Original Paper

Understanding Attitudes Toward Influenza Vaccination: Insights from a Romanian Family Medicine Patient Population

CLAUDIA MONICA DANILESCU[1], VIRGINIA MARIA RADULESCU[2,3], ANCUTA ROXANA DELUREANU[4], MIHAIL CRISTIAN PIRLOG[5]

[1]*Comunity Nursing Department, Faculty of Midwives and Nursing, University of Medicine and Pharmacy of Craiova, Craiova, Romania*

[2]*Department of Medical Informatics and Biostatistics, Faculty of Medicine, University of Medicine and Pharmacy of Craiova, Craiova, Romania*

[3]*Department of Automation and Electronics, University of Craiova, Craiova, Romania*

[4]*Delmedica Private Practice, Craiova, Romania*

[5]*Department of Medical Sociology, Faculty of Medicine, University of Medicine and Pharmacy of Craiova, Craiova, Romania*

ABSTRACT: Introduction: Influenza represents a global respiratory virus infection with significant individual and societal implications, leading to considerable economic burdens and substantial mortality rates. Vaccine hesitancy, characterized by delays or refusals despite vaccine availability, presents a growing challenge in achieving adequate vaccination rates globally. Aim: This study aimed to assess the attitudes of Romanian general practitioners' patients toward influenza vaccination during the recommended immunization period. Materials and Methods: A prospective multi-centered study involving 319 patients across five Family Medicine Offices in Romania was conducted. Participants completed a 12-item Vaccination Attitudes Examination (VAX) scale, assessing factors influencing vaccine acceptance. Statistical analyses were performed to evaluate the impact of demographic variables and attitudes toward vaccination. Results: The study revealed significant variations in attitudes influencing influenza vaccine acceptance. Trust in vaccine benefits and confidence in natural immunity emerged as primary motivators for vaccine acceptance/denial, whereas concerns about commercial profiteering held lesser importance. Gender and residential environment impacted specific attitudes toward vaccination, while factors such as education and employment status did not significantly influence vaccine acceptance. Discussion: The study underscores the critical role of trust in vaccine benefits as a primary driver for vaccine acceptance, diverging from prevalent conspiracy theories. While gender and residential environment influenced attitudes toward vaccination, education and employment status did not exhibit significant correlations with vaccine acceptance. Conclusions: Understanding public attitudes toward vaccination is crucial in designing effective public health strategies. This study emphasizes the importance of trust in vaccine benefits in driving vaccine acceptance, offering insights to enhance vaccination initiatives regionally.

KEYWORDS: *Influenza vaccination; vaccine hesitancy; attitudes toward vaccination; trust in vaccine benefits; public health strategies.*

Introduction

Influenza represents one of the predominant respiratory virus infections that circulates extensively on a global scale. This malady manifests considerable repercussions on both individuals and societies, generating a substantial economic burden attributed to treatment expenses and increased hospitalizations [1-3].

According to estimations by the World Health Organization (WHO) in 2017, the global annual incidence of influenza approximates one billion cases, with a subset of 3-5 million cases categorized as severe infections [4].

While the majority of influenza cases resolve within a week without medical intervention, the disease's impact on mortality is substantial, contributing to an estimated annual toll of 290,000-650,000 deaths globally [5,6].

Ordinarily, among healthy adults, seasonal influenza tends not to instigate severe infections.

However, within the elderly demographic, an influenza infection represents a substantial health risk, exacerbated by the heightened prevalence of comorbidities within this age cohort [7].

Also, individuals grappling with underlying comorbidities, inclusive of cardiovascular diseases, chronic respiratory conditions, diabetes, obesity, neurological ailments, and concurrent bacterial infections, manifest heightened susceptibility to influenza infections, further amplifying the epidemiological burden [8,9].

Although various measures exist to mitigate influenza incidence, vaccination stands out as the most efficacious preventive strategy [10].

However, diverging recommendations among countries delineate discrepancies regarding the

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primary target populations for influenza vaccination.

