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COVID-19 Vaccination and Its Determinant Factors among Pregnant and Lactating Women in Indonesia

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Abstract One of the efforts to control the spread of COVID-19 in Indonesia is a vaccination program for all community groups, including pregnant and lactating women. There are responses of acceptance or rejection related to vaccination policies that can affect the COVID-19 vaccination in Indonesia. This study aims to identify the COVID-19 vaccination in pregnant and lactating women in Indonesia, as well as identify the determinant factors so that effective strategies can be done to increase the vaccination. This study was an online cross-sectional study conducted in February-March 2022 to identify the vaccination status in pregnant and lactating women and its determinants. Data collection used a snowball sampling technique. Ordinal logistic regression was conducted to determine the association between socio-demographic characteristics and perceived psychological distress and vaccination status. The results of this study indicate that the highest coverage of vaccination in pregnant and lactating women was identified in the first dose (95%). Vaccination was significantly higher in pregnant women of age 26-35 years (96.6%), working as private-sector employees (98.6%) or civil servants (96.4%). In lactating women, vaccination was significantly higher in women working as private-sector employees (98%). The COVID-19 vaccination for pregnant and lactating women in Indonesia was already high. However, it still requires a strategy to increase the uptake, especially in booster doses. Socio-demographic and perceived psychological distress were determinant factors influencing the COVID-19 vaccination. The findings can be used to develop education-based strategies sensitive to the diversity of women's sociodemographic characteristics.

Keywords COVID-19, Vaccination, Pregnant, Lactating Women, Determinant Factors

1. Introduction

COVID-19 infection is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) with a wide range of symptoms from asymptomatic to severe. Pregnant and postpartum women have the same risk of being infected by COVID-19 compared to non-pregnant women, with more severe symptoms until they require intensive care hospitalization, ventilators, or other breathing aids, and the worst case is the increase in the risk of mortality. In addition, pregnant women who tested positive for COVID-19 will have a higher risk of having a preterm baby, stillbirth, and an increased risk of other pregnancy complications [1]. Therefore, pregnant and lactating women are categorized as the recommended group to get the developed COVID-19 vaccine [1, 2].

The COVID-19 vaccine used in both developed and developing countries has now received a permit for emergency use and appears to be equally effective in the general and vulnerable populations, including pregnant and lactating women [3, 4]. However, a global clinical trial

evaluating the safety and effectiveness of the vaccination in pregnant women is under development and results are not available yet [5].

There is some hesitancy among pregnant women related to the safety of COVID-19 vaccination although several national and international organizations recommend it for pregnant and lactating women. The same problem exists with other types of vaccination (e.g. influenza and pertussis), and a common reason for refusal is fear of side effects of the vaccine on the fetus [6].

Surveys regarding the acceptance of COVID-19 vaccination in pregnant and lactating women in high-income and low-middle-income countries have shown an increase in vaccine acceptance from 29.7% - 38.6% in mid-2020 to 72.2% at the end of 2021 [7-9]. However, the survey of vaccination in pregnant and lactating women in high-income countries is still lower than the acceptance (27.5% -49.3%) [10, 11]. Likewise, vaccination in low-middle-income countries only reached 12.9% in India until the end of 2021 [12]. It is necessary to determine the COVID-19 vaccination in pregnant and lactating women in Indonesia, as well as to identify the determinant factors related to the vaccination so that effective strategies can be done to increase uptake.

2. Materials and Methods

This study was an online cross-sectional study conducted in February-March 2022 to identify the COVID-19 vaccination status in pregnant and lactating women and its determinants. The inclusion criteria for the study were: a) women of reproductive age (15-49 years) in 6 provinces in Java, Indonesia, and b) currently pregnant at any trimester or lactating within the last two years.

