Clinical Epidemiology and Global Health 20 (2023) 101241

Contents lists available at ScienceDirect

Clinical Epidemiology and Global Health

journal homepage: www.elsevier.com/locate/cegh

Prevalence and predictive determinants of adherence to vaccination against COVID-19 among mothers who gave birth in the last two years in Morocco

Fatima Zohra Benayad [a,b,*], Rachid Razine [a,b], Abbas Ermilo Haroun [a,b], Ahmed Oubaasri [b,c], Elmostafa El Fahim [d,e], Redouane Abouqal [a,b], Majdouline Obtel [a,b]

[a] Laboratory of Biostatistics, Clinical Research and Epidemiology (LBRCE), Faculty of Medicine and Pharmacy of Rabat, Mohammed V University of Rabat, Morocco
[b] Laboratory of Social Medicine (Public Health, Hygiene and Preventive Medicine), Department of Epidemiology and Public Health, Faculty of Medicine and Pharmacy of Rabat, Mohammed V University of Rabat, Morocco
[c] Higher Institutes of Nursing Professions and Health Techniques, Guelmim, Morocco
[d] Molecular Biology and Functional Genomics Platform, National Center for Scientific and Technical Research (CNRST), Rabat, Morocco
[e] Neuroscience and Neurogenetics Research Team, Faculty of Medicine and Pharmacy, University Mohammed V, Rabat, Morocco

ARTICLE INFO

Keywords:
Covid-19
Vaccination
Breastfeeding
Pregnant
Determinants

ABSTRACT

Background and aim: Vaccination against COVID-19 was one of the most important resolute to stop the spread of the pandemic; however, its acceptance was controversial especially by pregnant and lactating women. This study aims to assess the prevalence of vaccination among participants as well as to explore the determinants of reluctance or adherence to vaccination among this population, and to investigate the intention towards vaccination among the unvaccinated.

Method: This is a cross-sectional study conducted among mothers (n = 458) residing in the prefecture of Skhirat-Temara in Morocco, and who have children aged between one month to 2 years, the survey was conducted on the basis of a semi-structured questionnaire.

Result: The prevalence of vaccination among the participants was 61.8%, although they were all vaccinated after their delivery. Among the unvaccinated, 64% wanted to be vaccinated either because they believed the vaccines were useful or because they wanted to get the vaccine pass, while 36% absolutely refused to be vaccinated due to lack of sufficient information on the efficacy and safety of new vaccines against COVID-19. The age of the last child ($p < 0.001$) and no gestational diabetes during pregnancy ($p = 0.016$) were found to be positive predictors of vaccination adherence; however, the average or the high monthly income ($p = 0.003$) and the lack of medical coverage ($p = 0.046$) were predictive factors limiting adherence to vaccination.

Conclusion: The results of this study suggest that public health decision-makers need to increase awareness of the benefits of vaccination and to address the economic and social factors limiting access to COVID-19 vaccination.

1. Introduction

Since December 2019, the new corona virus disease (COVID-19) has rapidly invaded the world and caused serious respiratory complications and deaths. Consequently, this pandemic has weighed heavily on the health systems of nations on the one hand, and on the economies and lives of individuals and communities on the other hand especially with the recurrent appearance of variants of the virus in the absence of an effective treatment that could eradicate the disease. This crisis situation has pushed the rich countries to compete for the rapid invention of vaccines against COVID-19 to be able to stop the pandemic. Hence, taking up the challenge to develop new vaccines in a limited time through important investments in the pharmaceutical industry and the clinical trials that reached billions of dollars.[1]

Meanwhile, the vaccination against the corona virus was subject to great controversy at the international level questioning the effectiveness, the safety, and the security of the new quickly invented vaccines.[2]

Indeed, low acceptance rates of corona virus vaccination have been recorded in the Middle East, Russia, Africa and in several European countries such as Italy and France.[3]

Morocco was among the first countries to provide vaccination for its citizens, prioritizing at the outset in accordance with the

* Corresponding author. Laboratory of Biostatistics, Clinical Research and Epidemiology (LBRCE), Faculty of Medicine and Pharmacy of Rabat, Mohammed V University of Rabat, Morocco.
E-mail address: benayad.fatimaz@yahoo.fr (F.Z. Benayad).

