hand, the Indonesian Demographic and Health Survey in 2012 found that at least 359 mothers died per 100,000 live births. Moreover, in 2016, there were 4912 maternal mortality rates (MMRs), with 28.7% of all pregnant women in Indonesia which were experienced anxiety [8]. Pregnancy is a natural process that causes physiological and psychological changes in women due to the alteration of pregnancy hormones [9]. A study [10] has explained that estrogen and progesterone hormone

activity will be altered during pregnancy. Physiological changes in the hormonal system during pregnancy will trigger mood swings – emotional conditions that often change. Therefore, anxiety is one of the psychological problems commonly experienced by pregnant women [9]. The maternal perinatal audit of the Indonesia Ministry of Health in 2008 showed that 28.7% of all pregnant women experienced anxiety [11]. Several studies state that maternal psychology is one of several factors that contribute to prolonged labor, where prolonged labor is one of the causes of the high MMR in Indonesia [12], [13].

Anxiety experienced by pregnant women can affect both the baby and the mother [2]. The psychological condition of the mother who is not ready to face childbirth can trigger the occurrence of prolonged labor, which is one of the causes of the high MMR in Indonesia [14]. In addition, a recent study [10] showed that maternal anxiety during prenatal was associated with diseases suffered by the baby after birth. This can happen because the production of the adrenaline hormone in response to fear will block blood flow to the womb and induce air deprivation in the fetus [10].

Severe and prolonged anxiety before or during pregnancy experienced by the mother often leads to medical difficulties and abnormal delivery compared to mothers who are relatively calm and less anxious [10]. Moreover, in many cases, severe and prolonged anxiety is often not well perceived by the patient, and deviations occur. This can result in delays in the planning of the recovery process after delivery [10].

The pandemic-related anxiety incidence in pregnant women is also due to the limited direct antenatal care, fear of being unable to meet daily intake properly, domestic conflicts related to socioeconomic conditions, lack of social support from family, and receiving false information related to COVID-19 [15], [16]. Suburban pregnant women are considered a group with a lack of access to antenatal care, which causes the health indicators of pregnant women to be lower than the urban population [17]. A previous study conducted during the COVID-19 pandemic stated that society living in suburban or rural areas had higher anxiety levels [18].

Factors that influence the psychological state of pregnant women are complicated and multifaceted. Demographic characteristics such as young age, education level, income level, stress level, lack of social support, unemployment, and pregnancy were associated with anxiety in pregnant women [1], [19]. Studies from 2012 until 2013 stated that there was a positive correlation between hemoglobin levels and anxiety in young females [20]. Another study in China, 2020, showed that pregnant women with higher education levels and who were obese before pregnancy had a lower risk of anxiety. The study also stated that gestational age was not a risk factor for anxiety [21]. However, other studies showed that the risk of anxiety

was increased in the second and third trimesters of pregnancy [19].

The COVID-19 pandemic has further increased the risk of anxiety in pregnant women [22]. More attention to the psychological condition of pregnant women during this period is, therefore, important. However, studies related to anxiety and associated factors among pregnant women during the COVID-19 pandemic are still lacking. Therefore, this study aimed to examine anxiety levels and associated factors among pregnant women during the COVID-19 pandemic in Semarang, Indonesia.

Methods

This observational study incorporates a cross-sectional design – an observational analytic epidemiological study that examines the dependent variable. This study was conducted between January 18 and February 13, 2021, in the suburban areas of Semarang, Indonesia, with pregnant women as the study population. Therefore, this research was conducted in Mijen and Banyumanik, which belonged to suburban areas [23]. Furthermore, cluster sampling was incorporated as a study sampling technique. The determination of the sample size for the cross-sectional study was hypothesis testing using the prevalence ratio as an estimate of the desired outcome. The minimum sample calculation used the Lemeshow formula [24].

$$n = \frac{\{Z_{1-\alpha/2} \sqrt{2P \times (1-P)} + Z_{1-\beta} \sqrt{P_1 \times (1-P_1) + P_2 \times (1-P_2)}\}^2}{(P_1 - P_2)^2} \times deff$$

Z_{α} = statistic Z normal distribution at the 95% significance level ($\alpha = 0.05$) for the two-way test of 1.96,

Z_{β} = statistic Z normal distribution at 80% power, equal to 0.842

P_1 = proportion of cases in the exposed group (0.667)

P_2 = proportion of cases in the unexposed group (0.412)

P = mean of P_1 and $P_2 = (0.667 + 0.412)/2 = 0.539$

$Deff$ = design effect (comparison between the variance in cluster sampling and the variance in simple random sampling, this study design effect was determined by 2).

