

# The shift in COVID-19 vaccination policy for pregnant women, from restricted to required, and the confusion that ensued

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## Abstract

**Introduction:** The aim was to investigate the response of pregnant women when the COVID-19 vaccination policy shifted from restricted to required, and the confusion that ensued during pregnancy, bearing in mind that women undergo unique physiological and immunological changes during pregnancy, making them at risk of developing a more severe course of COVID-19 infection compared to their non-pregnant peers.

**Material and methods:** A cross-sectional study was carried out at the outpatient clinics at Jordan University Hospital for all pregnant women during the period of the survey from 1<sup>st</sup> October 2021 to 31<sup>st</sup> December 2021, focusing on the source of information about the vaccine, receiving the vaccine, and the reasons for rejecting the vaccine, especially during pregnancy.

**Results:** In total, 468 pregnant women were interviewed. The single primary source of information about the COVID-19 vaccine was the traditional media, audio-visual and print media being the most important as reported by 191 women (40.81%), while possible harm to the fetus was the single main reason for refusal of vaccination during pregnancy as reported by 111 women (23.72%).

**Conclusions:** Reluctance toward vaccination is primarily driven by the fierce media campaign that portrayed its initially ambiguous effects on the pregnancy and fetus in a negative light, in conjunction with the open media platforms that enabled semi-experts to issue medically inaccurate statements and information and further complicated the matter by planting the seed of fear and mistrust of the public in the health care system and providers. More public healthcare awareness regarding the safety of the COVID-19 vaccine is needed.

**Key words:** social media, side effects, vaccination refusal, COVID-19, safety in pregnancy.

## Introduction

In December 2020, a blog post appeared online claiming, falsely, that a senior employee at Pfizer was concerned that antibodies elicited by COVID-19 vaccines could attack the placenta. Although the post was quickly removed, social media platforms were flooded with claims of risk of damage to the placenta due to cross-reactivity of the human placenta protein syncytin-1 and the SARS-CoV-2 spike protein (vaccine-elicited). Despite the fact that these claims are not supported by scientific evidence, they fueled public anxiety and fear of the vaccine and are being cited as reasons for hesitancy to receive the vaccine [1]. These claims that oppose public health recommendations have caused a rift and mistrust regarding the effects of the vaccine and may affect people's convictions and choices to receive the vaccination. This critical situation put the world on the brink of chaos and anarchy. It is understandable that people are frightened, especially about something new [2]. The primary function of vaccines is to

ensure safety and they have been historically proven to be efficient. However, the possibility that vaccination against COVID-19 is predominantly effective and safe in pregnancy must be addressed on a scientific basis and the results and recommendations must be communicated to the public effectively. Although the pandemic imposed life issues and behavioral changes, this does not justify avoiding adopting the necessary vaccines and treatments in a sound and convincing manner.

Despite the serious consequences of COVID-19 infection and the dread of this virus spreading, there was growing fear and apprehension of the public towards receiving the vaccine. The public concerns about the safety of the COVID-19 vaccine and the public resistance towards receiving it were spreading like wildfire and at the same time the virus was spreading at a crazy speed, exhibiting high transmissibility coupled with an often vague and silent symptoms profile but nonetheless an increased mortality rate that has challenged medical and public health decision-making strategies

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to contain the pandemic [3]. International cooperation and a firm conviction among all segments of society to receive the vaccine are mandatory and essential to achieve control of this pandemic spread and eradication of COVID-19 which at the beginning of this pandemic was merely a dream but today is a feasible reality.

When the COVID-19 vaccination program implementation started, the efforts to provide vaccination to the public including pregnant women were blocked by resistance and a fierce reaction between women and their husbands seeking to convince them of the necessity and safety of receiving the vaccine. When one considers that pregnant women with COVID-19 infection are more likely to need intensive care, and additionally the medical decision for early intervention increases the rate of neonatal admissions, provided that vaccination protects against these risks, prioritization of pregnant women for vaccination is only reasonable and sensible.

The value of the COVID-19 vaccine during pregnancy is not a questionable or argumentative issue as no harmful effects on the mother or the fetus have been reported, in addition to which vaccination can protect pregnant women from severe illness due to COVID-19 and can also help pregnant women in building antibodies that might protect their babies [4, 5]. The effects of COVID-19 infection go beyond physiological health complications to encompass psychological consequences as well, such as anxieties and obsessions associated with this pandemic [6]. It is of great value and importance to note that COVID-19 vaccines do not cause infection with the COVID-19 virus, in particular for pregnant women or their fetuses, because none of the currently available COVID-19 vaccines contain the live virus that causes COVID-19. In addition, mRNA COVID-19 vaccines do not alter the DNA or cause genetic changes [7]. Urgent action by medical personnel is crucial at this time as an initiative is needed to take serious steps to explain the benefits of the vaccine, suppress rumors, and clarify health facts while addressing public concerns and fears from the vaccine with transparency.