The WHO advocates annual vaccination for pregnant women, children aged six months to five years, older adults (>65 years), individuals with diverse comorbidities, and healthcare workers (HCWs) [11].

Conversely, the US Centre's for Disease Control and Prevention (CDC) extends its recommendation to encompass all individuals aged six months and older, emphasizing high-risk populations such as adults aged >65 years, adults with chronic health conditions, and pregnant individuals [12].

Numerous nations have since instituted policies advocating influenza vaccination for high-risk populations, especially the elderly [4,13].

Despite these explicit guidelines, influenza vaccination rates exhibit significant variability across global regions [1].

Recorded vaccination coverage among individuals aged >6 months over the past five years demonstrated noteworthy diversity, with Saudi Arabia documenting the lowest rate at 11.0% (2021) and Brazil reporting the highest coverage of 92.0% (2018).

Examination of influenza vaccination coverage in the US reveals consistently higher rates among older adults (69.8%) and children (63.8%) compared to the national average (51.8%), thereby indicating markedly lower coverage among adults aged 18-64 years in comparison to the overall population average [14].

Therefore, comprehending impediments to vaccination and motivators influencing vaccine acceptance across various regions stands imperative in enhancing global influenza vaccination coverage.

Recognizing this declining trend, the World Health Organization (WHO) flagged vaccine hesitancy as one of the paramount global health threats in 2019.

The phenomenon of vaccine hesitancy, characterized by delays in vaccine acceptance or outright refusal despite vaccine availability [15], significantly impedes adequate vaccination uptake [16].

Reasons underlying this hesitancy encompass decreased efficacy in specific years, concerns over potential vaccine side effects, misconceptions regarding vaccine-induced disease, beliefs in alternative health practices obviating the necessity for vaccines, and the propagation of conspiracy theories through social networks alleging financial gains for physicians advocating vaccines, along with pharmaceutical companies disseminating false vaccine-related information [17-20].

Vaccine hesitancy towards the influenza vaccine persists as a prevalent phenomenon on a global scale [21,22].

Similarly, emerging data indicate a growing hesitancy concerning COVID-19 vaccines, observed both within the general populace and among healthcare professionals [23,24].

The aim of our study was to measure the attitude of a convenience sample of Romanian general practitioners' patients toward vaccination during the recommended period of influenza immunization process.

Material and Methods

A prospective and multicenter study was conducted between November to December 2023 in five General Practice Offices in Craiova, Dolj County, Romania.

The study sample consisted of 319 patients who presented to their GP for periodical health assessment or other reasons related to their health status.

Before the health-status evaluation, the individuals were asked to fill a 12-item scale (Vaccination Attitudes Examination-VAX).

After that, they performed the health-check and received the recommendation for immunization against influenza through the vaccine which is currently used in the Romanian campaign of flu-vaccination.

Were also recorded the participants' demographic (age, gender, residence, professional, educational and family status), respectively the personal history for chronic diseases.

As above-mentioned, the evaluation of attitudes and intentions towards vaccines was conducted using a 12-item Vaccination Attitudes Examination (VAX) Scale, categorized into four distinct subgroups as delineated in previous research: (T1) mistrust of vaccine benefits, (T2) worries about unforeseen future effects, (T3) concerns about commercial profiteering, and (T4) preference for natural immunity [25].

Within these subcategories, a scoring system was employed, where a range of 5-6 out of a maximum of 6 denoted a high level of concern, 3-4 signified an intermediate level, and 1-2 indicated a low level of concern. These scores were indicative of the extent of negative attitudes individuals held towards the vaccine.

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The Romanian adaptation of the VAX scale demonstrated strong reliability, along with favourable discriminative and convergent validity. The scale exhibited a robust fit, thus endorsing its suitability for identifying individuals within the Romanian population who exhibit vaccine hesitancy [26].

