

THE INFLUENCE OF SOCIO-DEMOGRAPHIC CHARACTERISTICS ON ATTITUDES TOWARDS PROPHYLACTIC VACCINATION IN POLAND

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Abstract

Objectives: A legally regulated program of mandatory vaccinations is in place in Poland. The number of vaccination refusals increased from 3437 to 48 609 in 2010–2019. The aim of the study was to determine the association of various socio-demographic factors with the attitudes of the residents of Poland to prophylactic vaccination. **Material and Methods:** The study was based on a secondary statistical analysis of a representative sample of 977 adult residents of Poland (a cross-sectional questionnaire-based study). Data was purchased from the Public Opinion Research Center. **Results:** The study group was characterized by a high level of acceptance of vaccinations. At the same time, nearly a third (31%) of the subjects agreed with the statement that vaccination is promoted mainly because this is in the interests of pharmaceutical companies, and more than a fifth (22%) of the respondents believed that vaccines for children can cause serious developmental disorders, including autism. A detailed multivariate analysis based on logistic regression revealed that being deeply religious (compared to being a non-believer) and living in a town with a population of 20 000–499 999 (compared to living in a rural area) were strongly associated with a very high acceptance of the anti-vaccination content. The opposite attitude was associated with having an average or good financial situation (compared to a poor financial situation), having completed vocational education (compared to primary education) and being ≥ 65 years old (as opposed to being < 30 years old). **Conclusions:** Most socio-economic factors analyzed did not influence the respondents' attitudes to prophylactic vaccination or showed little influence. Strong anti-vaccination beliefs were associated with being deeply religious and living in a town with a medium-size or small population. *Int J Occup Med Environ Health.* 2021;34(1):121–32

Key words:

Poland, vaccination, vaccine, primary prevention, anti-vaccination movements, vaccination schedule

INTRODUCTION

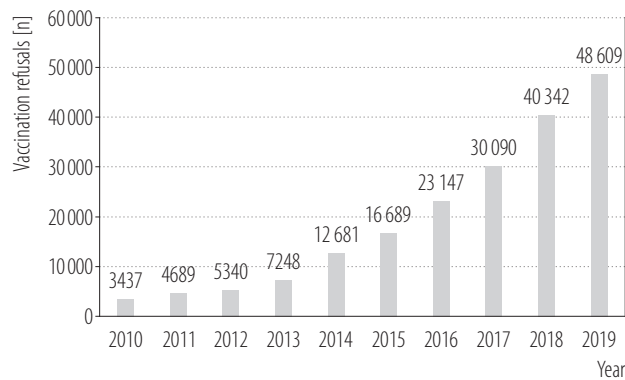
A vaccine is a biological preparation administered in order to render the body resistant to a particular pathogenic organism. A vaccine contains an antigen or organism of attenuated virulence, allowing people to develop immunity without developing the disease [1]. The scope of com-

pulsory vaccinations differs between European countries. Some countries, including Poland, have a legally regulated program of mandatory vaccinations in place [1–3].

In Poland, mandatory vaccinations are regulated by the Act of December 5, 2008 on the Prevention and Control of Infections and Infectious Diseases in Humans [1]. The Chief

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Source: original research, based on the National Institute of Public Health/the National Institute of Hygiene data [4]

Figure 1. Vaccination refusals in 2010–2019 in Poland

Sanitary Inspectorate publishes an annual Program of Prophylactic Vaccination in Poland, listing all mandatory vaccinations for the following year. The document is divided into a few sections, the first of which is concerned with mandatory vaccinations. This section comprises:

- a vaccination schedule,
- mandatory vaccinations for individuals particularly exposed to infections on clinical or epidemiological grounds,
- post-exposure vaccinations,
- recommended vaccinations,
- additional information.

The last subsection is concerned with the general principles of administration and organization of vaccination campaigns. The schedule for 2019 comprised vaccinations against 11 diseases [1]. The evasion of mandatory vaccinations has been a growing health problem. The number of vaccination refusals increased from 3437 to 23 000 in 2010–2016 [4], to eventually reach 48 609 at the end of 2019 (Figure 1).

A growing number of vaccination refusals is also commonly observed in other countries in the world. It became visible during the measles outbreak in Europe where almost 19 000 cases occurred in the period of January 2016–October 2017, most of which related to unvaccinated people. The European Center for Disease Prevention and Control

indicates that such a rise might have been connected with the so-called vaccine hesitancy and steps taken in response to it [2,4,5]. These rates have been increasing gradually in individual countries (including Poland). This has been noted in particular by the National Institute of Public Health, with increasingly more refusals being registered [4]. Vaccination refusals may be linked to the growing activity of anti-vaccination movements [6–8]. Owing to easy access to the Internet and social websites, anti-vaccination movements have gained an effective channel for disseminating their views. A significant concern is the manipulation of data so that they fit specific anti-vaccination claims [9,10].

