# STUDY ON THE ATTITUDE OF THE POPULATION TOWARDS THE FLU VACCINE AFTER THE COVID-19 PANDEMIC

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RESEARCH ARTICLE

**Abstract**

*The flu is a seasonal pathology that can be found all over the globe, affecting millions of people – that is why it represents a public health problem. Vaccination is the main possibility to prevent the seasonal influenza. The price of the vaccine can be compensated up to 100%, especially for the older population with chronic pathologies. The need for vaccination is different from the intent of vaccination. Evaluating a number of 244 of patients, there is a decrease regarding the intention of vaccination for seasonal influenza after the experience of Civid-19 pandemic.*

## INTRODUCTION

Seasonal influenza - the flu - is an acute respiratory infection caused by influenza viruses. It is common in all parts of the world because influenza spreads easily between people by cough or sneezing. Seasonal influenza spreads easily, with rapid transmission in crowded areas including schools and nursing homes. (www.who.int)

The etiology of flu is represented by 4 types of influenza viruses: A, B, C and D. Influenza A and B viruses circulate and cause seasonal epidemics of disease. Influenza A viruses are the only influenza viruses known to cause flu pandemics (i.e., global epidemics of flu disease). A pandemic can occur when a new and different influenza A virus emerges that infects people, has the ability to spread efficiently among people, and against which people have little or no immunity. Influenza C virus infections generally cause mild illness and are not thought to cause human epidemics. Influenza D viruses primarily affect cattle with spillover to other animals but are not known to infect people to cause illness. (https://vaccination-info.europa.eu)

Influenza A viruses are divided into subtypes based on two proteins on the surface of the virus: hemagglutinin (H) and neuraminidase (N). There are 18 different hemagglutinin subtypes and 11 different neuraminidase subtypes (H1 through H18 and N1 through N11, respectively). While more than 130 influenza A subtype combinations have been identified in nature, primarily from wild birds, there are potentially many more influenza A subtype combinations. Current subtypes of influenza A viruses that routinely circulate in people include A(H1N1) and A(H3N2).

Symptoms of influenza usually begin around 2 days of incubation. Symptoms of influenza include acute onset of fever, cough, sore throat, body aches and fatigue.

Most people recover from fever and other symptoms within a week without requiring medical attention. However, influenza can cause severe illness or death, especially in people at high risk. (Thompson WW et al., 2009)

Influenza can worsen symptoms of other chronic diseases. In severe cases, influenza can lead to pneumonia and sepsis.

All age groups can be affected but there are groups that are more at risk than others.

People at greater risk of severe disease or complications when infected are pregnant women, children under 5 years of age, older people, individuals with chronic medical conditions (such as chronic cardiac, pulmonary, renal, metabolic, neurodevelopmental, liver or hematologic diseases) and individuals with immunosuppressive conditions/treatments

(such as HIV, receiving chemotherapy or steroids, or malignancy).

Health and care workers are at high risk of acquiring influenza virus infection due to increased exposure to the patients, and of further spreading particularly to vulnerable individuals.

While seasonal influenza viruses are detected year-round, flu viruses typically circulate during the fall and winter - the flu season. The exact timing and duration of flu seasons varies, but flu activity often begins to increase in October. Most of the time flu activity peaks between December and February, although significant activity can last as late as May. Since the start of the COVID pandemic, the timing and duration of flu activity has been less predictable.

Most people will recover from influenza on their own requiring rest, liquids and anti-inflammatory nonsteroidal medication. People with severe symptoms or other medical conditions should seek medical care.

Vaccination is the best way to prevent influenza. (Nair H et. Al., 2011)

Safe and effective vaccines have been used for more than 60 years. Vaccines are updated routinely with new vaccines developed that contain viruses that match those circulating. Several inactivated influenza vaccines and recombinant influenza vaccines are available in injectable form.

Vaccine protection is generally obtained within 10 to 14 days of administration, and the duration of post-vaccination immunity is on average one year.

Immunity from vaccination goes away over time so annual vaccination is recommended to protect against influenza. Annual vaccination is recommended for: pregnant women, children aged 6 months to 5 years, people over age 65, people with chronic medical conditions, health workers.