Data collection used a snowball sampling technique; using Google Form (Alphabet, Inc., Mountain View, California, United States); and distributed through Whatsapp, Instagram, and Facebook applications. Distributed Google forms contain informed consent, vaccination status, sociodemographic data, and the depression, anxiety, and stress scale (DASS-21). The variables studied were the vaccination status as the outcome variable and the determinant factors as independent variables. The determinant factors studied consist of socio-demographic characteristics and perceived psychological distress. Socio-demographic characteristics consist of maternal age, gestational age for pregnant women or duration of breastfeeding for lactating women, parity, ethnicity, occupation, income, and education. Data on perceived symptoms of psychological distress, such as depression, anxiety, and stress, were assessed using the DASS questionnaire. Data on the vaccination status were grouped into four categories (not yet vaccinated, first dose, second dose, and booster dose), and family monthly income was grouped into below and above the minimum wage with a minimum wage range of IDR 2 million to 5 million (133.53 to US$ 333.82).

The vaccination in Indonesia was carried out for 15 months and divided into two periods. The targets for vaccination in the first period (January-April 2021) are healthcare professionals and public officials. While the second period (April 2021 – March 2022) is for the general public [13]. Pregnant women were recommended to get vaccinated on August 2, 2021, with the first dose starting in the second trimester of pregnancy, and the second dose and booster dose adjusted to the interval of the type of vaccine used [14]. Since the data collection period coincides with the end of the second COVID-19 vaccination period, the data are sufficient to provide an overview of vaccination coverage for pregnant and lactating women on the island of Java, Indonesia.

Data on COVID-19 vaccination status and its determinants are represented as number and percentage. Association between determinant factors and vaccination status was analyzed by ordinal logistic regression. The analysis was carried out on both groups (pregnant and lactating women). In the first step, association between determinant factors and vaccination status was analyzed separately. In the second step, all determinant factors that showed significance during univariate analysis were assessed in multivariate analysis to calculate the adjusted odds ratio (AOR). The significance of OR in univariate and AOR in the multivariate analysis was assessed at $\alpha = 0.05$.

This research protocol was approved by the institutional review board of Alma Ata University, Yogyakarta (KE/AA/II/10695/EC/2022). Informed consent has been obtained from all participants after being given the information about the research objectives, data confidentiality, data publication, and the right to withdraw from the study at any time.

3. Results

3.1. Socio-demographic Characteristics and Perceived Psychological Distress

The total respondents in this study were 410 women, consisting of 249 pregnant women and 161 lactating women. The majority of pregnant and lactating women were aged 26-35 years (48.8%), with family income above the minimum wage (76.6%), and as household heads (46.1%). Regarding the education status, 48.6% of pregnant women graduated from senior school and 63.4% of lactating women graduated from college. Perceived psychological distress of most pregnant and lactating mothers was at normal levels (>50%). However, a small proportion of pregnant women revealed severe levels of stress (3.6%), anxiety (11.4%), and depression (1.2%). Likewise, lactating women also expressed severe levels of stress (8.1%), anxiety (15.5%), and depression (8.7%).

3.2. COVID-19 Vaccination

Among the total 410 respondents, 95.98% (239/249) of pregnant women and 95% (153/161) of lactating women had received the first dose of vaccination. Subsequently, 71%

(177/249) of pregnant women and 71% (115/161) of lactating women received the second dose. However, only a small proportion of pregnant (20%) and lactating women (17%) have received booster doses.

3.3. Determinant Factors Associated with COVID-19 Vaccination

Analysis of determinant factors was carried out on sociodemographic characteristics and the psychological status of pregnant (Table 1) and lactating women (Table 2). Vaccination was significantly higher in pregnant women of age 26-35 years (96.6%) (AOR, 1.96; 95% CI, 1.03-3.71; P=0.040), working as private-sector employees (98.6%) (AOR, 4.66; 95% CI, 2.02- 10.77; P=<.001) or civil servants (96.4%) (AOR, 5.94; 95% CI, 1.96-17.96; P=0.002. In contrast, the vaccination was lower in pregnant women with extremely severe anxiety (AOR, 0.25; 95% CI, 0.08-0.83; P=0.023).