We determined the mean proportion of cases (P) to be 0.539, the proportion of cases in the exposed group (P_1) to be 0.667, and the proportion of cases in the unexposed group (P_2) to be 0.412 based on a previous study in Indonesia [25]. The minimum sample size in this study was 216 pregnant women. Therefore, the total subjects in this study were 238 pregnant women, and all subjects completed the measurements.

The variables studied included the subject's characteristics, socioeconomic status, level of knowledge, hemoglobin levels, and anxiety levels in pregnant women. The study instrument incorporated a structured questionnaire to determine the subject's characteristics, socioeconomic level, knowledge, and anxiety. Hamilton Rating Scale for Anxiety (HRSA) form was used to determine the subject's level of anxiety based on symptoms. HRSA questionnaire has been tested for validity and reliability in the Indonesian version by Ramdan [26]. The anxiety questionnaire included 14 questions with a range value of 0 (not experiencing), 1 (mild), 2 (moderate), 3 (severe), and 4 (very severe). The total score obtained was 0–56. Anxiety levels were classified into no anxiety until mild anxiety (score ≤ 17) and moderate to severe anxiety (score > 17) [26], [27]. This questionnaire was performed on pregnant women in a previous study in Surabaya, Indonesia [28].

In addition, subjects were categorized as < 20 years old, 20–35 years old, and > 35 years old, based on current age [29]. Total income was categorized into low (under the minimum wage of the city) and sufficient (above or equal minimum wage of the city) [30]. Subjects with an educational level of elementary school or junior high school were categorized as having low education, and subjects with senior high school or bachelor's degree educational levels were categorized as having moderate education [31].

HemoCue was used to measure the subject's hemoglobin level, incorporated the HemoCue Hb 201+ system by HemoCue manufacturer with Clinical Laboratory Improvement Amendments of 1988 certificate of waiver (82947QW) [32]. The blood samples drawn from the subjects were taken using a pipette and inserted into the micro cuvette. Each microcuvette was inserted into the HemoCue to get the hemoglobin levels. We classified hemoglobin levels as low (< 11 gr/dL) and normal (≥ 11 gr/dL) [33].

The questionnaire about nutrition and COVID-19-related knowledge was adopted from previous research conducted in Indonesia. The questionnaire consisted of 10 questions about COVID-19-related knowledge and 10 questions about nutrition-related knowledge. Questions for COVID-19-related knowledge include the disease symptoms, transmission, and prevention efforts. At the same time, the nutrition-related knowledge questions include a general understanding of healthy food, balanced nutrition, and hygiene sanitation. The first example of the COVID-19-related knowledge question was whether the main symptoms of being infected with COVID-19 are fever, fatigue, dry cough, and body aches. The second example was whether washing hands could reduce the risk of COVID-19 infection. Moreover, the first example of a nutrition-related knowledge question was, "*What do you know about healthy food?*" and the second example was, "*What was the composition of balanced*

nutrition?" [34], [35]. Subjects with scores > 60 were categorized as having good knowledge [36].

Gravida status was categorized as gravida in the 2nd or 3rd time and gravida in the 1st or ≥ 4 th time [37]. History of abortion status was categorized as never and once. Gestational age was categorized as first trimester (0–12 weeks), second trimester (13–28 weeks), and third trimester (≥ 29 weeks) [38]. The compliance with the antenatal care visits category was based on national guidelines from the Indonesian Ministry of Health. Subjects were categorized as complying with antenatal care visits if they had at least one visit in the first trimester, one visit in the second trimester, and 2 times visits in the third trimester [39]. Data collection was conducted through subject interviews conducted by 13 trained enumerators. Interviews were conducted at the health facility at the time of the antenatal care visit.

