



## Knowledge and Compliance of COVID-19 Health Protocols among Pregnant Women in Urban and Rural West Java Province

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### ABSTRACT

Pregnant women are a risk group for exposure to infectious diseases, especially COVID-19. The study aimed to analyze the relationship between knowledge and compliance with health protocols for preventing COVID-19 in pregnant women in urban and rural areas in West Province, Indonesia. A cross-sectional design on 414 pregnant women in Bekasi Regency representing urban, and Bekasi City representing rural West Java Province in May-July 2021. The sample was selected by random sampling technique. Data were taken through direct interviews using a questionnaire and analyzed using bivariate analysis with SPSS Version 22.0. Pregnant women who comply with health protocols for preventing COVID-19 in urban and rural areas are 91.8% and 89.4%, respectively. Pregnant women who have good knowledge about the prevention of COVID-19 disease in urban and rural areas are 54.1% and 60.4%, respectively. Knowledge is related to the compliance of pregnant women in urban areas ( $p=0.020$ ; OR:0.23; 95% CI:0.06-0.82). Whereas in rural areas, knowledge is not related to the compliance of pregnant women ( $p> 0.05$ ). Socialization regarding the importance of complying with health protocols still needs to be carried out to prevent exposure to infectious diseases, especially COVID-19

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### Kata kunci:

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### ABSTRAK

Ibu hamil merupakan kelompok berisiko untuk terpapar penyakit infeksi terutama COVID-19. Tujuan penelitian adalah menganalisis hubungan pengetahuan terhadap kepatuhan protokol kesehatan pencegahan COVID-19 pada ibu hamil di wilayah urban dan rural di Provinsi Jawa Barat, Indonesia. Desain cross-sectional dilakukan pada 414 ibu hamil di Kabupaten Bekasi mewakili wilayah urban, dan Kota Bekasi mewakili wilayah rural Provinsi Jawa Barat pada Mei-Juli 2021. Sampel dipilih dengan teknik random sampling. Data diambil melalui wawancara langsung menggunakan kuesioner dan dianalisis menggunakan analisis bivariat dengan SPSS Versi 22.0. Ibu hamil yang patuh terhadap protokol kesehatan untuk pencegahan COVID-19 di wilayah urban dan rural yaitu 91.8%, dan 89.4%, secara berurutan. Sedangkan ibu hamil yang memiliki pengetahuan yang baik mengenai pencegahan terhadap penyakit COVID-19 di wilayah urban dan rural yaitu 54.1% dan 60.4%, secara berurutan. Pengetahuan berhubungan dengan kepatuhan ibu hamil di urban ( $p=0.020$ ; OR:0.23; 95% CI:0.06-0.82). Sedangkan di wilayah rural, pengetahuan tidak berhubungan dengan kepatuhan ibu hamil ( $p>0.05$ ). Sosialisasi mengenai pentingnya kepatuhan protokol kesehatan tetap perlu dilakukan untuk mencegah paparan penyakit infeksi khususnya COVID-19

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## INTRODUCTION

A strategic effort that is an effective response to reducing the risk of exposure to COVID-19 is through various family- and community-based prevention efforts (WHO, 2020a). The highest increase in patients confirmed positive for COVID-19 occurred in urban areas where people have high mobility to move across areas from their homes to work locations. One of the risk groups that can be exposed to COVID-19 is the group of pregnant women. Hormonal changes, including the decreased function of the immune system in pregnant women, are a risk of easy exposure to COVID-19 in pregnant women which can harm themselves and their fetuses. During this period, the fetus is also forming an immune function that is correlated with its growth and development (WFP et al., 2020). Pregnant women are at great risk of having breathing problems, due to a change in physiology and immunology that occur in pregnant women as a result of pregnancy, so there are some risks and the risk occurs because of this stress on maternal partial immunity pregnant resulting in pregnant women more susceptible to viral infections (Liang & Acharya, 2020).

