

Determinants and coverage of seasonal influenza vaccination among women of childbearing age in Poland

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ABSTRACT

Objectives: Vaccination is the most effective method of controlling influenza in the human population, where pregnant women belong to a risk group that is especially vulnerable to influenza-related morbidity and mortality. The objectives of the survey were to report estimates of maternal vaccination coverage and assess reasons for the lack of influenza vaccination among Polish women of childbearing age.

Material and methods: The survey analysis included 564 pregnant women who had been surveyed in a self-reported questionnaire during the 2017–2018 influenza season in Warsaw, Poland.

Results: Over 95% of Polish women of childbearing age did not vaccinate against influenza due to the low perception of risk and a lack of providing evidence-based information on vaccine by physicians and midwives. General practitioners were most often indicated as healthcare workers who educated women about influenza risk factors and recommended influenza vaccine to them.

Conclusions: The results of the survey suggest that women of childbearing age did not vaccinate against influenza due to the low perception of risk and a lack of providing evidence-based information by healthcare workers (including obstetrician-gynaecologists and midwives), while their recommendations appear to be a powerful method of overcoming barriers to influenza vaccination among patients.

Key words: influenza; vaccine; women; pregnancy; coverage

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INTRODUCTION

Due to low influenza vaccination coverage (IVC), influenza constitutes one of the major health problems worldwide. While the main factor of low IVC in low and middle income countries is poverty, in high income countries it is related to poor knowledge of influenza complications and protective impact of vaccination for population health, along with high activity of anti-vaccination movements, resulting in the increase of vaccine hesitancy and refusals [1]. The influenza vaccine is one of the most important vaccines recommended in communicable disease prevention. This particularly concerns pregnant women, who are more prone to severe influenza, which is associated with hospitalization or death, increased risk of preterm births and low birth weight as well as an increased risk of hospitalization or death in the first six months of infant life [2, 3]. The World Health Organization (WHO) have classified pregnant women as the group of highest priority for seasonal influenza vaccination programs since

2012 [4]. Pregnancy might be an opportunity for healthcare providers (HCPs) to advocate for appropriate vaccination due to consistent contact with pregnant patients [5].

Objectives

The objectives of the analysis were to estimate maternal IVC and assess reasons for non-vaccination against influenza among Polish women of childbearing age.

MATERIAL AND METHODS

Setting and population

The survey was carried out in the 2nd Department of Obstetrics and Gynaecology, Medical University of Warsaw (MUW), a tertiary unit within the Polish National Health Insurance System. In 2017, the Department was one of 8 tertiary Obstetrics and Gynaecology units in Masovian voivodeship, providing public healthcare to the population of approximately 1 186 000 women of childbearing age (19–49 years) [6].

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Survey design

An original questionnaire was designed to establish main factors behind women of childbearing age getting vaccinated or not against influenza in the 2016–2017 (pre-pregnancy) and 2017–2018 (pregnancy) influenza seasons. The survey was anonymous and distributed during the 2017–2018 season. The responses were kept in secure data storage. Self-reported data included age, birth rate, noncommunicable diseases, gestational diabetes and vaccination status.

Inclusion criteria and recruitment

Women that were pregnant 9 weeks or more were eligible for inclusion. Information about the survey was distributed by obstetric providers among patients of the 2nd Department of Obstetrics and Gynaecology, MUW. Verbal invitation to participate in the study was issued by the obstetric providers, including the authors, within the context of a routine clinical care

Ethical approval

Ethical approval of the survey was granted by the MUW Ethics Committee (AKBE/160/17). Participants were provided a patient information form with the presentation of the aims of the study. It was emphasized that participation was voluntary and would have no implications for the antenatal care of the patients. The decision to participate or not was left to the patients in the absence of the authors of the survey.

Statistical analyses

Statistical analyses were performed using the statistical program Statistica 13. Quantitative variables had been checked for their data distribution before the analysis. The statistically significant results were at the $p < 0.05$. The Mann-Whitney's U-test and Pearson chi-square analysis were used to analyse the results. While assessing participants' knowledge, the answers "definitely yes" and "rather yes" were found to be correct, except questions about contraindications to vaccination, in which "definitely no" and "rather no" were correct answers.

RESULTS

Pregnant patients were asked about their opinions and practices related to influenza illness and vaccination.

The questionnaire was completed by 564 eligible women. Over 54% of participants were aged between 31–40 years (Fig. 1). Most patients declared having a higher education degree (64.9%) (Fig. 2). Similar percentage of women declared it was their first or second pregnancy (38.1% vs 36.2% respectively) (Fig. 3). Pregnancies were planned in 85.1%. Complications of pregnancy were reported by 75.4%

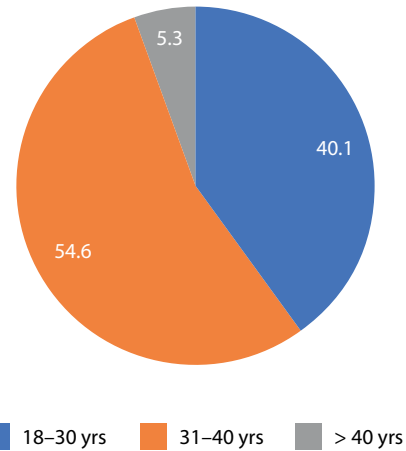


Figure 1. Percentage of participants by age (n = 564)

