

COVID-19 Vaccine Acceptance in Pregnant and Lactating Women and Mothers of Young Children in Poland

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Purpose: The World Health Organization indicated vaccine hesitancy as one of the top 10 threats to global health. The success of a vaccine depends not only on its efficacy but also on its acceptance. Our study aims to define COVID-19 vaccine acceptance in a sample of pregnant and lactating women in Poland. Since mothers are often key decision-makers for whether their children will receive vaccination, it is vital to measure vaccine confidence among this group.

Patients and Methods: An anonymous online survey was distributed to assess the level of acceptance of COVID-19 vaccination among pregnant and lactating women for themselves and their children in Poland.

Results: The trust of pregnant and breastfeeding women and women who have offspring in government, in healthcare professionals, in scientific authorities, and sound scientific data is strongly associated with vaccine acceptance and may influence an individual's decision to perceive recommended actions as beneficial to the society as a whole.

Conclusion: Acceptance and confidence in receiving the COVID-19 vaccination among pregnant and lactating women and mothers with young children is strongly associated with feelings of trust in government, health professionals, scientific authorities, and sound scientific data. The dissemination of professional and reliable information regarding the safety and efficacy of COVID-19 vaccine uptake by qualified health care personnel can significantly increase the level of trust and public awareness regarding the safety and efficacy of COVID-19 vaccine uptake in pregnancy, while breastfeeding, and mothers with young children.

Keywords: COVID-19, vaccination, breastfeeding, pregnancy, acceptance of vaccination

Introduction

By the end of 2021, the total number of COVID-19 cases will reach more than 234 million worldwide, and the number of deaths from SARS-CoV-2 related causes will hit 4.8 million.¹ Pregnant women are at high risk of severe illness, intensive care unit admission (3 times more likely), and invasive ventilation (1.5 times more likely) when compared with non-pregnant women of the same age.² Children appear to have a lower risk for symptomatic SARS-CoV-2 but similar rates of infection. It makes children the potential transmitters of SARS-CoV-2.³

Vaccine for SARS-CoV-2 is the most promising mean of controlling the spread of the COVID-19 pandemic.⁴ On the one hand, the Joint Committee on Vaccination and Immunisation (in line with recommendations from the USA and the WHO) advises that pregnant women should be offered COVID-19 vaccines at the same time as people of the same age or risk group and recommends that the vaccines can be received while breastfeeding.⁵ On the other hand, unfortunately, the COVID-19 vaccine trials generated minimal data on safety and efficacy for pregnant and lactating women and children.⁶ This is because pregnant and lactating women are excluded from all clinical trials on COVID-19 vaccines. It means that we still have scant available data on vaccine safety and efficacy in pregnant and lactating women. For example, in the United States, according to the data from Vaccine Safety Datalink, only 16.3% of pregnant women received one or more doses of a COVID-19 vaccine during pregnancy (data from May 2021).⁷

The success of a vaccine depends not only on its efficacy but also on its acceptance. Even the most successful vaccines cannot combat the epidemic without widespread acceptance. Unfortunately, despite considerable progress in vaccine development and administration, the current acceptance level remains inadequate to meet the requirements for developing so-called herd immunity – the community immunity level needs to reach at least 75% to stop the SARS-CoV-2 pandemic.⁸ In addition, the World Health Organization indicated vaccine hesitancy as one of the top 10 threats to global health. This information predates the SARS-CoV-2 pandemic.^{9,10} Because of that, it is imperative to understand and indicate the reason for vaccine hesitancy and the level of vaccine acceptance.

While millions of women have become pregnant, given birth, and initiated breastfeeding during the SARS-CoV-2 pandemic, it is important to understand patient perception and barriers to vaccine acceptance as a crucial key factor in helping to end the pandemic. To our best knowledge, there have been no data on vaccine acceptance for pregnant and lactating women and those having young children in Poland. Therefore, we hypothesized that pregnant and lactating women would avoid the COVID-19 vaccine because of the available data inconsistency. Our study aims to define COVID-19 vaccine acceptance in a sample of pregnant and lactating women in Poland. Since mothers are often key decision-makers for whether their children will receive vaccination, it is vital to measure vaccine confidence among this group.

