

Factors associated with the willingness to receive COVID-19 vaccination among pregnant women

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ABSTRACT

Pregnant women are a vulnerable group to be infected by COVID-19, and have a higher risk of serious illness, morbidity, and mortality than the general population. Willingness to receive COVID-19 vaccination has a decisive role in successfully controlling the COVID-19 pandemic. The objective of this study was to determine the factors related to the willingness to get COVID-19 vaccination in pregnant women at the Teluknaga Public Health Center. A total of 102 pregnant women with gestational ages of 13 to 33 weeks were selected by convenience sampling. Data were collected by filling out a questionnaire during November to December 2021. All respondents had a health status that meets the requirements for COVID-19 vaccination. Overall, 63% of pregnant women wanted to receive COVID-19 vaccination. There were significant relationships between education ($p=0.029$), frequency of antenatal care ($p=0.019$), husband's support ($p<0.001$) and willingness to receive vaccination. Religion, occupation, knowledge about COVID-19, parity, frequency of antenatal care visits, and sources of information did not show significant relationships with the willingness to receive COVID-19 vaccination among them. Education and awareness campaigns about the safety of the COVID-19 vaccine for pregnant women and the role of health workers are needed to raise awareness.

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1. INTRODUCTION

Coronavirus Disease 2019 (COVID-19) is a viral infectious disease caused by severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) [1]. COVID-19 can attack everyone regardless of age, comorbid conditions, and gender, including pregnant women [2]. Pregnant women have a higher risk of serious illness, morbidity, and mortality than the general population [3]. SARS-CoV-2 infection during pregnancy was associated with an increased incidence of adverse maternal and neonatal complications, such as spontaneous abortion, preterm delivery, intrauterine growth restriction, endotracheal intubation, and admission to the intensive care unit, renal failure, and disseminated intravascular coagulopathy [4].

There were 215,714,824 confirmed cases of SARS-CoV-2 infection worldwide as of August 29, 2021, with a total of 4,490,753 deaths [5]. In Southeast Asia, 41,119,317 confirmed cases were recorded, with 641,874 deaths. As of August 31, 2021, 4,089,801 infections were recorded in Indonesia and 133,023 deaths occurred [5]. Based on data from the Indonesian Obstetrics and Gynecology Association (IOGA) from April 2020 to April 2021, 536 cases occurred in pregnant women, 51.9% had no symptoms and did not need respiratory support. As many as 72% had gestational age above 37 weeks, as many as 4.5% entered maternal

intensive care and 3% died due to complications of COVID-19 [6]. Other countries, including Indonesia, have tried to prevent and control SARS-CoV-2 infection by paying particular attention to vulnerable groups with a greater potential risk of infection and its complications, including pregnant women [4].

Vaccination is an important strategy in controlling the COVID-19 pandemic by reducing disease severity and limiting infection [7], [8]. Recommendations from the Society for Maternal-Fetal Medicine and the American College of Obstetricians and Gynecologists (ACOG) have stated that the vaccine should be offered to pregnant and lactating women based on risk [7]–[9]. Based on a statement from the Ministry of Health of the Republic of Indonesia, which was issued on August 2, 2021, efforts to implement COVID-19 vaccination for pregnant women have begun since August 2, 2021 [10]. Before receiving a COVID-19 vaccination, there is a particular screening format for pregnant women: vaccination starts from 13 weeks of gestation to term pregnancy, and it is not necessary to obtain a recommendation from an obstetrics and gynecology specialist to vaccinate. The postponement of COVID-19 vaccination for pregnant women applies to those with complaints and signs of preeclampsia such as swollen feet, headaches, heartburn, blurred vision and blood pressure of more than 140/90 mmHg. In addition to these complaints, a history of severe allergic reactions to previous vaccinations such as shortness of breath, swelling, and urticaria throughout the body, having comorbidities (heart disease, diabetes mellitus, asthma, lung disease, HIV, hyperthyroidism/hypothyroidism, chronic kidney disease, liver disease) who are not controlled or have acute complications, have autoimmune diseases such as uncontrolled lupus and acute complications, are on treatment for blood clotting disorders, blood disorders, immune deficiencies, and recipients of blood products/transfusions, and in pregnant women who are receiving immunosuppressants such as corticosteroid therapy and chemotherapy [10].

