ORIGINAL RESEARCH ARTICLE

Attitude and behavior of pregnant women about influenza infection and influenza vaccine in a city in Turkiye

DOI: 10.29063/ajrh2022/v26i8.2

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Abstract

Pregnant women are among the risk groups for influenza. This study aimed to investigate the knowledge and attitude level of pregnant women in risk group about influenza infection and vaccine and some factors affecting their vaccination decision. In this descriptive cross-sectional study, 391 pregnant women in the city of Kütahya replied a questionnaire developed by the researchers. While 35% of the participants stated that they had an influenza infection during pregnancy, 62.4% did not know that they could get the flu vaccine while pregnant. Only one of the pregnant women had a flu vaccine during pregnancy. While 67% defined influenza infection as a simple and outpatient disorder, 51.3% who did not want to be vaccinated against the flu thought that the vaccine could harm the baby. In addition, it was found that having had the flu in a previous pregnancy and healthcare professionals counselling about the vaccine increased the rate of getting the flu vaccine. The fact that most of the participants learned that they could get the flu vaccine during pregnancy for the first time and they were worried that the flu vaccine might harm the baby shows that effective methods are not used in informing and raising awareness about the flu vaccine. *(Afr J Reprod Health 2022; 26 [8]: 13-19).*

Keywords: Pregnancy, influenza, influenza vaccine, information

Résumé

L'infection grippale touche 330 millions à 1,575 milliard de personnes chaque année et cause 500 000 à 1 million de décès par an directement ou avec des complications connexes. Les femmes enceintes font partie des groupes à risque pour la grippe. Comparativement aux femmes non enceintes, il a été observé qu'elles sont plus touchées par l'infection grippale. Cette étude visait à étudier le niveau de connaissances et d'attitude des femmes enceintes du groupe à risque concernant l'infection grippale et le vaccin et certains facteurs affectant leur décision de vaccination. Dans cette étude transversale descriptive, 391 femmes enceintes de la ville de Kütahya ont répondu à un questionnaire élaboré par les chercheurs. Alors que 35 % des participantes ont déclaré avoir eu une infection grippale pendant la grossesse, 62,4 % ne savaient pas qu'elles pouvaient se faire vacciner contre la grippe pendant leur grossesse. Une seule des femmes enceintes s'est fait vacciner contre la grippe pendant sa grossesse. Alors que 67 % ont défini l'infection grippale comme un trouble simple et ambulatoire, 51,3 % des participants (n : 318) qui ne souhaitaient pas être vaccinés contre la grippe pensaient que le vaccin pourrait nuire au bébé. De plus, il a été constaté que le fait d'avoir eu la grippe lors d'une grossesse précédente et que les conseils des professionnels de la santé sur le vaccin augmentaient le taux de vaccination contre la grippe. Le fait que la plupart des participantes aient appris qu'elles pouvaient se faire vacciner contre la grippe pendant la grossesse pour la première fois et qu'elles craignaient que le vaccin contre la grippe ne nuise au bébé montre que des méthodes efficaces ne sont pas utilisées pour informer et sensibiliser sur le vaccin contre la grippe. *(Afr J Reprod Health 2022; 26[8]: 13-19).*

Mots-clés: Grossesse, grippe, vaccin antigrippal, information

Introduction

Influenza is one of the most common viral diseases and an infectious disease that can affect people of all ages and groups and make epidemics in many countries around the world[1]. It has been observed that it causes severe disease due to complications developing in individuals, especially in risk groups, and even deaths. The World Health Organization (WHO) estimates that 330 million to 1.575 billion people can be affected by this disease each year, and 500 thousand to one million per year may die due to influenza or related complications[2,3].