All statistical analyses were performed using SPSS 17.0 (IBM Corp., Armonk, NY, USA). Categorical variables were presented as percentages, and continuous variables were presented as mean \pm standard deviations. Chi-square and independent t-tests were used to determine the differences between categorical and continuous variables across anxiety levels, with $p < 0.05$ considered significant. Odds ratios (OR) with a 95% confidence interval (CI) were analyzed using multivariate logistic regression to examine the association between variables. Model 1 was unadjusted and model 2 was adjusted for demographic variables such as age, education, and total income. $p < 0.05$ was considered statistically significant.

The study protocol was approved by the medical or health research bioethics commission from the medical faculty, Sultan Agung Islamic University, Semarang, Indonesia (No:308/IX/2020/*KomisiBioetik*). Participants were informed about the study's aim of assessing pregnant women's health to avoid bias related to anxiety levels data, and all subjects signed written informed consent. The data were collected and analyzed anonymously.

Results

The variables were defined as the following: Education: Moderate \geq Senior High School and low Elementary School – Junior High School; total income: Sufficient \geq minimum wage of Semarang City, Indonesia, and low $<$ minimum wage of Semarang City, Indonesia; hemoglobin: Normal ≥ 11 gr/dL and low < 11 gr/dL; knowledge: Good > 60 (score) and poor ≤ 60 (score); gravida: Gravida in 2nd times or 3rd times and gravida in the 1st time or ≥ 4 th times; gestational age: First trimester 0–12 weeks, second trimester 13–28 weeks, and third trimester ≥ 29 weeks; and antenatal care compliance:

Comply at least one visit in the first trimester, one visit in the second trimester, and 2 times visit in the third trimester and less comply if did not meet the minimum attendance rules.

The total subjects included in this study were 238 pregnant women in Semarang, Indonesia. Table 1 shows that 48 (20.2%) subjects had moderate-to-severe anxiety levels, and 190 (79.8%) subjects had no or mild anxiety levels. The majority of subjects with high anxiety levels were between the ages of 20 and 35 years old (81.3%), had moderate education levels (75.0%), sufficient total income (70.8%), normal hemoglobin levels (77.1%), good COVID-19-related knowledge (75%), good nutrition-related knowledge (87.5%), 1st time or $\geq 4^{\text{th}}$ times of gravidae (56.3%), never had an abortion (75.0%), in the third trimester (47.9%), and complied with antenatal care visits (87.5). There were significant differences in COVID-19-related knowledge and antenatal care visit compliance across all anxiety levels ($p < 0.05$). Subjects with higher anxiety levels had younger ages than subjects with lower anxiety levels ($p < 0.05$).

Table 1: Characteristics of pregnant women across anxiety levels values

Characteristics	Anxiety ^a		p-value ^b
	≤ 17 (n = 190)	> 17 (n = 48)	
Age (years) (%)	29.711 \pm 5.244	27.625 \pm 5.870	0.017*
<20 years old	1.1	4.2	0.325
20–35 years old	83.7	81.3	
>35 years old	15.3	14.6	
Education (%)			
Moderate	80.5	75.0	0.398
Low	19.5	25.0	
Total income (%)			
Sufficient	61.6	70.8	0.234
Low	38.4	29.2	
Hemoglobin levels (gr/dL) (%)	12.141 \pm 1.221	11.965 \pm 1.395	0.386
Normal	87.9	77.1	0.056
Low	12.1	22.9	
COVID-19 knowledge (scores) (%)	7.667 \pm 1.650	7.370 \pm 1.515	0.258
Good	87.9	75.0	0.024*
Poor	12.1	25.0	
Nutritional knowledge (scores) (%)	8.177 \pm 1.440	7.969 \pm 1.683	0.387
Good	92.1	87.5	0.390
Poor	7.9	12.5	
Gravida (times) (%)	2.216 \pm 1.118	2.125 \pm 1.248	0.624
2 nd or 3 rd	63.7	43.8	0.012*
1 st or $\geq 4^{\text{th}}$	36.3	56.3	
History of abortion (times) (%)	0.168 \pm 0.452	0.313 \pm 0.589	0.066
Never	85.3	75.0	0.089
\geq once	14.7	25.0	
Gestational age (weeks) (%)	25.221 \pm 8.361	26.979 \pm 8.284	0.193
First trimester	8.9	10.4	0.325
Second trimester	53.7	41.7	
Third trimester	37.4	47.9	
Antenatal care compliance (times) (%)	5.368 \pm 2.823	6.187 \pm 3.425	0.087
Obey	94.2	87.5	0.120
Less obedient	5.8	12.5	

