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ORIGINAL PAPER

# ATTITUDES REGARDING VACCINATION ON THE EXAMPLE OF COVID-19 PREVENTION

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**Abstract**

**Background:** COVID-19 vaccines for public use were approved at the turn of 2020 and 2021. The level of vaccination coverage against COVID-19 in Poland is one of the lowest in Europe. Despite scientific studies there are people who are afraid of vaccinations and spread false information about them. Vaccinations against COVID-19 allowed us to learn about the attitudes of people who decided to be vaccinated, which can be used to improve the effectiveness of the infectious diseases prevention in the work and public environment. The aim of the study was to analyze the main reasons determining a decision to get vaccinated against COVID-19. **Material and Methods:** The study was carried on among all the people who decided to be vaccinated against COVID-19 in Nofer Institute of Occupational Medicine in Łódź. All vaccinated people completed an anonymous survey containing questions related to the most important factors, which encouraged them to undergo this vaccination. **Results:** The study involved 945 people vaccinated against COVID-19. Statistical significance was revealed between 3 different reasons (one's own health, stress-free work, safe travelling and easier access to entertainment) for getting vaccinated and age, gender and a form of employment. The authors also found statistical significance of the correlation between the age, gender, education and form of employment of the respondents and the reason for choosing the specific vaccine product. **Conclusions:** Despite evidence presented by scientists about the effectiveness and safety of vaccinations, many people refused and still refuse to receive the vaccine. In order to increase the readiness of the population for vaccinations against COVID-19 and subsequent ones, if there is a need to limit new epidemics, the following should be done: introduce activities to raise health awareness, intensify strategies and campaigns aimed at increasing public trust in available vaccines against COVID-19, devolop individualized messages that contribute to vaccine hesitancy. Med Pr Work Health Saf. 2024;75(2)

**Key words:** public health, immunization, vaccine hesitancy, COVID-19 pandemic, COVID-19, information-seeking behavior

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## INTRODUCTION

Introducing vaccinations against infectious diseases has significantly improved the epidemiological situation in the world, thus becoming one of the greatest achievements of modern medicine. COVID-19 vaccines for public use were approved at the turn of 2020 and 2021. Due to their rapid introduction to the market, their safety was questioned from the beginning, but they have become the most effective method in preventing the disease, which practically paralyzed the entire world when the pandemic was announced.

Based on data published by World Health Organization (WHO), as of July 18, 2023 there were 767 972 961 confirmed cases of COVID-19 worldwide, which was the cause of 6 681 433 deaths [1]. As of July 9, 2023 a total of 13 474 185 140 doses of vaccine were administered, of which the number of people who received at least one dose of vaccine reached 5 579 675 050. The number of people subjected to the full course of vaccination was 5 137 977 280. In Europe, the rate of people fully vaccinated was calculated at 64.45 per 100 inhabitants, while the booster dose was administered in 30.38 per 100 people. A total of 58 223 243 doses of the vaccine were administered in Poland, including 22 983 299 people vaccinated with at least one dose and 22 704 578 people who completed the full course. The rate of people fully vaccinated gained 59.81/100, and the booster dose was administered in 33.02 per 100 people [1].

Project entitled "Factors determining the decision to undergo vaccination against COVID-19"; project manager: Marcin Rybacki, Nofer Institute of Occupational Medicine

The level of vaccination coverage in our country is one of the lowest on the European continent. Lower level was registered only in countries such as Slovenia (57.3), Croatia (55.3), Slovakia (51.1), Serbia (47.9), Albania (44.6), Romania (42.1), Montenegro (40.9), Ukraine (34.6), Bulgaria (29.9), Moldova (26.6) and Bosnia and Herzegovina (25.8). The record-holders in Europe are Malta and Portugal, where the number of people fully vaccinated was over 86/100 people [1].