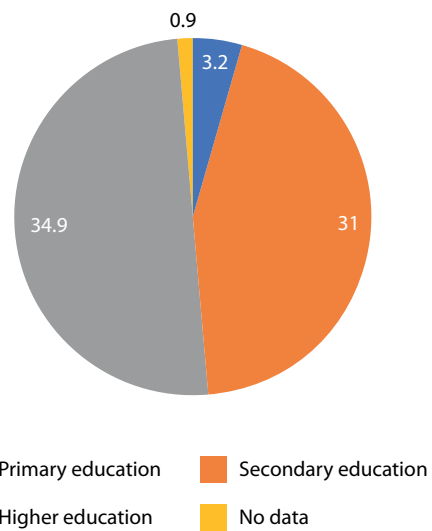


Figure 2. Percentage of participants by education level (n = 564)

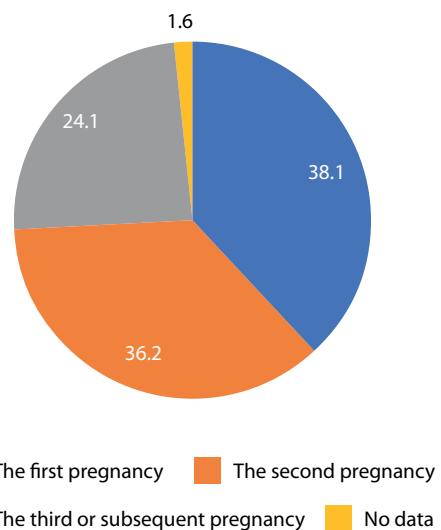


Figure 3. Percentage of women by the number of pregnancies (n = 564)

of patients, of which gestational diabetes was predominant (76.6%); whereas 17.7% women declared uncomplicated pregnancies, and no information about pregnancy status was indicated by 6.9% participants.

IVC declared in the 2016–2017 (pre-pregnancy) season was at the level of 2.8%, whereas 1.8% of participants did not remember their vaccination status in that season. Regular influenza vaccination was declared by the same percentage of women (2.8%). Occasional vaccination was declared by 16.9%. Only 3.5% of pregnant patients declared their willingness to be vaccinated against influenza in the upcoming 2017–2018 season, while 68.0% of them were strongly opposed to it, and 28.5% were hesitant. There was no statistically significant difference between women with uncomplicated and complicated pregnancies in the approach to influenza vaccination ($p = 0.8340$).

The analysis of patients' knowledge of influenza illness and vaccination showed that a low percentage of women of childbearing age had sufficient information on influenza risk factors and complications or influenza vaccines (Tab. 1, 2;

Fig. 4). Only 0.5% of all women answered all questions correctly (Fig. 4).

To evaluate responses by age and education level, the participants were regrouped, as the number of women aged over 40 and those with the primary education were small (they were combined with women aged 31–40 and those with the secondary education, respectively).

A detailed analysis of data showed statistically significant differences in answers to 11 questions on the knowledge of influenza risk factors and vaccination in pregnant women with regard to their education level ($p = 0.0059$) (Tab. 3; Fig. 5); however, no differences were found with regard to the age of patients (Tab. 4).

Over 60% of participants reported the Internet as the main source of information on influenza and influenza vaccination, followed by general practitioners (GPs), media other than the Internet, family and friends as other sources of information (Fig. 6, 7). A detailed analysis by age and education level showed statistically significant differences in sources of information on influenza illness (Fig. 8, 9) and vaccination (Fig. 10, 11).

Table 1. Knowledge of the risk factors related to severe and complicated influenza among women of childbearing age (correct answer in bold type)

Question	Answer (% , N)				
	Definitely yes	Rather yes	I don't know	Rather no	Definitely no
1. Do you think that pregnancy and postpartum period are risk factors for severe and complicated flu? (n = 557)	5.9% (33)	28.4% (158)	32.0% (178)	29.3% (163)	4.5% (25)
2. Do you think that chronic pulmonary diseases are risk factors for severe and complicated flu? (n = 557)	7.9% (44)	50.6% (282)	22.4% (125)	17.2% (96)	1.8% (10)
3. Do you think that metabolic diseases, including diabetes, are risk factors for severe and complicated flu? (n = 557)	4.9% (27)	21.3% (119)	30.7% (171)	36.3% (202)	6.8% (38)
4. Do you think that overweight and obesity are risk factors for severe and complicated flu? (n = 557)	3.8% (21)	18.7% (104)	27.3% (152)	41.6% (232)	8.6% (48)
5. Do you think that the flu is a dangerous disease with the risk of complications for pregnant women and postpartum women? (n = 560)	15.5% (87)	55.5% (311)	18.4% (103)	7.9% (44)	2.7% (15)
6. Do you think that the flu is a dangerous disease with the risk of complications for the fetus and the newborn? (n = 560)	18.0% (101)	55.5% (311)	17.7% (99)	8.0% (45)	0.7% (4)

Table 2. Knowledge about influenza vaccination among women of childbearing age (correct answer in bold type)