Materials and Methods

Study Design

An anonymous online survey ([Appendix](#)) was distributed between July 1, 2021, and August 30, 2021, to assess the level of acceptance of COVID-19 vaccination among pregnant and lactating women for themselves and their children in Poland. The survey included women aged 18 and older who were pregnant, breastfeeding, and/or had children under 18. Predictors assessed included sociodemographic data (pregnancy, breastfeeding, having children and number of children, age, marital status, education).

Further questions concerned general vaccine attitude, level of trust in healthcare in Poland, assessment of fear of COVID-19, confidence in safety and effectiveness of COVID-19 vaccination, and trust in government institutions and science. Question 13 (As the COVID-19 vaccination has been found 90% safe and effective and is available, do you want to get vaccinated?) applied only to pregnant and non-pregnant and breastfeeding women. Question 14 (As the COVID-19 vaccination has been found 90% safe and effective and is available, do you want to vaccinate your child?) only addressed the level of acceptance toward vaccinating their children.

A Likert scale (strongly disagree/disagree/neither agree nor disagree/agree/strongly agree and not at all/no/rather not/neither yes nor no/rather yes/yes/very much) was used to determine the degree of acceptance. All study participants were informed about the purpose of the work and the standards for archiving and anonymizing data. The survey was hosted on a social media platform on parenting and breastfeeding forums. Interested people clicked on the link, and a questionnaire was opened, ready to be filled in.

Ethics

The study was approved by the Bioethics Committee of the Medical University in Wrocław, No. KB-761/2021.

Statistical Methods

For statistical evaluation, the results of the Likert scale questionnaire were integrated into three responses: agree/neither agree nor disagree/disagree and yes/neither yes nor no/no).

The data analyzed in this study, including survey results and demographic data collected from study participants (N = 118), were nominal variables, including dichotomous variables. Therefore, the choice of statistical tests performed was dictated by the nature of the variables obtained.

For all variables, count tables containing absolute raw counts and each category's percentage and cumulative contribution to the nominal variable were determined. The main statistical inference was based on the results of two different computational procedures suitable for analyzing dependent variables based on nominal scales: non-parametric

analysis using Pearson's Chi-square statistic calculated for multivariate tables and univariate and multivariate logistic regression. When the expected values calculated based on Person's Chi-square statistic were smaller than 10, the Yates correction for small numbers was considered when assessing the statistical significance of differences between the compared subgroups.

For dichotomous dependent variables, univariate and multivariate logistic regression was performed. Based on its results, an odds ratio (OR), statistical significance (p), and 95% confidence interval were determined for the obtained estimator value.

General relationships between all statistically evaluated variables were analyzed and then visualized using multivariate analyses based on dimension reduction utilizing the procedure of decomposition of the matrix of results according to singular values: principal component analysis (PCA) and correspondence analysis. The constructed PCA models were estimated using the NIPALS iterative algorithm, with the convergence criterion set at 0.00001 and the maximum number of iterations corresponding to 100. The number of principal components was determined by determining the maximum predictive ability of Q2 using the V-fold cross-validation method, setting the maximum number of them at $V_{\max} = 7$.

PCA allowed us to pre-select the variables that have the most significant influence on the built model and select the most significant relationships among them. Thus, selected variables were then subjected to further statistical evaluation.

In all statistical analyses performed, the assumed significance level was $\alpha = 0.05$. Statistical analyses were carried out using STATISTICA PL[®] version 13.

Results

Sociodemographic Data

Out of 118 respondents, 28 (23.73%) women were pregnant, 60 (50.84%) were breastfeeding, and 109 (92.37%) had children. Furthermore, 51 (44.07%) had one child, 50 (42.37%) had two children, and 7 women (5.91%) had 3 and 4 children. The largest group, ie, 55 individuals, constituted women aged 30–35 (46.61%); moreover, 106 (89.83%) had higher education, and 102 (86.44%) were married.