Pregnant women are among the risk groups for influenza and WHO considers pregnant women as priority group for flu vaccine[4]. Compared to non-

pregnant women, pregnant women were observed to be more affected by influenza infection. It was also found in a study carried out in the United States that pneumonia and hospitalization increased in pregnant women who had suffered from influenza compared to pregnant women who hadn't suffered from influenza[5,6]. In addition, high fever during pregnancy, especially in the first trimester, increases the risk of congenital malfunction in infants. In the first trimester of pregnancy, there is a risk of developing two-fold major malformations related to influenza infection as well as 3.3-fold increased risk of neural tube defects and 1.6-fold increased risk of congenital heart disease. It was also determined that the incidence of congenital anomalies such as hydrocephaly, cleft lip, digestive system, and limb reduction defects increased[7,8]. In European studies, congenital heart defects were observed in 5-11 of every 1000 live births of pregnant women affected by influenza, which shows us how important the treatment and prevention of influenza infection is, especially in the first trimester, for maternal and child health[7,9].

Vaccination during pregnancy is recommended to protect the health of both mother and newborn. It was determined in a study that influenza vaccine during pregnancy even reduced fetal deaths[10]. Vaccines recommended during pregnancy are tetanus, diphtheria, acellular pertussis vaccines and influenza vaccination especially in the influenza season (October-May)[11-14]. Some countries provide free vaccination to women planning pregnancy and pregnant women (in October-November), especially in the 2nd and 3rd trimesters of pregnancy, and try to increase vaccination rates by organizing vaccination campaigns. It was determined in a study that the rate of influenza vaccination varied between 1.5% and 95%[15-17]. In Turkey, this rate is 9.1% for H1N1 and 3% for seasonal flu vaccine[18]. This study aimed to investigate the knowledge and attitude level of pregnant women in risk group about influenza infection and vaccine and some factors affecting their vaccination decision.

Methods

The population of this descriptive cross-sectional study consists of 1785 pregnant women registered in 23 Family Health Centers in the city of Kütahya. With Epi Info Stat Calc program, taking the expected prevalence 50%, margin of error 5% and the design effect one, the small sample volume was found 316 at 95% confidence level. The study was completed by applying a questionnaire in June-July-August 2019 consisting of 14 questions prepared by researchers to 391 pregnant women, 20 from each family health center, who agreed to participate. Prior to administration, oral or written consent of the participants was obtained. The surveys were conducted by face-to-face interviews. Ethical approval for the study was obtained from Kütahya Health Sciences University.

The data obtained in this study were analyzed in SPSS Version 22.0 (Statistical Package for the Social Sciences) program. The findings were given as descriptive statistics (number and percentage, mean±standart deviation). Chi-square test was used to analyze the data. Statistical significance level was accepted as α=0.05.

Results

With the average age of 27.59±4.92 years (min:20, max:42), 72.40% (n=282) of 391 pregnant women participating in the study were between the ages of 20-29 years. While 43.5% (n=170) were university graduates, it was the first pregnancy for 41,90% (n:164) of the pregnant women and %88 (n:344) had planned pregnancy (Table 1).

Of 227 participants who had two or more pregnancies, 79 (35.00%) had influenza infection in their previous pregnancy. One of the pregnant women (0.40%) stated that she had influenza vaccine in her previous pregnancy. Table 1 shows the distribution of influenza infection and influenza vaccination status of the pregnant women in their previous and current pregnancies.

When the participants were asked their opinions about influenza, 262 (67.00%) responded as "influenza is an ambulatory disorder" and 129 (33.00%) said "influenza is sometimes treated in a hospital/intensive care unit". While 81 (20.70%) stated "influenza vaccine can be administered while pregnant" and 134 (34.30%) stated "influenza vaccine cannot be administered while pregnant- it harms the baby", 176 (45.00%) stated that they were undecided (Table 2).