Question	Answer {%, (N)}				
	Definitely yes	Rather yes	I don't know	Rather no	Definitely no
7. Do you think that flu vaccination is safe for pregnant women and postpartum women? (n = 561)	1.4% (8)	9.4% (53)	51.2% (287)	30.5% (171)	7.5% (42)
8. Do you think that flu vaccination is effective for pregnant women and postpartum women? (n = 560)	1.1% (6)	12.0% (64)	65.2% (348)	17.0% (91)	4.7% (25)
9. Do you think that flu vaccination is necessary for pregnant women and postpartum women? (n = 560)	1.4% (8)	10.9% (61)	56.1% (314)	24.6% (138)	7.0% (39)
10. Do you think that pregnancy and postpartum period are contraindications for flu vaccination? (n = 559)	7.3% (41)	28.1% (157)	47.9% (268)	13.8% (77)	2.9% (16)
11. Do you think that lactation is contraindication for flu vaccination? (n = 557)	5.4% (30)	23.3% (130)	52.2% (291)	16.5% (92)	2.5% (14)

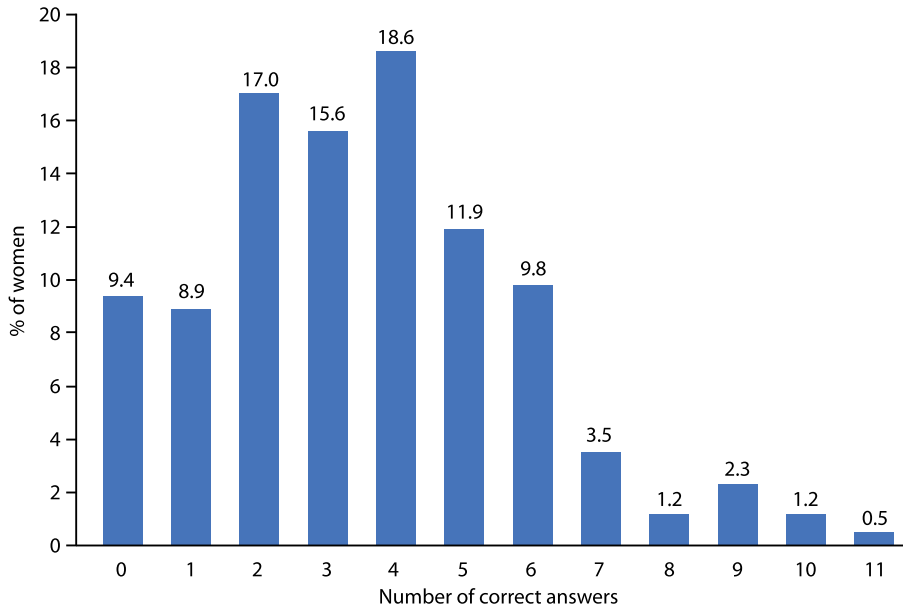


Figure 4. Percentage of answers given by women of childbearing age that were correct with regard to influenza risk factors and vaccination

Correct answers	Education level						p value*
	Primary and secondary education		Higher education		Total		
	N	M (min-max)	N	M (min-max)	N	M (min-max)	
Number	194	3.00 (0.00–11.00)	365	4.00 (0.00–11.00)	559	3.00 (0.00–11.00)	0.0059
%	194	27.27 (0.00–100.00)	365	36.36 (0.00–100.00)	559	27.27 (0.00–100.00)	0.0059

M — median; *U Mann-Whitney test

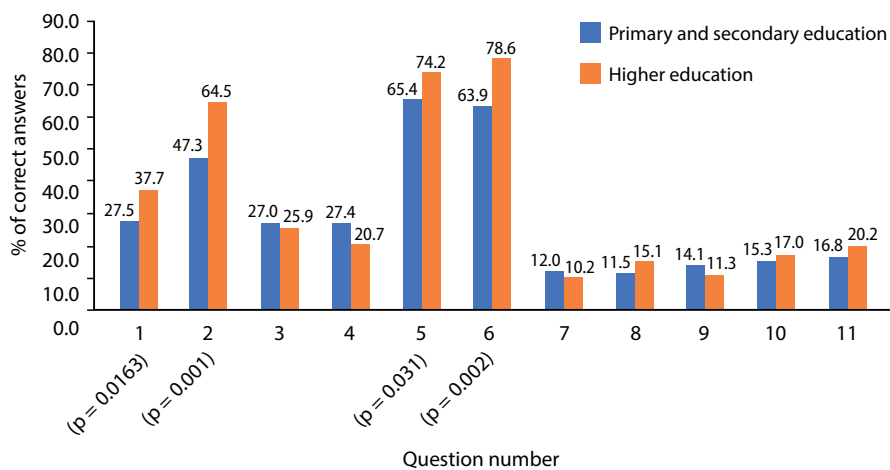


Figure 5. Percentage of correct answers to questions about influenza risk factors and vaccination with regard to education level

Table 4. Correct answers to questions on knowledge of influenza risk factors and vaccination with regard to age (n = 559)

Correct answers	Age						p value*
	18–30 years		> 30 years		Total		
	N	M (min–max)	N	M (min–max)	N	M (min–max)	
Number	225	4.00 (0.00–11.00)	338	3.00 (0.00–11.00)	559	3.00 (0.00–11.00)	0.5179
%	225	36.36 (0.00–100.00)	338	27.27 (0.00–100.00)	559	27.27 (0.00–100.00)	0.5179