Table 1. Factors Related to The Vaccination Status of Pregnant Women

Variables	Did not receive a COVID-19 vaccine n (%)	One dose a COVID-19 vaccine n (%)	Two doses a COVID-19 vaccine n (%)	Three doses a COVID-19 vaccine n (%)	OR (95%ci)	P Value[a]	Adjusted OR (95%ci)	P Value[b]
Maternal Age (y)								
17-25	5 (4.2)	10 (8.4)	93(78.2)	11(9.2)	Ref.		Ref.	
26-35	4(3.4)	5(4.2)	77(64.7)	33(27.7)	2.79(1.54-5.04)	.001	1.90(1.00-3.59)	.048
>35	1(9.1)	0	7(63.6)	3(27.3)	2.56(0.67-9.79)	.171	1.76(0.42-7.31)	.435
Gravida								
Primigravida	5(3.5)	11(7.7)	100(70.4)	26(18.3)	Ref.			
Multigravida	5(4.7)	4(3.7)	77(72)	21(19.6)	0.86(0.50-1.48)	.579		
Self-reported ethnicity								
Javanese	7(3.3)	14(6.6)	146(69.2)	44(20.9)	Ref.			
Sundanese	3(10.7)	1(3.6)	21(75)	3(10.7)	0.52(0.22-1.26)	.147		
Madurese	0	0	1(100)	0	0.63(0.01-48.44)	.834		
Betawi	0	0	5(100)	0	0.63(0.09-4.47)	.643		
Not reported	0	0	4(100)	0	0.63(0.07-5.61)	.678		
Monthly income (IDR)								
Below the minimum wage	3(3.1)	10(10.4)	71(74)	12(12.5)	Ref.		Ref.	
Above the minimum wage	7(4.6)	5(3.3)	106(69.3)	35(22.9)	1.94(1.09-3.44)	.025	0.87(0.45-1.67)	.668
Occupation								
Not employed	7(6.1)	10(8.8)	91(79.8)	6(5.3)	Ref.		Ref.	
Entrepreneur	1(2.8)	3(8.3)	26(72.2)	6(16.7)	2.17(0.88-5.38)	.094	2.13(0.83-5.46)	.116
Private sector employee	1(1.4)	2(2.8)	44(62)	24(33.8)	6.42(3.05-13.54)	<.001	5.37(2.35-12.27)	<.001
Civil servant	1(3.6)	0	16(57.1)	11(39.3)	8.17(3.17-21.04)	<.001	6.13(2.05-18.31)	.001
Educational status								
University graduated	4(3.6)	2(1.8)	72(65.5)	32(29.1)	Ref.		Ref.	
Sehior school graduated	6(5)	10(8.3)	92(76)	13(10.7)	0.71(0.12-4.29)	.712	0.20(0.02-2.03)	.175