## Material and methods

We carried out this cross-sectional study at the outpatient antenatal clinics at Jordan University Hospital during the period from 1<sup>st</sup> October 2021 to 31<sup>st</sup> December 2021, after adapting a questionnaire that obtained the data designed to serve this study. The research tool was adapted from a number of previous research papers [1, 3, 4, 8, 9], translated to the native language, and back-translated to assure consistency. Furthermore, it was reviewed by a group of experts in the field of validating scientific content. A total of 468 women were interviewed at the antenatal clinics who were deemed eligible to be enrolled and reviewed

in this study. The relative demographic data of patients, after a thorough discussion and illustration of the values of the vaccine for both the mother and fetus, were reported, the possibility of an associated medical disorder, the main source of information about the vaccine, the main reason for refusing the vaccination idea during pregnancy, and the possibility of acceptance.

The study was conducted after it had been sanctioned by the Institutional Review Board, the Ethics Committee, and the Scientific Research Committee at our hospital. We employed SPSS for data analysis. The essential statistical analysis values of the study were calculated using  $\chi^2$  and Wallis tests. *P*-values less than 0.05 are statistically significant. Verbal agreement from the patient herself to be involved in this study was also obtained during a routine antenatal visit. It was important to clarify that participation in filling out the questionnaire does not entail any obligations and is not considered approval to take the vaccine. All women received the same standard of care and attention; they were also offered a detailed description of the great benefits of the vaccine's effect on their protection and the protection of newborns, and the idea that there are no complications to pregnancy due to the vaccine so far nor will there be in the future, but rather the added benefit of the fetus gaining immunity against infection at birth.

All pregnant women who received the vaccination before and during the current pregnancy were excluded. Also, the study did not include an unvaccinated comparison group, so no comparison can be made for the questionnaire parameters, and therefore direct conclusions could not be drawn about the relative risks of complications. Limitations to the study included no specification for the trimester of pregnancy and the level of women's and husbands' education. For those who received the first dose of the vaccine, and refused the second dose due to pregnancy, we did not specify the gestational age at the time of vaccination. Our statistical results considered only the single most important source of information and the single most important cause of refusal of the vaccine. The limitations: no specification for the trimester, or the level of education. We did not specify the gestational age at the time of vaccination. We excluded those who received 2 or 3 doses of the vaccine.

## Results

Throughout the study period, from 1<sup>st</sup> October 2021 to 31<sup>st</sup> December 2020, a total of 468 pregnant women were eligible to be enrolled in this study, interviewed, and completed the questionnaire. The demographic data are illustrated in Table 1, which clearly reveals that the median age was 28.19 years, with a standard deviation of 4.7, the gravidity median is 3.3 with a stan-

standard deviation of 1.29, the parity median was 1.3 with a standard deviation of 1.06, and the gestational age median was 29.71 weeks with a standard deviation of 9.21. The employment status revealed a total number of 72 women (15.38%) who worked in the medical sector, with a majority of them being nurses working at our hospital, while 159 women (33.97%) were government workers, while the rest were housewives. The detailed COVID-19 history, illustrated in Table 2, showed that 308 women (65.81%) did not get the infection, and 272 women (58.12%) have no members in their close family who have had the disease; on one hand, 312 women (66.67%) never received the vaccine, and 330 women (70.51%) never received the seasonal influenza vaccine, and on the other hand, 312 women (66.67%) were not excited to be vaccinated. In Table 3, the main single source of information was the traditional media, i.e. television channels, radio stations, and newspapers, as reported by 191 women (40.81%), followed by co-workers in 113 women (24.14%); however, social media ranked third as a source of information about the disease. The main single cause of refusal to receive COVID-19 vaccination during pregnancy was the fear of the harmful effects on the fetus as reported by 111 women (23.72%), followed by the serious side effects of the vaccine on the pregnant women as mentioned by 69 women (14.74%), while complacency about the danger of the vaccine conjugated with mistrust of the vaccine in 63 women (13.46%), where the lack of data on the safety of the vaccine in pregnant women was reported by 45 women (9.62%), and 33 women (7.05%) were not happy to be vaccinated for no reason, and 25 women (5.34%) claimed the refusal was because of a plot of conspiracy as clearly exemplified and elucidated in Table 4.