M — median; *U Mann-Whitney test

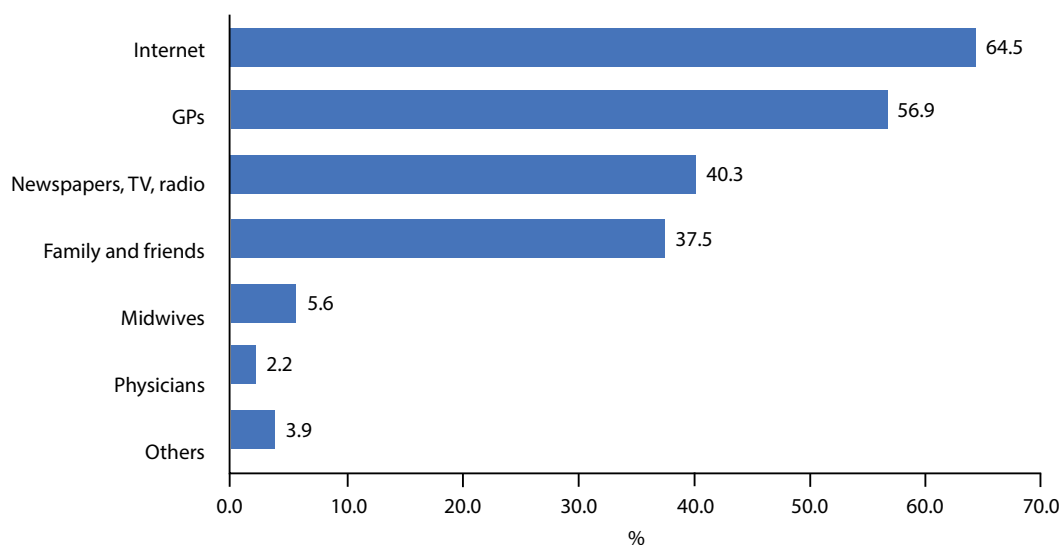


Figure 6. Sources of information on influenza illness (multiple-choice question) (n = 555)

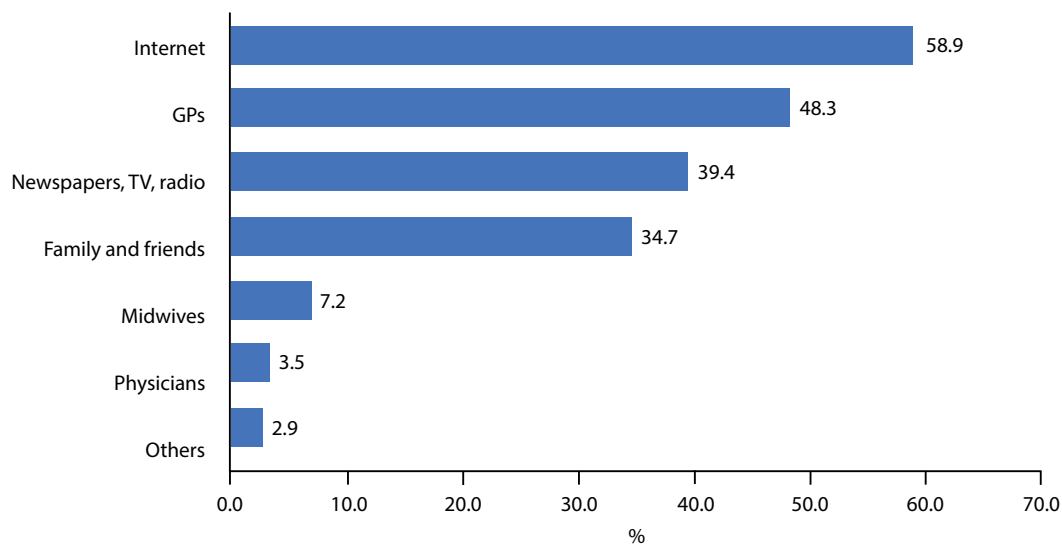


Figure 7. Sources of information on influenza vaccination (multiple-choice question) (n = 545)