https://doi.org/10.1016/j.cegh.2023.101241
Received 22 June 2022; Received in revised form 16 January 2023; Accepted 21 January 2023
Available online 28 January 2023

recommendations of the World Health Organization (WHO). The prioritized segments included health professionals, people with strategic functions, the elderly, people with comorbidities, and those suffering from chronic diseases.[4]

Currently, Morocco has expanded the population eligible for vaccination against the corona virus to include pregnant women in their second trimester and those who are breastfeeding. This decision was taken in order to prevent and avoid the risks of pre-eclampsia, abortion, premature delivery, induced fetal death, hospitalization, and even intensive care unit services in the event that women contract the virus during their pregnancy.[5]

The vaccination of this vulnerable category of the population against the corona virus was not addressed during the launch of the vaccination campaigns for reasons related to the safety, efficacy, and harmlessness of the new vaccines as they were excluded from clinical trials.[6] Therefore, in the absence of sufficient results and the lack of evidence for the safe use of corona virus vaccines by this population, it was important to assess and describe the perceptions of these women regarding vaccination in order to inform decision makers about factors affecting adherence and reluctance to vaccination among this population. Hence, providing them with crucial information that can assist them further promote vaccination.

This article is a cross-sectional study that aims at investigating the rate of vaccination among Moroccan mothers who gave birth in the last two years along with assessing their reasons for accepting or refusing vaccination, as well as to explore the determinants of reluctance or adherence to vaccination among this population, and to investigate the intention towards vaccination among the unvaccinated.

2. Methods

2.1. Study type and population

This was a descriptive and cross-sectional study, conducted in the health centers of the Skhirat-Temara prefecture in Morocco among adult mothers who resided in the same prefecture and accompanied their children aged one to 24 months (who were born or were breastfed during the first three waves of the Covid-19 pandemic in Morocco) for vaccination or other care. The survey period was from October 2021 to January 2022.

2.2. Eligibility criteria

Only mothers aged 18 years and up and given consent to participate to the study were included. Those who refused to participate in the study were excluded.

2.3. Questionnaire and sample

The sample size required for the results of this survey to be representative was calculated using the following formula[7]:

$$n = \frac{z^2 \times p \times (1-p)}{m^2} = 384.16 \approx 385$$

Where: n = sample size

z = 1.96 for a 95% confidence level

p = 0.5 (to our knowledge, no national study available to inform us on the prevalence of pregnant or lactating women vaccinated)

m = 0.05 (margin of sampling error tolerated).

However, our survey included 458 participants who completed a standardized questionnaire divided into two sections. The first section was used to provide information on demographics, socioeconomic and clinical characteristics (maternal age, marital status, education level, place of residence, maternal occupation, monthly household income, history of gestational diabetes, history of COVID-19, etc.), as well as the vaccination status of the participants during pregnancy and after delivery and the age of their last child. The second section provides information on perceptions and future intentions to adhere to vaccination among participants initially reported as unvaccinated.

2.4. Statistical analysis

Descriptive statistics and frequencies were computed for each variables of the questionnaire.

Univariate analysis was performed using the Chi-square test and Fisher's exact test according to the test conditions. The logistic regression analysis was performed to assess the independent effect of age, residence, couple's education level, monthly household income, medical coverage, age of last child, history of COVID-19, and previous gestational diabetes on vaccination against COVID-19.

The list of the explanatory variables was established according to the results of the univariate analysis. A difference was considered to be statistically significant if the p value was less than 0.05. The associations were expressed in odds ratio (OR) at a confidence interval of 95%. Data analysis was performed using the statistical software Jamovi 1.6.

Ethics approval

This study was conducted with the approval of the Ethics Committee for Biomedical Research, Faculty of Medicine and Pharmacy, Mohamed V University of Rabat, Morocco (ethical approval n° C68/20 issued on February 18, 2021).

All the Participants were provided with a briefing note explaining the purpose of the study, the interview process, the confidentiality of the data, and the utility of the study results. Subsequently, oral and written informed consent was obtained from the participants before the interview began.

Table 1
Description of the main features of the population of the study (n = 458).

