



What factors influence the uptake of vaccinations amongst pregnant women following the Covid-19 pandemic: A qualitative study

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ABSTRACT

Background: Pregnant women and their unborn babies are at increased risk from serious complications, hospitalisation and death from infectious diseases. Vaccinations for influenza (flu), pertussis (whooping cough) and Covid-19 are available for free for pregnant women in the UK, but uptake of these repeatedly remains low. This qualitative study aimed to explore how pregnant women feel about these vaccinations, and what factors influence the uptake of vaccinations amongst pregnant women since the onset of the Covid-19 pandemic.

Methods: Pregnant women were recruited via two participating hospitals in one geographic area of the UK, and via one community group offering support to pregnant women from ethnic minorities. Semi-structured interviews were conducted remotely using telephone, were anonymised and transcribed, and analysed using thematic analysis.

Findings: Interviews were conducted remotely with 43 pregnant women. The following themes were identified as influencing uptake of vaccinations amongst pregnant women: internal factors and beliefs, vaccination related factors, external influences and Covid-19 and changing perceptions of the pandemic.

Discussion: Findings of this study increase awareness of some of the factors influencing vaccination decisions of pregnant women. It informs practice regarding healthcare professionals' discussions with pregnant women about vaccinations, and future vaccination campaigns and interventions that are targeting an increase in vaccination uptake amongst this population.

Introduction/ background

Statement of significance

Problem or issue	Pregnant women and their unborn babies are at increased risk of serious ill health from flu, whooping cough and Covid-19.
What is already known	Uptake of these vaccinations is low, with previous research showing that pregnant women often experience concerns around the safety of vaccinations (particularly for their unborn baby) and concerns about efficacy of vaccinations. Vaccination uptake is also influenced by sociodemographic factors (such as age, ethnicity, employment)
What this paper adds	This paper looks at how pregnant women feel about routine vaccinations in pregnancy (flu, whooping cough and Covid-19), and how these views have been influenced by the pandemic. It also examines how pregnant women feel about

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their health and vulnerability to illness more generally following Covid-19.

Pregnant women and their unborn babies are at increased risk of serious illness from infectious diseases such as Influenza (flu), Pertussis (whooping cough) and Covid-19. Whooping cough is highly infectious and causes severe coughing and sometimes apnoea, and in some cases death in infants. (Afuwape et al., 2022). Pregnant women are four times more likely to be hospitalised as a result of flu, and mortality rates are significantly higher amongst pregnant women than non-pregnant women (Knight et al., 2022; Campbell et al., 2015). Furthermore, pregnant women and their babies are at increased risk of admission to intensive care and increased risk of death if they contract Covid-19

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(Heath et al., 2020; UKOSS 2021; Villar et al., 2023).

In the UK vaccinations are routinely offered to all pregnant women for flu and whooping cough, and more recently pregnant women are eligible to receive Covid-19 vaccinations and booster vaccinations. Flu and whooping cough vaccinations are proven to be safe and effective during pregnancy (Lynch et al., 2012; Regan et al., 2015; Tamma et al., 2009). Recent multinational evidence has showed that Covid-19 vaccinations gives pregnant women protection from serious complications, hospitalisation, and death (Villar et al., 2023).

Despite the availability of free vaccinations for pregnant women in the UK uptake is low. Amongst women who gave birth in England in October 2021, 29.4 % had received 2 doses of the Covid-19 vaccine (Gov.UK 2022), compared to approximately 60.4 % of the general population (Agency UHS 2021). Data from Scotland showed that in 2021 only 32.3 % pregnant women had received two doses of Covid-19 vaccination (Stock et al., 2022). Uptake of the flu vaccination amongst pregnant women only reached 37.9 % during the 2021/22 season (England, 2022). Data on uptake of flu vaccination varies geographically across the UK, with one area of the UK (North-West London) reporting only 21.1 % pregnant women vaccinating against flu in the 2019/20 season (Woodcock et al., 2023). Only 60.7 % pregnant women in the UK had the pertussis vaccination in 2022–23 (Agency UHS 2023).

