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Research Article

# COVID-19 Vaccine Hesitancy among Perinatal Women

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## Abstract

The impacts of Coronavirus (COVID-19) on reproductive health are detrimental. COVID-19 vaccine is recommended for pregnant women to prevent infection and its sequelae [1]. Vaccine uptake among pregnant women is generally low. Our study aimed to explore views, predictors and uptake of the COVID-19 vaccine among perinatal women & explore the reasons and concerns for declining it. A prospective cross-sectional muti-centred study was conducted from 1st November 2021 to 31st March 2022. It included 364 perinatal women through convenience sampling. The data was analyzed with Microsoft Excel & SPSS version 28.0 along with thematic analysis. A reasonable number of patients were doubtful about the safety (166/364=45.6%) & effectiveness of the COVID-19 vaccine (111/364=34%), & declined the vaccine (104/364=28.5%). Logistic regression analyses revealed that the predictors for COVID-19 vaccine uptake included Irish ethnicity, older age, employed status, & beliefs about the safety & effectiveness of the COVID-19 vaccine. Major concerns for the declining vaccine were not enough data about vaccine safety in pregnancy & its novel use. There is a need for public health campaigns using the internet and social media for advocating COVID-19 vaccine safety and efficacy. A focused and pragmatic approach is justified in a subgroup of women with vaccine misinformation, myths, and disbelief. The importance of funding future research on vaccines in pregnancy can't be over-emphasized.

**Keywords:** COVID-19 vaccine; Pregnancy; Vaccine hesitancy; Vaccine literacy

## Introduction

Different COVID-19-related obstetric complications e.g. increased risks of intensive care admissions, stillbirths, prematurity, perinatal mental health disorders, etc. have been reported in international research [1]. mRNA COVID-19 vaccine and boosters are strongly recommended at any time in pregnancy and postpartum period [2] to prevent adverse outcomes [3].

The women are routinely offered the COVID-19 vaccine during antenatal and postnatal periods after discussing its risks and benefits. Among them, those who decline the vaccine, their concerns are explored with the aim of a follow-up discussion. This study aimed to see if there are any predictors of vaccine uptake among the study population and to explore their views and concerns about declining the vaccine.

### Material and Methods

This study was a cross-sectional prospective multi-centre study conducted in the Department of Obstetrics and Gynaecology of Cavan General Hospital (CGH), University Hospital Waterford (UHW), and Wexford General Hospital (WGH) of Ireland between 1st November 2021 and 31st March 2022.

Pregnant and postnatal women were included in the study through convenience sampling. Women who did not consent, or did not complete their questionnaire were excluded. The data was anonymized. The study tool was a "hard copy questionnaire" designed on the "Survey Monkey" tool and it was modified after a pilot of 30 cases. Data outcome variables included questions regarding the demographic characteristics of the women, any immunosuppressive conditions, weight, uptake of COVID-vaccine, previous history of COVID-19 infection, effects of COVID-19 on the pregnancy, benefits, and risks of COVID -19 vaccine, and how they think about COVID-19 vaccine. We also studied what were the reasons for declining COVID-19 vaccine and if there are any specific predictors for the uptake of the vaccine among the study population.

SPSS version 28.0 was used to calculate mean ± SD, frequency, and percentages for quantitative data and descriptive analysis. Chi-Square and Fisher's exact tests were used to run descriptive statistics. The uptake of the vaccine among women was compared according to their age- groups, parity, gestational age, employment status, ethnicity, and high-risk factors for COVID-19 infection. High-risk factors for COVID-19 infection were defined as age 35 years and above, obesity, non-European ethnicity, steroids, or any other immunosuppressive therapy, and/or having diabetes or gestational diabetes. Logistic regression analyses were used to outline the predictors for COVID-19 vaccine uptake among study participants. Thematic analysis was performed for answers to the open-ended questions aiming to study the reasons for declining the vaccine.

### Results

Among 364 women who consented to participate in the study, 106 (pregnant) women were from CGH, 158 (128 pregnant and 30 postnatal women) from UHW, and 100 (70 pregnant and 30 postnatal women) from WGH.