Despite scientific researches or educational activities that are used to increase awareness about vaccinations and the benefits of their usage, there are people and groups around the world who are afraid of vaccinations and spread false information about them. In Poland since 2011 the number of refusals of compulsory vaccinations has been rising, and has doubled in the last 5 years. In the years 2003–2009, there were 3077–4993 cases of refusals of mandatory vaccinations (in children and adolescents). In 2010, 3437 refusals were reported, and in the next years as follows: 2011 – 4689, 2012 – 5340, 2013 – 7248, 2014 – 12 681, 2015 – 16 689, 2016 – 23 147, 2017 – 30 090, 2018 – 40 342, 2019 – 48 609, 2020 – 50 575, 2021 – 61 368, 2022 – 72 722 [2].

In response to anti-vaccination movements and the unsatisfactory level of vaccination rates, WHO created a special group, which aim was to understand the reasons for refusing vaccinations and to establish an appropriate strategy to increase the acceptance of this form of preventive measures (SAGE Working Group on doubts related to vaccinations). As part of the work, a definition of „vaccine reluctance" was created, which was defined as a delay in accepting or refusing vaccination despite its availability. Uncertainty of vaccinations is complex and depends on the type of vaccine, disease, place and time [3].

Vaccinations against COVID-19, despite a wide educational campaign and even mandatory nature, allowed us to learn about the attitudes of people who decided to be vaccinated, which can be used to improve the effectiveness of the infectious diseases prevention in the work and public environment – especially the use of arguments for vaccinations addressed to specific groups of population differentiated by age, gender, education or employment status. The aim of the study was to analyze the main reasons determining a decision to get vaccinated against COVID-19.

## MATERIAL AND METHODS

The study was carried on among all the people who decided to be vaccinated against COVID-19 in Nofer Institute of Occupational Medicine in Łódź (Instytut Medycyny Pracy – IMP) in the period 18.02.2021–16.06.2021. They were offered 4 products of vaccine: Comirnaty (produced by Pfizer-BioNTech), Spikevax (produced by Moderna), Vaxzevria (produced by Astra Zeneca), JCOVDEN (produced by Janssen-Cilag).

All vaccinated people completed an anonymous survey containing questions related to the most important factors, which encouraged them to undergo this vaccination. Study participants were asked to choose one decisive answer, unless they considered several answers to be equivalent. Among the most important reasons for getting vaccinated they could choose:

- taking care of their own health,
- caring of family health,
- ability to continue work without stress,
- the need for vaccination, as it was a requirement set by the current employer,
- the prospect of ability of travelling to foreign countries and easier use of entertainment (cinema, restaurants, etc.),
- other answer (open question).

When answering the question „What were your main considerations when choosing a specific product of COVID-19 vaccine?", the respondent had the choice of the following reasons:

- an information about the effectiveness of a given vaccine provided in the media,
- getting vaccination as fast as possible, so I chose the product that was available the soonest,
- the shortest possible interval between doses of the vaccine,
- an information about the lowest possible frequency of side effects after vaccination,
- the possibility of being vaccinated with a single-dose preparation,
- the recommendation from a doctor I've visited the last,
- the recommendation from friends/family,
- the fact which product I was vaccinated with did not matter at all
- other answer (open question).

Statistical inferences were performed using SPSS 26.0. In the statistical analysis, in order to check the significance of the relationship between the variables, the $\chi^2$ test of independence of 2 variables was performed. The precise test result (likelihood ratio) based on the regression method was used. Cramer's V coefficient (V) was used as a measure of dependence, and in the case of low expected numbers, the φ coefficient was used. The study didn't have

to get any opinion from the Bioethics Committee, as it was anonymous and no biological material was collected.

## RESULTS

The study involved 945 people vaccinated against COVID-19 at the IMP, including 485 men (51.3%) and 460 women (48.7%). Among them 36 people had primary/middle school education (3.8%), 341 – secondary (36.1%), and 544 (57.6%) – university education. When reporting their current employment situation, 676 people described their status as an employee (71.5%), 155 as self-employed (16.4%), and 81 (8.6%) as a pupil/student.

The reasons for undergoing vaccination and the statistical significance of the correlation between the indicated reasons and the age, gender, education and form of employment of the respondents are presented in Tables 1 and 2.