Recent global systematic reviews have shown that barriers to Covid-19, flu and whooping cough vaccination amongst pregnant women include concerns around the safety of vaccinations (particularly for their unborn baby), concerns about efficacy of vaccinations and sociodemographic factors (such as age, ethnicity, employment) (Nichol et al., 2023). Pregnant women from ethnic minorities have historically been reported to have lower flu and Covid-19 vaccination uptake. (Woodcock et al., 2023)

Currently little is known about what factors influence the uptake of vaccinations amongst pregnant women in the UK, and how they feel about vaccinations, their vulnerability to illness and perceptions of health, particularly since the onset of Covid-19. This research is crucial to learn more about how pregnant women feel about accepting vaccinations following a pandemic, and how any pandemic specific factors add to the understanding of addressing low uptake, in an attempt to protect more pregnant women from largely preventable conditions. This will also give valuable insights and allow specific interventions to be developed and implemented quickly in the event of a future pandemic.

Aim

This qualitative study aimed to explore how pregnant women feel about vaccinations (namely flu, whooping cough and Covid-19 vaccinations), and what factors influence the uptake of vaccinations amongst pregnant women since the onset of the Covid-19 pandemic.

Methods

This research is reported using the Standards for Reporting Qualitative Research framework (O'Brien et al., 2014). The study collected data using semi-structured interviews with pregnant women to explore their views and experiences of vaccinations, and the factors that influence their decisions to accept or refuse vaccinations, particularly since the Covid-19 pandemic. The study also included interviews with midwives to explore their experiences of discussing vaccinations with pregnant women. Findings are reported elsewhere (Grimley et al., 2024).

Ethical approval was obtained from the Yorkshire & The Humber - Sheffield Research Ethics Committee (REC 22/YH/0283).

Sampling and recruitment

Participants were recruited to the study March to June 2023. Participants were eligible to participate if they were pregnant at time of

recruitment), were over the age of 18 and had capacity to consent.

Participants were recruited to the study via two participating hospitals in one region of the UK (serving areas with high minority ethnicities and high levels of deprivation), and via one community group (a group based in the community providing child and maternal health to women in black, Asian and minority ethnic groups). Participants were informed about the study by midwives at participating hospitals, or by community group leaders, and interested participants were asked to contact the researchers. Aiming for a maximum variation sample to capture a range of views and experiences, women were recruited with varied backgrounds according to ethnicity, deprivation (measured by postcode and calculated using the English Indices of Deprivation) (Ministry of Housing CaLG 2019), and stage of pregnancy (measured by weeks pregnant).

Data collection

Semi-structured interviews were conducted via telephone. Views on vaccinations and susceptibility to illness during pregnancy, factors influencing vaccination decisions, and the impact of Covid-19 on vaccination decisions were explored during interviews. All participants were reassured that researchers were independent, and that no judgements would be made based on vaccination decisions.

The semi-structured topic guide was informed by previous literature (Parsons, 2020). Furthermore, to ensure reliability and validity of the study, interview schedules were developed with consultation from the wider research team and in consultation with healthcare professionals and Patient and Public Involvement (PPI) representatives. This ensured appropriateness of the interview schedule and the process. (Leung, 2015) Interview schedules were developed iteratively as interviews progressed (Interview questions can be found in Appendix 1). Informed consent was obtained prior to the start of interviews. Interviews were conducted by two experienced qualitative researchers, and were audio recorded and anonymised and transcribed by a University approved transcription service. All transcripts were checked against the audio recording for accuracy.

Only the two interviewing researchers had access to audio files and transcriptions, and all files were saved with unique participation numbers to ensure confidentiality.

Data analysis

Interviews were analysed using a codebook approach to Thematic Analysis (Byrne, 2022), which presents a flexible approach to analysis of qualitative data, whereby a structured codebook was used, whilst also recognising the interpretative nature of data coding (Byrne, 2022).

Thematic Analysis involves six phases (Byrne, 2022), and these were applied to the data. This consisted of 1. Familiarisation with the data, 2. Generating initial codes, 3. Generating themes, 4. Reviewing potential themes, 5. Defining and naming themes, and 6. Producing the report. First and second author coded and analysed the data collaboratively, with ongoing discussions about the data and the coding, mapping into the development of topic summary type themes. Feedback on early versions of the codebook was sought from the wider research team, and the PPI group. A proportion of transcripts were coded by two researchers independently, to ensure consistency of coding between researchers. Feedback on interpretation of analysis was sought from the wider research team, and the study PPI group. To ensure reliability and validity of the research, we conducted constant comparison and looking for deviant cases during the analysis between two researchers. (Leung, 2015)

Positionality of the research team and reflexivity

The immediate research team responsible for conducting and analysing interviews consisted of two researchers working in health sciences

(Assistant Professor and Research Fellow). The researchers are independent and were not affiliated with any organisation where care to pregnant women was provided. Both researchers are experienced qualitative researchers with experience in conducting interviews on potentially sensitive topics.