Table 1 continued

Junior school graduated	0	3(25)	8(66.7)	1(8.3)	0.19(0.05-0.71)	.014	0.32(0.05-2.29)	.258
Elementary graduated	0	0	5(83.3)	1(16.7)	0.32(0.17-0.58)	<.001	0.45(0.06-3.25)	.426
Depression						.		
Normal	8(4.1)	13(6.6)	134(68)	42(21.3)	Ref.			
Mild	0	1(4.3)	18(78.3)	4(17.4)	1.08(0.42-2.74)	.879		
Moderate	1(5)	1(5)	18(90)	0	0.43(0.16-1.19)	.103		
Severe	1(20)	0	3(60)	1(20)	0.58(0.08-4.12)	.584		
Extremely severe	0	0	4(100)	0	0.63(0.07-5.68)	.683		
Anxiety								
Normal	5(3.5)	9(6.3)	90(63.4)	38(26.8)	Ref.		Ref.	
Mild	1(2.5)	2(5)	33(82.5)	4(10)	0.52(0.23-1.17)	.113	0.59(0.26-1.36)	.219
Moderate	2(5.3)	2(5.3)	32(84.2)	2(5.3)	0.37(0.17-0.84)	.018	0.57(0.25-1.32)	.191
Severe	0	0	11(84.6)	2(15.4)	0.87(0.25-3.00)	.827	1.13(0.31-4.18)	.854
Extremely severe	2(12.5)	2(12.5)	11(68.8)	1(6.3)	0.20(0.07-0.64)	.006	0.25(0.08-0.81)	.021
Stress						.183		
Normal	7(3.4)	12(6.3)	145(70)	42(20.3)	Ref.			
Mild	2(8.3)	1(4.2)	18(75)	3(12.5)	0.63(0.25-1.57)	.318		
Moderate	1(8.3)	1(8.3)	8(66.7)	2(16.7)	0.63(0.17-2.29)	.485		
Severe	0	0	2(100)	0	0.64(0.03-13.83)	.775		
Extremely severe	0	0	1(100)	0	0.64(0.05-7.92)	.727		

[a]Univariate logistic regression, [b]multivariate logistic regression

In lactating women, vaccination was significantly higher in women working as private-sector employees (98%) (AOR, 2.90; 95% CI, 1.03-8.18; P=.044). In contrast, vaccinations were lower in women with self-employment (83.4%) (AOR, 0.25; 95% CI, 0.06-0.99; P=.049) and graduated from high school (89%) (AOR, 0.25; 95% CI, 0.09-0.70; P=.009).

Table 2. Factors Related to The Vaccination Status of Lactating Women

Variables	Did not receive a COVID-19 vaccine n (%)	One dose a COVID-19 vaccine n (%)	Two doses a COVID-19 vaccine n (%)	Three doses a COVID-19 vaccine n (%)	OR (95%ci)	P Value[a]	Adjusted OR (95%ci)	P Value[b]
Maternal age (y)								
17-25	4 (5.5)	7 (9.6)	51(69.9)	11(15.1)	Ref.		Ref.	
26-35	3(3.7)	3(3.7)	60(74.1)	15(18.5)	1.59(0.78-3.22)	.202	1.17(0.49-2.80)	.731
>35	1(14.3)	2(28.6)	4(57.1)	0	0.21(0.05-0.99)	.049	0.32(0.04-2.38)	.262
Length of breastfeeding								
0-6 weeks	1(2.3)	4(9.3)	33(76.7)	5(11.6)	Ref.			
>6 weeks-6 months	4(5.2)	5(6.5)	56(72.7)	12(15.6)	1.15(0.51-2.60)	.735		
>6 months-2 years	3(7.3)	3(7.3)	26(63.4)	9(22.0)	1.34(0.52-3.40)	.543		
Self-reported ethnicity								
Javanese	5(4.1)	3(2.5)	88(72.7)	25(20.7)	Ref.		Ref.	
Sundanese	1(3.7)	7(25.9)	18(66.7)	1(3.7)	0.18(0.06-0.48)	.001	0.28(0.06-1.28)	.100
Madurese	0	0	1(100)	0	0.51(0.00-52.74)	.777	25.88(0.02-31.19)	.369
Not reported	2(16.7)	2(16.7)	8(66.7)	0	0.12(0.03-0.44)	.001	0.22(0.04-1.25)	.087
Monthly income (IDR)								
Below the minimum wage	4(38.0)	5(10)	36(72)	5(10)	Ref.		Ref.	
Above the minimum wage	4(3.6)	7(6.3)	79(71.2)	21(18.9)	0.49(0.23-1.03)	.060	0.91(0.33-2.56)	.862
Occupation								
Not employed	4(5.3)	9(12.0)	56(74.7)	6(8.0)	Ref.		Ref.	
Entrepreneur	3(16.7)	3(16.7)	11(61.1)	1(5.6)	0.41 (0.14-1.22)	.108	0.25(0.06-0.99)	.049
Private sector employee	1(1.9)	0	37(71.2)	14(26.9)	5.22(2.10-12.98)	<.001	2.90(1.03-8.18)	.044
Civil servant	0	0	11(58.8)	5(31.3)	6.63(1.91-23.00)	.003	3.55(0.79-15.8)	.097
Educational status								
University graduated	2(2.0)	4(3.9)	74(72.5)	22(21.6)	Ref.		Ref.	
Sehior school graduated	6(11.1)	6(11.1)	38(70.4)	4(7.4)	0.24(0.11-0.54)	.001	0.25(0.09-0.70)	.009