Other ways to prevent influenza: washing hands regularly, covering mouth and nose when coughing or sneezing, isolation, avoiding close contact with sick people etc.

The epidemic of COVID-19 broke out at the end of 2019 and was declared a pandemic by the World Health Organization (WHO) on March 11, 2020. It is the first pandemic caused by a Coronavirus.

The main symptoms of COVID-19 are: fever, cough, general weakness or tiredness, change or loss of taste or smell, sore throat, headaches, muscle pain, diarrhea.

The severity of the disease varies greatly from person to person. People with severe symptoms needed specialist medical care and assistance. Unfortunately, some people with COVID-19 required hospitalization, some even requiring intensive care, sometimes for longer periods.

The most effective method of preventing COVID-19 is considered the vaccination, in addition to preventive measures such as wearing protective masks and physical distancing. In the case of vaccinated people, the probability of developing severe forms of the disease or needing hospitalization also decreases. For this reason, public health bodies strongly recommended the full schedule of vaccination against COVID-19 for all eligible persons as soon as possible.

In June 2023 over 8.1 million Romanians have been completely vaccinated against Covid-19 and 2.6 million people received the booster dose. (www.insp.gov.ro)

**MATERIAL AND METHOD**

The study was conducted on a group of 244 patients consulted in September-October 2023, in the specialized outpatient clinic of the Bihor County Emergency Clinical Hospital. Only people over the age of 18 were included in the study. The gender and age distribution of the people questioned is shown in the table below (Table 1):

Table 1.

**Demographic representation of the interviewed patients**

| Patients | Age | | | | Residence | |
|---|---|---|---|---|---|---|
| | 18-40 years | 40-65 years | Over 65 years | Total | Urban | Rural |
| Men | 15 | 19 | 23 | 57 | 44 | 13 |
| Women | 38 | 77 | 72 | 187 | 128 | 59 |
| Total | 53 | 96 | 95 | 244 | 172 | 72 |

The results obtained where statistically evaluated using analysis of variance (ANOVA). This method divides the observed cumulative variation of data set into two parts: systematic factors and random factors (system factors have statistical effects on specific data sets, while random factors do not). For our study we used an online ANOVA table Calculator (https://calculator-online.net/anova-

calculator/). One-way ANOVA calculator provides: Test Static F and P-value, Anova Data Summary Table, Sum of square between groups, Total sum of square, and mean square for error. A P-value less than 0.05 is typically considered to be statistically significant, in which case the null hypothesis should be rejected. A p-value greater than 0.05 means that deviation from the null hypothesis is not statistically significant, and the null hypothesis is not rejected.

The aim of the study is to evaluate the attitude of the population towards vaccination against seasonal flu and the extent to which the Covid-19 pandemic influences the vaccination decision.

## RESULTS AND DISCUSSIONS

According to the Ministry of Health (Order no. 3278/804 of 2023), the beneficiaries of compensated flu vaccine must contact family doctors and doctors of all specialties that are under the contract with a health insurance company, for issuing a compensated prescription (100% or 50%) (www.dspbihor.gov.ro)

100% compensation is attributed to:

1. children aged ≥ 6 months and < 19 years;

2. pregnant women;

3. persons aged ≥ 19 years and < 65 years in one of the following situations: chronic cardiovascular diseases; chronic respiratory diseases; chronic kidney disease; chronic liver diseases; chronic neurological diseases; metabolic diseases; oncological diseases; autoimmune diseases; congenital malformation; obesity; asplenia; people with HIV/AIDS infection; immunosuppressive therapy; transplant/ congenital immunosuppression.

4. people over 65 years old;

5. medical staff

Compensation 50%:

1. people aged ≥ 45 years and < 65 years, without chronic diseases.

People who are not included in the compensation categories (100% or 50%) from the above list can be vaccinated after purchasing the vaccine with full price.

The influenza vaccine prescription can be issued by any pharmacy in contract with the home of health insurance that has the 2023/2024 flu vaccine in stock. After picking up the vaccine, the beneficiary can contact either a vaccinating doctor or a dispensing pharmacy.

The flu vaccine administration service (inoculation) is free for the beneficiary, both at vaccinating doctors and pharmacies.