		Frequency (%)
Age group of participants	18–29 years old	263 (57.4)
	30–40 years old	178 (38.9)
	More than 40 years old	17 (3.7)
Marital status	Married	453 (98.9)
	Not married	5 (1.1)
Residence	Urban	424 (92.6)
	Rural	34 (7.4)
Mother's education level	Illiterate	73 (15.9)
	Primary	224 (48.9)
	Secondary	79 (17.2)
	Higher	82 (17.9)
Father's education level	Illiterate	62 (13.5)
	Primary	227 (49.6)
	Secondary	98 (21.4)
	Higher	71 (15.5)
Mother's work	Yes	65 (14.2)
	No	393 (85.8)
Spouse's work	Yes	454 (99.1)
	No	4 (0.9)
Monthly household income	<$282	185 (40.3)
	$282 – $504	183 (40)
	More than $504	90 (19.7)
Medical coverage	Yes	399 (87.1)
	No	59 (12.9)
Age of the last child	≤6 months	249 (54.4)
	7–12 months	106 (23.1)
	More than 12 months	103 (22.5)
Previous gestational diabetes	Yes	54 (11.8)
	No	404 (88.2)
Previous COVID-19	Yes	49 (10.7)
	No	409 (89.3)

3. Results

3.1. Characteristics of the participants

The results of the feature analysis are presented in Table 1. Our survey included 458 participants who accompanied their children aged 1–24 months to health centers in the Skhirat-Temara prefecture in Morocco for vaccination or other outpatient care. More than half of the respondents were between 18 and 29 years old (57.4%), the majority were married (98.9%), and 54.4% had children between 1 and 6 months old. A large percentage (92.6%) lived in urban areas. Primary education was the dominant level of education for the participants and their spouses (48.9% and 49.6% respectively). Around 85.8% of the respondents were not in the workforce while almost all (99.1%) of the spouses were gainfully employed. For more than 40% of the participants, their monthly household income was less than $282 (the monthly household income was defined in terms of the Moroccan Guaranteed Minimum Interprofessional Income set at ≈ 2800 Moroccan dirham ≈ $282) while 12.9% had no medical coverage. For participants' clinical history during the pandemic, 10.7% had COVID-19, and 11.8% had gestational diabetes.

3.2. Prevalence of vaccine acceptance

As far as vaccination status is concerned, almost two thirds of the participants (61.8%) had received at least one dose of the COVID- 19 vaccine; however, none of the vaccinated women had been vaccinated during their pregnancy (Fig. 1).

3.3. Intent of the unvaccinated on further vaccination

Concerning the response to the intention to be vaccinated against COVID-19 among the unvaccinated (38.2%), Fig. 2 reveals that 64% expressed their willingness to vaccination either because they were convinced of the importance of vaccination to face the pandemic (52.6%) or to obtain the vaccine pass (47.3%). On the other hand, 36% of the participants did not intend to be vaccinated and the major perception (60.3%) was the lack of information about the efficacy and safety of the new vaccines against COVID-19.

3.4. Univariate and multivariate analysis of participants' characteristics towards vaccination

The association study between acceptance of COVID-19 vaccination and participant characteristics reveals that the place of residence, couple's education level, monthly household income, history of gestational diabetes, and age of last child were significantly associated with acceptance of vaccination (Table 2). All variables with a p-value of less than 25% were included in the multivariate analysis.

Subsequently, the multivariate analysis showed that having a monthly income higher than $282 significantly decreases the chance of accepting vaccination compared to those who had an income lower than $282. In addition, not having medical coverage decreased the chance of being vaccinated to 48% compared to those who had it (aOR = 0.52, 95% CI: 0.27–0.98; p = 0.046). Finally, not having gestational diabetes in the last pregnancy increased the chance of being vaccinated by more than two times compared to those who did. In addition, the age of the last child was a very significant determinant to influence the practice of vaccination among the participants ($p < 0.001$).

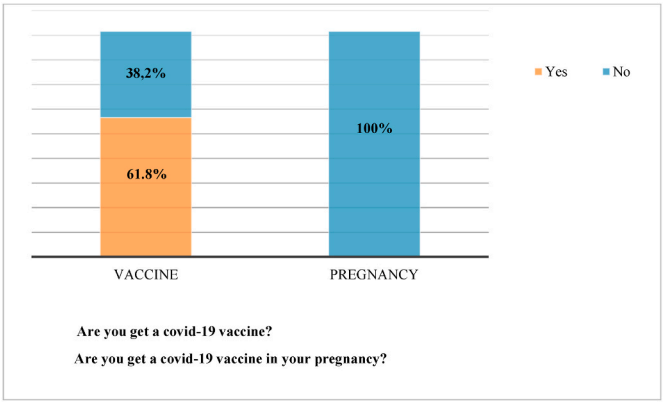

Fig. 1. The prevalence and period of vaccination against covid-19 among the participant group.