World Health Organization (WHO) reports that there are more than 800 pregnant women in the world who die from diseases or complications related to pregnancy and childbirth. This condition is exacerbated by the COVID-19 pandemic, where pregnant women who are infected with COVID-19 are more at risk of dying than pregnant women who are not exposed to COVID-19 (WHO, 2020b). This is associated with a correlation between the occurrence of infectious diseases and the occurrence of cases of malnutrition in pregnant women, where mothers who are exposed to COVID-19 are more at risk of experiencing malnutrition, and conversely, pregnant women who are malnourished are more at risk of being exposed to COVID-19 (Muhaidat et al., 2020). This is reinforced by data showing that almost 50% of pregnant women in Indonesia experience anemia, and this number has significantly increased in the last 4 (four) years. With the COVID-19 pandemic, the risk of increasing the prevalence of anemic pregnant women will continue to increase. This is because this epidemic also affects the declining economic level so the purchasing power of families for nutritious food is low (Kementerian Kesehatan RI, 2019).

Based on data from the Indonesian Ministry of Health (2021), globally the development data for COVID-19 states that the spike in positive confirmed patients continues to increase where the number has exceeded the peak in the first wave of COVID-19. The three countries that have reported the most confirmed cases of COVID-19 in the world are the United States, India, and Brazil, and Indonesia is the country with the highest number of confirmed cases in ASEAN. In Indonesia, the high number of COVID-19 is highest in urban areas, especially in the center of capital cities such as DKI Jakarta, West Java, and Central Java. West Java Province is one of the regions with the highest number of COVID-19 cases, namely 328,940 cases (17.2%). This province is located adjacent to DKI Jakarta Province. Communities in this area generally migrate from their place of residence to work locations in DKI Jakarta every day. One of the urban areas that support DKI Jakarta is Bekasi City, where this city is included in the top 10 areas with the highest number of patients exposed to COVID-19 (Pusat Informasi dan Koordinasi COVID-19, 2021).

More than 11,400 pregnant women are treated in hospitals due to COVID-19. And pregnant women with a suspected diagnosis of COVID-19 in the ICU room is 62%

higher than non-pregnant women of reproductive age, and pregnant women with may need ventilation invasive is also 88% higher than women who are not pregnant (Subbaraman, 2021). CDC too mentions more than 400,000 women with positive tests and symptoms of COVID-19 and found an increased likelihood of ICU admission and the need for invasive ventilation in pregnant women. As many as 57% of respondents are still lacking in preventing infection COVID-19 during pregnancy (Siregar et al., 2020).

The continued increase in the number of confirmed COVID-19 patients is due to the low level of public awareness in complying with health protocols in preventing COVID-19. The low behavioral compliance in preventing transmission of COVID-19 will be the cause of the high incidence of transmission of cases of COVID-19 so efforts to control COVID-19 shortly will experience obstacles in making it happen. A study of the level of compliance with activities outside the home in 34 provinces in Indonesia conducted by the Central Agency Statistics find the results of community disobedience using a mask reaches 9%, non-compliance using hand sanitizers/disinfectants reached 23%, non-compliance with washing hands for 20 seconds with soap reaches 25%, non-compliance avoid contact hands reach 19%, avoid non-compliance the crowd reached 24% and non-compliance kept their distance at least 1 meter to reach 27%.

The results of Rachmani et al's research (2021) stated that people's knowledge and attitudes about COVID-19 would be related to the practice of preventing COVID-19. From this research, it can be seen that knowledge and attitudes will influence a person in making changes in behavior. This research is also in line with the results of research by Law, et al (2020) which states that the knowledge possessed by the community will help in suppressing the transmission of COVID-19. Sari et al. (2020) also show that knowledge is a major factor in community compliance in carrying out COVID-19 prevention behaviors such as the use of masks and other personal protective equipment. Research by Ayele et al. (2021) shows educational status, husband's occupation, and knowledge of COVID-19 are also related to the practice of preventing COVID-19.

Compliance behavior with health protocols in efforts to prevent transmission of COVID-19 is influenced by internal and external factors. Several factors that influence this behavior are sociodemographic characteristics (age, education, and mother's occupation) and the mother's knowledge about clean and healthy living behavior in preventing COVID-19. This study aims to look at the relationship between knowledge and compliance in carrying out the COVID-19 prevention health protocol in urban and rural communities in West Java Province, especially in the high-risk group, namely pregnant women.