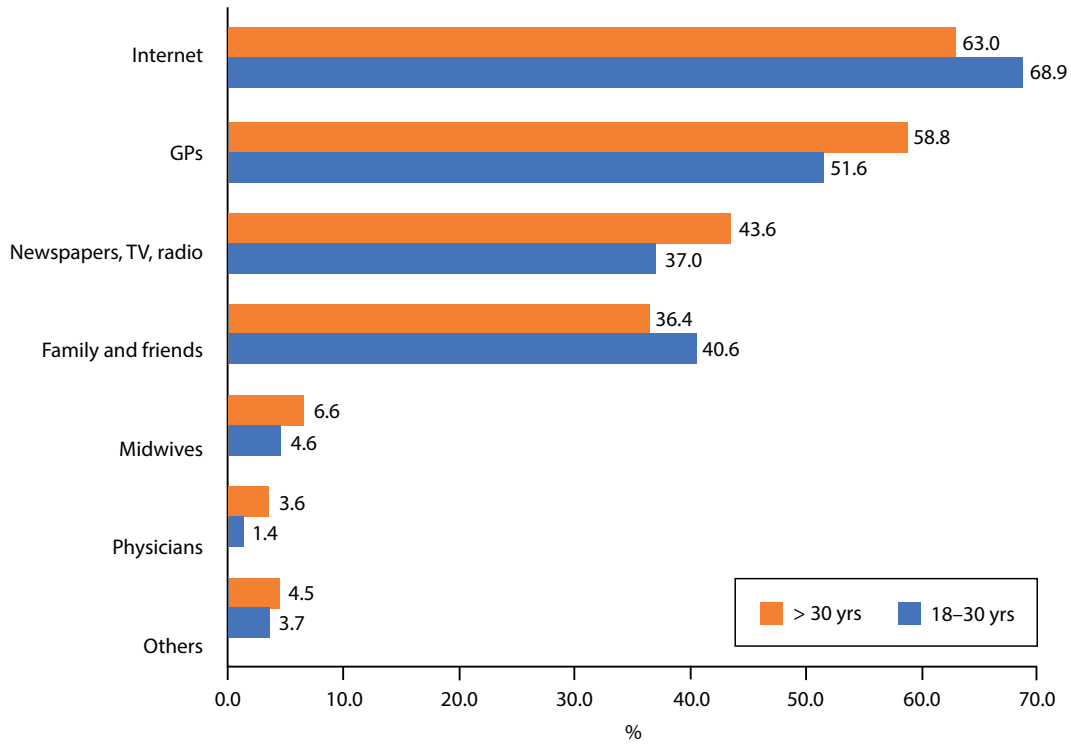


Figure 8. Sources of information on influenza illness by age group (multiple-choice question) (n = 554)

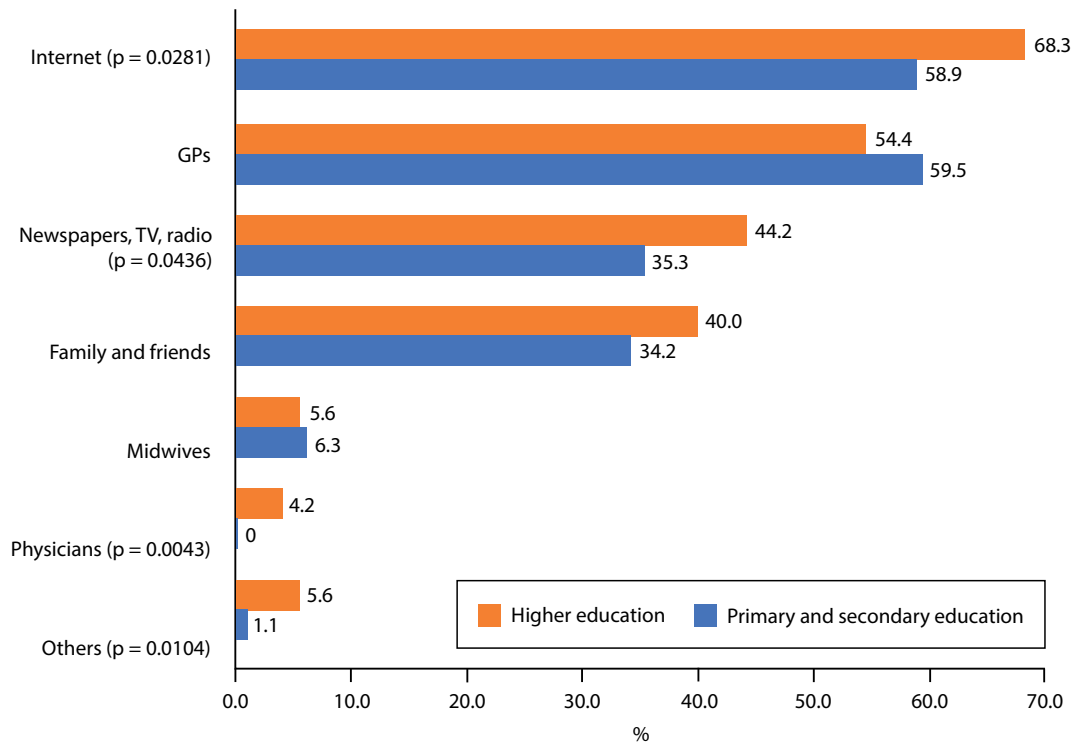


Figure 9. Sources of information on influenza illness by education group (multiple-choice question) (n = 550)