Table 1 shows the different demographic characteristics and basic information of the study population. Most of the study participants were Irish (326/364=89.6%). The majority of the Irish women (P value<0.001) and women within the age group 35-40 were vaccinated (P value <0.05).

| A: Demographic characteristics | | Cavan General Hospital (n=106) | University Hospital Waterford (n=158) | Wexford Hospital (n=100) |
|---|---|---|---|---|
| | | Number | Number | Number |
| Age (years) | <35 | 48 | 103 | 62 |
| | 35 and above | 58 | 55 | 38 |
| Ethnicity | Irish and Non-Irish European | 97 | 138 | 91 |
| | Black Asian or other minority ethnic background (BAME) | 9 | 20 | 09 |
| Employment status | Employed | 73 | 109 | 72 |
| | Unemployed | 33 | 49 | 28 |
| Are you attending hospital for | Antenatal visit | 106 | 104 | 46 |
| | Admitted in maternity ward | 0 | 50 | 49 |
| | Emergency hospital visit | 0 | 4 | 5 |
| Parity of women | 0 | 33 | 38 | 24 |
| | 1-4 | 72 | 113 | 74 |
| | 5 and above | 1 | 7 | 02 |
| Gestation | ≤20 weeks | 19 | 16 | 28 |
| | >20 weeks | 87 | 112 | 40 |
| Weight | Underweight | 0 | 1 | 1 |
| | Average- weight | 80 | 118 | 25 |
| | Over-weight | 26 | 39 | 74 |
| COVID-19 vaccine uptake | Yes | 71 | 111 | 78 |
| | No | 35 | 47 | 22 |
| Did you take COVID-19 vaccine? | Before pregnancy | 32 | 28 | 38 |
| | During early pregnancy | 29 | 55 | 54 |
| | During late pregnancy | 14 | 31 | 12 |
| Are you aware that COVID-19 is a risk to your health and the health of your baby? | | | | |
| Yes | | 85 | 142 | 83 |
| No | | 0 | 4 | 01 |
| Unsure | | 21 | 12 | 16 |
| Do you know that hospital admission and severe illness are more common in pregnant women with COVID-19? | | | | |
| Yes | | 83 | 123 | 72 |
| No | | 1 | 9 | 03 |