For the current study, it has been found that the overall Cronbach's alpha of VAX scale used is 0.9455, which indicates a high level of internal consistency. The reliability of each factor has also been assessed, and the analysis has revealed that the Cronbach's alpha score is supported and confirmed for each of the subcategories, as following: (T1) 0.966; (T2) 0.901; (T3) 0.946; (T4) 0.969. The research conducted received approval from the Ethics Committee of Craiova University of Medicine and Pharmacy of Craiova, adhering to the principles outlined in the Helsinki Declaration. Participation in the study was entirely voluntary, with individuals joining upon providing written informed consent. Stringent measures were implemented to ensure the security and confidentiality of participants' data.

All statistical analyses were performed by IBM SPSS Statistics 25.0 (Chicago, IL, USA), while the primary data were recorded in Microsoft Excel files.

Results

During the study period, were recruited 319 subjects, as a convenience sample, without being considered as representative for the general population of the Craiova city.

Analyzing the social and demographic details of the individuals involved in the research, it was observed a predominance of women (59.87%), with an average level of education (56.11%), being in a relationship (marriage, consensual union, couple) (71.79%) and professional active (53.61%) (Table 1).

Table 1. The socio-demographic characteristics of the study sample.

		M ± SD
Age		56.44 (17.10)
		n (%)
Gender	Male	128 (40.12)
	Female	191 (59.87)
Environment	Urban	255 (79.94)
	Rural	64 (20.06)
Education	Gymnasium	21 (6.58)
	High school	179 (56.11)
	Higher education	119 (37.30)
Marital status	Single	90 (28.21)
	Couple	229 (71.79)
Employment Status	Worker	108 (33.86)
	Healthcare professionals	40 (12.54)
	Education professionals	23 (7.21)
	Unemployed	13 (4.07)
	Retired	135 (42.32)

The outcomes of the study indicate that a marked contrast exists in the ratings attributed to each factor that influences the decision to accept influenza vaccination. Specifically, the analysis of the data revealed a highly significant difference ($p<.0001$) in the ratings for each factor, suggesting that some factors may have a greater impact than others on the decision-making process. Thus, we observed that the positive answer to vaccine recommendation was based on their belief for the current and future vaccine benefits (T1, T2 $p<0.0001$), respectively the boost that vaccine bring to the natural immunity (T4, $p<0.0001$) and the low impact of the pharmaceutical industry over this public health issue (T3, $p<0.0001$).

Moreover, the results demonstrate that gender has an influence on factors T1 and T3, as indicated by the p-values below the alpha=0.05 significance level ($p=0.0266$ and $p=0.0259$, respectively). Additionally, the environment of residence of the population under analysis has an impact on T1, T2, and T3, as evidenced by the p-values that were below the alpha=0.05 confidence level (Table 2).

Table 2. Correlations of the attitude factors, vaccination decision and demographic characteristics.

VAX factors	**Vaccinated**	**Median (Q1-Q3)**	**p**	**Gender**	**Median (Q1-Q3)**	**p**	**Residence**	**Median (Q1-Q3)**	**p**
T1	Y	17.00 (17.00-18.00)	**<0.0001**	Female	17.00 (15.00-18.00)	**0.0266**	Rural	16.00 (8.75-17.00)	**0.0023**
	N	7.00 (5.00-10.00)		Male	17.00 (10.75-18.00)		Urban	17.00 (15.00-18.00)	
T2	Y	4.00 (3.00-5.00)	**<0.0001**	Female	4.00 (4.00-6.00)	0.1303	Rural	6.00 (4.00-9.25)	**<0.0001**
	N	10.00 (7.00-12.00)		Male	5.00 (4.00-7.00)		Urban	4.00 (4.00-6.00)	
T3	Y	4.00 (3.00-5.00)	**<0.0001**	Female	4.00 (3.00-6.00)	**0.0269**	Rural	6.00 (4.00-9.00)	**<0.0001**
	N	10.00 (7.00-15.00)		Male	5.00 (3.00-8.00)		Urban	4.00 (3.00-6.00)	
T4	Y	6.00 (4.00-8.00)	**<0.0001**	Female	7.00 (4.00-10.00)	0.3710	Rural	8.00 (6.00-10.00)	0.1426
	N	16.00 (10.00-18.00)		Male	7.00 (5.00-11.00)		Urban	7.00 (4.00-10.50)	