Both researchers have backgrounds in Health Psychology research. The lead researcher for this study has conducted research into vaccinations in pregnancy in the past. Both researchers are female and have experienced pregnancy. It is acknowledged that views or experiences with vaccinations (for example being in favour of vaccinations personally) may have impacted on researchers approach to the research process. However, as analysis was conducted by two researchers, making it a collaborative and reflexive process, the potential for bias was lessened, and allowed for deeper and richer interpretations. Reflexivity was considered by the two researchers with ongoing discussions about potential meaning and interpretation of findings. The wider research team has a varied background and expertise, including healthcare professionals, and were involved in discussions about the meaning and interpretation of findings.

Results

Interviews were conducted with 43 pregnant women. The majority of participants were aged between 25 and 34, and were of White British ethnicity. Characteristics of participants can be found in Table 1.

Findings are categorised into four main areas, each influencing pregnant women's vaccination decisions. These were internal factors or beliefs held by pregnant women, vaccination related factors, external influences and Covid-19 and changing perceptions of the pandemic, with themes and sub-themes within each category. Themes and sub-themes can be found in Table 2. Themes are presented below, illustrated by direct quotations from participants. Participant's demographics (Participant number, age group and ethnicity) are presented after each quote for contextual purposes.

Internal factors or beliefs held by pregnant women about vaccinations

Beliefs or feelings about the perceived need to and expectation to vaccinate in pregnancy varied between participants, ultimately influencing their decisions about whether to vaccinate or not.

Table 1
Characteristics of participants.

Characteristic	Frequency n (%) (Total n = 43)
Age	
18–24	2 (5)
25–34	29 (67)
35–44	12 (28)
Ethnicity	
White British	28 (65)
White Other	2 (5)
Asian or Asian British	6 (14)
Black, Black British, Caribbean or African	4 (9)
Mixed or multiple ethnic groups	1 (2)
Other	2 (5)
Long-term health conditions	
Yes	11 (26)
No	32 (74)
Gestation (weeks)	
14–27	3 (7)
28 +	41 (93)
Deprivation Decile	
1–3	13 (30)
4–7	15 (35)
8–10	11 (26)
Missing	4 (9)

Table 2
Themes and sub-themes.

Themes	Sub-themes
1. Internal factors or beliefs held by pregnant women about vaccinations	1.1 Susceptibility to illness during pregnancy 1.2 Perceived immunity 1.3 Feelings of responsibility 1.4 Fear
2. Vaccination related factors	2.1 Effectiveness of vaccinations 2.2 Potential risks and benefits of vaccination 2.3 Availability and accessibility of vaccinations 2.4 Alternatives to vaccination
3. External factors	3.1 Visibility of illnesses 3.2 Prevalence of illnesses
4. Covid-19 specific factors	4.1 Covid-19 vaccination 4.2 Covid-19 and changing perceptions of the pandemic

Susceptibility to illness during pregnancy

Some participants reported that they did not feel any increased susceptibility to becoming ill from flu or Covid-19 due to being pregnant. Participants described that they were generally healthy, and did not experience any long-term health conditions and felt no increased risk from illness, or complications from illness purely because they were pregnant. This perception of not being susceptible reinforced decisions not to vaccinate.

I have had COVID, so ... For me, it wasn't that traumatising. I know, well, obviously, it is quite, can be severe for other people. But obviously I'm, I'm quite healthy, young, fit, a person with no other health conditions, so, for me, it was ... I don't really wanna put something, like, in my body that hasn't been medically researched enough...Whereas my body can naturally fight it and will do so, so that, that was my thoughts behind it (P23, 25–34, White British).

No. I feel, I feel the same... 'Cause I've had a, quite an uncomplicated pregnancy as well (P6, 25–34, mixed ethnicity).

Those participants that did recognise that they were at increased risk of becoming ill from flu or Covid-19 whilst pregnant, reported this as a reason for accepting vaccinations they had been offered.

And really without pregnancy I would not take. But in pregnancy, because you're more aware you're vulnerable and also for baby, I will take it to be on the safe side (P29, 25–34, Afghan).