It was determined that having had a flu infection in previous pregnancy (p:0.001), thinking that the influenza infection might be severe (p:0.004) and being informed by healthcare

Table 1: Distribution of influenza infection and influenza vaccination status in previous and current pregnancies

	Number	(%)
Status of undergoing influenza infection in previous pregnancies (n=226)		
Yes	79	35.00
No	124	54.80
Can't remember	23	10.20
Status of having influenza vaccination in previous pregnancies (n=226)		
Yes	1	0.40
No	169	74.80
Can't remember	56	24.80
Status of undergoing influenza infection in current pregnancy (n=391)		
Yes	183	46.80
No	208	53.20
Treatment methods used for influenza while pregnant (n:201)		
Simple painkillers	81	40.30
Herbal methods	69	34.30
No treatment	27	13.50
Antibiotics	24	11.90
Status of going to hospital/emergency due to influenza while pregnant (n:201)		
Yes	32	15.90
No	169	84.10

Table 2: Opinions of pregnant women about influenza and influenza vaccine

	Number	(%)
Opinions about influenza (n:391)		
Influenza disease is an ambulatory disorder	262	67.00
Influenza is sometimes treated in a hospital/intensive care unit	129	33.00
Opinions about influenza vaccine and pregnancy (n:391)		
Influenza vaccine can be administered while pregnant	81	20.70
Influenza vaccine cannot be administered while pregnant; it harms the baby	134	34.30
Undecided	176	45.00
Information resources about pregnancy and influenza vaccine (n:391)		
I learned it from you for the first time	244	62.40
From family physician/midwife in charge	65	16.60
Social media	56	14.30
Health programs/News	13	3.30
From gynecologist	13	3.30
Status of wanting to get influenza vaccine while pregnant (n:391)		
Yes	73	18.70
No	256	65.50
Undecided	62	15.90
Reasons of not wanting vaccination while pregnant (n:318)		
I do not trust the vaccine, it can harm the baby	163	51.30
I leave it to its natural course	123	38.70
I find the vaccine unnecessary	30	9.40
I can't afford it	2	0.60

professionals that flu vaccine could be given during pregnancy ($p<0.001$) increased the rate of getting influenza vaccine. The fact that 46.80% (n: 183) of the pregnant women had an influenza infection in their current pregnancy shows that influenza infection is one of the common diseases during pregnancy. It was observed that the biggest obstacle to being vaccinated was the thought that the vaccine could harm the baby during pregnancy ($p<0.001$). The number of pregnant women who learned for the first time the information that it is possible to be vaccinated during pregnancy and that it is recommended to be vaccinated was 62.4% (n: 244) (Tables 3).

Discussion

Influenza infection is common during pregnancy and is therefore an important public health problem. According to the results of this study, the incidence

Table 3: Distribution of the decision of pregnant women to have influenza vaccine according to their opinions on influenza vaccine