## METHODS

The cross-sectional study design was conducted on pregnant women as a group that has a high risk of exposure to COVID-19 in May-July 2021. The research location was conducted in Bekasi City and Bekasi Regency, West Java Province, which have characteristics as urban and rural areas. A sample of 414 pregnant women was calculated using the hypothesis test formula 1 (one) proportion of the population. The research sample met the research inclusion criteria, namely: 1) pregnant women aged >19-40 years, 2) living in urban and rural areas (research locations) for at

least 1 year from before the study was conducted, 3) not survivors of COVID-19. While the exclusion criteria were patients exposed to COVID-19 or other chronic diseases when they were the research sample. The sample was selected by random sampling technique. The data obtained primarily includes the dependent variable, namely the behavior of complying with health protocols for the prevention of COVID-19, which consists of 5 M (Wearing Masks, Keeping Distance, Washing Hands, Avoiding Crowds, and Reducing Mobility), as well as independent variables, which include sociodemographic characteristics of mothers such as mother's age, mother's education, mother's occupation, husband's education, husband's occupation, family income, and exposed to COVID-19. As well as knowledge of pregnant women regarding clean and healthy living behavior in preventing COVID-19.

Data were collected through direct interviews using a structured questionnaire instrument consisting of sociodemographics of pregnant women and questions regarding health protocol compliance behavior toward preventing COVID-19. After the data is collected, the data will be analyzed using univariate and bivariate analysis with SPSS Version 22.0 to determine the relationship between sociodemographic factors of pregnant women and health protocol compliance behavior towards the prevention of COVID-19.

This research has received ethical approval from the health research ethics committee of the Faculty of Medicine and Health, University of Muhammadiyah Jakarta with number 099/KE/FKK-UMJ/IV/2021. In addition, the government in West Java Province as the study area has obtained a permit. Informed consent was confirmed by the study participants. Confidentiality is maintained throughout the study by excluding personal identifiers from the data collection forms. During data collection, pregnant women were also given priority during the data collection period. The author confirms that all methods are carried out following the relevant guidelines and regulations.

## RESULTS AND DISCUSSION

The results of the study of 414 pregnant women in West Java Province, obtained characteristic data in Table 1 which shows that the majority of mothers aged between 25-35 years 57.5% in urban areas and 58.5% in rural areas. Mother's education is dominated by senior high school as much as 47.8% in urban and 54.1% in rural areas. Almost all mothers are housewives, namely 81.6% in urban areas and 83.6% in rural areas. Husband's education is also dominated by senior high school as much as 53.1% in urban areas and 60.9% in rural areas. Husband's occupation as private employees was most commonly found in this study, namely 45.4% in urban areas and 49.8% in rural areas. Most of the family income  $\geq$  Rp. 4,000,000, - respectively in urban areas at 60.4% and rural areas at 61.4%. There were 27 mothers (13.0%) who stated that they had been exposed to COVID-19 in urban areas, while in rural areas there were 16 people (7.7%). Knowledge of pregnant women regarding clean and healthy living behavior in preventing COVID-19 in urban areas is 54.1% good knowledgeable. This figure is lower than the good knowledge of pregnant women in rural areas, namely 60.4%. Compliance of pregnant women in carrying out the COVID-19 health protocol shows that almost all pregnant women are compliant, namely in urban areas 91.8% and in rural areas 89.4%.

**Table 1**  
**Characteristics of Pregnant Women in Urban and Rural West Java**

Characteristic	Urban		Rural	
	N	%	N	%
<b>Mothers Age</b>				
< 25 years	58	28.0	61	29.5
25-35 years	119	57.5	121	58.5
> 35 years	30	14.5	25	12.1
<b>Mothers Education</b>				
Elementary school	21	10.1	15	7.2
Junior high school	33	15.9	45	21.7
Senior high school	99	47.8	112	54.1
College	54	26.1	35	16.9
<b>Mothers Occupation</b>				
Housewife	169	81.6	173	83.6
Private sector employee	18	8.7	19	9.2
Entrepreneur	5	2.4	3	1.4
Laborer	1	0.5	0	0.0
Private teacher	7	3.4	5	2.4
Government employees	2	1.0	2	1.0
Others	5	2.4	5	2.4
<b>Husbands Education</b>				
Elementary school	17	8.2	17	8.2
Junior high school	27	13.0	27	13.0
Senior high school	110	53.1	126	60.9
College	53	25.6	37	17.9
<b>Husbands Occupation</b>				
Not Work	3	1.4	2	1.0
Private sector employee	94	45.4	103	49.8
Entrepreneur	51	24.6	50	24.2
Laborer	32	15.5	33	15.9
Private teacher	3	1.4	6	2.9
Government employees	4	1.9	2	1.0
Others	20	9.7	11	5.3
<b>Family income</b>				
< Rp. 4.000.000	82	39.6	80	38.6
$\geq$ Rp. 4.000.000	125	60.4	127	61.4
<b>Exposed to COVID-19</b>				
Yes	27	13.0	16	7.7
No	180	87.0	191	92.3
<b>Knowledge</b>				
Good	95	45.9	82	39.6
Quite good	112	54.1	125	60.4
<b>Compliance with the Health Protocol of COVID-19</b>				
No	17	8.2	22	10.6
Yes	190	91.8	185	89.4