^aData are presented as % related to categorical variables and mean \pm standard deviations for continuous variables. ^bThe p values were analyzed by Chi-square test for categorical variables and independent t-test for continuous variables. *Data with $p < 0.05$ indicate statistically significant

The variables were defined as the following: Hemoglobin: Normal ≥ 11 gr/dL and low < 11 gr/dL; knowledge: Good > 60 (score) and poor ≤ 60 (score); gravida: Gravida in 2nd times or 3rd times and gravida in the 1st time or $\geq 4^{\text{th}}$ times; gestational age: First trimester 0–12 weeks, second trimester 13–28 weeks, and third trimester ≥ 29 weeks; and antenatal care compliance: Complied at least one visit in the first trimester, one visit in the second trimester, and 2 times visit in the third trimester and less complied if did not meet the minimum attendance rules.

Table 2 shows a multivariate analysis of unadjusted and adjusted OR for pregnant women characteristics across anxiety levels. This study showed that pregnant women with poor COVID-19 knowledge had higher odds of anxiety levels than pregnant women with good COVID-19 knowledge (OR 2.496; 95% CI 1.791–5.777). After controlling for the demographics variable, the association between COVID-19 knowledge and anxiety levels was slightly weakened (OR 2.420; 95% CI 1.035–5.658). This study also showed that pregnant women with the 1st time gravida had higher odds of being anxious than pregnant women with gravida number in low-risks pregnancy (OR 2.366; 95% CI 1.199–4.670). After adjustment for demographic variables, the association was strengthened (OR 2.407; 95% CI: 1.202–4.820).

Table 2: The odds ratio for pregnant women characteristics across all anxiety levels during the COVID-19 pandemic

Variables	Odds ratio (95% confidence interval)	
	Model 1 ^a	Model 2 ^b
Hemoglobin levels		
Normal	1	1
Low	2.212 (0.928–5.271)	2.185 (0.906–5.265)
p-value	0.073	0.082
COVID-19 knowledge		
Good	1	1
Poor	2.496 (1.791–5.777)	2.420 (1.035–5.658)
p-value	0.033*	0.042*
Nutrition knowledge		
Good	1	1
Poor	1.791 (0.605–5.301)	1.703 (0.561–5.167)
p-value	0.292	0.347
Gravida		
2 nd or 3 rd times	1	1
1 st or $\geq 4^{\text{th}}$ times	2.366 (1.199–4.670)	2.407 (1.202–4.820)
p-value	0.013*	0.013*
History of abortion		
Never	1	1
\geq Once	1.943 (0.862–4.739)	1.024 (0.824–4.490)
p-value	0.109	0.131
Gestational age		
First trimester	1	1
Second trimester	0.516 (0.157–1.691)	0.523 (0.156–1.739)
p-value	0.274	0.290
Third trimester	0.967 (0.291–3.214)	1.049 (0.310–3.543)
p-value	0.956	0.939
Antenatal care compliance		
Obey	1	1
Less obedient	1.730 (0.534–5.604)	1.717 (0.499–5.907)
p-value	0.360	0.391

All values are odds ratio and 95% confidence interval. unadjusted; ^badjusted for age, education, and total income. *Data with $p < 0.05$ indicate statistically significant.