The most common reason for getting vaccinated was a concern for one's own health, and this criterion was more often used by older age groups (>46 years of age) and women. However, people with primary/middle school education, pupils and students showed such a reason for vaccination relatively less often, which correlated with the attitudes of people <30 years of age.

The second most frequently chosen reason for vaccination was concern for family health, more often indicated by the oldest age group (>65 years), men and people with primary/middle school education.

Nearly 1/4 of respondents stated that the main reason for vaccination was the prospect of safe travel and easier access to entertainment (cinema, restaurants, etc.), and this answer was given more often by younger groups, i.e., pupils/students, people with university education and women.

In an open question (other reason), respondents indicated the following reasons for getting vaccinated:

- planned hospital stay/procedure (4),
- pregnancy (1),

**Table 1.** Reasons for undergoing vaccination against COVID-19 among all the people who decided to be vaccinated against COVID-19 in Nofer Institute of Occupational Medicine in Łódź in the period February 18, 2021–June 16, 2021

| Variable | Participants (N = 945) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | COVID vaccination undergoing reason[a] | | | | | | | | | | | |
| | | | 1 (N = 465, 49.2%) | | 2 (N = 356, 37.7%) | | 3 (N = 72, 7.6%) | | 4 (N = 6, 0.6%) | | 5 (N = 231, 24.4%) | | 6 (N = 31, 3.3%) | |
| | | | n | % | n | % | n | % | n | % | n | % | n | % |
| Age | | | | | | | | | | | | | | |
| 18–30 years | 259 | 27.4 | 94 | 36.3 | 98 | 37.8 | 13 | 5.0 | 0 | 0.0 | 95 | 36.7 | 7 | 2.7 |
| 31–45 years | 390 | 41.3 | 185 | 47.4 | 144 | 36.9 | 25 | 6.4 | 4 | 1.0 | 91 | 23.3 | 19 | 4.9 |
| 46–60 years | 249 | 26.3 | 157 | 63.1 | 90 | 36.1 | 28 | 11.2 | 1 | 0.4 | 39 | 15.7 | 4 | 1.6 |
| 61–75 years | 47 | 5.0 | 29 | 61.7 | 24 | 51.1 | 6 | 12.8 | 1 | 2.1 | 6 | 12.8 | 1 | 2.1 |
| Gender | | | | | | | | | | | | | | |
| male | 485 | 51.3 | 226 | 46.6 | 189 | 39.0 | 46 | 9.5 | 3 | 0.6 | 110 | 22.7 | 16 | 3.3 |
| female | 460 | 48.7 | 239 | 52.0 | 167 | 36.3 | 26 | 5.7 | 3 | 0.7 | 121 | 26.3 | 15 | 3.3 |
| Education | | | | | | | | | | | | | | |
| primary/middle school | 36 | 3.8 | 15 | 41.7 | 16 | 44.4 | 3 | 8.3 | 0 | 0.0 | 8 | 22.2 | 0 | 0.0 |
| secondary | 341 | 36.1 | 166 | 48.7 | 129 | 37.8 | 31 | 9.1 | 1 | 0.3 | 73 | 21.4 | 10 | 2.9 |
| university | 544 | 57.6 | 275 | 50.6 | 201 | 36.9 | 36 | 6.6 | 5 | 0.9 | 141 | 25.9 | 20 | 3.7 |
| Form of employment | | | | | | | | | | | | | | |
| employee | 676 | 71.5 | 346 | 51.2 | 263 | 38.9 | 56 | 8.3 | 6 | 0.9 | 159 | 23.5 | 21 | 3.1 |
| self-employed | 155 | 16.4 | 75 | 48.4 | 52 | 33.5 | 15 | 9.7 | 0 | 0.0 | 41 | 26.5 | 4 | 2.6 |
| pupil/student | 81 | 8.6 | 27 | 33.3 | 29 | 35.8 | 2 | 2.5 | 0 | 0.0 | 25 | 30.9 | 3 | 3.7 |

COVID vaccination undergoing reason: 1 – concern about one's own health, 2 – concern about family health, 3 – ability to continue stress-free work, 4 – the necessity to be vaccinated is a requirement set by one's employer, 5 – the prospect of safe travel and easier access to entertainment (cinema, restaurants, etc.), 6 – other reason.
[a] Multiple choice options.