Health protocol compliance behavior towards preventing COVID-19, which consists of 5 M (Washing Hands, Wearing Masks, Keeping Distance, Avoiding Crowds, and Reducing Mobility) in pregnant women can be seen in Table 2. Almost all pregnant women comply with the five COVID-19 health protocols. Washing hands before and after eating with soap/hand sanitizer and running water is 99.0% in urban areas and 97.1% in rural areas. Using masks when outside the home is 98.1% in urban areas and 96.1% in rural areas. Keeping a minimum distance of 1 meter, especially when outside the house, is 96.6% in urban areas and 91.8% in rural areas. Stay away from the crowd as much as 98.1% in urban and 91.8% in rural areas. Limiting mobilization or interaction outside the home is 95.2% in urban areas and 93.2% in rural areas.

**Table 2**  
**Health Protocol of COVID-19**

Health Protocol of COVID-19	Urban				Rural			
	No		Yes		No		Yes	
	N	%	N	%	N	%	N	%
Wash hands before and after eating with soap/hand sanitizer and running water	2	1.0	205	99.0	6	2.9	201	97.1
Using a mask when outside the home	4	1.9	203	98.1	8	3.9	199	96.1
Maintain a distance of at least 1 meter, especially when outside the house	7	3.4	200	96.6	17	8.2	190	91.8
Stay away from the crowd	4	1.9	203	98.1	17	8.2	190	91.8
Limiting mobilization or interaction outside the home	10	4.8	197	95.2	14	6.8	193	93.2

Characteristic	Urban				P (OR; 95% CI)	Rural				P (OR; 95% CI)
	Not comply		Comply			Not comply		Comply		
	N	%	N	%		N	%	N	%	
Mothers Age					0.495					0.045*
< 25 years	5	8.6	53	91.4		9	14.8	54	85.7	
25-35 years	8	6.0	111	93.3		7	5.8	112	94.1	
> 35 years	4	13.3	26	86.7		6	24.0	20	80.0	
Mothers Education					0.227					0.014*
Low	0	0.0	21	100.0		5	31.3	11	68.8	OR: 4.97; 95%
High	17	9.1	169	90.9		16	8.4	175	91.6	CI: 1.54-16.09
Mothers Occupation					0.207					0.211
Housewife	12	7.1	157	92.9		20	11.6	153	88.4	
Work	5	13.2	33	86.8		1	2.9	33	97.1	
Husbands Education					0.370					0.078
Low	0	0.0	17	100.0		4	23.5	13	76.5	
High	17	8.9	190	91.8		17	8.9	173	91.9	
Husbands Occupation					0.342					0.034*
Private sector employee and Entrepreneur	12	8.3	133	91.7		14	9.3	136	90.7	
Laborer	1	3.1	31	96.9		7	20.6	27	79.4	
Others	4	13.3	26	86.7		0	0.0	23	100.0	
Family income					0.207					0.936
< Rp. 4.000.000	8	6.8	109	93.2		11	8.9	113	91.1	
≥ Rp. 4.000.000	8	14.0	49	86.0		8	10.3	70	89.7	
Knowledge					0.020*					0.305
Good	3	3.2	92	96.8	OR: 0.23;	11	13.4	71	86.6	
Quite Good	14	12.5	98	87.5	95% CI: 0.06-0.82	10	8.0	115	92.0	