Discussion

This study demonstrated the effect of the COVID-19 pandemic on the prevalence of anxiety among 238 pregnant women in Semarang, Indonesia. Based on the study results, 20.2% of pregnant women experienced moderate-to-severe anxiety levels, and 79.8% experienced no or mild anxiety levels during the COVID-19 pandemic, which was higher than the prevalence before the pandemic (15.2%) [40]. Women are more likely to experience emotional issues during pregnancy due to changes in their physiological, physical, hormonal, and social life [41]. During the COVID-19 pandemic, the severity of anxiety levels among pregnant women is increasing. A previous study

showed that pregnant women who live in areas with a high number of COVID-19 cases have greater anxiety rates [16]. Wuhan, the first city where COVID-19 cases were found, showed a slightly higher number of anxiety among pregnant women compared to this study (24.5% vs. 20.2%) [42]. The possible reasons might be due to various factors, such as unpreparedness for childbirth during the pandemic, anxiety about infection during perinatal, limited direct to antenatal care services, and socioeconomic conflicts related to the pandemic. The Indonesian government advises people to limit travel and health-care services visits, including antenatal care visits [43].

This study found that pregnant women with low COVID-19-related knowledge had a higher risk of anxiety than pregnant women with good COVID-19-related knowledge. This study finding was in line with a study conducted in Indonesia which stated that there was a significant relationship between knowledge and anxiety in pregnant women during the COVID-19 pandemic [44]. The finding of a study conducted in Wuhan was also in line with this study. Good knowledge regarding COVID-19 was a protective factor against anxiety [45]. This study found that most pregnant women have not properly understood the signs and symptoms of COVID-19. The previous study also found that the most incorrect answer to COVID-19-related knowledge questions were on signs and symptoms of COVID-19. This can be due to the variability of COVID-19 signs and symptoms. Based on the Indonesian Ministry of Health, COVID-19 symptom includes fever, fatigue, dry cough, soreness, nasal congestion, flu, headache, diarrhea, loss of smell, inflammation, conjunctivitis, and skin rash [46]. Misperceptions related to the signs and symptoms of COVID-19 make pregnant women feel excessively alert, so they tend to feel anxious.

Ignorance can trigger anxiety, while knowledge can be used to overcome existing problems. Pregnant women's lack of knowledge may be due to information obtained from unreliable sources (misinformation). Therefore, pregnant must be careful in receiving information about pregnancy and COVID-19. It is important to know and support pregnant women by providing accurate and up-to-date information. Pregnant women need to appoint reliable sources of knowledge related to COVID-19 from both online and offline media. In addition, health services also have a role in emphasizing correct information to the public, especially pregnant women, regarding COVID-19-related knowledge [44]. Antenatal care effectively provides information to pregnant women that can improve their understanding of knowledge and maternal health status [47]. However, the COVID-19 pandemic has reduced pregnant women's access to antenatal care due to social restrictions. Therefore, the implementation of online antenatal and counseling services, as well as health applications from mobile

phones, needs to be improved as a trusted media for information related to COVID-19 [48].

The analysis of this study showed an association of gravida with anxiety levels in pregnant women. The association of the two variables was pregnant women with first gravida or \geq fourth gravida experienced higher risks of anxiety levels (2.496 times) than pregnant women with second or 3rd times. The first and \geq fourth gravida are known as high-risk pregnancies [37]. Based on the multivariate analysis, the gravida variable had a stronger association with anxiety after adjustment for demographic variables such as age, education, and total income. This indicates that pregnant women in the first or \geq fourth gravida from any demographic group could experience anxiety. Even though the mother had sufficient age, education, or total income, a mother with the first and \geq fourth gravida tends to feel more anxious.