Correlation Analysis Between Sociodemographic Data and Survey Questions

Statistically significant results for pregnant women indicated that they have confidence in government health institutions as opposed to non-pregnant women ($p=0.002$). Pregnant women are 4 times more likely to trust government health information than non-pregnant women (OR = 4.150; $p = 0.009$).

Breastfeeding women declared that they vaccinate their children as opposed to non-breastfeeding women ($p=0.001$). Moreover, breastfeeding women expressed trust in health services ($p=0.039$). They had confidence in COVID-19 vaccination with regard to its safety and effectiveness ($p=0.023$; $p=0.010$). Therefore, they were determined to get vaccinated themselves ($p=0.006$) and have their children vaccinated against COVID-19 ($p=0.000$). They agreed with the statement that vaccines are safe and do not cause serious side effects ($p=0.007$).

Breastfeeding women are 53 times more likely than non-breastfeeding women to vaccinate their children (OR = 53.302; $p = 0.002$), while they are 5 times more likely than non-breastfeeding women to want to vaccinate their children against COVID-19 (OR = 5.129; $p = 0.004$).

Surveyed women with children declared a lack of trust in government health information. Women who had one or two children were more likely to vaccinate them than those with more children ($p=0.000$). Participants with one child declared confidence in the safety and effectiveness of childhood vaccinations in preventing infectious diseases in contrast to women who have more children ($p=0.000$).

Women aged 30–35 believed that vaccinations were safe and effective in preventing infectious diseases in children as opposed to women aged 35–40. Younger women tended not to have an opinion ($p=0.031$). The distribution of responses was different in terms of willingness to vaccinate their children against COVID-19. Women in the 35–40 group were more likely to declare their willingness to vaccinate their children for this disease than younger women ($p=0.018$).

There is a significant correlation between the level of education and trust in healthcare and vaccination. Women with higher education declared confidence in health services in Poland ($p=0.007$); they vaccinate their children ($p=0.005$) and think that vaccinating children is safe and effective in preventing infectious diseases ($p=0.055$). Responses regarding the effectiveness of COVID-19 vaccination suggest that some of this group of respondents agreed with the statement, and some did not ($p=0.001$). Those with higher education were more afraid of the virus ($p=0.041$) and declared confidence in science as opposed to those with lower education ($p=0.000$). Moreover, their trust in science increased during the pandemic ($p=0.035$). Regarding vaccination against COVID-19, some women with higher education were willing to vaccinate themselves, and some were against vaccinating themselves against COVID-19, while in the group of women with secondary education, a large number of respondents did not have an opinion on this issue ($p=0.001$). Respondents with higher education declared the willingness to vaccinate their children against COVID-19 ($p=0.002$).

The correlations discussed along with the level of statistical significance are described [Table 1](#)

In addition, all effects and correlations are presented graphically in PCA in [Figure 1](#) Principal component analysis (PCA) evaluating corresponding variables.

Correlation Analysis Between COVID-19 Vaccination Acceptance Questions and Other Survey Questions

Correlation analysis between selected questions of the questionnaire showed that women who want to vaccinate themselves and their children against COVID-19 and who believe that this vaccination does not have serious side effects (questions 13,14,15) also have confidence in health services (Q 1), their confidence increased during the pandemic (Q 2), they are satisfied with the actions of the government in controlling the pandemic (Q 3), and believe that vaccination against COVID-19 is safe (Q 6) and effective (Q 7).