Table 2 continued

Junior school graduated	0	1(25.0)	3(75.0)	0(0)	0.19(0.02-1.65)	.132	0.08(0.00-1.49)	.092
Elementary graduated	0	1(100)	0	0	0.04(0.00-1.56)	.085	1.65(0.00-403.75)	.858
Depression						.		
Normal	6(5.1)	8(6.8)	79(67.5)	24(20.5)	Ref.		Ref.	
Mild	0	1(7.7)	11(84.6)	1(7.7)	0.70(0.19-2.52)	.586	1.55(0.32-7.38)	.585
Moderate	0	0	17(100)	0	0.69(0.22-2.14)	.519	1.57(0.30-8.30)	.596
Severe	2(22.2)	2(22.2)	4(44.4)	1(11.1)	0.16(0.04-0.63)	.009	0.15(0.01-2.40)	.181
Extremely severe	0	1(20.0)	4(80.0)	0	0.34(0.05-2.34)	.273	1.03(0.02-58.27)	.989
Anxiety								
Normal	4(4.7)	5(5.9)	56(65.9)	20(23.5)	Ref.		Ref.	
Mild	1(3.4)	1(3.4)	23(79.3)	4(13.8)	0.75(0.29-1.92)	.545	1.39(0.46-4.17)	.559
Moderate	1(4.5)	4(18.2)	16(72.7)	1(4.5)	0.27(0.09-0.79)	.016	0.37(0.08-1.65)	.193
Severe	0	0	10(100)	0	0.56(0.13-2.46)	.441	0.45(0.05-3.79)	.463
Extremely severe	2(13.3)	2(13.3)	10(66.7)	1(6.7)	0.23(0.07-0.77)	.017	0.27 (0.02-3.11)	.293
Stress								
Normal	4(3.4)	7(6.0)	81(69.2)	25(21.4)	Ref.		Ref.	
Mild	1(7.1)	2(14.3)	11(78.6)	0	0.25(0.07-0.85)	.026	0.31(0.07-1.50)	.146
Moderate	3(18.8)	0	13(81.3)	0	0.24(0.08-0.77)	.016	0.58(0.12-2.75)	.495
Severe	0	2(22.2)	6(66.7)	1(11.1)	0.38(0.08-1.76)	.216	4.65(0.31-69.83)	.266
Extremely severe	0	1(20.0)	4(80.0)	0	0.28(0.04-1.96)	.202	3.20(0.12-85.11)	.487

[a]Univariate logistic regression, [b]multivariate logistic regression

4. Discussion

4.1. COVID-19 Vaccination

The study finding showed that vaccination in pregnant and lactating women reached 95% for the first dose and 71% for the second dose. A survey on acceptance of vaccination in 16 countries showed that vaccine acceptance was 52.0% among pregnant women and 73.4% among child-rearing mothers, with acceptance lower in high-income countries [8]. A review on COVID-19 vaccination for pregnant women in high-income countries also showed low uptake (27.5%) [10]. It described that acceptance of vaccination is in line with its uptake, where Indonesia as a low-middle income country has shown high acceptance and uptake of vaccination, especially in Java.