4. Discussion

This current cross-sectional study aims at investigating women's practices and perceptions of COVID-19 vaccination during pregnancy and postpartum (up to 24 months), as well as assessing the predictive determinants of acceptance of vaccination.

In this study, all participants revealed that they avoided being vaccinated during their pregnancies even with the availability of the vaccines and the recommendations of the national scientific commission, which are in line with those of the international learned society in favor of vaccination of pregnant and breastfeeding women.[8,9] This result was nil compared to those reported in studies conducted in United States, and the Saudi Arabia, where the prevalence rates of vaccination among pregnant women were 29.3%, 32.0% respectively.[10,11] This attitude can be explained by women's sense of responsibility to protect the health of their fetuses and newborns during pregnancy and breastfeeding in the absence of evidence of the safety of the new, rapidly developed vaccines such as those against COVID-19.[12] Therefore, the risk of harming children's health during pregnancy and breastfeeding, and the lack of reliable data on vaccination of this vulnerable segment of the population are considered determinants of non-adherence to COVID-19 vaccination. In contrast, the vaccination prevalence rate among participants who received at least the first dose during the survey period was 61.8%.

Concerning the perceptions of the unvaccinated regarding intention to be vaccinated against COVID-19 in the future, when the unvaccinated (175 participants) were asked if they would be willing to be vaccinated, the results showed that 64% of them expressed willingness to be vaccinated. In comparison with other studies, this result was almost similar in six European countries where 60–70% of pregnant and lactating women expressed willingness to be vaccinated.[13] However, nearly half of the participants who changed their minds about vaccination (47.3%) made that choice just to have the vaccination pass required by the public authorities to be able to carry out normal activities of daily life. Vaccine pass possession can be included in the Compliance component, which is one of the most significant determinants of psychological readiness for vaccination acceptance.[14] Indeed, our finding is consistent with other studies that have indicated that vaccination can be accepted when it is considered a requirement to get free movement and access to public facilities and spaces.[15]

Lastly, although two thirds of the unvaccinated (60.3%) who confirmed their categorical refusal of vaccination justified this behavior by the lack of information on the safety and security of vaccines against COVID-19, this result is considered lower than that reported in the Czech Republic (82.4%).[16]

The result of the univariate analysis showed a significant association between adherence to vaccination and place of Residence, education level of the couples, previous history of gestational diabetes, monthly household income of the participants, and age of their last child. This association was consistent with the results of other studies.[17,18] However, there are other studies that have invalidated this association with antecedent gestational diabetes.[19]