*** p Mann-Whitney test**

Regarding the presence of children in the family, when they could be considered as a more protective factors when talk about decision of vaccination, the results of our study have shown that only the concerns about commercial profiteering, T3 factor, was influenced by them. A quite similar situation was recorded regarding the chronic disease diagnosis on the subjects where those with such a medical condition (207 individuals-64.89%) were not influenced in their decision by this health-complication (Table 3).

However, in our study sample, despite the declared attitude towards vaccination it was proved that half of the individuals with a diagnosis of chronic disease (163 subjects-51.10%) has accepted to be immunized against influenza within the current vaccination national campaign.

Table 3. Correlations of the attitude factors, vaccination decision and social and medical characteristics.

VAX factor	Children	Median (Q1-Q3)	p	Chronic Diseases	Median (Q1-Q3)	p
T1	Yes	17.00 (11.00-18.00)	0.1173	Yes	17.00 (15.00-18.00)	0.5657
	No	17.00 (16.00-18.00)		No	17.00 (10.00-18.00)	
T2	Yes	5.00 (4.00-7.00)	0.0811	Yes	4.00 (4.00-6.00)	0.2803
	No	4.00 (3.00-5.25)		No	5.00 (4.00-8.00)	
T3	Yes	5.00 (3.00-7.00)	**0.0016**	Yes	5.00 (3.00-7.00)	0.4836
	No	3.00 (3.00-5.00)		No	4.00 (3.00-7.00)	
T4	Yes	7.00 (5.00-11.00)	0.0918	Yes	7.00 (4.00-10.00)	0.2564
	No	6.00 (4.00-8.00)		No	7.00 (5.00-11.00)	

*** p Mann-Whitney test**

Table 4. Relationship between attitude factors and professional status and education level.

Factor	Employment Status	Median (Q1-Q3)	p	Education	Median (Q1-Q3)	p
T1	Education	17.00 (13.50-18.00)	**0.0394**	Higher Education	17.00 (15.00-18.00)	0.0981
	Healthcare	17.00 (16.00-18.00)		College	17.00 (10.00-18.00)	
	Retired	17.00 (15.00-18.00)		Secondary school	17.50 (15.50-18.00)	
	Unemployed	17.00 (10.00-18.00)		Primary Education	18.00 (17.50-18.00)	
	Worker	16.50 (9.00-17.00)		Higher Education	4.00 (4.00-6.00)	0.6317
T2	Education	4.00 (4.00-6.50)	0.3610	College	5.00 (4.00-7.00)	
	Healthcare	4.00 (4.00-5.25)		Secondary school	4.00 (4.00-5.00)	
	Retired	4.00 (4.00-6.00)		Primary Education	4.00 (3.50-4.50)	
	Unemployed	4.00 (3.00-6.00)		Higher Education	4.00 (3.00-6.00)	0.2022
	Worker	5.00 (4.00-8.00)		College	5.00 (3.00-8.00)	
T3	Education	5.00 (4.00-7.00)	0.2567	Secondary school	4.50 (3.25-6.75)	
	Healhcare	4.00 (3.00-5.00)		Primary Education	4.00 (3.50-4.00)	
	Retired	4.00 (3.00-6.00)		Higher Education	7.00 (4.50-11.00)	0.2554
	Unemployed	4.00 (3.00-5.00)		College	7.00 (5.00-10.00)	
	Worker	5.00 (3.00-8.00)		Secondary school	8.00 (4.00-10.75)	
T4	Education	7.00 (3.00-13.50)	0.7253	Primary Education	4.00 (3.50-4.00)	
	Healhcare	6.50 (4.75-9.00)				
	Retired	6.00 (4.00-9.00)				
	Unemployed	7.00 (5.00-9.00)				
	Worker	7.00 (5.00-11.25)				

*** p Kruskal-Wallis test**

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Upon analyzing the p-values for each factor in Table 4, it has been determined that neither education nor employment status holds significant influence over the acceptance or non-acceptance of influenza vaccination.