Despite the growing presence of anti-vaccination movements, vaccination refusals are also secondary to various barriers, with a lack of appropriate education in this area and poor interactions with medical personnel being listed as the most common of these [11,12].

The aim of the study was to determine the association of various socio-demographic factors with the attitudes of the residents of Poland to prophylactic vaccination.

MATERIAL AND METHODS

Study design

The study was based on a secondary statistical analysis of data purchased from the Public Opinion Research Center (Centrum Badania Opinii Społecznej – CBOS). The data came from a cross-sectional questionnaire-based study employing the Computer Assisted Personal Interview (CAPI) technique in a representative random sample of adult residents of Poland.

Setting

The questionnaires were carried out on June 29–July 6, 2017 on a sample of 977 individuals. The sample had been drawn from the personal identification number (PESEL) database, which contains information about all residents of Poland. Stratified and cluster sampling was used, and the respondents were approached in their homes.

Variables

The questionnaire comprised a series of close-ended questions regarding vaccination. It included asking the respondents about their opinions on the following 10 statements:

- 1.Thanks to prophylactic vaccination of children, many dangerous diseases practically do not occur at present.
- 2.Generally speaking, vaccination of children does more good than harm.
- 3.Vaccination is the most effective way of protecting children from serious diseases.
- 4.Vaccines for children are safe.
- 5.The parents of vaccinated children receive sufficient information about the side effects of the vaccines.
- 6.Instead of having a child vaccinated, it is better to let them contract the infectious disease, because this is not a big deal, just a few days of an illness such as measles, chickenpox or German measles.
- 7.Vaccinations are promoted not because they are really necessary, but because this is in the interests of pharmaceutical companies.
- 8.Vaccines for children may produce serious side effects and complications.
- 9.Children receive too many vaccines in the first years of their lives.
- 10.Vaccines for children can cause serious developmental disorders, such as autism.

These statements were then used to develop a scale of acceptance of the anti-vaccination content. Questions 5 and 8 were arbitrarily removed as they did not testify directly to anti-vaccination beliefs. All answers were coded to represent a spectrum from no acceptance (0 pts) to full acceptance (4 pts) of the anti-vaccination content. Total scores (0–32 pts) were then calculated for each respondent. A reliability analysis revealed a Cronbach's α of 0.849.

Based on the anti-vaccination content acceptance scores, 5% of the respondents ($N = 47$) with the highest scores were identified, where the cut-off value was 21 pts.

For the logistic regression analysis, ordinal variables such as age, education, the population size in the place of residence, the financial situation and religious views were converted to a series of 0–1 variables.

Data sources

The data set was supplied by CBOS which is an independent foundation entrusted by the Polish Parliament with the task of carrying out social research for public use. All variables were measured via questionnaire items.

Bias

All variables used in the study were declarative. The truthfulness of the declarations was not verified against any medical records.

Study size

A representative sample of 977 individuals was drawn for the purposes of the study from among the 31.5 million adult residents of Poland.

Statistical methods

Statistical analyses employed contingency tables, a comparison of means and logistic regression. Statistical significance was verified with the χ^2 test, the Mann-Whitney U test and the Kruskal-Wallis test. The level of statistical significance was set at 0.05. All analyses were performed with IBM SPSS ver. 25.

RESULTS

Participants

In the study group of 977 individuals, parents accounted for 68.1% ($N = 665$). Women accounted for 53% of all respondents and for 56.5% of the parents. The mean age for all respondents was 49.33 years (with a median of 49 years). The mean age of the parents was 52.4 years (a median of 52). The detailed characteristics of the study group are presented in Table 1.

Table 1. Characteristics of the participants in the study on the association of socio-demographic factors with the attitudes of the residents of Poland to prophylactic vaccination, June 29–July 6, 2017