## Discussion

This cross-sectional-based survey about the conservative behavior toward the COVID-19 vaccination during pregnancy revealed that the most cited reasons for hesitancy and resistance to receiving the vaccine are concerns about side effects on the fetus and distrust in health care policies, and worries regarding vaccine expedited production, published studies, and vaccine-producing companies providing the controversial issues on both traditional, and social media platforms, coupled with the shift in medical advice from warning and rejection, to necessity. We appreciate and understand

**Table 1.** Demographic data

Characteristic	Value
Age (years)	28.19 ±4.70
Gravidity	3.30 ±1.29
Parity	1.30 ±1.06
Gestational age (weeks)	29.71 ±9.21
Employment status (%)	
Housewife	237 (50.64)
Governmental official	159 (33.97)
Medical sector	072 (15.39)
Associated medical disorder	
Thyroid disorder	44 (9.40)
Diabetes mellitus	23 (4.91)
Hypertension	21 (4.49)
Allergy	20 (4.26)
Others	19 (4.05)

Values are given as median ± standard deviation or as number (percentage).

the circumstances that accompanied the emergence of the epidemic and the initiation of quarantine and its impact on all social classes, and the category of pregnant women in particular [8].

Regarding employment status, most of the women in the study sample are housewives, 237 women (51%), while 159 women (34%) work as employees in the government or private sector, specifically in the field of education, and the rest of the study sample, 72 women (15%), are from the medical sector, and most of them are nurses and doctors, and this may be consistent with the results of the study performed in Turkey by Ayhan *et al.* [9]. By inquiring about the presence of any medical history accompanying pregnancy, it was found that thyroid disorders, followed by diabetes mellitus, and allergies, are the most important concomitant diseases as evident in 44 women (9%), 23 women (4.91%), and 21 women (4.49%) respectively. It is clear that the rate of spread of infection among workers in the education and medical fields ranked on the top of the professions, due to the nature of the career, and in addition among people with a common medical disease during pregnancy [10, 11].

Although the data about safety are growing, they are still limited and not up to expectations, with a low acceptance rate, particularly due to the controversies that accompanied the delivery of these vaccines. It is the doctor's medical responsibility to take the initia-

**Table 2.** Corona history

Parameter no/yes	Got infected (%)	Any family member infected (%)	Received the vaccine (%)	Received H1N1 vaccine before (%)	Excited to be vaccinated (%)	p-value
No	308 (65.81)	272 (58.12)	312 (67.67)	330 (91.88)	312 (66.67)	0.03
Yes	160 (34.19)	196 (41.88)	156 (33.33)	038 (08.12)	156 (33.33)	0.01

P-values less than 0.05 are statistically significant.

**Table 3.** Main single source of information about COVID-19 vaccination

Source	Total number	Incidence (%)
Traditional media: TV, radio, newspapers	191	40.81
Co-workers	113	24.15
Social media	071	15.17
Relatives	051	10.90
Maternal health care professional	022	04.70
Friends	020	04.27
Total	468	100

tive to start giving advice and accurate information to the pregnant woman about the unlimited benefits of the COVID-19 vaccine during pregnancy, which facilitates the appropriate informed decision about the vaccine, as waiting for an answer to the question may give rise to some doubts. This and another important factor that further augments resistance and hesitancy to receive vaccination are problems of trust towards the health care providers and policies while hearing or reading about negative events from different unreliable sources.

These results can be attributed to the fact that people have concerns and doubts regarding the effectiveness and the safety of the vaccine, particularly since the vaccine was developed rapidly and received accelerated approval [12, 13]. The way the traditional media and social media circulated news about the vaccine from unreliable sources, coupled with medical advice that shifted positions from warning and rejection to necessity, needs review, as it is non-ethical to only broadcast negative news at the expense of the positives with the sole aim to raise the reader’s attention

and increase views of the text to generate media propaganda with economic and financial goals. In that light, it is necessary to mention and remember two facts here; the first is that the main reason for refusing the vaccine or hesitating to receive it was a reaction to the famous announcement tweeted by a senior Pfizer employee, who questioned the safety of the vaccine for the pregnant woman, the second is conflicting medical advice about the benefits and possible hazards and conflicting medical advice about the benefits and complications of the vaccine.