Acceptance of vaccination depends on public awareness of disease risk, vaccine attitude, and demand. Immunization programs are essential to achieve high vaccination coverage levels, especially for emerging infectious diseases. Vaccination coverage will be more comprehensive if we can better identify barriers to vaccination in the community, especially among vulnerable groups such as pregnant women. The study found that pregnant women respondents had a lower vaccine acceptance rate (44.3%) than non-pregnant women (76.2%) [11]. Vaccination can be applied readily if pregnant women are willing to receive the vaccine. If the woman is reluctant to be vaccinated, this might be due to several reasons including fear of vaccine side effects, the assumption that vaccines may not be effective, already using other COVID-19 prevention methods, fears that vaccines can cause COVID-19 infection, and that vaccines can adversely affect the fetus [12]. This study aimed to determine the factors associated with the willingness to receive COVID-19 vaccination among Indonesian pregnant women.

2. RESEARCH METHOD

This was an observational analytic study with a cross-sectional design. The research was conducted in Teluknaga Public Health Center, Tangerang Regency, Banten Province, Indonesia from November to December 2021. A total of 102 pregnant women were selected by convenience sampling with a consecutive sampling technique. The inclusion criteria in this study were pregnant women, gestational age 13 to 33 weeks who had a pregnancy checkup at the Teluknaga Community Health Center. Hence, the exclusion criteria were: complaints and signs of preeclampsia, a history of severe allergies, uncontrolled co-morbidities (heart disease, diabetes mellitus, asthma, lung disease, HIV, hyperthyroidism/hypothyroidism, chronic kidney disease, liver disease), autoimmune conditions such as uncontrolled lupus and acute complications, on medication for a blood clotting disorder, receiving blood products/transfusions, being immunocompromised or receiving immunosuppressant medication. Ethical clearance was issued by the Health Research Ethics Committee, Faculty of Medicine and Health, University of Muhammadiyah Jakarta with ethical approval number 175/PE/KE/FKK-UMJ/X/2021. All respondents already signed informed consent for the study.

Data were obtained by a self-administered questionnaire. The questionnaire consisted of the following parts: age, religion, ethnicity, education, occupation, frequency of antenatal care visits, knowledge about COVID-19 vaccination/disease, source of information about COVID-19 vaccination/disease, husband support, and willingness to receive COVID-19 vaccination. A questionnaire regarding the willingness of pregnant women to receive the COVID-19 vaccination and the reasons in qualitative. The questionnaire regarding the mother's knowledge of COVID-19 was categorized into good (75% score), sufficient (56-74%), and poor (55%). Every correct answer was given a score of 1 and a wrong or incorrect response was given a score of 0. Test the validity and reliability of the questionnaire involving 30 respondents. Test the validity using the Pearson correlation test. The results are declared valid if the value of r count $> r$ table. Reliability test using Cronbach's Alpha method. We tested 12 questions for the knowledge variable. Of the 12 questions, there is 1 question that is not valid, so we remove it. In the reliability test results, the Cronbach's Alpha value was obtained at 0.730, which means that the instrument is declared qualified or reliable.

Univariate analysis was carried out to obtain an overview of the frequency distribution, bivariate analysis using Chi-square test and Fisher's exact probability test to assess the relationship between two variables. For the multivariate analysis, candidate predictors were selected choosing those, which had a p-value <0.25 in bivariate analysis. Furthermore, in a multivariate analysis using multiple logistic regression the relationship between independent variable (age, religion, ethnicity, education, occupation, frequency of antenatal care visits, knowledge about COVID-19 vaccination/disease, source of information about COVID-19 vaccination/disease, husband support) and dependent variable (willingness to receive COVID-19 vaccination) was investigated. The multivariate test was carried out using multiple logistic regression because the dependent and independent variables were categorical data. Statistical analysis was carried out by Statistical Package for Social Science (SPSS) version 25 use of level of significance was set to $p < 0.05$.