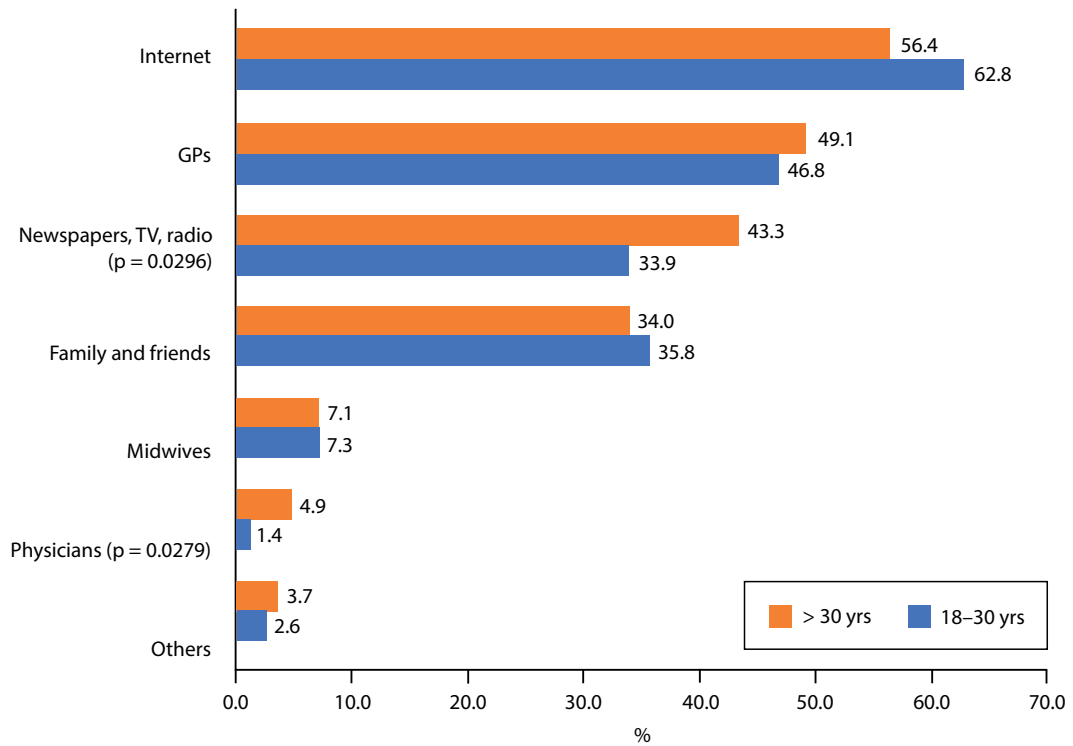


Figure 10. Sources of information on influenza vaccination by age group (multiple-choice question) (n = 544)

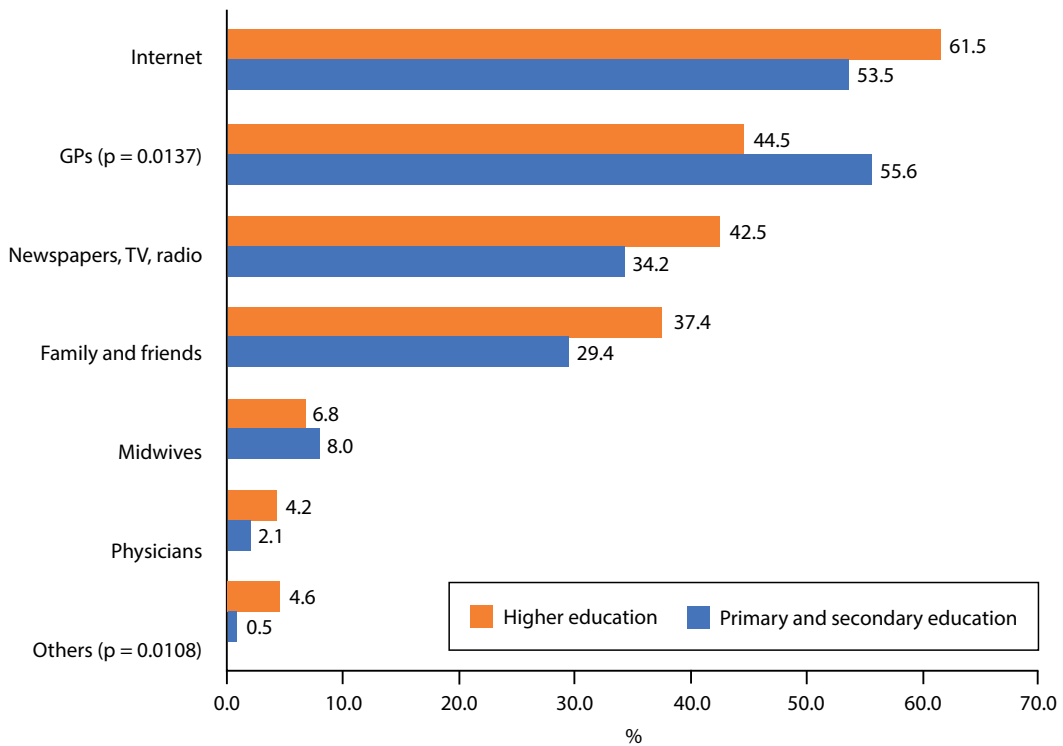


Figure 11. Sources of information on influenza vaccination by education group (multiple-choice question) (n = 540)