Vaccine efficacy and safety are the main sources of concerns; a conflict between the benefit of receiving the vaccine contrasted with fear and concern for the fetus and the pregnancy is the obsession of a pregnant woman. This is most augmented after a period of contradicting health recommendations and statements about the safety of the vaccine for pregnant women, as health care providers initially had an absolute ban on vaccinating pregnant women, then later they recommend that the vaccine is urgent, essential, and necessary for pregnant women to receive. We are aware that with the disclosure of full intent to perform future research on COVID-19 vaccine safety in this population, the health authorities and researchers prioritized the urgent delivery of a safe and effective vaccine to the public, responding to an emergency call to action, unfortunately with limited time and lower thresholds for evidence before implementation for the pregnant and lactating patient, especially since the health authorities all over the world have given limited approvals for the safety of the drug according to the recommendations by the WHO, which is an important fear factor.

As health care providers we cannot overlook the fears and concerns among pregnant women, as there is societal resistance against the vaccine all over

**Table 4.** Main single cause of refusal of the COVID-19 vaccination during pregnancy

Main cause of refusal	Total number	Incidence (%)	p-value
The vaccine may harm the fetus	111	23.72	0.01
The vaccine has side effects	69	14.74	0.01
Complacency about the dangers of the disease, mistrust	63	13.46	0.02
Lack of data about COVID-19 vaccine safety in pregnant women	45	09.62	0.01
Being forced to take the first dose of the vaccine	37	07.91	0.063
I am not happy to be vaccinated for no reason	33	07.05	0.054
Being a plot of conspiracy	25	05.34	0.04
Not trusting the vaccine effectiveness	22	04.70	0.01
I got the COVID-19 infection myself	15	03.21	0.03
I have an allergy to vaccination in general	11	02.35	0.05
My pregnancy is a high-risk one	10	02.14	0.03
The vaccine was the main cause of death	02	00.42	0.06
Others	25	05.34	0.06
Total	468	100	

P-values less than 0.05 are statistically significant.

the world and our country is no different, especially since most of the working women of the current study were teachers and nurses, as illustrated in the demographic data in Table 1. Pregnant women's reluctance to receive vaccine doses against infection with COVID-19 represents a new challenge for the medical sector due to the novelty of the topic and the limited research and studies on the safety of treatment. Receiving the vaccine outweighs any known or potential adverse effects of vaccination during pregnancy. The study statistics show that about 160 women (34.18%) were infected with the virus without specifying a period of time, while 156 women (33.33%) gave a history of an infected member of her family, which is the same percentage of women who were eager to take the vaccine after clarification and explanation in the clinic about the importance of vaccination during pregnancy for both parties, i.e. the pregnant woman and the fetus who acquires immunity against infection after birth, as it was necessary to have a clear policy to explain the benefits of taking the vaccine and the expected side effects to aid in reaching the decision to take the vaccine after a personal and family refusal. This is very important, as it is unsurprising that only 38 women (8.12%) were keen to take the seasonal influenza vaccine.

Perhaps the widespread medical information on the Internet as part of the debates between scientists and laboratories, and the humble beginning of the vaccine's safety for pregnant women, further complicates the task of the medical sector and makes it more difficult to deal with the vocabulary of this file, from a medical warning against taking the vaccine, because of its possible devastating effects on the fetus, to the new reality of the need to take the vaccination during pregnancy, which provides immunity to both parties: the pregnant mother and fetus [14, 15].

As mentioned above, the study clearly demonstrates that the reluctance of pregnant women to receive the COVID-19 vaccine stems from the ambiguity and the lack of identification of the current and future side effects on the pregnant woman and the fetus, which requires a national media awareness campaign about the importance of the vaccine and its therapeutic safety and personal, family and societal benefits, especially since initially the category of pregnant women was excluded from receiving the vaccine [16, 17], particularly among Arab countries as reported by Qunaibi *et al.* [18]. Disagreement to be vaccinated should not be attributed to illogical responses, unawareness, or fabrication and further research is needed to gain a better understanding of the reasons of antagonists.

An unfortunate result that we obtained through the study sample is the decline in the percentage of women who received the well-known seasonal influenza vaccine, as 38 women (12.8%) did not receive the vaccine and the largest percentage do not know

about it, because that vaccine was not accompanied by a media campaign similar to the COVID-19 vaccine, which is the same conclusion reached by others [19, 20].