Would you have an influenza vaccine while pregnant?	Yes* Number(%)	No* Number(%)	Undecided* Number(%)	Total** Number(%)	x^2; *p*
Age					
20-29 year	48 (17,0)	188 (66.4)	47 (16.6)	283 (72.4)	2,111;
30 year and above	25 (23,1)	68 (63.0)	15 (13.9)	108 (27.6)	0.348
Education					
Primary school	14 (19.2)	53 (20.7)	9 (14.5)	76 (19.4)	5,092;
High school	21 (28.8)	101 (39.5)	23 (37.1)	145 (37.1)	0.278
University	73 (52.1)	256 (39.8)	62 (48.4)	170 (43.5)	
Number of pregnancies					
1-2	52 (17.0)	208 (68.0)	46 (15.0)	306 (78.3)	4.067;
3 and above	21 (24.7)	48 (56.5)	16 (18.8)	85 (21.7)	0.131
Planned pregnancy					
Yes	66 (19.2)	221 (64.2)	57 (16.6)	344 (88.0)	1.986;
No	7 (14.9)	35 (74.5)	5 (10.6)	47 (12.0)	0.371
Status of undergoing influenza infection in previous pregnancies (n=226)					
Yes	27 (34.2)	33 (41.8)	19 (24.1)	79 (35.0)	18.385;
No	23 (18.5)	87 (70.2)	14 (11.3)	124 (54.9)	**0.001**
Opinions about influenza (n:391)					
Influenza disease is an ambulatory disorder	37 (14.1)	181 (69.1)	44 (16.8)	262 (67.0)	10.819; **0.004**
Influenza is sometimes treated in a hospital/intensive care unit	36 (27.9)	75 (58.1)	18 (14.0)	129 (33.0)	
Opinions about influenza vaccine and pregnancy (n:391)					
Influenza vaccine can be administered While pregnant	54 (66.7)	22 (27.2)	5 (6.2)	81 (20.7)	
Influenza vaccine cannot be administered while pregnant; it harms the baby	3 (2.2)	125 (93.3)	6 (4.5)	134 (34.3)	197.138; **<0.001**
Undecided	16 (9.1)	109 (61.9)	51 (29.0)	176 (45.0)	
Information resources about pregnancy and influenza vaccine (n:391)					
I learned it from you for the first time	17 (7.0)	181 (74.2)	46 (18.9)	244 (62.4)	
From family physician/midwife in charge	48 (61.5)	16 (20.5)	14 (17.9)	78 (19.9)	136.565;
Social media	8 (11.6)	59 (85.5)	2 (2.9)	69 (17.6)	**<0.001**
Total	73 (18.7)	256 (65.5)	62 (15.9)	391 (100.0)	

* Line percentage, ** Column percentage

of flu during pregnancy is high. While 35.00% of the pregnant women participating in this study stated that they had influenza infection in their previous pregnancies, 46.80% had influenza infection in their current pregnancies. Therefore, the level of knowledge of pregnant women about influenza and its vaccine is important in terms of protection from this disease. Most of the pregnant women who participated in this study did not know that pregnancy was a risk factor for the flu. In addition, 67% of the participants considered flu as a simple, less dangerous infection. In the study of Arriola *et al*., 9% of pregnant women in India, 51% of pregnant women in Peru and Thailand saw influenza infection as a simple ailment and reported that they were not worried[17].

Most of the pregnant women in this study tended to beat the flu infection with simple painkillers and natural methods. The drug called oseltamivir is recommended to be used in the treatment of flu during pregnancy[19]. In a study conducted by Ehrenstein *et al*., it was shown that there was no relationship between prenatal Oseltamivir treatment and the development of congenital malformations[20]. It was found that the pregnant women participating in our study did not use, or even did not know, antiviral agents such as Oseltamivir in influenza infection. In addition, it

was determined that 24 (11.90%) of the pregnant women used antibiotics that had no place in the treatment of influenza. Increasing influenza vaccination rates to prevent influenza infections may prevent the use of drugs that may harm the baby, such as antibiotics and painkillers, and herbal teas of unknown safety.

As is known, risky populations can only be protected against influenza infection by vaccination. Pregnant women are at risk population. Only about one-fifth of the pregnant women who participated in the study knew that they could be vaccinated against influenza while they were pregnant. The remaining four-fifths stated that it could not be done or that they were undecided due to lack of knowledge. While 62.40% heard for the first time in this study that influenza vaccine can be given during pregnancy, the rate of those who stated that the flu vaccine could harm the child during pregnancy was quite high (34.3%). This finding is similar to Heninger *et al*.[21] . This shows that family physicians, family health professionals and obstetricians involved in the follow-up of pregnant women do not provide sufficient information to pregnant women about influenza and its vaccine. Therefore, the knowledge level of pregnant women about influenza vaccine administration during pregnancy is quite low.