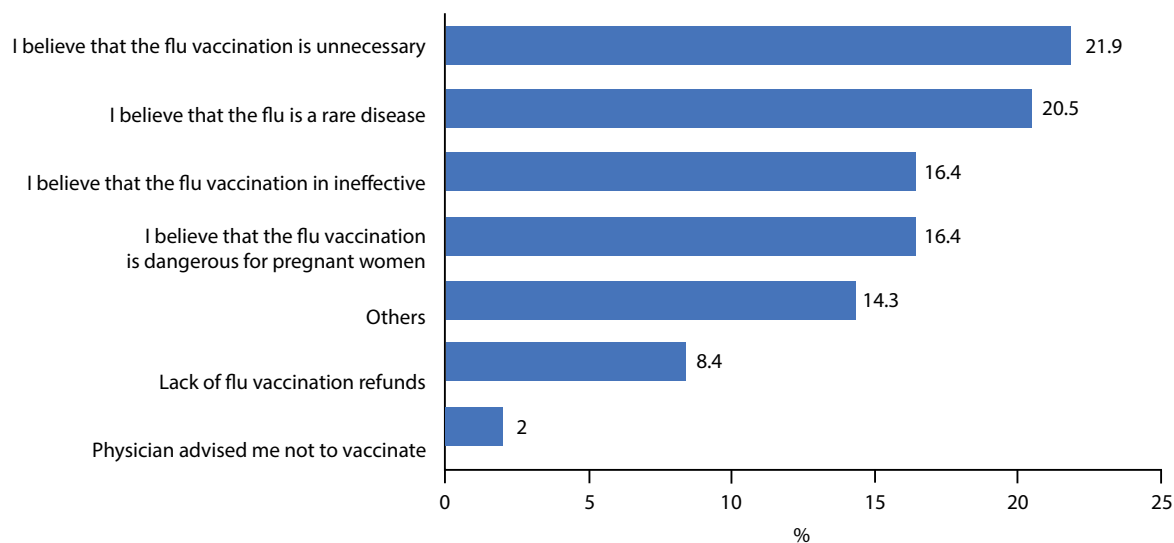


Figure 12. Reasons for vaccine refusal among pregnant women (n = 432)

Main reasons for refusing influenza vaccination were negative attitude towards vaccination (conviction that it is unnecessary, ineffective or dangerous for pregnant women), a belief that influenza was a rare disease and lack of vaccination refund (Fig. 12).

DISCUSSION

In the study, self-reported IVC rates were estimated and potential determinants of influenza vaccination uptake were examined (including sociodemographic factors, obstetric characteristics, maternal health beliefs and sources of information on influenza illness and vaccination) in the group of women of childbearing age in a single obstetric care centre in Warsaw, the capital of Poland.

Self-reported IVC in the survey was ca. 3%. A similar percentage of participants declared their willingness to get vaccinated against influenza during pregnancy in the upcoming influenza season; however, almost 70% of participants were strongly opposed to the vaccination. For many years, IVC in Poland has been very low and remained below 4% [7, 8]. IVC among the survey participants was comparable to the general population and much lower than that reported in other countries. In comparison to our survey, self-reported IVC rates among pregnant women in the previous and subsequent influenza seasons in other countries were as follows: 50–78% in the USA [9–13], ca. 50% in Australia [14], 45% in Belgium [15], 11–23% in Germany [16], less than 10% in France and Singapore [17, 18]. Regular influenza vaccination in previous years increased the probability of influenza immunization during pregnancy as much as 4 times [9] or at least it provided a similar level of IVC [12, 19], which has also been observed in our study: 3.5% of pregnant participants wanted to vaccinate in the upcoming

2017–2018 season, as compared with the observed 2.8% IVC in the 2016–2017 season.

Polish women of childbearing age had insufficient knowledge of influenza risk factors and vaccination, which has been identified as patient barriers to vaccination of the same importance as negative vaccination history, general mistrust towards the medical establishment, lack of established relationship with obstetrician-gynaecologists (OB/GYNs) as vaccine providers and no access to medical care [12]. Less than 5% of pregnant participants to the study gave correct answers to 8 or more out of 11 questions about influenza risk factors and vaccination; over 50% of patients provided less than 4 correct answers. Knowledge of influenza vaccination was poorer than that of the influenza risk factors. These results were worse than those observed by Kuchar E. et al. [7] for the general Polish population in 2018 and those obtained in the unvaccinated US pregnant female population [20]. Women with a higher level of education had a statistically significant better knowledge of risk factors, in particular, and according to some authors, higher level of education had a significant influence on the maternal IVC [15, 20, 21]. The majority of the surveyed women searched for the information on influenza illness and vaccination on the Internet (64.5% and 58.9% respectively), with a statistically significant difference with regard to the level of education: patients with higher education chose the Internet as the source of information on influenza illness and vaccination (68.3%), and they used TV, radio and newspapers as a source of information on influenza illness (44.2%) and vaccination (43.3%). A systematic review of the Internet use among pregnant women revealed that the Internet was recognized in many countries to be a reliable and useful source of information about pregnancy and birth: up to 75% of

childbearing women used it to deal with pregnancy-related doubts and decisions, whereby better educated women were three times more likely to seek advice online than those less educated [22]. Unfortunately, up to 70% of women did not discuss the information found online with their HCPs [20], which is why "HCPs may not be aware of potentially inaccurate information or mistaken beliefs about pregnancy, reported on the Internet", as Sayakhat et al. [22] aptly put it.