This study shows two contradictory phenomena. The first and unfortunate one is that there are 33 women (7.05%) from the study sample who did not take the vaccine based on medical advice that the vaccine is not safe during pregnancy, and that seems a common attitude that a number of respected medical practitioners adopted [21]. The second is that there was a positive response for about 55 women (11.32%) who were convinced to take the vaccine during pregnancy based on medical advice, and there are 22 (4.5%) women who promised to take the vaccine immediately after birth [22].

Respect for patient autonomy must be a priority at any stage of pregnancy. This may constitute a justification for increasing health awareness among medical practitioners to give advice according to the rules, as there is confidence in the medical practitioners and their advice that must be preserved. Clinical medical advice is integral to good professional practice and the delivery of quality healthcare [23]. Distrust of the vaccine is mixed with the conspiracy theory; we note that 33 women (7%) have refused the vaccine. As an expression of temperament and personal freedom without explanation or justification, 37 women (10%) refused to receive the vaccine as a counteracting response to pressures exerted on them, especially at work. COVID-19 vaccination in pregnancy and lactation generated robust humoral immunity similar to that observed in nonpregnant women with similar side effect profiles. The data published by Kathryn *et al.* [24] confirmed that the COVID-19 mRNA vaccines result in comparable humoral immune responses in pregnant and lactating women with those observed in nonpregnant populations. As a logical response to the medical advice about the danger of pregnant woman receiving the vaccine at first, then stressing the need to receive the vaccine now, is a bold step that highlights the importance of continuing scientific research and modernization, we are aware of the strong efforts needed to clarify the situation and change policy from restricted to required, and the confusion that ensued [25]. The clear message of this study to improve awareness among pregnant women and healthcare authorities on vaccine safety is desirable, alongside clear stratagems to address vaccine doubtfulness. A special message to be delivered via this scientific work is that we must remember the golden words of the Director-General of the World Health Organization, who warned of a moral disaster recorded in the dictionary of human history if the fair distribution of vaccines against the epidemic among the human population, especially pregnant women, was lacking [26]. Unfortunately, there is a worrying overlap between the health care necessary for this epi-

demic, especially the lack of fair distribution of vaccines among the world's population, with the need to persevere in the manufacture of curative treatments, especially safe treatments for pregnant women [27]. Most women need medical attention from the attending physician to explain the objectives of the procedure, its benefits and complications, and an explanation, especially during pregnancy, and we succeeded in this with previous treatment for patients with dermoid cysts. A good listener has the skill of employing therapy [28].

## Conclusions

The current study demonstrates the great importance and the crucial role of the media, especially television stations that are widely watched and relied upon by the public as a reliable source of medical information, followed by the means of social media platforms. Furthermore, the study also showed that there is strong resistance among pregnant women and their husbands to receiving the vaccine during pregnancy due to concern regarding the effect on the fetus from the vaccine, and the uncertainty and controversies that accompanied the development of the vaccine, as the majority of them considered that the safety test period for the vaccine was insufficient. There is no evidence of adverse maternal or fetal effects from vaccinating pregnant women with the COVID-19 vaccine, and the newly delivered data demonstrate the safety of such use. Vaccination is the best way to reduce risks of infection, and eliminate obsessions and fear that endanger the life of all people, particularly pregnant women. Pregnant women are a priority group for COVID-19 vaccination and should be routinely offered Comirnaty at any stage of pregnancy. We suggest larger-scale studies in the future on a multi-center or national scale to generalize the findings of this study.

## Disclosure

The authors report no conflict of interest.