The correlations are shown in [Table 2](#)

Discussion

There is an ongoing concern in Polish society about the safety of receiving COVID-19 vaccinations. According to a report dated October 12, 2021, 46% of Poland's population has been fully vaccinated.¹¹ However, according to alarming data from the NHS (National Health Service) in the UK, nearly one-fifth of the most critically ill COVID-19 patients are unvaccinated pregnant women.²⁰

The present study was designed to assess the attitudes of three categories of women: pregnant, breastfeeding, and having children toward receiving COVID-19 vaccination. According to our research, the profile of a woman who accepts COVID-19 vaccination is the one who is breastfeeding, has 1 or 2 children, with higher education, in age between 30 and 35 years old. Participants, who did not declare breastfeeding, have more than 2 children, and with a high school education, did not trust in COVID-19 vaccination and their vaccine acceptance level was lower. The analysis may prove helpful in further work on vaccine campaigns against the SARS-CoV-2 virus, as the success of a vaccine depends not only on its efficacy but also on its acceptance. Despite limited data on the effects of COVID-19 vaccination on pregnancy, there is no biological evidence to pose maternal and child safety risks associated with receiving COVID-19 vaccination.^{12,13} However, it has been documented abundantly that SARS-CoV-2 virus infection during pregnancy is associated with severe disease course and adverse obstetric outcomes.^{14–16}

Overcoming public fears and relying on sound and factual knowledge can help women make informed decisions, achieve high vaccination rates, and stop the pandemic.

Our study showed high acceptance of the COVID-19 vaccine among pregnant and breastfeeding women. In addition, pregnant and breastfeeding women have been shown to have high trust in government health institutions as opposed to women who are not pregnant. The above results may be influenced by frequent contacts of pregnant and breastfeeding women with health care professionals (check-ups during pregnancy, patronage visits as part of the newborn's primary healthcare). Involving health professionals in providing information focused on the safety of vaccine uptake and its effectiveness may be a useful way to counter women's hesitancy to receive vaccinations.

Table I Correlation Analysis Between Socio Demographic Data and Survey Questions

No. Question	Variable	Subgroups	Answers			Chi2	p
			Yes	Neither Yes Nor No	No		
4	Pregnancy	Yes	17 (14.41)	–	11 (9.32)	9.166	0.002
		No	12 (10.17)	–	78 (66.20)		
10	Pregnancy	Yes	10 (8.47)	2 (1.69)	16 (13.56)	6.161	0.045
		No	13 (11.02)	9 (7.63)	68 (57.63)		
14	Pregnancy	Yes	8 (6.78)	7 (5.93)	13 (11.02)	6.822	0.033
		No	41 (34.75)	7 (5.93)	42 (35.59)		
1	Breastfeeding	Yes	40 (33.90)	5 (4.24)	13 (11.02)	6.452	0.0397
		No	28 (23.79)	12 (10.17)	20 (16.95)		
4	Breastfeeding	Yes	54 (45.76)		4 (3.39)	11.531	0.00068
		No	41 (34.75)		19 (16.10)		
6	Breastfeeding	Yes	41 (34.75)	4 (3.39)	13 (11.02)	7.566	0.0227
		No	28 (23.75)	11 (9.32)	21 (17.80)		
7	Breastfeeding	Yes	38 (32.20)	6 (5.08)	14 (11.86)	9.148	0.0103
		No	24 (20.34)	17 (14.41)	19 (16.10)		
13	Breastfeeding	Yes	44 (37.29)	1 (0.85)	13 (11.02)	10.107	0.0063
		No	31 (26.27)	9 (7.63)	20 (16.95)		
14	Breastfeeding	Yes	34 (28.81)	3 (2.54)	21 (17.80)	14.982	0.00056
		No	15 (12.71)	11 (9.32)	34 (38.81)		
15	Breastfeeding	Yes	36 (30.51)	4 (3.39)	18 (15.25)	9.863	0.0072
		No	20 (16.95)	6 (5.08)	34 (28.81)		
4	Children	Yes	93 (78.81)	–	16 (13.56)	21.093	0.000
		No	2 (1.69)	–	7 (5.93)		
5	Children	Yes	91 (77.12)	2 (1.69)	16 (13.56)	11.574	0.003
		No	7 (5.93)	2 (1.69)	7 (5.93)		
10	Children	Yes	18 (4.24)	11 (9.32)	16 (13.56)	8.388	0.015
		No	5 (4.24)	0	0		
4	Number of Children	0	2 (1.69)	–		26.604	0.000
		1	48 (40.68)	–			
		2	41 (34.75)	–			
		3	4 (3.39)	–			

(Continued)

Table 1 (Continued).