Influenza vaccination in pregnancy was included into the Polish National Immunisation Programme in 2014 as it was first recommended by the WHO in 2012 [4, 23]. The Programme is conducted by GPs in children and adults. This provides explanation why GPs were the second major source of information on influenza illness and vaccination (56.9% and 48.3% respectively) and why they were a statistically significant, more common source of information on influenza vaccination for the better educated participants ($p = 0.0137$). An exceptionally low percentage of pregnant women indicated midwives (< 10%) or physicians (< 5%) as the sources of information. A prospective observational hospital-based study performed in France in the 2014–2015 season on a group of 2045 pregnant women showed a similar percentage of vaccine recommendations by GPs (57.3%), but a significantly higher percentage of recommendations by midwives (40.1 to 54.3%) or physicians (48.1%). GPs administered 67.6% of vaccines among pregnant women in Belgium [15]. In our study, only 2 pregnant women indicated OB/GYNs as information providers. Almost 10% of Spanish pregnant women vaccinated against influenza recalled being informed about influenza vaccine by their GPs, whereas almost 90% declared midwives to be the source of information [19]. Bartolo et al. [24] reported that 50.7% of French OB/GYNs recommended influenza vaccine in the 2014–2015 season, which was similar to the data obtained in French reports since 2010 (56%) [17]. According to King JP et al. [20], in the 2016–2017 season ca. 80% of vaccinated or unvaccinated US pregnant women indicated that their obstetric providers (OB/GYNs and midwives) frequently recommended influenza vaccination. Over 90% of those women reported being recommended influenza vaccine by at least one HCP and none of them reported being advised against vaccination by their HCPs, while in our survey it was reported that 2% of Polish physicians advised their patients not to vaccinate during pregnancy. Gaps in HCPs' knowledge about influenza vaccine contributed to low IVC of patients, whereas lack of providing vaccination to pregnant women by the OB/GYNs resulted from the conviction that the influenza vaccine should be administered by GPs [12]. Vishram et al. [25] proved that HCPs were more likely to recommend influenza vaccination in pregnancy if they had been vaccinated as patients or healthcare workers. The observed IVC rates in the Polish HCPs ranged from 10% to

20% [26, 27], which may result in providing insufficient recommendations for influenza vaccination to pregnant women. Personal recommendation of HCPs to get vaccinated against influenza during pregnancy increased the odds ratio of accepting the vaccine from 1.45 to 7 times [9, 12, 18]. Pregnant women appeared highly motivated to improve their health in order to protect their children [12, 20]. If they were offered vaccination by HCPs, they were also more likely to have a positive attitude towards vaccine efficacy and safety [12, 21]. Statically, 50% of French mothers and 78% of Kenyan women reported their willingness to get vaccinated during their next pregnancy to protect their children or prevent a disease [17, 28].

It is worth noticing that good communication between HCPs and women of childbearing age, along with influenza vaccine recommendations, increased the IVC rates by 80% even among patients with a negative attitude towards influenza vaccination [12]. This is particularly crucial for the populations with extremely low IVC, such as Polish women of childbearing age. Over 95% of pregnant participants to the study did not get vaccinated in the 2016–2017 and 2017–2018 seasons. Between 15–22% of them believed vaccination was unnecessary, ineffective or dangerous for pregnant women and that influenza was a rare disease, which might be related to the observed ignorance of influenza risk factors and vaccination. Similar reasons for refusing vaccination were found in women in other countries. A comparable percentage of unvaccinated Spanish pregnant women underestimated the personal risk of contracting influenza (23%) or considered the vaccination as non-essential (16%) [19]. Up to 30% of US respondents who reported having received no influenza vaccine were concerned about vaccine effectiveness, and the risk of the mother or baby getting influenza after the vaccination [12, 20]. It should be stressed that during the pandemic of AH1N1pdm09 influenza, no harm to the fetus was found in the population of over 31,000 children exposed to influenza vaccine while in utero [29]. According to a retrospective observational matched-cohort study performed from 2004–2005 to 2008–2009 seasons on a group of over 57 000 women, maternal vaccination was not associated with an increased or decreased risk of preterm or small for gestational age birth [30]. Murthy NC et al. [13] observed that almost 65% of pregnant women did not know medical recommendations for seasonal influenza vaccination at the time of the study, and that IVC was higher among women who indicated correct maternal influenza vaccination recommendations (63.4%), as compared to those who did not know the correct recommendations (39.7%). The US study data also suggested that vaccination offers combined with HCP's recommendations were more likely to result in vaccination being performed than the vaccination recommendations alone; increasing IVC from 14.8% to 70.5% [11, 13],

whereby the IVC was limited by the cost of vaccine. Over 8% of Polish women of childbearing age indicated the lack of influenza vaccination refund as a reason for refusing influenza vaccination in pregnancy. If the vaccination cost was covered by the health insurance, IVC could be 2.3 times higher [18], therefore high IVC rates are observed in the countries where both the vaccine itself and vaccine administration are covered by the health insurance [8].

CONCLUSIONS

The results of our survey indicate that women of childbearing age did not vaccinate against influenza due to the low perception of risk and a lack of providing evidence-based information by HCPs (GPs, OB/GYNs and midwives). These findings highlight the need to improve the performance of influenza vaccination promotion activities among pregnant patients by HCPs, as their recommendations appear to be a powerful method of overcoming barriers to influenza vaccination among patients.

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Limitations

There are several limitations to our findings. Results are subject to reporting bias, since data were self-reported and not verified by review of medical records, including immunization information. Selection bias can result from pregnant women with higher prevalence of gestational diabetes or other complications being included into the study. Therefore, although influenza vaccine is recommended for all pregnant women, it is especially recommended for those with gestational diabetes, so IVC in population of pregnant women without complications might be even lower than the observed 2.8%.

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Conflict of interests

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