3. RESULTS AND DISCUSSION

More than half of the pregnant woman (63%) were willing to receive the COVID-19 vaccination. This result is similar to a study conducted in Vietnam and Saudi Arabia which found 61% and 68% [9], [13]. Another study by Aisyah *et al.* found that the willingness of pregnant women to vaccinate against COVID-19 was 85% [14]. Studies on acceptance of the COVID-19 vaccine have been carried out in various countries and on vulnerable groups such as pregnant women around the world. It is important to identify existing barriers and develop evidence-based interventions to address them. The most reason respondents were not willing to vaccinate against COVID-19 in this study were respondents were worried about the side effects of the vaccine 29 (76%), followed by reasons for fear of affecting the baby 28 (74%), as presented in Table 1. This study was conducted not long after the Indonesian government announced the recommendation for vaccination for pregnant women on August 2, 2021, so the coverage of information for pregnant women has not been entirely correct. This misinformation causes pregnant women to worry about the side effects of the vaccine, especially for their babies. Constant media coverage may increase information among the public about vaccines. This situation and a lack of knowledge and information may have hindered vaccine acceptance. However, the government must also make regulations that can reach pregnant women with low education by involving stakeholders and groups of pregnant women vaccinated [15]. A study conducted in Hanoi found that 154 (67%) pregnant women refused vaccination because they were worried about the side effects of COVID-19 [13]. Another study found that the two main reasons for rejection were concerns about the lack of data on the safety of COVID-19 vaccination and the possible harm to the fetus [9]. A study conducted in pregnant women in Ethiopia, 70.7% were accepting vaccination [12]. The most frequent reasons for refusal were fear of side effects of the COVID-19 vaccine (13.6%), and the belief that vaccines are not effective for COVID-19 prevention (6.1%) [12]. Education and awareness campaigns about the safety of the COVID-19 vaccine for pregnant women and the role of health workers are needed to raise awareness.

Table 1. The response of pregnant women to be willing to receive the COVID-19 vaccination

Willingness to accept the Covid-19 Vaccination	n (%)
Willing to accept	64 (63)
Not willing to accept	
▪ I find it difficult to reach health care facilities	38 (37)
▪ I'm afraid of needles	4 (11)
▪ I don't feel the need for a COVID-19 vaccination because the COVID-19 disease is not too serious	10 (26)
▪ I'm afraid it will affect the baby in my womb	6 (16)
▪ I'm worried about the side effects of the COVID-19 vaccine	28 (74)
▪ I am unsure of the safety and effectiveness of the COVID-19 vaccine	29 (76)
▪ I'm not sure about the halalness of the COVID-19 vaccine	15 (39)
▪ I don't feel need for a COVID-19 vaccination because the COVID-19 disease is not too serious	11 (29)
	6 (16)
	7 (18)

*One respondent answered more than one reason

The majority of respondents are in the age range of 20 to 35 years (74%), moslem (99%), ethnic Betawi (71%), had primary education (59%), housewives (85%), multipara (73%), had more than four antenatal care (ANC) visits (60%), lack of knowledge about COVID-19 (57%), getting information about the COVID-19 vaccine through the media (television, radio, social media) (39%), and received support from their husbands to receive COVID-19 vaccination (87.3%). Age ($p=0.000$), education ($p=0.029$), frequency of ANC ($p=0.033$) and husband's support ($p=0.000$) were statistically significantly related to the willingness to receive COVID-19 vaccination in bivariate analyses as presented in Table 2. For the multivariate analysis, candidate predictors were selected choosing those, which had a p-value <0.25 in bivariate analysis. There were four

variables meeting this criterion: age, education, frequency of ANC visits, and husband's support for COVID-19 vaccination. These variables were included in the multivariate logistic regression.