**Table 2.** Statistical significance of the correlation between the age, gender, education and form of employment of the respondents and the reason for getting vaccinated and choosing the vaccine product among all the people who decided to be vaccinated against COVID-19 in Nofer Institute of Occupational Medicine in Łódź in the period February 18, 2021–June 16, 2021

| Reason | Correlation | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | age (N = 945) | | | gender (N = 945) | | | education (N = 920) | | | form of employment (N = 906) | | |
| | $\chi^2$ | p | V | $\chi^2$ | p | φ | $\chi^2$ | p | V | $\chi^2$ | p | V |
| For getting vaccinated | | | | | | | | | | | | |
| taking care of one's own health | 40.27 | **<0.001** | 0.205 | 2.71 | 0.100 | 0.054 | 1.18 | 0.554 | 0.036 | 9.93 | **0.007** | 0.104 |
| taking care of family health | 3.82 | 0.282 | 0.065 | 0.71 | 0.398 | –0.027 | 0.79 | 0.673 | 0.030 | 1.38 | 0.502 | 0.039 |
| ability to continue stress-free work | 9.25 | **0.026** | 0.101 | 5.00 | **0.025** | –0.072 | 1.80 | 0.406 | 0.045 | 4.39 | 0.111 | 0.061 |
| necessity to be vaccinated is a requirement set by one's employer | 5.37 | 0.147 | 0.069 | 0.00 | 1.000 | 0.002 | 1.86 | 0.394 | 0.041 | 3.53 | 0.171 | 0.048 |
| the prospect of safe travel and easier access to entertainment (cinema, restaurants, etc.) | 34.88 | **<0.001** | 0.193 | 1.68 | 0.195 | 0.042 | 2.48 | 0.290 | 0.052 | 1.45 | 0.485 | 0.040 |
| other reason[a] | 5.93 | 0.115 | 0.078 | 0.00 | 0.974 | –0.001 | 2.80 | 0.246 | 0.042 | 0.28 | 0.871 | 0.018 |
| For choosing the vaccine product | | | | | | | | | | | | |
| the information about the effectiveness of a given vaccine provided in the media | 10.02 | **0.018** | 0.103 | 3.62 | 0.057 | –0.062 | 0.15 | 0.929 | 0.013 | 5.40 | 0.067 | 0.074 |
| getting vaccination as fast as possible, so I chose the product that was available the soonest | 12.94 | **0.005** | 0.120 | 4.63 | **0.031** | –0.070 | 0.92 | 0.633 | 0.032 | 1.93 | 0.382 | 0.044 |
| the shortest possible interval between doses of the vaccine | 0.16 | 0.983 | 0.013 | 0.41 | 0.521 | –0.021 | 4.11 | 0.128 | 0.048 | 5.64 | 0.060 | 0.085 |
| information about the lowest possible frequency of side effects after vaccination | 3.38 | 0.336 | 0.060 | 24.82 | **<0.001** | 0.162 | 4.23 | 0.121 | 0.067 | 3.13 | 0.209 | 0.058 |
| the possibility of being vaccinated with a single-dose preparation | 15.89 | **0.001** | 0.109 | 1.04 | 0.307 | –0.033 | 3.00 | 0.223 | 0.049 | 2.08 | 0.354 | 0.047 |
| the recommendation from the doctor I've visited the last | 0.78 | 0.854 | 0.026 | 2.08 | 0.149 | 0.047 | 4.09 | 0.129 | 0.064 | 0.95 | 0.623 | 0.030 |
| the recommendation from friends/family | 4.36 | 0.225 | 0.066 | 3.31 | 0.069 | –0.059 | 1.69 | 0.430 | 0.043 | 2.20 | 0.333 | 0.053 |
| the fact which product I was vaccinated with did not matter at all | 5.64 | 0.130 | 0.077 | 1.26 | 0.262 | –0.036 | 3.37 | 0.185 | 0.066 | 7.47 | **0.024** | 0.097 |
| no ability to choose the specific product | 1.49 | 0.685 | 0.051 | 0.15 | 1.000 | –0.013 | 2.15 | 0.342 | 0.064 | 2.69 | 0.261 | 0.059 |
| conscious choice of a specific product | 3.21 | 0.360 | 0.054 | 6.63 | **0.018** | 0.079 | 4.17 | 0.124 | 0.061 | 1.69 | 0.430 | 0.032 |

Bolded are statistically significant values.