It is thought that the low level of knowledge of the society about influenza, its complications and influenza vaccine affects vaccination rates. According to this study, the biggest obstacles to vaccination are that the influenza vaccine is not trusted, that influenza disease is believed to be a simple ambulatory disorder, and that they think that the influenza vaccine administered during pregnancy may harm the baby. Many studies have shown that informing the public about the diseases that threaten them and their vaccines will increase vaccine acceptance[22]. Pathirina *et al*. stated that as people's level of knowledge about diseases and prevention methods increases, the rate of vaccination will also increase[23]. According to our study, positive attitudes of pregnant women towards flu vaccine increase when they have the right information about flu and flu vaccine. In addition, it was observed that the desire of pregnant women who had had a flu infection in their previous pregnancy and those who thought that the flu infection might be severe increased. In the literature, it has been observed that the rates of influenza and other vaccinations increase during pregnancy, especially when information about influenza and its vaccine is given to pregnant women by healthcare professionals. In a study by McCarthy *et al*., an increase in vaccination rates was observed when pregnant women were informed by a gynecologist[24]. In another study in Germany by Böhm *et al*., recommendations of obstetricians were found to be more effective in influenza vaccination rates for pregnant women. In our study, it was determined that there was a significant increase in the desire to be vaccinated when influenza vaccination was recommended by healthcare professionals. This finding is consistent with the work of Böhm *et al*.[17,25].

In our study, it was found that there was no significant relationship between education level and the desire to be vaccinated against influenza while pregnant. However, it is stated in several studies that the desire to be vaccinated increases with the level of education[26]. Studies show that influenza vaccination rates are low in pregnant women. In a study conducted on 358 pregnant women in Italy, vaccine acceptance rates were generally lower in pregnant women (0.4%)[26]. In our study, vaccination rates in pregnant women were low; there was no one who got the influenza vaccine in her current pregnancy, but only one pregnant stated that she had been vaccinated in her previous pregnancies.

It is a limitation of this study that it doesn't cover all pregnant women in Kütahya but those followed by a family health center in Kütahya. Also, the effect of the memory factor resulting from the study design may be another limitation, since it is a cross-sectional study.

Conclusion

As a result, the influenza vaccination rate was found low in pregnant women participating in the study. In addition, the correct knowledge and attitudes of pregnant women about influenza and vaccine weren't sufficient. The pregnant women had inaccurate and incomplete information about the flu and its vaccine, and accordingly, they had prejudices. Mostly, pregnant women avoided vaccination with the prejudice that the vaccine could harm their babies. These findings are important in terms of demonstrating that the influenza vaccine information and awareness activities aren't adequately provided by healthcare

professionals and that effective methods aren't used. Pregnant women must be informed by the family physician, community health centers, healthcare professionals and the gynecologist in charge about seasonal influenza infection, complications that may develop after infection and that vaccination can provide protection. This should be pointed out to family physicians, family health professionals and gynecologists serving pregnant women.

Acknowledgement

This study is not funded by any institution and there are no conflicts of interest.

Contribution of authors

AD designed the study, collected and analyzed data, interpreted and discussed the findings under the supervision of MY. Both authors revised the manuscript and provided inputs in finalizing the manuscripts together. Both authors read and approved the manuscript.