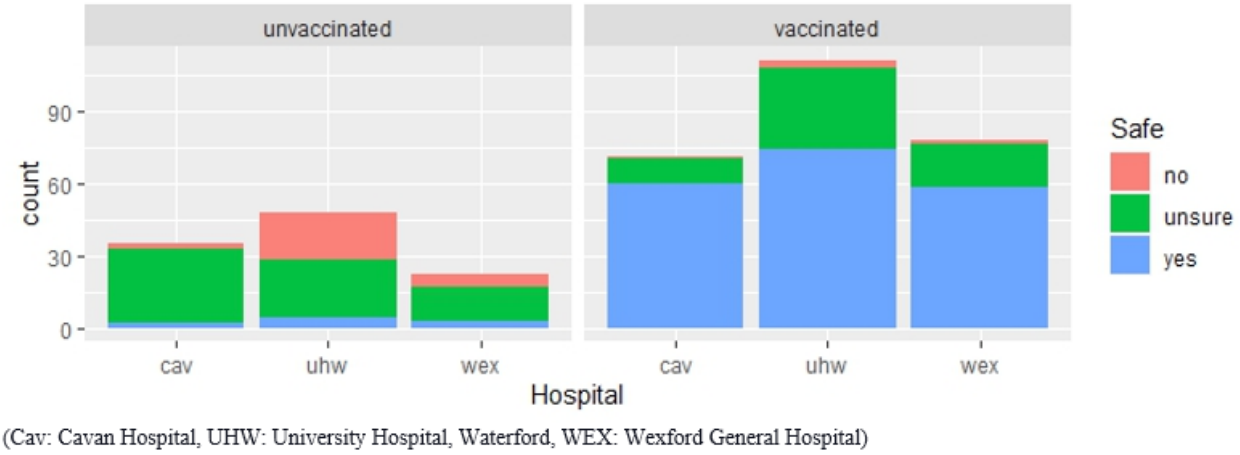
| | | | |
|---|---|---|---|
| Unsure | 16 | 13 | 19 |
| Are you aware that being vaccinated will reduce your chance of becoming very unwell from COVID-19 and reduce the chance of complications for your baby? | | | |
| Yes | 81 | 132 | 81 |
| No | 1 | 02 | 03 |
| Unsure | 24 | 24 | 16 |
| Do you know that vaccination is the best way to protect against the known risks of COVID-19 infection in pregnancy for both women and babies? | | | |
| Yes | 80 | 129 | 77 |
| No | 1 | 02 | 02 |
| Unsure | 25 | 27 | 21 |
| Do you know that vaccination is effective in preventing COVID-19? | | | |
| Yes | 76 | 106 | 71 |
| No | 2 | 06 | 04 |
| Unsure | 28 | 46 | 25 |
| Are you aware that you cannot get COVID-19 from vaccination? | | | |
| Yes | 77 | 123 | 73 |
| No | 5 | 15 | 09 |
| Unsure | 24 | 20 | 18 |
| Are you aware that common side effects of vaccine include injection site reaction, fatigue, headache, fever, joint pains, etc.? | | | |
| Yes | 64 | 143 | 85 |
| No | 0 | 02 | 04 |
| Unsure | 42 | 13 | 11 |
| Do you think that the COVID-19 vaccine is safe throughout the pregnancy? | | | |
| Yes | 62 | 75 | 61 |
| No | 1 | 23 | 07 |
| Unsure | 43 | 60 | 32 |
| Do you think that the COVID-19 vaccine does not contain any ingredients that are known to be harmful to the mother or baby? | | | |
| Yes | 58 | 57 | 42 |
| No | 4 | 16 | 06 |
| Unsure | 44 | 85 | 52 |
| How do you feel about the COVID-19 vaccination? | | | |
| Anxious | 15 | 44 | 24 |
| Disturbed | 0 | 1 | 02 |
| Sad | 0 | 1 | 00 |

| | | | |
|---|---|---|---|
| Worried | 16 | 32 | 13 |
| Unaffected | 4 | 1 | 14 |
| Unsure | 20 | 29 | 15 |
| Satisfied | 49 | 58 | 34 |
| Q14. If you are unsure to take the COVID-19 vaccine during this pregnancy, which of the following would you agree with? | | | |
| I have already received one. | 71 | 111 | 78 |
| I don't wish to get it | 35 | 47 | 22 |
| If you are unsure to take the COVID-19 vaccine during this pregnancy, which of the following would you agree with? | | | |
| I don't believe anyone should take vaccines. | 2 | 2 | 2 |
| I never take any vaccine, although I am ok with other people receiving vaccines. | 2 | 6 | 10 |
| I have received vaccines in past, but I don't wish to take this one. | 7 | 23 | 6 |
| I am worried that the COVID-19 vaccine is dangerous for baby. | 12 | 30 | 10 |
| Because the vaccine is recently released, I don't want to take it. | 26 | 25 | |

**Table 1:** The different demographic characteristics, basic information, maternal knowledge, attitudes and practices of women (n=364) regarding the COVID-19 Vaccine.

Most study participants had good knowledge about COVID-19 infection. A reasonable number of patients were doubtful about the safety (166/364=45.6%) as well as the effectiveness of the COVID-19 vaccine or its contents (111/364=34%). Although most patients had a positive attitude toward the vaccine, a reasonable number of them did not take it (104/364=28.5%) (Table 1). Most of the women were sure that they can't get a COVID-19 infection from the vaccine (273/364=75%) and aware of its side effects (292/364=80%).