The mother's education factor is most closely related to the mother's willingness to vaccinate against COVID-19, with an Exp(B) of 3,291, as shown in Table 3. Education level is 3,291 times more likely to affect the mother's willingness to vaccinate. The resulting model fulfills the meaning of the model; this can be seen from the p-value of the omnibus test ($p < 0.05$). In a study conducted in Southwest Ethiopia, pregnant women who had completed primary education were about 3.5 times more likely to receive the COVID-19 vaccine than pregnant women without formal education [12]. Research in Saudi Arabia found that pregnant women with higher education were more likely to want to receive the SARS-CoV-2 vaccine [9]. A meta-analysis study showed that higher education (POR=1.84) influenced pregnant women's willingness to vaccinate against SARS-CoV-2 [16]. An earlier study found significant concern about SARS-CoV-2 immunization among those less educated. This may be related to more accessible access to vaccination facts and interpreting better particulars about the benefits and risks of the SARS-CoV-2 vaccine in highly educated people. On the other hand, people are misinformed about vaccinations, perhaps due to a lack of information [17]. A study conducted in Southwest Ethiopia found that maternal age (34–41) years, mother's primary school education status, good knowledge, and good pregnancy practices of women against COVID-19 and their preventive measures were factors associated with receiving COVID-19 vaccine [12].

Table 2. Relationships between potential predictors and willingness to receive COVID-19 vaccination in pregnant women

Variables	Willingness to receive COVID-19 Vaccination for Pregnant women				p-value	OR(95%CI)
	Willing		Not willing			
	n	%	n	%		
Age						
<20 years	3	4.7	11	28.9		
20-35 years	55	85.9	20	52.6	0.000*	1.803 (0.802-4.055)
>35 years	6	9.4	7	18.4		
Religion						
Islam	63	98.4	38	100	1.000	0.62 (0.536-0.726)
Buddha	1	1.6	0	0		
Education						
Primary education	33	51.6	27	71.1		
Secondary education	22	34.4	11	28.9	0.029*	0.027 (0.024-0.030)
Higher education	9	14.1	0	0		
Occupation						
Housewife	54	84.4	33	86.8	0.734	1.222 (0.384-3.889)
Works	10	15.6	5	13.2		
Knowledge about COVID-19 vaccination/disease						
Good	10	15.6	3	7.9		
Enough	21	32.8	10	26.3	0.317	0.63 (0.343-1.154)
Less	33	51.6	25	65.8		
Parity						
Primipara	16	25	12	31.6	0.472	1.385 (0.57-3.364)
Multipara	48	75	26	68.4		
Frequency of antenatal care visits						
<4	20	31	20	53	0.033*	2.44 (1.608-5.592)
≥4 times	44	69	18	47		
Source of information about COVID-19 vaccination/disease						
Media (television, radio, social media)	26	40.6	14	36.8		
Health workers	25	39.1	10	26.3	0.293	0.76 (0.510-1.120)
Friends	7	10.9	7	18.4		
Family	6	9.4	7	18.4		
Husband's support for pregnant women vaccinating against COVID-19						0.08 (0.016-0.382)
Support	62	96.9	27	71.7	0.000*	
Does not support	2	3.1	11	28.9		

*Candidate for multivariate modeling (p-value <0.25)

Housewives and women who had an occupation did not differ in their willingness to be vaccinated. This is in line with research conducted in the Southeast Sulawesi region which states that occupational status is not related to willingness to be vaccinated against COVID-19 [18] but differs from a study conducted in Central Sulawesi that reported a significant relationship between employment and willingness to receive

vaccination [19]. This underlines the cultural diversity of vaccination hesitancy and may be due to the importance of occupational status for the receipt of diverse information from the social environment [20].

Self-evaluated knowledge about COVID-19 had no impact on the willingness to receive COVID-19 vaccination. This is not in line with research conducted in the Surabaya area [20]. Factors behind knowledge could be age, education, occupation, and sources of information. Knowledge is not only associated with a person's level of education; it can also be related to the level of understanding of something, motivation to learn, and adaptation to existing science and technology [21]. In this study, more than 50% of pregnant women had less knowledge about COVID-19 vaccines/diseases. This result is different from the study in northern Ethiopia, where 50.7% respondents had good knowledge about COVID-19 [22]. Pregnant women with a good understanding of SARS-CoV-2 will be aware of the severity of the virus for themselves and their fetuses, enabling them to quickly receive the SARS-CoV-2 vaccination to reduce the effects of the pandemic [23].