No. Question	Variable	Subgroups	Answers			Chi2	p
			Yes	Neither Yes Nor No	No		
5	Number of children	0	7 (5.93)	2 (1.69)	0	25.527	0.000
		1	46 (38.98)	2 (1.69)	4 (3.39)		
		2	42 (35.59)	0	8 (6.78)		
		3	3 (2.54)	0	4 (3.39)		
5	Age	30–35	57 (48.31)	1 (0.85)	10 (8.47)	10.647	0.031
		35–40	24 (20.34)	0	5 (4.24)		
		<30	17 (14.41)	3 (2.54)	1 (0.85)		
14	Age	30–35	29 (24.58)	6 (5.08)	33 (27.97)	11.866	0.018
		35–40	13 (11.02)	1 (0.85)	15 (12.71)		
		<40	7 (5.93)	7 (5.93)	7 (5.93)		
1	Level of education	Master's degree	65 (55.08)	16 (13.56)	25 (21.19)	9.963	0.007
		High school	3 (2.54)	1 (0.85)	8 (6.78)		
4	Level of education	Master's degree	89 (77.12)	–	17 (14.41)	7.923	0.005
		High school	6 (5.08)	–	6 (5.08)		
5	Level of education	Master's degree	91 (77.12)	3 (2.54)	12 (10.17)	5.797	0.055
		High school	7 (5.93)	1 (0.85)	4 (3.39)		
7	Level of education	Master's degree	60 (50.85)	16 (13.56)	30 (25.42)	13.654	0.001
		High school	2 (1.69)	7 (5.93)	3 (2.54)		
8	Level of education	Master's degree	66 (55.93)	7 (5.93)	33 (27.97)	6.344	0.041
		High school	3 (2.54)	2 (1.69)	7 (5.93)		
11	Level of education	Master's degree	100 (84.75)	6 (5.08)	0	27.615	0.000
		High school	9 (7.63)	0	3 (2.54)		
12	Level of education	Master's degree	35 (29.66)	27 (22.88)	44 (37.29)	6.658	0.035
		High school	0	3 (2.54)	9 (7.63)		
13	Level of education	Master's degree	72 (61.02)	6 (5.08)	28 (23.73)	13.762	0.001
		High school	3 (2.54)	4 (3.39)	5 (4.24)		
14	Level of education	Master's degree	49 (41.53)	10 (8.47)	47 (39.83)	11.889	0.002
		High school	0	4 (3.39)	8 (6.78)		

Notes: 1: I trust the healthcare service in my country. 4: Do you vaccinate your children? 5: Do you think that vaccinating children is safe and effective in protecting them against infectious diseases? 6: With assurances from government health agencies, do you think COVID vaccination is safe? 7: With assurances from government health agencies, do you think COVID vaccination is effective? 8: Are you afraid of the SARS-CoV-2 virus? 10: Do you trust government information on healthcare? 11: Do you trust science? 12: Has your trust in science increased during the pandemic? 13: As the COVID-19 vaccination has been found 90% safe and effective and is available, do you want to get vaccinated? 14: As the COVID-19 vaccination has been found 90% safe and effective and is available, do you want to vaccinate your child? 15: When the public health agencies approve a COVID-19 vaccine in Poland, do you think the vaccine will be effective and protect against COVID-19? Chi2 – Pearson's test Chi square, P-statistical significance >0.05.