## References

- Sutton D, D'Alton M, Zhang Y, et al. COVID-19 vaccine acceptance among pregnant, breastfeeding, and nonpregnant reproductive-aged women. *Am J Obstet Gynecol MFM* 2021; 3: 100403.
- Moghadas SM, Fitzpatrick MC, Sah P, et al. The implications of silent transmission for the control of COVID-19 outbreaks. *PNAS* 2020; 117: 17513-17515.
- Neumann-Böhme S, Varghese NE, Sabat I, et al. Once we have it, will we use it? A European survey on willingness to be vaccinated against COVID-19. *Eur J Health Econ* 2020; 21: 977-982.
- Lazarus JV, Ratzan SC, Palayew A, et al. A global survey of potential acceptance of a COVID-19 vaccine. *Nat Med* 2021; 27: 225-228.
- Sallam M. COVID-19 Vaccine hesitancy worldwide: a concise systematic review of vaccine acceptance rates. *Vaccines (Basel)* 2021; 9: 160.
- Michie S, West R. Behavioral, environmental, social, and systems interventions against COVID-19. *BMJ* 2020; 370: m2982.
- Tremblay S, Castiglione S, Audet LA, Desmarais M, Horace M, Peláez S. Conducting qualitative research to respond to COVID-19 challenges: reflections for the present and beyond. *Int J Qual Methods* 2021.
- Muhaidat N, Saleh S, Fram K, et al. Prevalence of endometriosis in women undergoing laparoscopic surgery for various gynaecological indications at a Jordanian referral centre: gaining insight into the epidemiology of an important women's health problem. *BMC Women's Health* 2021; 21: 2-8.
- Goncu Ayhan S, Oluklu D, Atalay A, et al. COVID-19 vaccine acceptance in pregnant women. *Int J Gynecol Obstet* 2021; 154: 291-296.
- Available from: <https://www.hopkinsmedicine.org/health/conditions-and-diseases/coronavirus/coronavirus-and-covid19-who-is-at-higher-risk>.
- Control CfD, Prevention. People with certain medical conditions. Morbidity and mortality weekly report CDC 2020. Available from: <https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/people-with-medical-conditions.html>. Accessed September 7, 2020.
- Sutton D, D'Alton M, Zhang Y, et al. COVID-19 vaccine acceptance among pregnant, breast-feeding, and nonpregnant reproductive-aged women. *Am J Obstet Gynecol MFM* 2021; 3: 100403.
- Ciaponni A, Bardach A, Comandè D, et al. COVID-19 and pregnancy: An umbrella review of clinical presentation, vertical transmission, and maternal and perinatal outcomes. *PLoS ONE* 2021; 16: e0253974.
- Chervenak FA, McCullough LB, Grunebaum A. Reversing physician hesitancy to recommend COVID-19 vaccination for pregnant patients. *Am J Obstet Gynecol* 2021; 226: 805-812.
- Levy AT, Singh S, Riley LE, et al. Acceptance of COVID-19 vaccination in pregnancy: a survey study. *Am J Obstet Gynecol* 2021; 3:100399.
- Goncu Ayhan S, Oluklu D, Atalay A, et al. COVID-19 vaccine acceptance in pregnant women. *Int J Gynaecol Obstet* 2021; 154: 291-296.
- Tran T, Valecha R, Rad P, Rao HR. An investigation of misinformation harms related to social media during two humanitarian crises. *Inf Syst Front* 2021; 23: 931-939.
- Qunaibi EA, Helmy M, Basheti I, Sultan I. A high rate of COVID-19 vaccine hesitancy in a large-scale survey on Arabs. *Elife* 2021; 10: e68038.
- Peretti-Watel P, Raude J, Sagaon-Teyssier L, Constant A, Verger P, Beck F. Attitudes toward vaccination and the H1N1 vaccine: poor people's unfounded fears or legitimate concerns of the elite? *Soc Sci Med* 2014; 109: 10-18.
- Van Lange PAM, Rand DG. Human cooperation and the crises of climate change, COVID-19, and misinformation. *Annu Rev Psychol* 2022; 73: 379-402.
- Allotey J, Stallings E, Bonet M, et al. Clinical manifestations, risk factors, and maternal and perinatal outcomes of coronavirus disease 2019 in pregnancy: living systematic review and meta-analysis. *BMJ* 2020; 370: m3320.
- Blakeway H, Prasad S, Kalafat E, et al. COVID-19 vaccination during pregnancy: coverage and safety. *Am J Obstet Gynecol* 2022; 226: 236.e1-14.
- Mathioudakis A, Rousalova I, Gagnat AA, et al. How to keep good clinical records. *Breathe* 2016; 12: 371-375.
- Gray KJ, Bordt EA, Atveo C, et al. Coronavirus disease 2019 vaccine response in pregnant and lactating women: a cohort study. *AJOG* 2021; 225: 303.e1-303.e 17.
- Lazarus JV, Ratzan SC, Palayew A, et al. A global survey of potential acceptance of a COVID-19 vaccine. *Nat Med* 2021; 27: 225-228.
- Bump JB, Baum F, Sakornsin M, Yates R, Hofman K. Political economy of covid-19: extractive, regressive, competitive. *BMJ* 2021; 372: n73.
- Sabahelzain M, Hartigan-Go K, Larson HJ. The politics of COVID-19 vaccine confidence. *Curr Op Immunol* 2021; 71: 92-96.
- Fram KM, Saleh SS, Muhaidat NA, et al. The ideal approach of ovarian dermoid cyst excision; the predicament of laparoscopy versus laparotomy. *Obstet Gynaecol Int J* 2021; 12: 205-210.