Perceived immunity

Closely linked to feelings of susceptibility were beliefs about immunity. Participants' views of existing immunity influenced their decisions to accept offered vaccinations, but views on immunity during pregnancy were mixed. Previously being ill with a condition, or previously being vaccinated against it was felt by some to offer sufficient immunity, with vaccinations during pregnancy often perceived as not necessary as the participant had established an immunity to it already.

I believe that, you know, like, my body's, kind of, building up, built up that immunity to it, 'cause I've had COVID (P1, 25–34, British Indian).

Some participants reported that catching an illness was a necessary process to allow their body to build up natural immunity to it, even whilst pregnant, and so would not accept a vaccination as this was seen as unnecessary.

so, for me I just won't take, take it, 'cause I know, if I have the flu then the body's, should be able to fight it, so (P39, 25–34, African).

However, some participants did acknowledge that their immune system was suppressed whilst they were pregnant, making it more likely they would become ill. This was not necessarily enough to encourage the acceptance of vaccinations, possibly linked to the underestimation of how susceptible they were as pregnant women.

I think so, I think so because I, again, I have read that, online and, and heard that, like, woman's immune system gets a bit weaker (P29, 25–34, Afghan).

Feelings of responsibility

Participants often referred to a sense of responsibility or duty to accept vaccinations, with it being something that was done in consideration of health and wellbeing of other people. There was a desire to protect others and maintain a healthy society, feeling that everyone was responsible to protect vulnerable people (such as family members who were unwell, or those who were unable to vaccinate themselves). Feelings of social responsibility were still apparent during pregnancy for these participants. This was a driving force for accepting vaccinations for some participants.

so, they're really, really important and I think particularly, you know, the herd immunity for people can't get vaccinated, it's important for the rest of us to get vaccinated to help them as well (P15, 25–34, White British).

There was a perceived responsibility amongst pregnant women that they had a duty to have vaccinations to protect the unborn baby. It was felt by participants that they wanted to do everything possible to protect the baby as much as possible, and vaccinations were considered to be part of that protection. The desire to protect their baby was more prominent than the desire to protect themselves for many participants.

I don't know if it's a motherly instinct or what it is, but there, from the second you know you're pregnant, your baby is the priority over yourself (P24, 25–34, White British).

The desire to protect unborn babies was particularly evident in participants' acceptance of the whooping cough vaccination (which pregnant women are generally informed as being primarily to provide protection for the baby before they are old enough to receive the vaccination themselves) over other vaccinations where the benefit and protection to baby was not seen as direct and obvious.

For me, I, having that whooping cough vaccine isn't for myself. That, that's not me protecting myself from whooping cough. That's me getting that at the right time to try and get immunity for the baby...so that's more important to me. I think that's part of, that's, kind of, like, one of the first responsibilities of a parent, is to try and make sure that they are ready to come out into this world (P17, 35–44, White British).

Other forms of responsibility were apparent in the form of individual responsibility. Some participants described a feeling of duty to maintain their own health. Some reported a responsibility to stay fit and healthy to best protect their unborn baby, so engaging with recommendations from healthcare professionals to stay as healthy as possible were followed.

I, I just kind of think, well, if you're carrying a baby for, you know, nine months, then actually, if you can't keep well, then it's gonna ... You know, you ... I worry that you'd, you'd, you'd, somehow, you, you'd pass, you know, or, or you not being your fittest and healthiest would somehow impact the baby anyway. So I feel like it's a bit of a win-win situation. If you protect the baby directly, then that's great. If it's protecting yourself so you can be fit and healthy and carry a healthy baby, then I think that's, you know, another, another win there (P16, 35–44, White British).

Fear

Vaccination decision amongst participants was often influenced by fear. Participants reported both fear of the illness, and fear of vaccinations.

Participants reported vaccination acceptance as a decision driven by fear. Fear of seeing other people experiencing severe outcomes from illnesses, led some to feel pushed towards accepting vaccinations in an attempt to avoid negative outcomes from illnesses themselves. Some participants reported fear from previous experiences of illnesses, from experiences of previous pregnancies, or from society more generally.

Just 'cause it adds that extra fear, 'cause it's not just you. It's you and the

baby, and so you just ... and I think if I hadn't experienced what I did with the first pregnancy, then I would've just been fine. But just 'cause that happened, it's kind of impacted my views (P11, 25–34, White).

For other participants, feelings of fear were associated with the vaccination being offered. Fear of needles and fear of side effects from vaccinations were reported by participants, and there was a general feeling of wariness about new vaccinations amongst participants. Many participants were fearful of putting things into their body during pregnancy, and this fear was amplified by the general conflicting advice to avoid most medication during pregnancy.