Before analyzing flu vaccination, patients were asked about their vaccination against Covid-19. Out of 244 patients, 179 confirmed that they were vaccinated against Covid-19 with one of the vaccines recommended by the Ministry of Health (Table 2).

Table 2.

**Number of patients vaccinated against Covid-19**

| Patients | Vaccinated | Non-Vaccinated |
|---|---|---|
| Men | 43 | 14 |
| Women | 127 | 50 |

**Data Summary**

| Groups | N | ∑x | Mean | ∑x² | Std. Dev. | Std. Error |
|---|---|---|---|---|---|---|
| Vaccinated | 2 | 170 | 85 | 17978 | 59.397 | 42 |
| Non vaccinated | 2 | 64 | 32 | 2696 | 25.4558 | 18 |
| **Total** | **4** | **234** | **58.5** | **20674** | | |

P value = 0.3658

P-value indicates that there is not a significant difference between men and women regarding vaccination against Covid-19. According to Toshkov D. (2023) women have been significantly more likely than men to express hesitancy toward COVID-19 vaccination and, to a lesser extent, to refuse vaccination altogether. This gender gap is puzzling because women have been more likely to perceive higher risks from COVID-19, to approve more restrictive measures to fight the pandemic and to be more compliant with such measures.

Table 3.

**Patients that used to get vaccination to prevent seasonal influenza (before Covid-19 pandemic)**

| Patients | Vaccinated | Non-Vaccinated |
|---|---|---|
| Men | 21 | 36 |
| Women | 72 | 105 |

**Data Summary**

| Groups | N | ∑x | Mean | ∑x² | Std. Dev. | Std. Error |
|---|---|---|---|---|---|---|
| Vaccinated | 2 | 93 | 46.5 | 5625 | 36.0624 | 25.5 |
| Non Vaccinated | 2 | 141 | 70.5 | 12321 | 48.7904 | 34.5 |
| **Total** | **4** | **234** | **58.5** | **17946** | | |

**ANOVA Summary**

| Source | Degrees of Freedom (DF) | Sum of Squares (SS) | Mean Square (MS) | F-Stat | P-Value |
|---|---|---|---|---|---|
| **Between Groups** | 1 | 576 | 576 | 0.313 | 0.6321 |
| **Within Groups** | 2 | 3681 | 1840.5 | | |
| **Total** | 3 | 4257 | | | |

Table 4.

**Patients that are vaccinated or want to be vaccinated for seasonal influenza (after Covid-19 pandemic)**

| Patients | Vaccinated | Non-Vaccinated |
|---|---|---|
| Men | 15 | 42 |
| Women | 66 | 111 |

**Data Summary**

| Groups | N | ∑x | Mean | ∑x² | Std. Dev. | Std. Error |
|---|---|---|---|---|---|---|
| Vaccination | 2 | 81 | 40.5 | 4581 | 36.0624 | 25.5 |
| Non Vaccination | 2 | 153 | 76.5 | 14085 | 48.7904 | 34.5 |
| **Total** | **4** | **234** | **58.5** | **18666** | | |

**ANOVA Summary**

| Source | Degrees of Freedom (DF) | Sum of Squares (SS) | Mean Square (MS) | F-Stat | P-Value |
|---|---|---|---|---|---|
| **Between Groups** | 1 | 1296 | 1296 | 0.7042 | 0.4897 |
| **Within Groups** | 2 | 3681 | 1840.5 | | |

**Data Summary**

| Groups | N | ∑x | Mean | ∑x² | Std. Dev. | Std. Error |
|---|---|---|---|---|---|---|
| Total | | 3 | | 4977 | | |

There is a difference of 12 persons (4.91%) that do not wish any longer to get vaccinated against the flu, after the Covid-19 pandemic.