[a] Other reason: planned hospital stay/procedure (4), pregnancy (1), social (collective) responsibility (9), social pressure (4), pressure exerted by family (2), prospect of returning to normal life (1), full trust in medical recommendations, including undergoing all recommended vaccinations (2), I don't know, that's how it turned out (1).

- social (collective) responsibility (9),
- social pressure (4),
- pressure exerted by family (2),
- prospect of returning to normal life (1),
- full trust in medical recommendations, including undergoing all recommended vaccinations (2),
- I don't know, that's how it turned out (1).

The reasons for choosing the specific COVID-19 vaccine product and the statistical significance of the correlation between the indicated reasons and the age, gender, education and form of employment of the respondents are presented in Tables 2 and 3.

If respondents were given the opportunity to choose the specific product of COVID-19 vaccine, they most often made their decision based on information about the effectiveness of a given product provided in the media (27.6%), and this relatively more often concerned the oldest age group (>60 years of age), men and people with primary/middle school education.

However, the second, similarly frequently indicated reason for choosing the specific product of vaccine (27%) – information about the lowest possible risk of side effects after vaccination – was also chosen by people >60 years of age and people with primary/ /middle school education, but – contrary to the previous reason – women rather than men. Moreover, 22% of the study group made their decision based on availability, without paying attention to the type of vaccine, and another 10% expected a single-dose product.

## DISCUSSION

Analyzing the decision to vaccinate against COVID-19 due to age, this study showed that people aged 18–30 years made their decision equally based on concern for their own health, family health and the possibility of safe travelling and easier access to entertainment (cinema, restaurants, etc.) – 36–37%. More often than other groups they made their decision based on the possibility of undergoing a single-dose vaccination – 13.5% vs. 10.2% in total. The main reason for getting vaccinated in people aged 31–45 years was concern for their own health (47.4%), then concern for the health of their family (36.9%), and in the third place – the prospect of safe travelling and easier access to entertainment (cinema, restaurants, etc.) (23.3%). A small percentage of people in this age group indicated „occupational" reasons for getting vaccinated. The possibility of continuing stress-free work was indicated by 6.4% of respondents, while vaccinations as a requirement set by the employer constituted only 1%.

Among people in the 46–60 age group, concern for their own health and the health of their family were the main reasons for getting vaccinated against COVID-19 (63.1% and 36.1%, respectively), followed by the prospect of safe travelling and easier access to entertainment (15.7%). The possibility of continuing stress-free work was declared by 11.2% as a reason for getting vaccinated, and vaccination as a requirement set by the employer by only 0.4%. Similarly among people in the 61–75 age group, concern for their own health and the health of their family (61.7% and 51.1%, respectively) were among the most common reasons for the decision to get vaccinated against COVID-19, followed by the prospect of safe travelling and easier access to entertainment (12.8%). More often than in other age groups, „occupational" reasons for vaccination against COVID-19 were indicated: the possibility of continuing stress-free work (12.8%) and the requirement set by the employer (2.1%).

When choosing a COVID-19 vaccine product, more likely than other groups they made their decision based on information about the effectiveness of a given vaccine provided in the media (40.4% vs. 27.6% in total), while no one in this age group pointed out the possibility of vaccination with a single-dose product and conscious choice of a specific one.