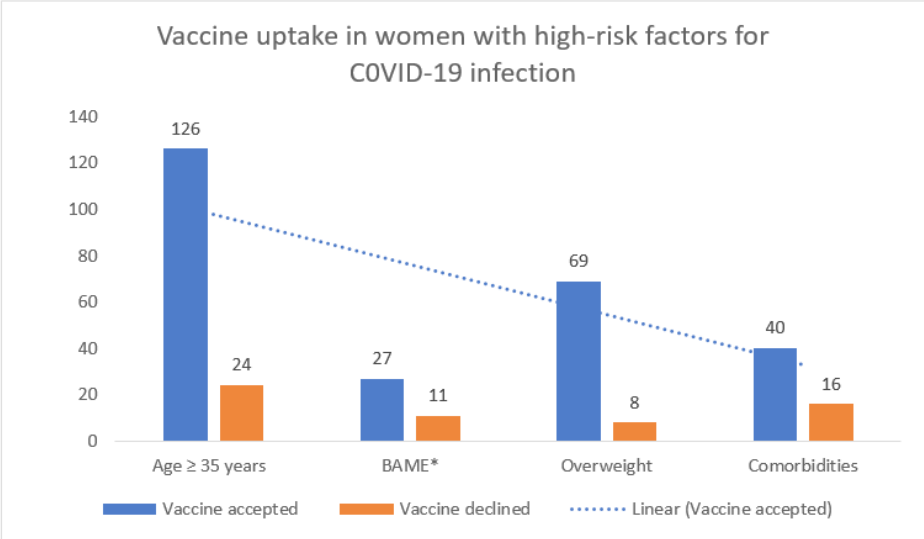
Most of the demographic factors including maternal age, parity, and gestational age were not significantly associated with COVID-19 vaccine uptake (P value>0.05). Albeit, the uptake of the vaccine was significantly higher among employed women than unemployed women (P value<0.001). Moreover, there was a highly statistically significant (P value<0.001) association between the response variable "vaccine uptake" and "Irish ethnicity". Logistic regression analyses also showed the women who believed that the COVID-19 vaccine is safe (P value < 0.01) and effective (P value <0.01) were more likely to get the vaccine (Figure 1).




(Cav: Cavan Hospital, UHW: University Hospital, Waterford, WEX: Wexford General Hospital)

**Figure 1:** Vaccine uptake and women's views about safety of COVID-19 vaccine.

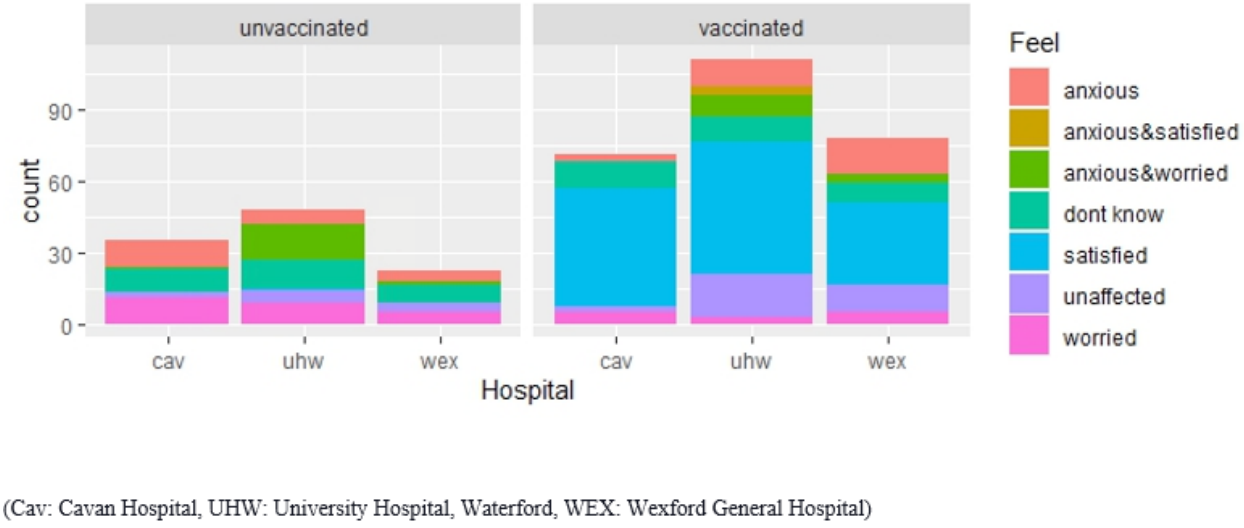
The uptake of the vaccine among women with high-risk factors for COVID-19 infection was generally high (Figure 2).