There are several explanations for this finding. First, anxiety in primigravida can occur because pregnancy with the first child can cause an imbalance in the woman's personality. After all, she will be faced with the duties and roles of a mother [49]. This study was in line with other studies, which stated that there was a relationship between gravida and anxiety. Moreover, the percentage of severe anxiety was more common in primigravida than in the second and third gravida [50]. Second, pregnant women will experience a period of adaptation to their first pregnancy related to preparation for birth, changes in relationships with partners, and the role of being a new mother [51]. Third, primigravida pregnant women with less knowledge tend to have high anxiety due to ignorance about pregnancy and living far from their parents, so they do not share the pregnancy-related experience. Fourth, primigravida pregnant women with poor pregnancy-related attitudes experience anxiety due to non-compliance to antenatal care [52]. Finally, during the COVID-19 pandemic, the Indonesian government policy regarding activity restrictions, including limited access to health-care facilities, can trigger anxiety in pregnant women who have their first pregnancy. Online consultations are now widely used by the public. Therefore, the ability of a community to access smartphones and the increasing use of mobile technology are needed for the developments of online consultations [43].

Anxiety is more common in pregnant women with high-risk pregnancies. Therefore, pregnant women with gravida more than or equal to 4 were included in the category of high-risk pregnant women. This study finding was in line with a study conducted in Iran which stated that gravida in fourth or above increases the incidence of anxiety or depression in pregnant women [53]. Pregnant women with a high number of children may experience a decline in reproductive health and increase the risk of experiencing abortion, preeclampsia, low birth weight, and premature birth [54]. Another study in Indonesia showed that pregnant women with a high number of gravida were more at risk of experiencing

preeclampsia and seizures than pregnant women with less than four gravidae [55]. The Health Belief Model theory of a person's perception of drug susceptibility and efficacy can influence health behavior decisions. Perceptions of high-risk pregnancies in pregnant women with more than or equal to 4 gravidae will affect the mother's anxiety during pregnancy and preparation for delivery. Related to the risk of large numbers of gravida, pregnant women will feel anxious about their and their fetus's safety in the womb [56].

This study had a limitation that should be acknowledged. First, this study was conducted when there were social restrictions related to the COVID-19 pandemic. Therefore, the intensity of data collection was only at the *Puskesmas* and could not be done through in-depth interviews with each subject, so the data obtained were only quantitative. Second, this study was conducted with a small number of subjects ($n = 238$ pregnant women), although this number still met the minimum sample requirements. Third, our study has not measured other medical services such as nutritional status, blood sugar levels, and blood pressure. The previous studies stated that blood pressure and blood sugar levels were associated with anxiety in pregnant women [57], [58]. However, this study has looked at data related to overall antenatal care for pregnant women. Furthermore, this study has not assessed marital status as a variable because, in Indonesian culture, almost all pregnant women are married. The previous studies showed that 95% of pregnant women in Indonesia were married. Therefore, the researchers did not observe the marital status of pregnant women [59]. Nevertheless, despite all of the limitations, the results of this study are expected to contribute to the reduction of anxiety among pregnant women, especially in suburban areas.

Conclusions

The prevalence of pregnant women during the COVID-19 pandemic who experienced moderate-to-severe anxiety is 20.2%, and no or mild anxiety is 79.2%. COVID-19-related knowledge and gravida are strongly associated with anxiety levels among pregnant women. Pregnant women with low COVID-19-related knowledge and pregnant women in first or more than the fourth gravida are more likely to have higher anxiety levels. Providing knowledge related to pregnancy and COVID-19 in antenatal care is needed as a reliable source of information to the public. Moreover, community health centers/health-care facilities must improve the quality of psychological services provided during antenatal care. Psychological services can help pregnant women at a higher risk of anxiety, especially during the COVID-19 pandemic. It is recommended that mental health examinations, including anxiety,

especially for pregnant women, should be intensified. In the developing countries such as Indonesia, mental health examinations are considered embarrassing because of the bad stigma of mental disorders. Additional longitudinal studies are needed to explore the determinants of anxiety among pregnant women during the COVID-19 pandemic, such as medical services, nutritional status, blood sugar levels, or blood pressure, with a higher number of subjects. Mental health issues among pregnant women can be considered an important factor during pregnancy not only during the pandemic but also after the pandemic. The intervention studies to manage mental health among pregnant women can be developed further to prevent prolonged labor and maternal mortality.

Data Availability Statement

The datasets are only not publicly available but are available from the corresponding author on reasonable formal request.

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