Research carried out by Luyten et al. showed that people aged 50–59 years had greater confidence in vaccines than people in the age group 20–29 years [4]. Based on a questionnaire study carried out by Kupsova et al. in the Czech Republic in autumn 2021 among 2408 respondents, it was found that the most frequently mentioned reasons for vaccination were the desire to protect one's own health and that of family members (74.7% of respondents) and to facilitate social life (69.1%). In almost half of the cases, the motivation was to prevent the spread of the disease in the workplace. Women, members of the Faculty of Military Health Sciences and people vaccinated against influenza were more likely to say that the reason for getting vaccinated against COVID-19 was the desire to protect their health, in contrary to younger people (81% vs. 67.7%). Younger people more often claimed, the reason for vaccination was an easier access to social life (84% vs. 55.8%) and the possibility of avoiding tests for SARS-CoV-2 infection (51.1% vs. 25.5%). The most frequently mentioned reasons for not getting vaccinated were fear of side effects (79.1%), lack of confidence in the effectiveness of

**Table 3.** Reasons for choosing the COVID-19 vaccine product among all the people who decided to be vaccinated against COVID-19 in Nofer Institute of Occupational Medicine in Łódź in the period February 18, 2021–June 16, 2021

| Variable | Participants (N = 945) | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | vaccine product choosing reason[a] | | | | | | | | | | | | | | | | | |
| | n | % | 1 (N = 261, 27.6%) | | 2 (N = 119, 12.6%) | | 3 (N = 54, 5.7%) | | 4 (N = 255, 27.0%) | | 5 (N = 96, 10.2%) | | 6 (N = 42, 4.4%) | | 7 (N = 59, 6.2%) | | 8 (N = 97, 10.3%) | | 9 (N = 5, 0.5%) | | 10 (N = 9, 1.0%) | |
| | | | n | % | n | % | n | % | n | % | n | % | n | % | n | % | n | % | n | % | n | % |
| Age | | | | | | | | | | | | | | | | | | | | | | |
| 18–30 years | 259 | 27.4 | 55 | 21.2 | 22 | 8.5 | 15 | 5.8 | 77 | 29.7 | 35 | 13.5 | 12 | 4.6 | 22 | 8.5 | 35 | 13.5 | 1 | 0.4 | 2 | 0.8 |
| 31–45 years | 390 | 41.3 | 115 | 29.5 | 44 | 11.3 | 21 | 5.4 | 96 | 24.6 | 43 | 11.0 | 18 | 4.6 | 21 | 5.4 | 40 | 10.3 | 2 | 0.5 | 6 | 1.5 |
| 46–60 years | 249 | 26.3 | 72 | 28.9 | 42 | 16.9 | 15 | 6.0 | 72 | 28.9 | 18 | 7.2 | 11 | 4.4 | 15 | 6.0 | 18 | 7.2 | 1 | 0.4 | 1 | 0.4 |
| 61–75 years | 47 | 5.0 | 19 | 40.4 | 11 | 23.4 | 3 | 6.4 | 10 | 21.3 | 0 | 0.0 | 1 | 2.1 | 1 | 2.1 | 4 | 8.5 | 1 | 2.1 | 0 | 0.0 |
| Gender | | | | | | | | | | | | | | | | | | | | | | |
| male | 485 | 51.3 | 147 | 30.3 | 72 | 14.8 | 30 | 6.2 | 97 | 20.0 | 54 | 11.1 | 17 | 3.5 | 37 | 7.6 | 55 | 11.3 | 3 | 0.6 | 1 | 0.2 |
| female | 460 | 48.7 | 114 | 24.8 | 47 | 10.2 | 24 | 5.2 | 158 | 34.3 | 42 | 9.1 | 25 | 5.4 | 22 | 4.8 | 42 | 9.1 | 2 | 0.4 | 8 | 1.7 |
| Education | | | | | | | | | | | | | | | | | | | | | | |
| primary/middle school | 36 | 3.8 | 11 | 30.6 | 4 | 11.1 | 0 | 0.0 | 7 | 19.4 | 1 | 2.8 | 2 | 5.6 | 3 | 8.3 | 7 | 19.4 | 1 | 2.8 | 0 | 0.0 |
| secondary | 341 | 36.1 | 94 | 27.6 | 48 | 14.1 | 19 | 5.6 | 83 | 24.3 | 35 | 10.3 | 9 | 2.6 | 25 | 7.3 | 36 | 10.6 | 1 | 0.3 | 1 | 0.3 |
| university | 544 | 57.6 | 150 | 27.6 | 65 | 11.9 | 31 | 5.7 | 161 | 29.6 | 57 | 10.5 | 30 | 5.5 | 29 | 5.3 | 50 | 9.2 | 3 | 0.6 | 8 | 1.5 |
| Form of employment | | | | | | | | | | | | | | | | | | | | | | |
| employee | 676 | 71.5 | 193 | 28.6 | 84 | 12.4 | 31 | 4.6 | 192 | 28.4 | 69 | 10.2 | 33 | 4.9 | 39 | 5.8 | 69 | 10.2 | 2 | 0.3 | 7 | 1.0 |
| self-employed | 155 | 16.4 | 40 | 25.8 | 22 | 14.2 | 15 | 9.7 | 33 | 21.3 | 19 | 12.3 | 7 | 4.5 | 9 | 5.8 | 11 | 7.1 | 2 | 1.3 | 2 | 1.3 |
| pupil/student | 81 | 8.6 | 14 | 17.3 | 7 | 8.6 | 5 | 6.2 | 24 | 29.6 | 5 | 6.2 | 2 | 2.5 | 8 | 9.9 | 15 | 18.5 | 1 | 1.2 | 0 | 0.0 |