(*: BAME=Black Asian or other minority ethnic background)

**Figure 2:** Vaccine uptake in women with high-risk factors for COVID-19 infection.

Generally, a reasonable number of the study population (141/364=38.7%) showed a feeling of satisfaction about the COVID-19 vaccination, a small number of them were worried (61/364=16.7%) and felt anxious (83/164=.22.8%). Moreover, the number of vaccinated women reporting a feeling of satisfaction about the COVID-19 vaccine was more than the number of unvaccinated individuals (Figure 3).




(Cav: Cavan Hospital, UHW: University Hospital, Waterford, WEX: Wexford General Hospital)

**Figure 3:** COVID-19 vaccine uptake and participants' feelings for COVID-19 vaccine.

Among the patients who declined the vaccine (104/364= 28.5%), the biggest reasons were the patients' worries that the COVID-19 vaccine could be dangerous for the baby (52/104=50%) and the recent release of the vaccine (51/104=49%). Although a reasonable number of patients (36/104=34.6%) were vaccine friendly and took them previously, they did not agree to take the COVID-19 vaccine particularly.

The thematic analysis of the open-ended questionnaire showed that women were concerned that there was not enough data on the effects of the COVID-19 vaccine in pregnancy and on the baby due to its novel use. Other concerns, which were raised, included feared risk of clotting in the presence of varicose veins, possible interaction with low molecular weight heparin, the risk of getting COVID-19 infection even after vaccination, and fear of anaphylaxis. Extraordinarily, one woman refused the vaccine as she had heard that it was made by a man who killed and sterilized African women. One of the patients explained that she had preterm Premature Rupture of Membrane (PPROM) after the vaccine and attributed it to the vaccine.

## Discussion

The average COVID-19 vaccine uptake rate at three different Irish hospitals was 71.4% (260/356) among the study population. Two other international studies reported lower vaccine acceptance rates of 62% and 42.6% respectively during pregnancy [4,5]. Thus, globally the uptake of vaccines in pregnancy is low [3].

The good knowledge about COVID-19 infection, the COVID-19 vaccine, and its side effects (Table 1, Figure 1) represent good communication between patients and healthcare service providers as well as the spread of awareness through social media and public health awareness campaigns.

A reasonable number of patients voiced concerns about the safety of the vaccine (45.6%) and its effectiveness (34%); these could be the possible reasons for declining the vaccine. Similar concerns about the low level of self-reported knowledge were also raised by participants of other international studies [4,6]. General mistrust of the COVID-19 vaccine was seen only in a very small number of cases (24/364= 6.6%). Some international studies explored further reasons behind this mistrust and found 'concerns about the speed of the development of the vaccine and mistrust in government' regarding the COVID-19 pandemic as possible reasons. Albeit, the available data of women who took the COVID-19 vaccine in pregnancy explain no increased risk of adverse outcomes after covid-19 vaccination in pregnancy and the COVID-19 vaccine is the safest and most effective way to protect mothers and babies [7].

It was interesting that the total number of employed women (254/364=70%), as well as their uptake of vaccine (206/364=56.5%), was more than the total number of unemployed women (110/364=30%) and vaccine uptake by them (59/364=16%) among the study population. Moreover, employment status showed a significant association with vaccine uptake (p-value <0.001). There could be two reasons behind that; firstly, employed women

are generally well informed and secondly, employed women could not stay at home like the unemployed women to prevent COVID-19 infection, thus preferred being vaccinated. Literature review suggests certain predictors of COVID-19 vaccination among pregnant women were older age, ethnicity, race, confidence in the safety of the COVID-19 vaccine, fear of COVID-19 during pregnancy, and employment status [3,8]. Our study also showed that Irish and older women more open to COVID-19 vaccination while women with BAME and of younger age had a lower uptake of the vaccine. Targeted interventions to promote COVID-19 vaccine uptake among this subgroup of women are advocated, namely providing audio and written information leaflets in different languages, use of social media, and public campaigns.