References

1. Nitsch-Osuch A, Korzeniewski K, Gawlak M, Życińska K, Wardyn K and Kuchar E. Epidemiological and clinical reasons for vaccination against pertussis and influenza in pregnant women. AdvExpMedBiol. 2015;849:11-21. doi: 10.1007/5584_2014_95.
2. World Health Organization (2009) Influenza (seasonal) fact sheets no. 211: 2009. Available for: http://www.who.int.mediacentre/factshhets/fs211/en/index.html. Accessed 22 July 2014
3. Yakut N, Soysal S, Soysal A and Bakir M. Knowledge and acceptance of influenza and pertussis vaccinations among pregnant women of low socioeconomic status in Turkey. Hum Vaccin Immunother. 2020;16(5):1101-1108. doi:10.1080/21645515.2019.1689082.
4. World Health Organization (2013), Global Influenza Programme, Available for: https://www.who.int/teams/global-influenza-programme/vaccines/vaccine-use, Accessed: 10. Juny.2022
5. Ellington SR, Hartman LK, Acosta M, Martinez-Romo M, Rubinson L, Jamieson DJ and Louie J. Pandemic 2009 influenza A (H1N1) in 71 critically ill pregnant women in California. Am J Obstet Gynecol. 2011;204(6 Suppl 1):S21-S30. doi:10.1016/j.ajog.2011.02.038
6. Jamieson DJ, Honein MA, Rasmussen SA, Williams JL, Swerdlow DL, Biggerstaff MS, Lindstrom S, Louie JK, Christ CM, Bohm SR, Fonseca VP, Ritger KA, Kuhles DJ, Eggers P, Bruce H, Davidson HA, Lutterloh E, Harris ML, Burke C, Cocoros N, Finelli L, MacFarlane KF, Shu B and Olsen SJ. H1N1 2009 influenza virus infection during pregnancy in the USA. Lancet. 2009;374(9688):451-458. doi:10.1016/S0140-6736(09)61304-0
7. Luteijn JM, Brown MJ and Dolk H. Influenza and congenital anomalies: a systematic review and meta-analysis. Hum Reprod. 2014;29:809–23.doi: 10.1093/humrep/det455.
8. Acs N, Banhidy F, Puho E and Czeizel AE. Maternal influenza during pregnancy and risk of congenital abnormalities in offspring. BirthDefectsRes A ClinMolTeratol. 2005;73:989–96. doi: 10.1002/bdra.20195
9. European Surveillance of Congenital Anomalies EUROCAT Guide 1.4, Section 3.3 EUROCAT Subgroups of Congenital Anomalies (Version 2014). 2014. http://www.eurocat-network.eu/content/EUROCAT-Guide-1.4-Section-3.3.pdf. Accessed 16 July 2017.
10. Zhang C, Wang X, Liu D, Zhang L and Sun X. A systematic review and meta-analysis of fetal outcomes following the administration of influenza A/H1N1 vaccination during pregnancy. Int J Gynaecol Obstet. 2018;141(2):141-150. doi:10.1002/ijgo.12394.
11. Fiore AE, Uyeki TM, Broder K, Finelli L, Euler GL, Singleton JA, Iskander JK, Wortley PM, Shay DK, Bresee JS and Cox NJ. Prevention and control of influenza with vaccines: recommendations of the Advisory Committee on Immunization Practices (ACIP), 2010 [published correction appears in MMWR Recomm Rep. 2010 Aug 13;59(31):993] [published correction appears in MMWR Recomm Rep. 2010 Sep 10;59(35):1147]. MMWR Recomm Rep. 2010;59(RR-8):1-62.
12. Gabas T, Leruez-Ville M, Le Mercier D, Lortholary O, Lecuit M and Charlier C. Grippe et grossesse [Influenza and pregnancy]. Presse Med. 2015;44(6 Pt 1):639-646. doi:10.1016/j.lpm.2015.04.012.
13. Rasmussen SA, Kissin DM, Yeung LF, MacFarlane K, Chu SY, Turcios-Ruiz RM, Mitchell EW, Williams J, Fry AM, Hageman J, Uyeki TM and Jamieson DJ. Preparing for influenza after 2009 H1N1: special considerations for pregnant women and newborns. Am J Obstet Gynecol. 2011;204(6 Suppl 1):S13-S20. doi:10.1016/j.ajog.2011.01.048.
14. ACOG Committee Opinion No. 468: Influenza vaccination during pregnancy. Obstet Gynecol. 2010;116(4):1006-1007. doi:10.1097/AOG.0b013e3181fae845.
15. Buchy P, Badur S, Kassianos G, Preiss S and Tam JS. Vaccinating pregnant women against influenza needs to be a priority for all countries: An expert commentary. Int J Infect Dis. 2020;92:1-12. doi:10.1016/j.ijid.2019.12.019
16. Razzaghi H, Kahn KE, Black CL, Lindley MC, Jatlaoui TC, Fiebelkorn AP, Havers FP, D'Angelo DV, Cheung A, Ruther NA and Williams WW. Influenza and Tdap Vaccination Coverage Among Pregnant Women - United States, April 2020. MMWR Morb Mortal Wkly Rep. 2020;69(39):1391-1397.