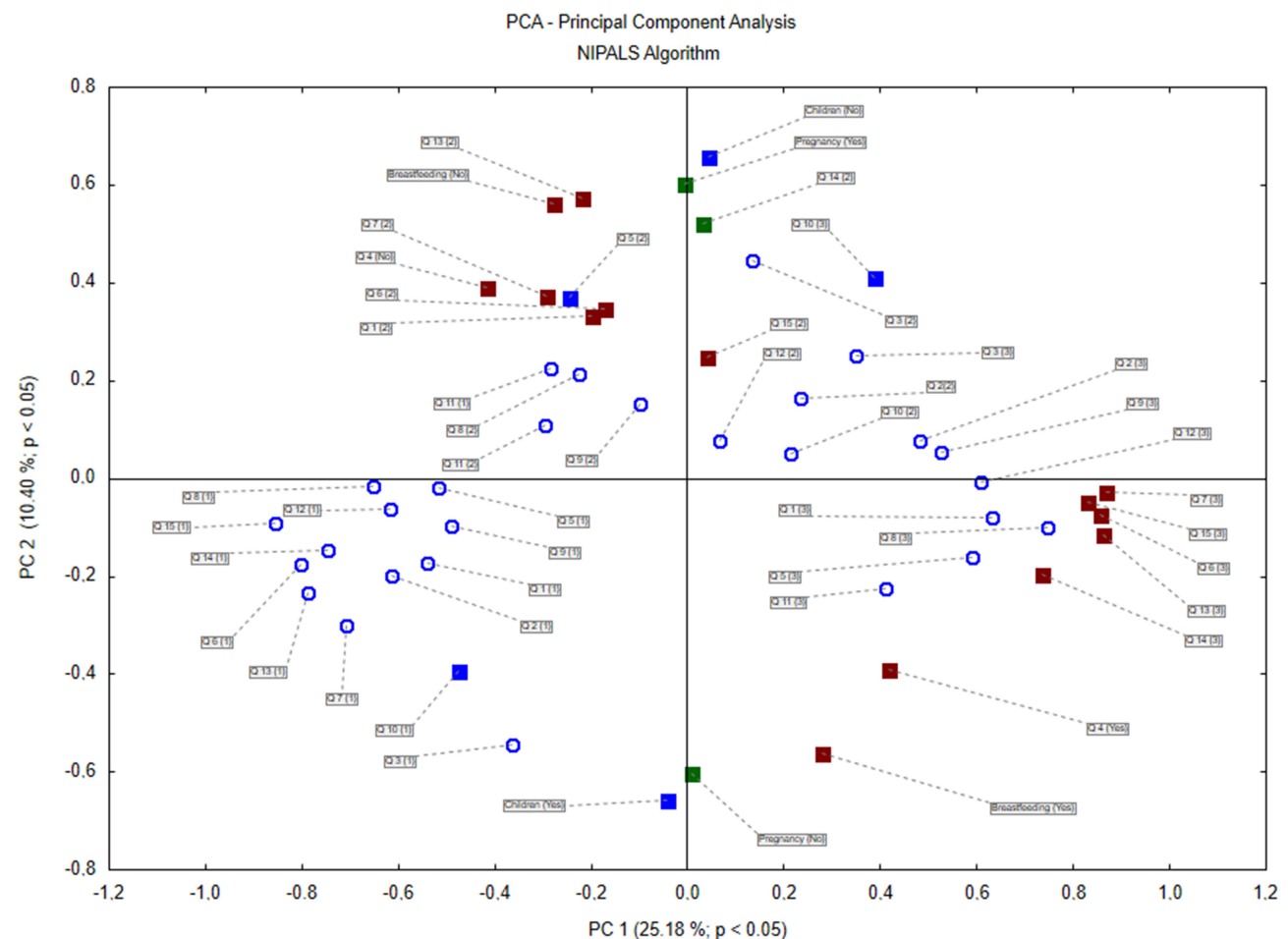


Figure 1 Principal component analysis (PCA) evaluating corresponding variables.