Pregnancy is an independent risk factor for Covid-19 infection-related morbidity and mortality and the best way to prevent it is through vaccination [10]. Certain patients are at risk of serious COVID-19 sequelae because of their comorbidities e.g. diabetes, immunosuppression, asthma, etc. In our study population, the number of patients with high-risk factors who got vaccinated was high (Figure 2) explaining that they were well-informed and motivated.

The attitude of pregnant and postnatal women to the COVID-19 vaccine was variable and comprised of satisfaction to anxiety, with a trend of satisfaction feeling among vaccinated women (Figure 3). COVID-19 itself is associated with maternal psychological distress [9,10].

The biggest reasons for the declining vaccine in our study were a perceived danger for the baby and the recent release of the vaccine (Figure 4). The factors compounding this situation include that when the COVID-19 vaccine was introduced, pregnant women were excluded from trials as well as its clinical use initially, resulting in public mistrust. Fears about the safety and side effects of the COVID-19 vaccine have been reiterated in other international studies [3,5]. A certain number of vaccine-friendly patients who took other vaccines previously (36/104=34.6%) declined to take the COVID-19 vaccine in our study. This is contrary to findings in another study which showed flu vaccine was negatively associated with COVID-19 vaccine hesitancy [3]. Other factors predicting vaccine hesitancy included younger age and living in a less urban context [3].


**Figure 4:** Reasons and concerns for declining COVID-19 vaccine.

Major concerns for the declining vaccine were not enough data about vaccine safety in pregnancy and its novel use in our study (Figure 4). Safety issues regarding the long-term effects of the vaccine on the baby have been also raised in other studies [4,5]. Due to these issues, a certain number of pregnant women declined the COVID-19 vaccine. These pregnant women also suffered as the decision of women not to take the COVID-19 vaccine resulted in the temporary segregation of pregnant women to mitigate public health risks of the pandemic [11].

The risks of COVID-19 infection are poorly understood and/or poorly valued in the subgroup of pregnant and lactating women and it could be helped by giving explicit information and advocating that the vaccine is safe in pregnancy and beneficial for mother and baby (Figure 5). A small number of patients were concerned because of the clotting risk associated with the vaccine as they were at higher risk for venous thromboembolism (VTE). A study by Favre G, et al also reported a case of venous thromboembolism at 21 weeks post-vaccination [12]. mRNA COVID-19 vaccine has been associated with frequent adverse local and systemic effects, but severe events including VTE are rare [12]. Contrarily, COVID-19 infection is itself a transient risk factor "current systemic infection" for VTE [13] as well and VTE prophylaxis is provided to pregnant women following RCOG guideline [14].