An odds ratio (OR) greater than 1 indicates positive adherence to

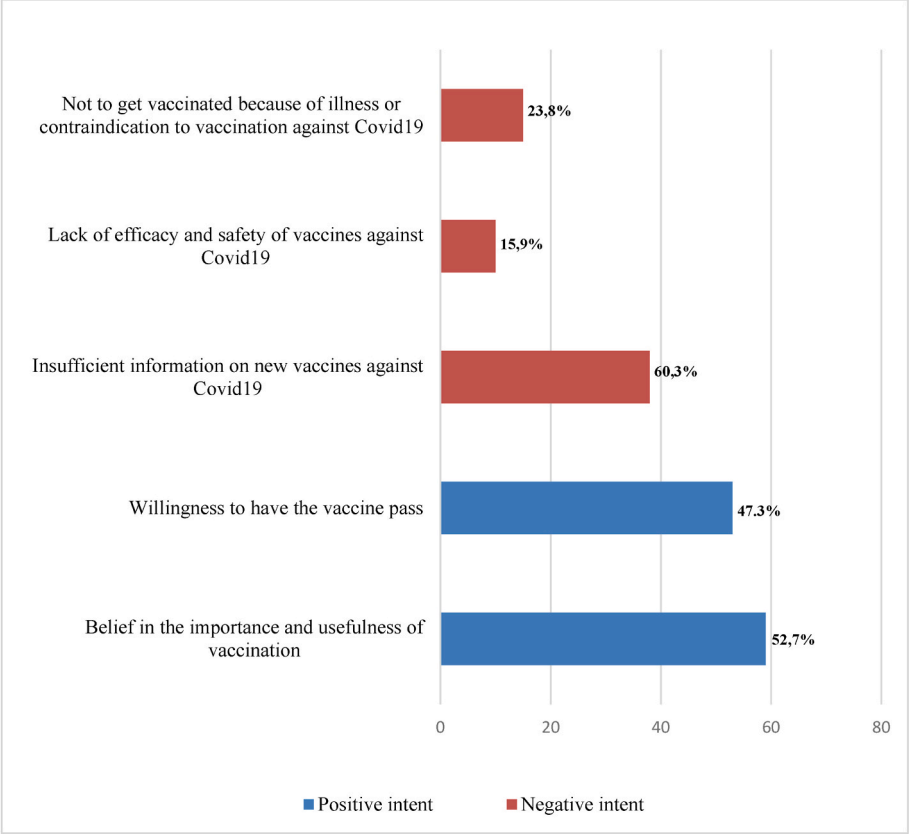

Fig. 2. Perceptions of unvaccinated regarding intention to be vaccinated against COVID-19 in the future.

vaccination, while an odds ratio less than 1 indicates the opposite attitude towards vaccination acceptance.

In the multivariate analysis, the predictive determinants for low adherence to vaccination were monthly household income above $282 (middle or high income) and lack of medical coverage. This result was in line with the results of other studies that have confirmed our findings regarding the lack of medical coverage[20–22] as one of the limiting factors for adherence to COVID-19 vaccination.

Nevertheless, this finding was found to be inconsistent with the results of other studies[18,23] which have reported that participants with average or high monthly incomes are more likely to accept vaccination than those with low incomes. Similarly, our result was opposed to that of Miranda K. Kiefer,[19] who found that having medical coverage was one of the factors for hesitancy and refusal of vaccination.

On the other hand, having a child older than 6 months and not having gestational diabetes were considered positive factors for adherence to vaccination. This result may be explained by the reduced sense of risk to their children's health that mothers may feel as their children advance in age and do not rely solely on breastfeeding for nutrition, and as they develop immunity to disease as they grow older.

In our study, women who had gestational diabetes were the least likely to adhere to vaccination compared to those who did not. This finding contradicts other study that found that participants who had gestational diabetes were the most accepting of the vaccination.[11] This attitude can be related to the fear of worsening their clinical condition during pregnancy due to lack of awareness or information. Nevertheless, studies have shown that gestational diabetes increases the risk of getting COVID-19 and that vaccination against COVID-19 has been shown to have no adverse effect on ongoing pregnancy.[24,25]

This study allowed us to make an initial diagnosis of the status of vaccination against COVID-19 among pregnant women and women with infants in Morocco, to reveal that adherence to vaccination was largely associated with the vaccination pass required by the authorities, while refusal was overwhelmingly justified by the lack of reliable data on vaccine safety and efficacy. In addition, factors such as income, medical coverage, history of gestational diabetes, and age of last child emerged as determinants of vaccine adherence.

4.1. Limitation of the study

Our study faced some limits. First, because of the fact that only few studies have reported the prevalence of effective vaccination among pregnant and lactating women, or those whose last delivery was less than two years ago, the results of univariate and multivariate analyses were compared with studies exploring the intention to vaccinate in that particular population. Participants with a positive attitude towards vaccination were considered as if they were vaccinated, and those with a negative attitude were considered as if they were unvaccinated. Secondly, the cross-sectional study we conducted does not allow us to establish cause-effect relationship.

5. Conclusion

In conclusion, the results of this study can serve as a roadmap for policymakers and public health officials to better inform and educate pregnant and lactating women about the safety and efficacy of available vaccines, as well as to address factors that may discourage this population from getting vaccinated.

Data availability

All data relevant to the study is reported in the article, the author is welcome to provide further information or clarification.

Table 2
Univariate and multivariate analysis of participants' characteristics by vaccination status (n = 458).