I think, if I had the option now, I don't think I would've had the vaccine. I think I only had them just 'cause you had, had to do that. I think I'd be a bit more concerned about what I put into my body, absolutely (P12, 25–34, White British).

Vaccination related factors

Factors relating to the vaccinations themselves influenced pregnant women's feelings about whether to accept them or not. This included perceived effectiveness, perceived safety, how available or accessible vaccinations were, and the desire to use other strategies of protection.

Effectiveness of vaccinations

Many participants expressed the belief that vaccinations (particularly for protection against Covid-19) were not effective, and reported experiencing situations where they (or others) had received vaccinations, yet still become unwell from the illness, influencing their belief in the ineffectiveness of the vaccination, and making them less likely to accept the vaccination when offered it.

No, because I got it straight after so if I'm, I'm not going to have something if it's not really going to prevent from getting it (P20, 25–34, White British).

Some participants felt that the vaccination offered no protection to their baby, making them feel reluctant to accept it.

The flu vaccine is for me. It's not, it doesn't immunise the baby, so it's for me. Again, haven't had it ever before, so it wasn't something I was gonna do. And then COVID vaccine, it, it quite clearly shows that, that, like, in the, in, sort of, the leaflets and the research they give you, it's absolutely nothing to do with the baby (P14, 25–34, White British).

Potential risks and benefits of vaccination

Pregnant women's perceptions of the safety of vaccinations influenced their decisions to vaccinate and their feelings about it. Some participants questioned the lack of certainty around the safety of vaccinations. These concerns were felt about both newer vaccinations and more established vaccinations that have been available for many years.

I think I'd just need to know what effect it would have on my baby. Myself, obviously, like, I'm not too worried about, but if it has negative effects on the baby (P23, 25–34, White British).

I'd want to know, what research have you done, how many pregnant women have you tested this on? (P24, 25–34, White British).

Many participants described the decision to vaccinate involving a weighing up of the perceived benefits of vaccination (and risks of the illness) against the potential risks they believe to be associated with them. This links to the feelings of susceptibility described above, and often participants had concerns or worries about both the illness and the vaccination side effects, so described a process of balancing the risks against each other.

I'd probably just wanna know, like, what the risks and side effects of having the vaccine are and the risk and side effects of not having the vaccine. So, if I don't have it, what could happen? If I do have it, what could happen? And make a decision based on that (P15, 25–34, White British).

But I think that risk, that risk analysis, you know, where you're weighing up, "Do the, do the," you know, "Do the pros outweigh the cons?" and I

always feel like they have. And, and, like I say, I've always took up vaccines at the first, kind of, opportunity (P16, 35–44, White British).

Availability and accessibility of vaccinations

One factor that played an important role in pregnant women's vaccination decisions, was the accessibility of vaccinations, how easily they were able to access the vaccinations available to them. For some participants who were offered vaccinations at the hospital whilst there already to attend an antenatal clinic appointment, they found it easy and straightforward and this encouraged uptake.

if I'm up there already, I, I, I see it as like killing two birds with one stone you can get it done. But that, I suppose, because I'm pro vaccine, I, I don't need much convincing, I don't need to talk about it or anything I'm happy to go ahead but I think, for most people, because they're already up there, they don't have to make a special visit to their GP or the hospital then (P24, 25–34, White British).

However, when participants needed to book appointments for a vaccination for themselves at a later date, this was often a barrier to uptake, with some reporting that other commitments (such as work or family commitments) or forgetting to book an appointment were obstacles that reduced the likelihood of the vaccinations being completed.

I think I had, when I was at the hospital, I had the flu one, which was quite easy. It was just the whooping cough one I had to book back in at the surgery, which, obviously, was a bit frustrating. It's one of those (P12, 25–34, White British).

I didn't actually get my whooping cough until I was, like, 30 weeks, because I wasn't actually offered it. They told me to get it, but the only way I could get it was through the doctor. And then to book an appointment, you know, sitting on the phone at eight o'clock in the morning with everybody else was just, no. So you'd think that would be, that they'd be able to book you in for that (P3, 25–34, White British).

Alternatives to vaccination

Some participants had a preference for alternative means of protection, and favoured these over vaccination. This included behaviours such as masking, maintaining distance from others, increased hand-washing, and in some cases preferring more natural approaches rather than medication or vaccination.