Table 3. Results of multivariate logistic regression

Model	Sig.	Exp(B)	95% C.I. for EXP(B)		Omnibus tests
			Lower	Upper	
Education	0.012	3.291	1.292	8.381	0.000
Frequency of ANC	0.019	3.121	1.208	8.063	
Husband support	0.000	0.047	0.009	0.258	
Constant	0.678	1.634			

Parity and willingness to receive COVID-19 vaccination did also show no significant association. This is in line with research conducted in Ethiopia [11]. However, Ceulemans *et al.* reported a weak association between parity and the willingness to get a COVID-19 vaccination in pregnant women. Gravidity is often associated with conditions of anxiety or concern about the state of pregnancy, complications and the health of the fetus [24], [25]. Women who are pregnant for the first time (primipara) tend to feel more pressure and anxiety on the condition of themselves and their fetuses, so that they may have more concerns about side effects of the vaccines [24], [25].

The frequency of ANC visits and the willingness to receive COVID-19 vaccination were significantly related. However, a study of Tetanus Toxoid immunization in pregnant women in Pakistan reported a significant increase in receipt of this vaccine with an increasing number of ANC visits [26]. However, in the era of the COVID-19 pandemic, restrictions for services, including maternal and child health services, have been issued. In addition, pregnant women may be reluctant to go to health care facilities for antenatal checks because of fear of contracting COVID-19. The level of knowledge of pregnant women also affects ANC visits which can affect pregnant women's acceptance of the COVID-19 vaccine. Implementing the COVID-19 prevention protocol in health care facilities is a predictor of pregnant women's ability to access ANC [27]. The husband's support also influences the frequency of ANC. In addition, Ariani's study shows that pregnant women with sufficient knowledge about COVID-19 transmission have a higher chance of 2,975 (CI 1.793–4.938) times getting ANC. Pregnant women who are well informed on social media about COVID-19 have a higher chance of getting an ANC 3,035 (CI 1.179–7.815) times [28].

Health promotions carried out through the media (television, radio, social media) have a significant impact on the knowledge of pregnant women, especially regarding COVID-19. However, source of information and willingness to receive COVID-19 vaccination in pregnant women was not related in this study. This is in contrast to the results reported by Piltch-Loeb *et al.* [29].

Husband's support for COVID-19 vaccination and the willingness to receive this vaccination was strongly related. A study conducted by Lieskusumastuti regarding factors related to the implementation of Tetanus Toxoid immunization in pregnant women also revealed a strong impact of husband's support [30]. The COVID-19 pandemic has significantly impacted pregnancies compared to the pre-pandemic era. The main reasons of a negative impact on pregnancy are the absence of a husbands during antenatal check-ups, lack of regular visits to the doctor, increased maternal anxiety due to the pandemic situation with self-isolation, regional restrictions, and social distancing [20]. Husbands can support mothers by providing direct or indirect assistance to pregnant women to avoid COVID-19 infection and motivate them to maintain their health [31].




4. CONCLUSION

This study concluded that education is the factor that most influences the acceptance of pregnant women to vaccinate against COVID-19. Furthermore, religion, occupation, knowledge, parity, and sources of information did not show significant relationships. Education related to COVID-19 vaccination for pregnant women is strongly suggested.