The high cases of infection due to COVID-19 and the high number of deaths in pregnant women and children under five years old may have been a lesson for high vaccination for pregnant and lactating women in Java Indonesia [8, 15]. These high burdens may have increased mothers' perceptions of the risks posed by COVID-19 and increased their awareness of vaccination. In addition, the government's efforts to accelerate vaccination were also the key. The strategies taken by the Indonesian government to reduce COVID-19 cases were: 1) to maximize the availability of vaccines; so that vaccination increased to six times in the general population; 2) to maximize vaccination for the second period by implementing vaccination in strategic public places, public and private offices, and private sector; 3) to maximize education and persuasion through various social media and door-to-door to be able to reach all people; 4) to facilitate transportation from home to vaccination site [16] and 5) to apply vaccination certificates as a requirement for travel or obtain various public services.

However, there was a decrease in booster dose in both pregnant women (19.7%) and lactating women (17%). This percentage was lower than booster dose in the general group (25.25%) in Indonesia [17] and pregnant women in the United States (49.6%) [18]. While the booster dose can provide 46.9% greater protection compared to a full dose (2 doses) against Omicron variant infections [19].

4.2. Determinant Factors

Based on the results of study, the COVID-19 vaccination in pregnant and lactating women was significantly influenced by facilitating and inhibiting factors. In pregnant women, vaccination was higher in women aged 26-35 years old [10, 20, 21] working as private-sector employees [7, 21-23] or civil servants [22, 24]. Meanwhile, for lactating women, vaccination was higher in women with private-sector employees [7, 21-23].

The older age of pregnant women was a facilitator of vaccination. Although statistically significant only showed in pregnant women, vaccination equally increased in both pregnant and lactating women over 25 years. This finding supported previous studies [8-10, 20] that maternal awareness of their vulnerability during pregnancy and the severity, when infected with COVID-19, made women more worried and fear to receive vaccination [8, 10].

Pregnant and lactating women who work as private-sector employees and civil servants are factors that facilitate higher vaccination. This finding was in line with previous studies [7, 23, 25] stated that pregnant women who were employed had higher acceptance of vaccination than the unemployed. Meanwhile, one study [7] showed that education and employment status did not influence the vaccine acceptance of lactating women yet were significant in pregnant women. Working women likely had higher education and access to information, so they had a positive attitude towards vaccination [25] and were willing to receive vaccinations [7]. In addition, several high-risk working sectors generally require their workers to receive vaccinations, such as the health care sector [7]. In Indonesia, vaccination is a requirement for workers in health services, and public and private offices.

On the other hand, symptoms of extremely severe anxiety were an obstacle to vaccination in pregnant women [9, 25, 26]. This finding was in line with previous studies [25]. The COVID-19 pandemic has increased the prevalence of depression and anxiety in pregnant women [27, 28]. Apart from the COVID-19 disease itself, anxiety also arose when faced with recommendations for vaccination, vaccine considered efficient, and vaccine adverse effects. The anxiety may have increased maternal hesitancy and fears about the COVID-19 vaccine, especially in women who were not accustomed to getting vaccines [10, 26, 29]. Furthermore, this psychological distress and hesitancy made mothers tend to have a negative attitude and refuse the vaccination [25] and have a lower quality of life [27, 30].

In lactating women, high school education level and self-employment were factors that inhibit vaccination. This finding was in line with previous studies that identify determinants affecting hesitancy, acceptance, and vaccination uptake [7, 20, 22, 31]. Mothers with lower education tend to have higher vaccine hesitancy [20] and lower acceptance [31], which ultimately leads to low uptake of vaccination [22]. Otherwise, women with higher education tend to have better access to information about COVID-19 and its vaccinations, more aware of the adverse effects of COVID-19 and the benefits of getting a vaccination [7, 31]. Furthermore, mothers with higher education tend to be positive predictors of vaccination acceptance in their children [32].