Characteristics	Univariate analysis			Multivariate analysis		
	Vaccination status			aOR*	IC 95%	p
	Yes	No	p			
	n (%)	n (%)				
Age group of participants						
18–29 years old	163 (57.6)	100 (57.1)		1		
30–40 years old	109 (38.5)	69 (39.4)	0.957	0.95	0.61–1.49	0.95
More than 40 years old	11 (3.9)	6 (3.4)		0.84	0.25–2.77	
Marital status						
Married	279 (98.6)	174 (99.4)	0.654[a]			
Not married	4 (1.4)	1 (0.6)				
Residence						
Urban	256 (90.5)	168 (96)	**0.028**			
Rural	27 (9.5)	7 (4)				
Mother's education level						
Illiterate	49 (17.3)	24 (13.7)				
Primary	145 (51.2)	79 (45.1)	**0.008**			
Secondary	52 (18.4)	27 (15.4)				
Higher	37 (13.1)	45 (25.7)				
Father's education level						
Illiterate	48 (17)	14 (8)				
Primary	143 (50.5)	84 (48)	**0.012**			
Secondary	51 (18)	47 (26.9)				
Higher	41 (14.5)	30 (17.1)				
Mother's work						
Yes	42 (14.8)	23 (13.1)	0.613			
No	241 (85.2)	152 (86.9)				
Spouse's work						
Yes	282 (99.6)	172 (98.3)	**0.158**[a]			
No	1 (0.4)	3 (1.7)				
Monthly household income						
<$282	130 (45.9)	55 (31.4)		**1**		
$282– $504	103 (36.4)	80 (45.7)	**0.009**	**0.47**	0.28–0.76	0.003
More than $504	50 (17.7)	40 (22.9)		**0.44**	0.25–0.80	
Medical coverage						
Yes	252 (89)	147 (84)	**0.117**	1		
No	31 (11)	28 (16)		0.52	0.27–0.98	0.046
Age of the last child						
≤6 months	108 (38.2)	141 (80.6)		**1**		
7–12 months	87 (30.7)	19 (10.9)	**<0.001**	5.85	3.30–10.36	<0.001
More than 12 months	88 (31.1)	15 (8.6)		8.62	4.62–16.08	
Previous gestational diabetes						
Yes	24 (8.5)	30 (17.1)		**1**		
No	259 (91.5)	145 (82.9)	**0.005**	2.28	1.17–4.47	0.016
Previous COVID-19						
Yes	34 (12)	15 (8.6)	**0.247**			
No	249 (88)	160 (91.4)				

[a] Fisher's exact test. A p value < 0.05 is considered significant. *aOR: Adjusted odds ratio.

Declaration of competing interest

The authors declare that they have no conflicts of interest.

Acknowledgments and funding

The authors would like to thank all those who contributed to this article.

References

1 Chakraborty C, Sharma AR, Bhattacharya M, Lee S-S, Agoramoorthy G, et al. COVID-19 vaccine: challenges in developing countries and India's initiatives. *Inf Med.* 2021;29:165–166, 01.
2 Al-Qerem WA, , et alJarab AS. COVID-19 vaccination acceptance and its associated factors among a middle eastern population. *Front Public Health.* 2021;9. Consulté le: 12 avril 2022. [En ligne]. Disponible sur: https://www.frontiersin.org/article/10.3389/fpubh.2021.632914.
3 Sallam M. COVID-19 vaccine hesitancy worldwide: a concise systematic review of vaccine acceptance rates. *Vaccines.* 2021;9(2). https://doi.org/10.3390/vaccines9020160. Art. n° 2, févr.
4 OPSFPLIMCOVID-19210008_fre.pdf ». Consulté le: 12 avril 2022. [En ligne]. Disponible sur. https://iris.paho.org/bitstream/handle/10665.2/53319/OPSFPLIMCOVID-19210008_fre.pdf?sequence=1&isAllowed=y.
5 Garg I, Shekhar R, Sheikh AB, Pal S, et al. COVID-19 vaccine in pregnant and lactating women: a review of existing evidence and practice guidelines. *Infect Dis Rep.* 2021;13(3). https://doi.org/10.3390/idr13030064. Art. n° 3, sept.
6 Craig AM, Hughes BL, Swamy GK, et al. Coronavirus disease 2019 vaccines in pregnancy. *Am J Obstetric Gynecol MFM.* 2021;3(2), 100295. https://doi.org/10.1016/j.ajogmf.2020.100295. mars.
7 Serhier Z, Bendahhou K, Ben Abdelaziz A, Bennani MO, et al. Methodological sheet n°1: how to calculate the size of a sample for an observational study? *Tunis Med.* 2020;98(1):1–7. janv.
8 Rasmussen SA, , et alJamieson DJ. Pregnancy, postpartum care, and COVID-19 vaccination in 2021. *JAMA.* 2021;325(11):1099–1100. https://doi.org/10.1001/jama.2021.1683. mars.
9 Davanzo R, et al. Breastfeeding and COVID-19 vaccination: position statement of the Italian scientific societies. *Ital J Pediatr.* 2021;47(1):45. https://doi.org/10.1186/s13052-021-00998-6. févr.
10 Binger KS, Cui Y, Tsaih S-W, Palatnik A, et al. Factors associated with receipt of COVID-19 immunization during pregnancy. *Am J Obstet Gynecol.* 2022;226(1):S497-S498. https://doi.org/10.1016/j.ajog.2021.11.823. janv.
11 Ghamri RA, Othman SS, Alhiniah MH, Alelyani RH, Badawi AM, Alshahrani AA, et al. Acceptance of COVID-19 vaccine and associated factors among pregnant women in Saudi Arabia. *Patient Prefer Adherence.* 2022;16:861–873. https://doi.org/10.2147/PPA.S357653. avr.
12 Wilson RJ, Paterson P, Jarrett C, Larson HJ, et al. Understanding factors influencing vaccination acceptance during pregnancy globally: a literature review. *Vaccine.* 2015;33(47):6420–6429. https://doi.org/10.1016/j.vaccine.2015.08.046. nov.
13 Ceulemans M, 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. *Int J Environ Res Publ Health.* 2021;18(7). https://doi.org/10.3390/ijerph18073367. Art. n° 7, janv.
14 M. Geiger et al., « Measuring the 7Cs of vaccination readiness. », Eur J Psychol Assess, 20210715, doi: 10.1027/1015-5759/a000663.
15 Moccia G, Carpinelli L, Savarese G, De Caro F, et al. Vaccine hesitancy and the green digital pass: a study on adherence to the Italian COVID-19 vaccination campaign. *Int J Environ Res Publ Health.* 2022;19(5). https://doi.org/10.3390/ijerph19052970. Art. no 5, janv.