REFERENCES

- [1] R. Syahniar, M. B. Purba, H. S. Bektı, and M. Mardhia, "Vaccines against coronavirus disease: target proteins, immune responses, and status of ongoing clinical trials," *Journal of Pure and Applied Microbiology*, vol. 14, no. 4, pp. 2253–2263, 2020, doi: 10.22207/JPAM.14.4.03.
- [2] D. A. Styawan, "Pandemi Covid-19 Dalam Perspektif Demografi," *Seminar Nasional Official Statistics*, vol. 2020, no. 1, pp. 182–189, 2021, doi: 10.34123/semnasoffstat.v2020i1.716.
- [3] J. Qiao, "What are the risks of COVID-19 infection in pregnant women?," *The Lancet*, vol. 395, no. 10226, pp. 760–762, 2020, doi: 10.1016/S0140-6736(20)30365-2.
- [4] POGI, "Revised POGI Recommendations for Pregnant Women with Covid-19." POKJA Reproductive Tract Infection, Jakarta, 2020.
- [5] World Health Organization, "COVID-19 Weekly Epidemiological Update," *World Health Organization*, no. August, pp. 1–33, 2022, [Online]. Available: <https://www.who.int/publications/m/item/covid-19-weekly-epidemiological-update>.
- [6] Ministry of Health Republic of Indonesia, "Current Situation Developments (COVID-19)," *Kemendes*, no. agustus, pp. 1–4, 2021, [Online]. Available: <https://infeksiemerging.kemkes.go.id/>.
- [7] A. Irsan, M. Mardhia, and A. Rialita, "Evaluation of Humoral Response of Emergency Unit Healthcare Workers after Third Dose of COVID-19 Vaccination," *Muhammadiyah Medical Journal*, vol. 3, no. 1, p. 27, 2022, doi: 10.24853/mmj.3.1.27-32.
- [8] R. Syahniar and D. S. Kharisma, "SARS-CoV-2 vaccine challenge based on spike glycoprotein against several new variants," *Clinical and Experimental Vaccine Research*, vol. 11, no. 2, pp. 173–183, May 2022, doi: 10.7774/cevr.2022.11.2.173.
- [9] R. A. Ghamri, S. S. Othman, M. H. Alhiniah, R. H. Alelyani, A. M. Badawi, and A. A. Alshahrani, "Acceptance of COVID-19 Vaccine and Associated Factors Among Pregnant Women in Saudi Arabia," *Patient Preference and Adherence*, vol. 16, pp. 861–873, Apr. 2022, doi: 10.2147/PPA.S357653.
- [10] PP POGI, "Recommendations for Handling Corona Virus Infection (Covid-19) in Maternal (Pregnant, Maternity and Postpartum)," *Maret*, pp. 1–28, 2020.
- [11] A. N. Battarbee *et al.*, "Attitudes Toward COVID-19 Illness and COVID-19 Vaccination among Pregnant Women: A Cross-Sectional Multicenter Study during August-December 2020," *American Journal of Perinatology*, vol. 39, no. 1, pp. 75–83, Mar. 2022, doi: 10.1055/s-0041-1735878.
- [12] A. Mose and A. Yeshaneh, "COVID-19 vaccine acceptance and its associated factors among pregnant women attending antenatal care clinic in Southwest Ethiopia: institutional-based cross-sectional study," *International Journal of General Medicine*, vol. Volume 14, pp. 2385–2395, Jun. 2021, doi: 10.2147/IJGM.S314346.
- [13] L. H. Nguyen *et al.*, "Acceptance and willingness to pay for COVID-19 vaccines among pregnant women in Vietnam," *Tropical Medicine and International Health*, vol. 26, no. 10, pp. 1303–1313, Oct. 2021, doi: 10.1111/tmi.13666.
- [14] R. D. Aisyah, F. Fitriyani, and D. B. Pambudi, "Determinant Factors Involved In Pregnant Women's Willingness To Receive Covid-19 Vaccine," *Interest : Jurnal Ilmu Kesehatan*, vol. 10, no. 2, pp. 231–239, 2022, doi: 10.37341/interest.v0i0.362.
- [15] C. Sidarta *et al.*, "The Determinants of COVID-19 Vaccine Acceptance in Sumatra," *Kesmas*, vol. 17, no. 1, pp. 32–39, 2022, doi: 10.21109/kesmas.v17i1.4958.
- [16] R. D. Nirenda, D. Djanas, Warsiti, I. Y. Darma, H. Hendriyani, and N. P. Sari, "The risk factors and pregnant women's willingness toward the SARS-CoV-2 vaccination in various countries: A systematic review and meta-analysis," *Clinical Epidemiology and Global Health*, vol. 14, no. December 2021, p. 100982, 2022, doi: 10.1016/j.cegh.2022.100982.