I've thought, no, no, I'm in control of my own health, and I would rather do it through, like, exercising and eating healthily and looking after myself... and then I, then I'm well enough and equipped to fight something that I might get, rather than giving myself something, vaccine, that I don't know (P7, 25–34, White British).

But because I'm pregnant, I'm just a bit more aware. And my husband is very aware as well. Like, if we're, go somewhere, and there's anyone who's ill, we'll both, like, not ... like, keep away or not go... And so, yeah, it definitely makes you think more about just protecting yourself and what you could be putting yourself in, situations with COVID or ... even with the flu, because I didn't have the flu jab (P11, 25–34, White).

External influences

In addition to the influence of internal factors and vaccination-related factors, there were other, external factors that influenced pregnant women's vaccination decisions. This included how visible the illness being vaccinated against was felt to be, and how much of the illness was felt to be around at the time.

Visibility of illnesses

How visible participants felt illnesses to be, or their encounters with it impacted on their decisions to receive the vaccinations. Participants reported that seeing or hearing about other people experiencing the illness, having had the vaccinations in the past, or previous experience of

it themselves was likely to make them more likely to accept the vaccination. On the other hand, those who have no experience of the illness, did not perceive it as great a risk, and were therefore less likely to accept the vaccinations offered to them.

Obviously it's been around for a long time. My mum, my mum had her whooping cough injections with all of us. It wasn't something that was offered when she was born, and she actually had whooping cough, so, you know, I sort of took all of that on board. And with regards to flu, I've never had the flu vaccination before, so, personally, it wasn't something I was gonna put in my body while pregnant (P14, 25–34, White British).

Yeah, I mean, I've had a little bit of ... I mean, I think it's natural to have a little bit of anxiety that ... I remember the, after, like, one of the ... But obviously, I've never, I've never had a flu vaccine outside of pregnancy, 'cause I'm not eligible otherwise (P16, 35–44, White British).

Prevalence of illnesses

How much of the illness was around, or how much information is available about it, when making vaccination decisions influenced pregnant women's views. This related to whether participants felt that they were likely to become ill based on how much of the illness was around at the time.

I think, with the, I mean, particularly the COVID one, yeah. That was, I mean, it was everywhere, and so that's why I had those, those jabs (P8, 35–44, White British).

Covid-19 specific factors

The decision was made to discuss Covid-19 specific factors separately, due to the unique nature of the pandemic situation, and differences that might arise between perceptions of Covid-19 and the vaccination, and other more routine illnesses. It is acknowledged that there are some overlaps in some of the feelings identified, but as these feelings stem from different experiences, with feelings about Covid-19 often generating strong negative feelings and worries, these have been reported separately.

Covid-19 vaccination

The majority of participants reported stronger and more negative feelings about Covid-19 vaccination than other vaccinations offered during pregnancy. Despite many participants describing themselves as being very much in favour of vaccinations, and accepting vaccinations during pregnancy, this did not include Covid-19 vaccination, and the majority view was that Covid-19 vaccination differed to other vaccinations, with more doubts and concerns expressed even among those happy to receive vaccinations in pregnancy. It is also apparent that Covid-19 likely influenced pregnant women's beliefs and feelings about other vaccinations, making them more aware or questioning of vaccinations more generally.

Participants reported concerns about the newness of the Covid-19 vaccination, with fears around the lack of long-term evidence on safety for pregnant women and their unborn babies. Participants also voiced concerns about the lack of evidence on the effectiveness of the Covid-19 vaccination, or the necessity for it. This distrust of the Covid-19 vaccination contributed to some participants declining the Covid-19 vaccination.

We don't know what the long-term effects are and even thought health-care professionals are saying, you know there's, there's no risks further on down the line, we actually don't know that, because those, those tests are gonna be in the future and, you know, when ... when my kids grows up and are 20, ten, 20, 30 years old, my age. So, we don't actually know what the long-term benefits are or, you know, what's gonna happen yet, or any repercussions (P1, 25–34, British Indian).

But I did have it in the end and the COVID vaccine I wouldn't have, because last time, the last vaccine I had I got COVID straight after (P20,

25–34, White British).

Feelings about Covid-19, and of the vaccination were impacted by the messaging available. Inconsistent Government messaging, and uncertain media messaging on Covid-19 vaccination throughout the pandemic caused confusion and distrust amongst pregnant women

it does make you think, "Oh, well, what were the ..." 'Cause they didn't really say why the reasons that we couldn't get it, and then why the reasons it suddenly changed (P11, 25–34, White).