Published 2020 Oct 2. doi:10.15585/mmwr.mm6939a2.

17. Arriola CS, Suntarattiwong P, Dawood FS, Soto G, Das P, Hunt DR, Sinthuwattanawibool C, Kurhe K, Thompson MG, Wesley MG, Saha S, Hombroek D, Brummer T, Kittikraisak W, Kaoiean S, Neyra J, Romero C, Patel A, Bhargav S, Khedikar V, Garg S, Mott JA, Gonzales O, Cabrera S, Florian R, Parvekar S, Tomyabatra K, Prakash A and Tinoco YO. What do pregnant women think about influenza disease and vaccination practices in selected countries. Hum Vaccin Immunother. 2021;17(7):2176-2184. doi:10.1080/21645515.2020.1851536.
18. Celikel A, Ustunsoz A, Guvenc G. Determination of vaccination status of pregnant women during pregnancy and the affecting factors. J Clin Nurs. 2014;23(15-16):2142-2150. doi:10.1111/jocn.12351.
19. Beigi RH, Pillai VC, Venkataramanan R and Caritis SN. Oseltamivir for the treatment of H1N1 influenza during pregnancy. Clin Pharmacol Ther. 2015;98(4):403-405. doi:10.1002/cpt.179.
20. Ehrenstein V, Kristensen NR, Monz BU, Clinch B, Kenwright A and Sørensen HT. Oseltamivir in pregnancy and birth outcomes. BMC Infect Dis. 2018;18(1):519. Published 2018 Oct 16. doi:10.1186/s12879-018-3423-z
21. Henninger M, Naleway A, Crane B, Donahue J and Irving S. Predictors of seasonal influenza vaccination during pregnancy. Obstet Gynecol. 2013;121(4):741-749. doi:10.1097/AOG.0b013e3182878a5a.
22. Lu PJ, Srivastav A, Amaya A, Dever JA, Roycroft J, Kurtz MS, O'Halloran A and Williams WW. Association of provider recommendation and offer and influenza vaccination among adults aged ≥18 years - United States. Vaccine. 2018;36(6):890-898. doi:10.1016/j.vaccine.2017.12.016
23. Pathirana J, Nkambule J and Black S. Determinants of maternal immunization in developing countries. Vaccine. 2015 Jun 12;33(26):2971-7. doi: 10.1016/j.vaccine.2015.04.070. Epub 2015 Apr 30. PMID: 25936666.
24. McCarthy EA, Pollock WE, Tapper L, Sommerville M and McDonald S. Increasing uptake of influenza vaccine by pregnant women post H1N1 pandemic: a longitudinal study in Melbourne, Australia, 2010 to 2014. BMC Pregnancy Childbirth. 2015;15:53. Published 2015 Mar 5. doi:10.1186/s12884-015-0486-3
25. Böhm S, Röbl-Mathieu M, Scheele B, Wojcinski M, Wichmann O and Hellenbrand W. Influenza and pertussis vaccination during pregnancy - attitudes, practices and barriers in gynaecological practices in Germany. BMC Health Serv Res. 2019;19(1):616. Published 2019 Sep 2. doi:10.1186/s12913-019-4437-y.
26. D'Alessandro A, Napolitano F, D'Ambrosio A and Angelillo IF. Vaccination knowledge and acceptability among pregnant women in Italy. Hum Vaccin Immunother. 2018;14(7):1573-1579. doi:10.1080/21645515.2018.1483809.