- [17] A. A. Malik, S. A. M. McFadden, J. Elharake, and S. B. Omer, "Determinants of COVID-19 vaccine acceptance in the US," *EClinicalMedicine*, vol. 26, Sep. 2020, doi: 10.1016/j.eclinm.2020.100495.
- [18] E. Sugawara and H. Nikaido, *Properties of AdeABC and AdeIJK efflux systems of Acinetobacter baumannii compared with those of the AcrAB-TolC system of Escherichia coli*, First., vol. 58, no. 12. Jakarta: Kita Menulis, 2014.
- [19] M. Pakpahan, D. Siregar, and A. Susilawaty, *Health Promotion and Health Behavior*. Medan: Yayasan Kita Menulis, 2021.
- [20] N. Febriyanti, M. Choliq, and A. Mukti, "The Relationship between Knowledge Levels and Willingness to Vaccinate Covid-19 for Residents of Dukuh Menanggal Village, Surabaya City," *Seminar Nasional Hasil Riset dan Pengabdian*, vol. 3, pp. 1–7, 2021.
- [21] D. S. Ichsan, F. Hafid, K. Ramadhan, and T. Taqwin, "Determinan Kesiediaan Masyarakat menerima Vaksinasi Covid-19 di Sulawesi Tengah," *Poltekita : Jurnal Ilmu Kesehatan*, vol. 15, no. 1, pp. 1–11, 2021, doi: 10.33860/jik.v15i1.430.
- [22] Z. N. Azene *et al.*, "Adherence towards COVID-19 mitigation measures and its associated factors among Gondar City residents: A community-based cross-sectional study in Northwest Ethiopia," *PLoS ONE*, vol. 15, no. 12 December, p. e0244265, Dec. 2020, doi: 10.1371/journal.pone.0244265.
- [23] A. Di Crosta *et al.*, "Psychological factors and consumer behavior during the COVID-19 pandemic," *PLoS ONE*, vol. 16, no. 8 August, p. e0256095, Aug. 2021, doi: 10.1371/journal.pone.0256095.
- [24] M. Ceulemans *et al.*, "Vaccine willingness and impact of the COVID-19 pandemic on women's perinatal experiences and practices—a multinational, cross-sectional study covering the first wave of the pandemic," *International Journal of Environmental Research and Public Health*, vol. 18, no. 7, Apr. 2021, doi: 10.3390/ijerph18073367.
- [25] Y. Podungge, S. C. D. Astuti, T. T. Hiola, and I. Suherlin, "Prevention of Corona Virus Infection (COVID-19) in Health Workers and Supporting Personnel of Maternal Health Services in the East City Health Center Area of Gorontalo City," *Medika Respati : Jurnal Ilmiah Kesehatan*, vol. 16, no. 2, pp. 141–148, 2021, doi: 10.35842/mr.v16i2.483.
- [26] Asmariyah, Novianti, and Suriyati, "Anxiety Levels of Pregnant Women During the Covid-19 Pandemic In Bengkulu City," *Journal Of Midwifery*, vol. 9, no. 1, pp. 1–8, 2021.
- [27] S. Iqbal, I. Ali, C. Ekmekcioglu, and M. Kundi, "Increasing Frequency of Antenatal Care Visits May Improve Tetanus Toxoid Vaccination Coverage in Pregnant Women in Pakistan," *Human Vaccines and Immunotherapeutics*, vol. 16, no. 7, pp. 1529–1532, 2020, doi: 10.1080/21645515.2019.1705693.
- [28] N. Ariani, "Antenatal care services utilization during COVID-19 second wave attack in Pasuruan, Indonesia," *Journal of medicine and life*, vol. 15, no. 1, pp. 7–14, 2022, doi: 10.25122/jml-2021-0238.
- [29] R. Subekti and L. A. Ratmawati, "Overview of ANC Behavior and Vaccination of Pregnant Women in the Era of the COVID-19 Pandemic in Punggelan 1, Banjarnegara Regency," *Jurnal Ilmiah Kesehatan*, vol. 20, no. 1, pp. 40–44, 2021.
- [30] R. Piltch-Loeb *et al.*, "Examining the effect of information channel on COVID-19 vaccine acceptance," *PLoS ONE*, vol. 16, no. 5 May, pp. 1–14, 2021, doi: 10.1371/journal.pone.0251095.
- [31] A. D. Lieskusumastuti and C. Setyorini, "Relationship of Age and Gravida with Completeness of Immunization (Tetanus Toxoid) TT Pregnant Women at BPM Dyah Widya Susilowati Ngemplak Boyolali," *Jurnal Kebidanan Harapan Ibu Pekalongan*, vol. 5, 2019, doi: 10.37402/jurbidhip.vol5.iss1.39.

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