Obviously there's been a lot of scaremongering in the press, and you kind of think, "What, what is actually in that vaccine? What has it, what has it done to my body?" (P12, 25–34, White British).

Covid-19 and changing perceptions of the pandemic

Feelings around the visibility of Covid-19 were closely linked to participants' perceptions of where we are in the pandemic. Many interviewees felt that the threat and risk of Covid-19 to them was significantly less than previously, as less was heard about Covid-19 in the news, and fewer people were becoming ill. The perception was that the risks of Covid-19 had passed, was no longer something to worry about, and therefore uptake of the vaccination during pregnancy was not considered to be important. Covid-19's reduced presence in society more widely appeared to impact on pregnant women's perception of the need to be vaccinated.

And it's really surreal actually. You know, like, when they play, like, a clip of, like, on the news of what, what the news was like at the time being in lockdown and things like that, it, it almost feels like a different world, like a different scenario we've lived through it but we've, kind of, moved on (P17, 35–44, White British).

The Covid-19 pandemic increased awareness of health, illness and potential vulnerability amongst some participants. Participants reported being more aware of their health and illness whilst pregnant, suggesting that the pandemic had increased awareness of health amongst participants.

Yes. I think I've become more worried about my health. I've changed my diet. I'm exercising a lot. I'm more, like, focussed on my health.... 'Cause I had a really close friend who had COVID so many times... and since then, she had, like, more severe health problems.... Really made me aware of my health (P22, 18–24, Romanian).

There were mixed perceptions around whether participants felt that they were at risk of serious illness from Covid-19 whilst pregnant. As with other illnesses, some felt that they were at no greater risk due to the pregnancy, and others had experienced Covid-19 before and as they had not been too ill, were not concerned about getting it whilst pregnant.

And so I feel like, if I had, like, a couple of bouts of really bad COVID, or if I'd been, again, in a risk group, I think it would've changed my mind. But because I haven't actually tested positive or been massively affected by it (P11, 25–34, White).

Other participants however, reported being aware of the risks of Covid-19, and being concerned about catching it whilst pregnant. These participants reported being more cautious and taking precautions to avoid coming into contact with it.

I'm also quite conscious of COVID, so, like, I probably would've accessed a bit more stuff in, in pregnancy. Like, I probably would've gone to the gym and stuff like that, whereas, at the minute, I'm just feeling like, 'cause I, I ... Because I work in the NHS, I'm aware of when there's surges.... And, obviously, there's been surges over spring, and I'm just thinking, "Oh, yeah, no, I'd rather stay away. I don't wanna risk it" (P19, 35–44, British Indian).

It is clear that the Covid-19 pandemic has impacted pregnant women's feelings about their health more generally, and about how at risk to infectious diseases they feel.

Discussion

Summary of findings

Findings of this study show that pregnant women's vaccination decisions were influenced by a complex interplay of internal factors or beliefs held by pregnant women, vaccination related factors, external and social influences and Covid-19 specific factors, which were intertwined. It is evident that vaccination decisions for this population are often complicated and not always clear. This study shows a clear feeling of responsibility amongst some pregnant women to vaccinate, sometimes due to the desire to protect themselves or their unborn baby, but sometimes in an attempt to protect society more widely.

Fears around the Covid-19 vaccination, society's perception of Covid-19 and its newness appear to have influenced pregnant women's feelings about vaccinations more generally, with many participants reporting worries or concerns about vaccinations generally. How available or easy to access vaccinations are was also apparent as a factor influencing vaccination decisions. Having to make a separate appointment was often a barrier.

Findings of this study show that how pregnant women feel about their risk to illness varies greatly. Participants often underestimated their susceptibility to flu, whilst whooping cough was often considered more of a priority because of the direct protection it offered to unborn babies. Feelings about risks from getting ill from Covid-19 were mixed, often women basing their risk on their pre-pregnancy health status.

Comparison to previous literature

Increased concern about vaccinations since the pandemic is reflected in recent levels of flu vaccinations falling from pre-pandemic years (England, 2022). This is likely due to the increase in awareness and media messages surrounding vaccinations as a result of the pandemic, and the huge national impact that the Covid-19 pandemic had. It is possible that society more generally has changed views on vaccination, with more acceptance to declining vaccination than previously.