\*significant  $p < 0.05$  chi-square test

Table 3 shows that in urban areas there is no difference between the ages of mothers <25 years, 25-35 years, and > 35 years who adhere to health protocols. This shows that maternal age is not related to compliance with health protocols (p-value 0.495). Mothers with low education 100.0% comply with health protocols, while higher education 90.9%. This shows that the mother's education is not related to compliance with health protocols (p-value 0.227). Housewives at 92.9% comply with health protocols while working mothers are slightly lower at 86.8%. This shows that the mother's occupation is not related to compliance with health protocols (p-value 0.207). The husband's low education is 100.0% complying with health protocols, while higher education is 91.8%. This shows that the husband's education is not related to compliance with health protocols (p-value 0.370). Husbands who occupation as private and self-employed employees comply with health protocols by 91.7%, laborers by 96.9%, and others by 86.7%. This shows that the husband's occupation is not related to compliance with health protocols (p-value 0.342). Family income < Rp. 4,000,000,- 93.2% more adherents to implementing health protocols compared to family income ≥ Rp. 4,000,000,- by 86.0%. This shows that family income is not related to compliance with health protocols (p-value 0.207).

In rural areas, there are more mothers aged between 25-35 years who comply with health protocols compared to mothers aged < 25 years (85.7%) and > 35 years (80.0%). This shows that there is a significant relationship between the mother's age and compliance with health protocols (p-value 0.045). Mother's education is low, 68.8% comply with health protocols, while higher education 91.6%. This shows that the mother's education is related to compliance with health protocols (p-value 0.014; OR= 4.97; 95% CI= 1.54-16.09). Housewives at 88.4% comply with health protocols, which is lower than working mothers at 97.1%. Even so, this shows that the mother's work is not related to compliance with health protocols (p-value 0.211). Low-husband education 76.5% comply with health protocols, while higher education is 91.9%. This shows that the husband's education is not related to compliance with health protocols (p-value 0.078). Husbands who occupy as private employees and entrepreneurs who comply with health protocols are 90.7%, laborers are 79.4%, and others are 100.0%. This shows that the husband's occupation is related to compliance with health protocols (p-value 0.034). Family income < Rp. 4,000,000,- 91.1% comply with health protocols, while family income ≥ Rp. 4,000,000,- by 89.7%. This shows that family income is not related to compliance with health protocols

(p-value 0.936). Knowledge of pregnant women about clean and healthy living behavior in preventing COVID-19 is significantly related to compliance with health protocols in urban areas (p-value 0.020; OR= 0.23; 95% CI= 0.06-0.82). Whereas in rural areas the knowledge of pregnant women is not significantly related to compliance with health protocols (p-value 0.305) (Tabel 3).

This study shows that most pregnant women are aged between 25-35 years with the most recent education being high school, and almost all mothers are housewives. The husband's education is dominated by the high school level, most of the husbands work as private employees and have income  $\geq$  Rp. 4,000,000,-. The results of this study are in line with research conducted by Nurrachmawati et al. (2022) which shows that the majority of pregnant women aged 25-35 years are 84.0%, 55.7% have the last education from senior high school and 67.0% of mothers are housewives.

This study shows that pregnant women's knowledge of clean and healthy living behavior in preventing COVID-19 in rural areas is higher than in urban areas. In line with the results of previous studies where knowledge of COVID-19 in rural areas is higher than in urban areas (Surtimanah et al., 2021).

The results of this study show that the behavior of compliance to health protocols for pregnant women in preventing COVID-19 between urban and rural areas is equally good. From the mothers' answers regarding compliance with the 5 M health protocols (Washing Hands, Wearing Masks, Maintaining Distance, Avoiding Crowds, and Reducing Mobility) it can be seen that almost all health protocols are complied with by pregnant women. In line with research conducted by Nadifa et al. (2021) which shows good COVID-19 prevention behavior in pregnant women at 89.0%. Compliance with carrying out health protocols for pregnant women at the PKU Muhammadiyah Mamajang Makassar hospital showed higher results than this study, namely 97.7% (Nurdin et al., 2022). Research conducted in Malaysia on pregnant women showed the same results where compliance with washing hands was 98.8% and using masks was 96.1% (Aly et al., 2021). This result is higher than that of Maleki et al. (2022) who stated that compliance with hand washing was 84.7% and the use of masks was 76.6% for pregnant women in Zanjan province, Iran.