Statistical comparation between the group of those vaccinated against the flu (Group 1), and those non-vaccinated (Group 2), before and after the Covid-19 pandemic, is showed below:

| Group 1 | Group 2 |
|---|---|
| 93 | 141 |
| 81 | 153 |

**∑Group 1 = 174**          **∑Group 2 = 294**

**Data Summary**

| Groups | N | ∑x | Mean | ∑x² | Std. Dev. | Std. Error |
|---|---|---|---|---|---|---|
| Group 1 | 2 | 174 | 87 | 15210 | 8.4853 | 6 |
| Group 2 | 2 | 294 | 147 | 43290 | 8.4853 | 6 |
| Total | 4 | 468 | 117 | 58500 | | |

**ANOVA Summary**

| Source | Degrees of Freedom (DF) | Sum of Squares (SS) | Mean Square (MS) | F-Stat | P-Value |
|---|---|---|---|---|---|
| Between Groups | 1 | 3600 | 3600 | 50 | 0.0194 |
| Within Groups | 2 | 144 | 72 | | |
| Total | 3 | 3744 | | | |

A P-value less than 0.05 shows that the Covid -19 pandemic had an influence on the decision of vaccination against seasonal influenza. A negative attitude against flu vaccination was debated in a study conducted by the Romanian Ministry of Health and the National Institute of Public Health in 2023. According to this study the reasons for not getting an influenza vaccination are: the vaccine was not available (25.8%); people do not think that the vaccine protects them from the disease (16.7%); consider natural immunity better, through illness (13.6%); they need additional information (6.1%).

For approving the vaccination, people need more information about: the adverse effects of vaccines (33.3%); vaccination complications (28.8%); benefits (27.3%),

effectiveness (27.3%) and mode of action of vaccines (27.3%); severity of influenza (24.2%).

Nowadays, according to many international institutions for communicable diseases, the flu vaccine and COVID-19 vaccine should be given at least 14 days apart. There is no particular requirement regarding the order of receiving the influenza and COVID-19 vaccine. If both vaccines are available at the same time and an individual is eligible for both, it is recommended to prioritize the COVID-19 vaccine.

## CONCLUSIONS

Seasonal influenza is a public health problem worldwide that usually affect millions of people in the cold months of the year.

For more than half of century, the pharmaceutical industry offers the possibility of vaccination to reduce the impact of flu on society's heath.

Usually children, pregnant women, and old people with chronic diseases are more exposed to get flu in a more severe way.

At the present time the flu vaccine can be obtained in Romania with up to 100% compensation. Despite this, we found a 4.9% drop in interest in flu vaccination.

The decision not to vaccinate against the seasonal influenza is partially determined by the experience of the population during the Covid 19 pandemic.

## REFERENCES

https://www.who.int/news-room/fact-sheets/detail/influenza-(seasonal)?gclid=EAIaIQobChMI9aLe6r7uggMV8JyDBx3MEQrtEAAYASAAEgIV9vD_BwE

Thompson WW, Weintraub E, Dhankhar P, Cheng OY, Brammer L, Meltzer MI, et al. Estimates of US influenza-associated deaths made using four different methods.Influenza Other Respi Viruses. 2009; 3:37-49

Nair H, Abdullah Brooks W, Katz M et al. Global burden of respiratory infections due to seasonal influenza in young children: a systematic review and meta-analysis.Lancet 2011; 378: 1917–3

https://www.cdc.gov/flu/about/viruses/types.htm

https://www.dspbihor.gov.ro/2023/10/Comunicate%20de%20presa/Comunicat_de_presa_03102023.pdf

https://calculator-online.net/anova-calculator/

Dimiter Toshkov, Explaining the gender gap in COVID-19 vaccination attitudes, *European Journal of Public Health*, Volume 33, Issue 3, June 2023, Pages 490–495, https://doi.org/10.1093/eurpub/ckad052

INSP, Ministry of Health – Flu and flu vaccination – Situation analysis, 2023

https://insp.gov.ro/centrul-national-de-supraveghere-si-control-al-bolilor-transmisibile-cnscbt/infectia-cu-noul-coronavirus-sars-cov-2/raportare-saptamanala-vaccinare-impotriva-covid-19/

https://vaccination-info.europa.eu/en/disease-factsheets/influenza?gclid=Cj0KCQiAyKurBhD5ARIsALamXaEUw3xR03v4Kk7DyCmyoiNSsYA-vpdvTVFNypWr5z0SSbSt_W7JqBcaAi-DEALw_wcB

https://www.nicd.ac.za/the-covid-19-vaccine-and-the-flu-vaccine/