Findings from this study are in line with previous qualitative findings that determine vaccination decisions in pregnancy are influenced by individual, social and contextual factors (Berendes et al., 2023). For example, both this study and previous research have demonstrated that physical access to vaccinations, recommendations received about vaccinations, evaluation of risk vs benefits of vaccinations, fear of vaccinations and the illness being vaccinated against, were all factors in the decision making of pregnant women (Berendes et al., 2023). In line with this study, conflicting information from healthcare professionals, as well as how accessible vaccinations are also influenced vaccination decisions (Berendes et al., 2023).

Previous international literature on Covid-19 hesitancy reinforces some of the findings in the current study (Troiano and Nardi, 2021). Factors such as concerns about the safety of the vaccination, the newness of the vaccination, feelings that Covid-19 is not a serious concern and concerns around the effectiveness of the Covid-19 vaccination, were some reasons for vaccine hesitancy amongst the general population of 12 countries (Troiano and Nardi, 2021) and are in line with the findings of this research.

Strengths and limitations

This study included a varied sample of participants, including a range of ethnicities. Given this population is disproportionately affected by Covid-19 complications, and historical low uptake, this is a strength of the study.

It is acknowledged that at the time of interviews, the Covid-19 pandemic was not at its peak, with restrictions lifted and many participants feeling like the pandemic had passed. It is likely that if the interviews were conducted at a time where the pandemic was more

current and visible, responses and feelings about the vaccination may have been different. It is however acknowledged that the Covid-19 situation is continuously evolving, so more changes in the future are likely.

Findings about Covid-19 and the Covid-19 vaccination were reported separately to other vaccinations, as it was felt that Covid-19 was such a unique experience, it would potentially differ to that of more routine vaccinations. However, we acknowledge that the Covid-19 pandemic is likely to have influenced pregnant women's feelings about the more routine vaccinations and their health more widely, so this should be considered when interpreting the findings.

Implications

This study has provided a greater understanding of some of the factors that influence vaccination decisions amongst pregnant women, and the effect that the Covid-19 pandemic has had on enhancing these factors. It helps broaden our understanding of how pregnant women feel about the introduction of a new vaccination, which has usefulness for the implementation of future vaccinations or future pandemics.

It is clear that for many participants more information or reassurance is needed to help with the decision to vaccinate during pregnancy, something that could adequately be addressed by the development of a suitable intervention. Pregnant women hold mistaken understandings about vaccinations. In practice, addressing healthcare professionals' approaches to information provision is essential to address these misconceptions. Whilst vaccination levels for flu and whooping cough have remained low for many years, it is worrying that rates of these (particularly flu) are decreasing since the onset of Covid-19. This reinforces the need to address concerns and provide accurate information to pregnant women.

From a policy perspective, it is evident that clear and consistent information on a national level that is easy to access, and accessible vaccination gives pregnant the opportunity to make informed decisions about vaccination.

Future research is needed that examines how attitudes of pregnant women changes over time, particularly as we continue to live in a world with Covid-19. It is important to determine which views and beliefs are Covid-19 related, and which are not. One barrier that remains, is the exclusion or pregnant women from many clinical trials. The inability to determine the safety and effectiveness of medication, creates a feeling that all medication (including preventative vaccinations) should be avoided whilst pregnant for fear of unknown risks.

Conclusion

This research demonstrates the huge impact that the Covid-19 pandemic has had on pregnant women's perceptions and acceptance of vaccinations. This is evident by the continuing decline in uptake of flu vaccination since the pandemic, and highlights the importance of clear and consistent messaging from top level national government sources down to more local community information, to allow pregnant women to make accurate and informed choices about vaccinating in pregnancy. Findings of this research will be used to inform an intervention to address the concerns and worries identified by pregnant women, in an attempt to aid attempts to increase vaccination in this population.

CRedit authorship contribution statement

Dr Jo Parsons: Writing – review & editing, Writing – original draft, Visualization, Validation, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Dr Cath Grimley:** . **Professor Helen Atherton:** Writing – review & editing, Validation, Supervision, Methodology, Funding acquisition, Conceptualization. **Louise Clarke:** Writing – review & editing, Resources, Methodology. **Dr Sarah Hillman:** Writing – review & editing, Validation, Funding acquisition, Conceptualization. **Professor Debra Bick:**

Writing – review & editing, Validation, Supervision, Funding acquisition, Conceptualization.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

Debra Bick is Editor in Chief of Midwifery, but all editorial decisions from submission to final decision have been undertaken by one of 'Midwifery's' associate editors. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Supplementary materials

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