Other research states that compared to urban residents, rural residents are less likely to engage in preventive behavior, are more likely to hold negative attitudes toward the effectiveness of carrying out preventive behavior, and are more likely to have lower levels of information appraisal skills (Chen & Chen, 2020). Mose et al. (2022) found that pregnant women who live in urban areas have a 2.23 times better chance of preventing COVID-19 infection than pregnant women who live in rural areas.

Community understanding of COVID-19 in urban areas is better than in rural areas. This can be seen from the attitude and behavior of the community in responding to the pandemic. Most of the public's understanding of COVID-19 is good by implementing health protocols related to COVID-19, although there are still a small number of pregnant women who have not implemented COVID-19 prevention behaviors.

In urban areas, the results show that the mother's age, mother's education, mother's occupation, husband's education, husband's occupation, and family income have no significant relationship with pregnant women's compliance with health protocols. This research is in line with research conducted by Yunia et al. (2022) which shows that the mother's age and education have no relationship with compliance with the COVID-19 health protocol.

Sociodemographic factors that influence COVID-19 prevention behavior in urban South Korea are age, education level, monthly household income, and employment status (Hyun et al., 2022).

This study shows that the proportion of mothers who have high compliance with COVID-19 prevention is higher in the proportion of mothers with good knowledge compared to mothers with quite good knowledge in urban areas. Knowledge is related to compliance with COVID-19 prevention in pregnant women in urban areas. Increasing public knowledge regarding COVID-19 information is very important in changing attitudes regarding COVID-19, which will have an impact on appropriate behavior among the community (Retnaningsih et al., 2020). In line with the results of previous research which showed that knowledge is related to compliance with COVID-19 prevention in pregnant women.

In rural areas, it was found that the mother's age, mother's education, and husband's occupation had a significant relationship with the compliance of pregnant women in carrying out health protocols. Meanwhile, the mother's occupation, husband's education, and family income did not have a significant relationship with the compliance of pregnant women in implementing health protocols. In rural areas of South Korea, age and education level were significantly associated with increased COVID-19 prevention behavior (Hyun et al., 2022). Research by Silesh et al. (2021) found similar results where the age of pregnant women was a significant predictor of having good compliance with COVID-19 precautions. Pregnant women aged 25 years and over are more likely to have good compliance with COVID-19 prevention measures compared to women aged less than 25 years. In line with research conducted by Ayele et al. (2021) who obtained results that the mother's education and husband's occupation were related to COVID-19 prevention behavior. It was also stated in the study that respondents who had completed college and above were almost three times more likely to have an adequate level of practice to prevent COVID-19 compared to respondents who did not attend formal education. Kumbeni et al. (2021) found that factors that were positively related to good COVID-19 prevention practices in pregnant women were older age ( $>$  23 years), having at least primary school education, and living in urban areas. Research Maleki et al. (2022) showed the location, age, education, occupation, household income, and family history of COVID-19 disease were the most important predictors of compliance with the COVID-19 health protocol.

This study shows that the proportion of mothers with quite good knowledge is more compliant with COVID-19 prevention compared to mothers with good knowledge in rural areas. However, knowledge is not related to compliance with COVID-19 prevention in pregnant women in rural areas. In line with the results of previous research which showed that knowledge is related to compliance with the prevention of COVID-19 in pregnant women in Citaringgul Babakan Madang Village (Nadifa et al., 2021).

#### LIMITATIONS OF THE STUDY

The limitations of this study were only analyzing sociodemographic factors and knowledge about clean and healthy living behavior in preventing COVID-19 in pregnant women towards compliance with the COVID-19 health protocol. However, they did not see the attitude of pregnant

women toward compliance with the COVID-19 health protocol.

## CONCLUSIONS AND SUGGESTIONS

The behavior of complying with health protocols for the prevention of COVID-19 in pregnant women in urban and rural areas is equally good. Mother's age, mother's education, and husband's occupation are related to compliance of pregnant women in implementing health protocols in rural areas. Whereas in urban areas sociodemographic factors are not related to compliance with health protocols for preventing COVID-19. The implementation of the COVID-19 health protocol must be continued considering that pregnant women are a vulnerable group to the virus and so far no cure has been found.

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### Conflict of Interest Statement

The authors declared that no potential conflicts of interest to the authorship and publication of this article.

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