Vaccine product choosing reason: 1 – the information about the effectiveness of a given vaccine provided in the media, 2 – getting vaccination as fast as possible, so I chose the product that was available the soonest, 3 – the shortest possible interval between doses of the vaccine, 4 – the lowest possible frequency of side effects after vaccination, 5 – the possibility of being vaccinated with a single-dose preparation, 6 – the recommendation from the doctor I've visited the last, 7 – the recommendation from friends/family, 8 – the type of product did not matter, 9 – no possibility of choosing a specific product, 10 – conscious choice of a specific product.

[a] Multiple choice options.

the vaccine (68.7%) and having no fear of COVID-19 (64.2%) [5].

When analyzing the decision to get vaccinated based on gender, this study did not reveal any significant differences between the main reasons for getting vaccinated against COVID-19. When choosing the type of vaccine, women more likely than men made their decision based on the lowest possible prevalence of side effects after vaccination (34.3% vs. 20.0%), this was also their main criterion when choosing the type of vaccine. When choosing a vaccine, men were more likely than women made their decision based on information about the effectiveness of a given vaccine provided in the media (30.3% vs. 24.8%). In a study by Kupsova et al., it was found that women more often than men claimed the desire to protect their health was the reason for vaccination against COVID-19 (80.8% vs. 72.1%), while the possibility of avoiding tests for SARS-CoV-2 was less frequently reported by women (28.1% vs. 41.5%) [5].

Analyzing the decision to vaccinate based on education, it was found that people with primary/middle school education were the only ones to give concern for their family's health as the main reason for getting vaccinated (44.4%), followed by concern for their own health (41.7%) and the prospect of safe travel and easier access to entertainment (22.2%). A small percentage (8.3%) of this group gave the possibility of continuing stress-free work as a reason to get vaccinated. No one indicated the need to get vaccinated as a requirement of the employer as a reason of getting vaccine.

People with secondary and university education stated that the main reasons for getting vaccinated against COVID-19 were concern for their own health (48.7% and 50.6%, respectively), followed by concern and the health of their family (37.8% and 36.9%) and the prospect of safe travel and easier access to entertainment (21.4% and 25.9%). A higher percentage of people with secondary education than with primary/middle school and higher education gave the opportunity to continue stress-free working as the reason. People with primary/middle school education were much more likely than people with secondary and higher education to say that the type of product was of no importance (19.4% vs. 10.6% and 9.2%).