The results have been carefully examined (Kruskal-Wallis test), and it can be concluded that there is no statistically significant correlation between these two factors and the decision to accept or reject vaccination against influenza (Table 4).

Discussions

Vaccines play a pivotal role in preventing and managing influenza, endorsed by various worldwide and local public health entities. Nevertheless, discrepancies arise among different nations regarding the prioritization of specific demographics for influenza vaccination, leading to conflicting recommendations on target populations for vaccination.

In our country, the ongoing influenza vaccination drive prioritizes particularly vulnerable groups, including children, pregnant women, individuals with chronic cardiovascular, respiratory, kidney, liver, and neurological conditions, those with metabolic, oncological, or autoimmune disorders, people with congenital malformations, individuals living with HIV/AIDS, the elderly, and healthcare workers [27].

Despite concerted efforts by healthcare authorities, the vaccination coverage remains below anticipated levels. Consequently, understanding the underlying reasons for vaccine refusal becomes increasingly crucial within this context.

Our study contributes to the collective effort aimed at examining the population's perspective on influenza immunization.

Specifically, our research focused on identifying the primary factors influencing individuals' decisions regarding vaccination.

According to our working instrument, there are those four main reasons that stands behind the decision of accepting vaccination, respectively mistrust of vaccine benefits, worries about unforeseen future effects, concerns about commercial profiteering, and preference for natural immunity.

Our study sample revealed that trust in the vaccine was the primary motivator for those who accepted vaccination, while a belief in their own immunity was the primary reason for refusal.

Unlike certain international studies [28-34], our investigation did not find cost as a significant barrier to vaccination due to the complete reimbursement of expenses during the ongoing campaign.

The influence of gender on the inclination toward vaccination exhibited notable significance in only two domains within our study cohort.

Specifically, women demonstrated a higher propensity to place trust in the perceived benefits of the vaccine, whereas men exhibited increased apprehension regarding potential commercial exploitation associated with the vaccine.

Consequently, 79.06% of women opted for vaccination, contrasting with 69.53% of men who concurred.

This finding diverges from certain prior studies that underscored an inverse pattern in gender disparity, where a slightly elevated inclination towards vaccination was observed among men (45.6%-56.5%) in comparison to females (43.6%-47.6%) [35-37].

The domains explored within the VAX scale exhibited a direct correlation with the populace's educational background and knowledge base. Within our study cohort, a predominant percentage of individuals possessed an average level of education, with 62.69% having completed gymnasium or high school, while only one-third (37.31%) pursued higher education. Interestingly, this distribution did not significantly impact the outcomes on the VAX scale across any of the four domains.

In contrast to our findings, extensive literature highlights the influential role of education and comprehension in shaping individuals' decisions regarding vaccine acceptance.

Other studies have shown a positive association between higher levels of education and a predisposition toward vaccination acceptance [38,39].

Additionally, an increased emphasis on informed knowledge within the biomedical and vaccine domains markedly amplifies individuals' willingness to undergo vaccination [40].

Conclusions

Within the landscape of escalating infectious occurrences, vaccination assumes a paramount role within prevention strategies.

A comprehensive understanding of public sentiment regarding artificial immunization stands as a pivotal determinant in shaping the architecture of vaccination initiatives.

Our investigation has elucidated that the primary driver influencing the inclination towards vaccine acceptance resides in trust regarding the perceived benefits of vaccination, whereas conspiracy theories occupy a lower priority in this regard.

These findings hold significant promise in informing the development of nuanced and effective public health strategies at a regional level.

Conflict of interests

None to declare.

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Corresponding Author: Virginia Maria Rădulescu, Department of Medical Informatics and Biostatistics, University of Medicine and Pharmacy of Craiova, Romania, e-mail: virginia.radulescu@edu.ucv.ro