16 Riad A, et al. COVID-19 vaccine acceptance of pregnant and lactating women (PLW) in Czechia: an analytical cross-sectional study. *Int J Environ Res Publ Health*. 2021;18 (24). https://doi.org/10.3390/ijerph182413373. Art. n° 24, janv.
17 Mose A. Willingness to receive COVID-19 vaccine and its determinant factors among lactating mothers in Ethiopia: a cross-sectional study. *Infect Drug Resist*. 2021;14: 4249–4259. https://doi.org/10.2147/IDR.S336486. oct.
18 Skirrow H, et al. Women's views on accepting COVID-19 vaccination during and after pregnancy, and for their babies: a multi-methods study in the UK. *BMC Pregnancy Childbirth*. 2022;22(1):33. https://doi.org/10.1186/s12884-021-04321-3. janv.
19 M. K. Kiefer et al., « Characteristics and perceptions associated with COVID-19 vaccination hesitancy among pregnant and postpartum individuals: a cross-sectional study », BJOG An Int J Obstet Gynaecol, vol. n/a, no n/a, doi: 10.1111/1471-0528.17110.
20 C. Nicastri et al., P. Kumar, « Psychosocial, economic, and mental health predictors of COVID-19 vaccine intent ». PsyArXiv, 10 février 2022. doi: 10.31234/osf.io/snrgf.
21 Ku L. The association of social factors and health insurance coverage with COVID-19 vaccinations and hesitancy, july 2021. *J Gen Intern Med*. 2022;37(2):409–414. https://doi.org/10.1007/s11606-021-07213-6. févr.
22 Callaghan T, et al. *« Correlates and Disparities of COVID-19 Vaccine Hesitancy », Social Science Research Network*. 2020. https://doi.org/10.2139/ssrn.3667971. Rochester, NY, SSRN Scholarly Paper 3667971, août.
23 Ruiz JB, , et alBell RA. Predictors of intention to vaccinate against COVID-19: results of a nationwide survey. *Vaccine*. 2021;39(7):1080–1086. https://doi.org/10.1016/j.vaccine.2021.01.010. févr.
24 Perreand E, et al. Gestational diabetes mellitus: a risk factor for COVID-19. *Am J Obstet Gynecol*. 2022;226(1):S750-S751.
25 Dick A, Rosenbloom JI, Gutman-Ido E, Lessans N, Cahen-Peretz A, Chill HH, et al. Safety of SARS-CoV-2 vaccination during pregnancy- obstetric outcomes from a large cohort study. *BMC Pregnancy Childbirth*. 2022;22(1):166. https://doi.org/10.1186/s12884-022-04505-5. févr.