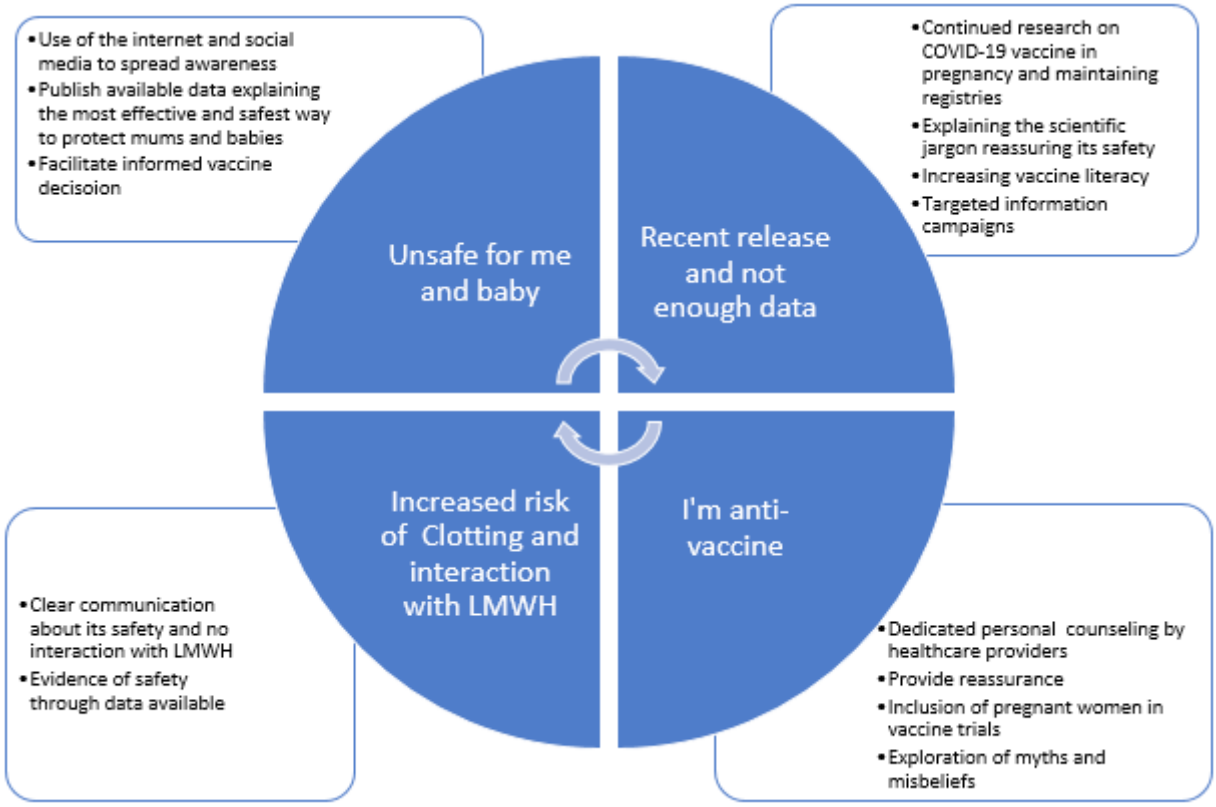



**Figure 5:** Targeted measures to improve vaccine uptake.

Our study highlighted that asking a simple question "Why are you declining the vaccine?" in a supportive manner is also important in reducing vaccine hesitancy as few patients have queries specific to their particular situation e.g. having varicose veins and on LMWH does not interfere with the COVID-19 vaccine and needs simple reassurance. Moreover, the risk of anaphylaxis is extremely rare with the COVID-19 vaccine and we generally advise women who are allergic to a previous dose or its components e.g. polyethylene glycol vaccines not to take the COVID-19 vaccine.

One of our patients said she did not want to take the vaccine as she heard that it was made by a man who killed and sterilized African women. A study conducted in Nigeria focused on vaccine hesitancy caused by misinformation and conspiracy theories about the disease and vaccines and concluded that exploring these insights and improving communication would help increase vaccine literacy.15 One of our patients explained that she had PPROM after the vaccine and attributed it to the vaccine. Although a study by Favre G, et al. [12] also reported a case of PPROM at 31 weeks after getting the COVID-19 vaccine, pregnant women are reassured that this is a rare event.

The limitations of the study include the use of the English language for the questionnaire, thus excluding women with language barriers and a low number of women with a BAME background. As this study was cross-sectional, it did not look at women who declined the COVID-19 vaccine initially to see if their opinions changed over time. Although this study was multi-institutional and conducted in three different hospitals, generalization of results to other regions could not rule out bias as there could be region-specific sociocultural factors contributing to vaccine hesitancy.

The use of terms like "Anti-vaccine" is misleading as most women are vaccine-hesitant because of the potential risks of the vaccine on the development of the fetus and newborn and we could manage them effectively by addressing them scientifically and systematically.

## Conclusions

There is a large gap in available evidence regarding factors influencing the choice of pregnant women to get the COVID-19 vaccine. It is important to prioritize research on vaccines in pregnancy, publish results and build up a data bank to reduce vaccine hesitancy and resultant health risks. Maintaining the vaccine registries, publishing results and organising public health campaigns on the long-term safety and efficacy of the COVID-19 vaccine in pregnant and lactating women and infants would help in the acceptance of COVID-19 vaccine uptake and vaccine awareness. The importance of achieving goals of reducing COVID-19-associated health risks and related costs through vaccination of pregnant and lactating women can't be overemphasized.

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1. Hajra Begum (RIP)
2. Muhammad Khan Janjua
3. Dr Naveed Kausar Janjua

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