Another inhibiting factor is working status as self-employment. Similar to other adults who enter retirement age [24], women as self-employed generally work at home, look after their babies, have less contact with crowds, tend to have a lower perceived risk of being exposed to COVID-19, and finally have a lower vaccination acceptance.

5. Implication and Limitations

Determinant factors that inhibit vaccination in pregnant and lactating women in this study were factors that can be bridged by education strategy [7] and have been carried out by the Indonesian government. However, this strategy needs to be optimized to further increase the booster vaccination which is still low. Education strategy sensitive to a diverse community group with low vaccination (in younger women, lower education, non-employees, and severe psychological distress) and involving healthcare professionals and community leaders might be the key to accelerating vaccination, including booster dose.

The finding that pregnant and lactating women experience moderate to severe symptoms of depression, anxiety, and stress during the COVID-19 pandemic, indicated that comprehensive education from a healthcare provider is needed. The education is aimed to identify the perceived psychological distress and provide appropriate interventions; evidence-based information related to vaccination; vaccine safety and effectiveness; and various misinformation about the covid-19 vaccination widely spread in the community [10]. Meaningful communication and adequate information are expected to reduce maternal fears and psychological distress [23] assist vaccination-related decisions and ultimately increase vaccination.

This study was conducted six months after the recommendation of pregnant women vaccination and entered the end of the second period of COVID-19 vaccination in Indonesia. Hence, the results of this study might be sufficient to provide an overview of vaccination in pregnant and lactating mothers in Java, Indonesia. In addition, the identification of socio-demographic and psychological distress as determinant factors has provided a comprehensive description of vaccination determinants in this group.

This study has several limitations. Firstly, respondents received vaccination before pregnancy, in the second and third trimesters, and during lactation. Therefore, this study is less applicable to pregnant women in the first trimester. Recommendation of COVID-19 vaccination for pregnant women in Indonesia begins in the second trimester [14].

Secondly, the sample proportion in each province is less balanced (range 1.2%-44.6% for six provinces), which may be caused by the sampling method (selection bias). Therefore, the finding is less representative in provinces with a small sample proportion. However, the percentage of vaccination in these provinces was greater than 80% for at least the first dose, similar to vaccination in the general population in Java [33].

Thirdly, data on women's characteristics and vaccination status were obtained from women's self-reported and not checked in the national vaccine registry or medical records of health services providing vaccinations. So misreporting and misclassification of vaccination status through inaccurate self-report is possible.

Fourthly, data collection was performed by the online form. This technique was more accessed by women who graduate from senior school or university but less accessed by women with limited internet access, low education levels, and illiteracy. Whereas, based on Indonesian Statistics data for 2021, women of productive age majority graduate from junior school (8.7 years of education) [34] with a literacy percentage of 98.03% [35]. So need caution to interpret the finding.

6. Conclusion

The COVID-19 vaccination of at least one dose for pregnant and lactating women in Java is high, reaching 95%. However, there was a drastic decrease in the frequency of participants receiving booster doses. The facilitating and inhibiting determinant factors of vaccination come from women's socio-demographic characteristics and perceived psychological distress. The findings can be used to develop educational strategies that focus on the diversity of women's socio-demographic characteristics, especially in women with low vaccination. In addition, the finding that perceived psychological distress is an obstacle to vaccination indicates that detailed information on the benefits and side effects of vaccination; transparency of information behind vaccination recommendations; and the use of vaccination as a requirement for obtaining public services are needed. These interventions are expected to help women determine the decision to accept or refuse the vaccination.

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Author's Contributions

Conceptualization, E.S; methodology, E.S.; formal analysis, E.S and N.S.; investigation, E.S., S.R; data curation, E.S., N.S., A.Y., W.W., H.K.R., writing-original draft preparation, E.S., N.S.; writing-rewiew and editing, E.S., N.S., A.Y., W.W., H.K.R. All authors contributed to the article and approved the submitted version.

Conflict of Interest

The authors have declared that no competing interest exists.

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