Notes: Q1: I trust the healthcare service in my country. Q2: During the pandemic, my confidence in my country's healthcare increased. Q3: I am satisfied with the performance of the government and professionals in my country in controlling the pandemic. Q4: Do you vaccinate your children? Q5: Do you think that vaccinating children is safe and effective in protecting them against infectious diseases? Q6: With assurances from government health agencies, do you think COVID vaccination is safe? Q7: With assurances from government health agencies, do you think COVID vaccination is effective? Q8: Are you afraid of the SARS-CoV-2 virus? Q9: Do you monitor pandemic information at least once a day? Q10: Do you trust government information on healthcare? Q11: Do you trust science? Q12: Has your trust in science increased during the pandemic? Q13: As the COVID-19 vaccination has been found 90% safe and effective and is available, do you want to get vaccinated? Q14: As the COVID-19 vaccination has been found 90% safe and effective and is available, do you want to vaccinate your child? Q15: When the public health agencies approve a COVID-19 vaccine in Poland, do you think the vaccine will be effective and protect against COVID-19? {1} – Disagree; {2} – Neither agree nor disagree; {3} – Agree.

During the pandemic, the expert panel of the Polish Society of Gynecologists and Obstetricians (PTGiP) agreed with the positions of the American College of Obstetricians and Gynecologists (ACOG), Royal College of Obstetricians and Gynaecologists (RCOG), Centers for Disease Control and Prevention (CDC), and the Society for Maternal-Fetal Medicine (SMFM), emphasizing that COVID-19 vaccination should be offered to pregnant and breastfeeding women.¹⁷ The ever-increasing body of scientific evidence related to the safety of vaccine uptake during pregnancy and lactation may influence wider acceptance of COVID-19 vaccination in this population.

Different results were found by Ayhan et al, who measured the acceptance of COVID-19 vaccination in a group of pregnant women in Turkey. The authors showed low acceptance of COVID-19 vaccination among pregnant women. Lack of confidence in vaccination was one of the most common reasons for vaccination refusal.⁹ On the other hand, in a study conducted in the Czech Republic, high level of education was found to be a significant predictor of Covid-19 vaccine uptake among pregnant and lactating women.²⁰ The authors of the above study also emphasize the relationship between acceptance of COVID-19 vaccine and trimester of pregnancy. The study showed that women who were in the third trimester of pregnancy declared the highest level of acceptance of the vaccine.²⁰ This observation may be related to

Table 2 Correlation Analysis Between COVID-19 Vaccination Acceptance Questions and Other Survey Questions

No. Question	I3		I4		I5	
	Chi2	p	Chi2	p	Chi2	p
1	52.474	0.000	28.216	0.000	57.484	0.000
2	27.386	0.000	24.186	0.000	35.417	0.000
3	21.517	0.000	10.829	0.028	18.932	0.000
6	118.147	0.000	58.257	0.000	77.045	0.000
7	101.129	0.000	70.203	0.000	74.851	0.000

Notes: Q1: I trust the healthcare service in my country. Q2: During the pandemic, my confidence in my country's healthcare increased. Q3: I am satisfied with the performance of the government and professionals in my country in controlling the pandemic. Q6: With assurances from government health agencies, do you think COVID vaccination is safe? Q7: With assurances from government health agencies, do you think COVID vaccination is effective? Q13: As the COVID-19 vaccination has been found 90% safe and effective and is available, do you want to get vaccinated? Q14: As the COVID-19 vaccination has been found 90% safe and effective and is available, do you want to vaccinate your child? Q15: When the public health agencies approve a COVID-19 vaccine in Poland, do you think the vaccine will be effective and protect against COVID-19? Chi2 – Pearson's test Chi square, P-statistical significance >0.05.

the fact that a number of vaccinations, including influenza (H1N1) vaccines, are recommended and widely accepted in the third trimester of pregnancy. The first and second trimester of pregnancy is presented as a critical period for organogenesis. During this period, women avoid taking medications during pregnancy.²⁰ In observation reported by Sutton et al¹⁸ where attitudes and beliefs regarding the acceptance of COVID-19 vaccination were examined in pregnant, lactating, and non-pregnant women. Pregnant as well as breastfeeding women were less likely to receive the vaccination compared to non-pregnant women. They argued their stance on the lack of sufficient research on vaccination.¹⁸