According to Czech research carried out by Riad et al., between April and June 2021 a total of 73.3% of Czech university students were willing to get vaccinated against COVID-19 whenever possible; on the other hand, 19.3% of respondents were not willing to get vaccinated, and only 7.4% were hesitant to get vaccinated against COVID-19 [6]. A Polish study conducted by Szmyd et al. in 2020–2021 revealed that the willingness to get vaccinated against COVID-19 was associated with increasing fear of this disease (OR 1.56). The main reason for refusing vaccination was the fear of long-term side effects after COVID-19 vaccination. However, the willingness to get vaccinated was strengthened, similarly to this study, by fear for one's own health, with particular emphasis on suffering from chronic diseases and the fear of family members getting sick [7].

According to a study by Babicki et al., a more favorable attitude towards vaccinations was found in women, while the prevalence of chronic diseases had no significant impact on the attitude towards vaccinations. Despite increasing experience with new types of vaccines, the percentage of people concerned about post-vaccination complications has not decreased significantly, and concerns about vaccine ineffectiveness have increased dramatically [8]. Study conducted in Kuwait in January 2021 showed that concerns about getting vaccinated against COVID-19 were extremely high (74.3%), and half of respondents did not plan to get vaccinated. Interest in vaccinations was much higher among younger people, men, people with a history of influenza vaccination and health care workers [9].

According to the results of a survey conducted in Hong Kong in April 2020, 45.3% of participants (out of 1501 respondents) intended to get vaccinated. The most common reason for vaccine hesitancy was fear of vaccine safeness. Men, younger adults, and people without chronic diseases were more likely to be hesitant about vaccination [10]. According to a questionnaire survey conducted at a US Air Force base from November 2020 to January 2021, nearly 23% of respondents were undecided about getting vaccinated against COVID-19. Respondents were more concerned about short-term vaccine side effects (43% vs. 26%), long-term vaccine side effects (82% vs. 50%, $p < 0.001$), and lack of vaccine effectiveness (23% vs. 5%). Younger age was an independent risk factor for vaccine refusal [11].

What is important, after conducting an educational intervention (live PowerPoint presentation) in this database in January 2021 the number of people undecided about getting vaccinated decreased by 36% [12]. After a retrospective analysis of data from the US military health care system, 61% of respondents in the above study were vaccinated. Similarly to this study, there were

no differences in the acceptance of vaccinations due to gender [13]. In a survey conducted by Kessels et al. in October 2020 in Belgium, 34% of respondents declared that they would definitely undergo vaccination against COVID-19, 39% that they would „probably" do it.

Willingness to get vaccinated was strongly related to age, opinion on the government's handling of the COVID-19 pandemic, risk of getting ill, nationality, gender and, to a lesser extent, knowing someone who had been hospitalized with COVID-19. Similar predictors were identified for attitudes toward vaccinations in general. Hesitancy to vaccinate against COVID-19 was more visible in age groups <54 years [14].

This study has some limitations. The survey was conducted only among people who were vaccinated, people who refused to take the vaccine were not examined. Moreover, university education predominates among the respondents, so it can be assumed that they also have a higher health awareness. Undoubtedly, the strong suit of the study is the number of people examined (945 people) and the participation of people from many age groups in the study.

## CONCLUSIONS

In this study, the most common reason for getting vaccinated against COVID-19 was concern for one's own health. Other studies have shown that people with a low level of health awareness are more likely to have worse test results, are more often hospitalized, are more likely to not follow medical recommendations and are less likely to participate in preventive programs [15]. Moreover, vaccine success depends not only on scientific and clinical readiness (i.e., having an adequate supply of tested vaccine), but also on public readiness (i.e., the willingness to vaccinate a large part of the population, conferring herd immunity) [16].

In view of the above, in order to increase the readiness of the population for vaccinations against COVID-19 and subsequent ones, if there is a need to limit new epidemics, the following should be done:

- permanent, consistent and multidirectional activities to raise health awareness,
- intensified strategies and campaigns aimed at increasing public trust in available vaccines against COVID-19 and, if necessary, other pathogens,
- individualized message (also direct) including a number of demographic factors and individual differences that contribute to vaccine hesitancy.

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