Very often, mothers are the key decision-makers in matters concerning their children. In our study, we set out to measure the level of acceptance and attitudes toward COVID-19 vaccination among mothers of children under 18. Surveyed women with children declared a lack of trust in government health information. Mothers with one or two children and breastfeeding women accept COVID-19 vaccination, want to be vaccinated, and want to vaccinate their children as opposed to non-breastfeeding women and women with more than two offspring. COVID-19 vaccine acceptance and prognostic factors among women vary worldwide. The meta-analysis by Skjefte et al⁶ presented results from 16 countries where COVID-19 vaccination acceptance rates were measured among pregnant women and mothers of children under 18. Significant geographical variation in the acceptance of vaccination among pregnant women and young mothers has been demonstrated. Vaccine acceptance was generally highest in India, the Philippines, and all sampled countries in Latin America; it was lowest in Russia, the United States, and Australia.⁶ Women in Russia and the US consistently expressed lower acceptance and confidence in the safety/efficacy of the COVID-19 vaccine and reported lower confidence in public health agencies.⁶ The decision to vaccinate against COVID-19 is a multi-faceted event. SARS-CoV-2 virus disease perceptions and public trust play a key role in shaping vaccine acceptance. COVID-19 vaccination campaigns for women, lactating women, and mothers should be unique to each country in order to achieve the highest possible level of acceptance and trust of a given population in vaccination.

We investigated women's level of education and determined its effect on confidence and acceptance of COVID-19 vaccination. Women with higher education declared confidence in science and the healthcare system in Poland. They expressed willingness to get vaccinated themselves and have their children vaccinated against COVID-19 as opposed to those with lower education. In Poland, the predominant group of unvaccinated persons includes those with primary education.¹¹ Doubt about SARS-CoV-2 virus disease, skepticism about the vaccine, distrust of the health care system, and pre-formed beliefs about vaccination may contribute to the reluctance we observed among the women interviewed. Differences in education were also significant in other countries. For example, the study by Lazarus et al¹⁹ proved that people with high education in Ecuador, France, Germany, India, and the United States reported vaccine acceptance; however, individuals with higher levels of education in Canada, Spain, and the United Kingdom demonstrated lower vaccine acceptance.¹⁹ Thus, there is considerable heterogeneity in terms of demographic factors

in respondents' propensity to receive the vaccine recommended by the World Health Organization. Clear and consistent communication from government officials is critical to building public confidence in immunization programs.

A limitation of this study was that respondents' reported intentions to vaccinate against COVID-19 may not always translate into vaccine uptake, as vaccination decisions are multifactorial and may change over time.

Conclusion

In conclusion, acceptance and confidence in receiving the COVID-19 vaccine is an integral and modifiable part of the efficacy against the SARS-CoV-2 virus. Our results indicate that the trust of pregnant and breastfeeding women and women who have offspring in government, in healthcare professionals, in scientific authorities, and sound scientific data is strongly associated with vaccine acceptance and may influence an individual's decision to perceive recommended actions as beneficial to the society as a whole. Therefore, it is critical to expand scientific evidence regarding the safety and efficacy of COVID-19 vaccines in pregnancy and during breastfeeding.

Building trust and public awareness is a multifactorial aspect that must start at the global, national, and sub-national levels. Vaccination campaigns for pregnant and lactating women and mothers should be specific to each country to achieve the greatest impact on still undecided women.

Abbreviations

NHS, National Health Service; PTGiP, Polish Society of Gynecologists and Obstetricians; ACOG, American College of Obstetricians and Gynecologists; RCOG, Royal College of Obstetricians and Gynaecologists; CDC, Centers for Disease Control and Prevention; SMFM, Society for Maternal-Fetal Medicine (SMFM); Q, question.

Institutional Review Board Statement

The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by the Bioethics Committee of the Medical University in Wrocław, No. KB-761/2021.

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

Disclosure

The authors declare no conflicts of interest in this work.

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