Variable	Participants (N = 977) [n (%)]	
	total	parents
Sex		
male	459 (47)	290 (43.5)
female	518 (53)	377 (56.5)
Age		
<30 years	145 (14.8)	35 (5.3)
30–44 years	279 (28.5)	216 (32.4)
45–64 years	326 (33.3)	241 (36.2)
≥65 years	228 (23.3)	174 (26.1)
Population in the place of residence		
rural area	389 (39.9)	290 (41.6)
town		
<20 000 inhabitants	149 (15.1)	109 (15.6)
20 000–99 999 inhabitants	210 (21.5)	143 (21.5)
100 000–499 999 inhabitants	133 (13.6)	87 (12.5)
≥500 000 inhabitants	98 (9.9)	68 (9.8)
Financial situation		
poor or rather poor	66 (6.9)	37 (5.6)
neither good nor poor	383 (39.2)	274 (41.4)
good or rather good	528 (53.9)	351 (53)
Education		
primary (including junior secondary)	187 (19.1)	116 (17.3)
vocational	237 (24.3)	185 (27.9)
secondary (including non-university-based post-secondary schools)	300 (30.7)	193 (29.1)
university	253 (25.9)	171 (25.8)
Religious beliefs		
deeply religious	73 (7.5)	50 (7.5)
religious	827 (84.6)	577 (86.8)
rather non-believer or definitely non-believer	61 (6.2)	28 (4.3)
refused to answer that question	16 (1.6)	10 (1.6)

Descriptive data

The percentage of the respondents who agreed with the statements that thanks to prophylactic vaccination of children,

many dangerous diseases practically do not occur at present, that vaccination of children does more good than harm, and that vaccination is the most effective way of protecting

children from serious diseases ranged 84.7–88.1%. A total of 72.9% of the respondents were convinced that vaccination is safe (including 21.7% who definitely agreed, and 51.2% who would rather agree). Similarly, 75.8% of the respondents did not agree that it would be better to let the child contract an infectious disease instead of vaccinating them. The question concerned with an association between vaccination and serious developmental disorders (such as autism) revealed a definite divide, with 22.3% of the respondents confirming a connection between these factors and 44.6% being of the opposite opinion, while 33.1% could not decide whether this statement was true or false. The distribution of responses among the parents was similar to that revealed for the entire sample. The details are shown in Figure 2.

Main results

Scores reflecting the respondents' acceptance of the views opposing compulsory prophylactic vaccination (anti-vaccination beliefs) were significantly different with regard to the respondents' level of education ($p < 0.01$), having a child/children ($p < 0.05$) and religious beliefs ($p < 0.01$). Sex, age, the population size in the place of residence and the financial situation did not significantly influence the results. The detailed results are shown in Table 2.

A total of 3.5% ($N = 23$) of the parents taking part in the study ($N = 665$) declared that their child had skipped a mandatory vaccination in their life. The respondent's sex ($p = 0.831$), age ($p = 0.088$) and level of education ($p = 0.059$) did not significantly influence the distribution of these responses. A statistically significant influence was exerted by the population size in the place of residence ($p < 0.05$), with the highest percentage of those parents who had at least once not vaccinated their child according to the schedule living in towns with a population of $>500\,000$ (10.6%), and the lowest in rural areas (1.5%). The answers also differed significantly with regard to the parents having children in a specific age group, as the highest percentage of mandatory vaccination failures was noted

among the parents of children aged 3–6 years (13.5%, $p < 0.05$) and the lowest among the parents of children aged >18 years (1.4%; $p < 0.001$). The self-reported financial situation also had a significant influence ($p < 0.01$) on the answers: among those who described their financial situation as poor or rather poor ($N = 39$), 12.8% stated that their child had failed to attend a scheduled mandatory vaccination. Self-reported religiosity also influenced the answers, with 18.2% of those who refused to answer the religiosity question ($N = 11$) reporting having missed a scheduled mandatory vaccination of their child, compared to 9.8% of those declaring themselves to be deeply religious ($N = 51$). A detailed breakdown of the answers may be found in Figure 3.

Of the parents who reported having missed a mandatory vaccination of their children ($N = 23$), 9 described the reason as the presence of medical contraindications (e.g., an illness) and 3 attributed the failure to attend to oversight. The number of participants who had not vaccinated their children out of fear of undesirable effects (when there were no medical contraindications) was 9, or 1.4% of all parents in the sample. Finally, 2 participants refused to provide the reason.

Other analyses

The logistic regression model predicting the probability of a participant finding him- or herself among the 5% of the respondents who had the highest anti-vaccination attitude scores reached Cox and Snell's R^2 of 0.052, and Nagelkerke's R^2 of 0.162. Of the study variables, the strongest statistically significant influence on the odds of being in that group was exerted by the declaration of being deeply religious (OR = 7.585; 95% CI 1.174–49.024) and living in a town with a population of 100 000–499 999 (OR = 4.219, 95% CI: 1.554–11.456). The most important "adverse" factor in this context was the age of ≥ 65 years (OR = 0.168, 95% CI: 0.038–0.749). Having a child did not significantly influence the results, irrespective of the child's age. The detailed data are shown in Table 3.

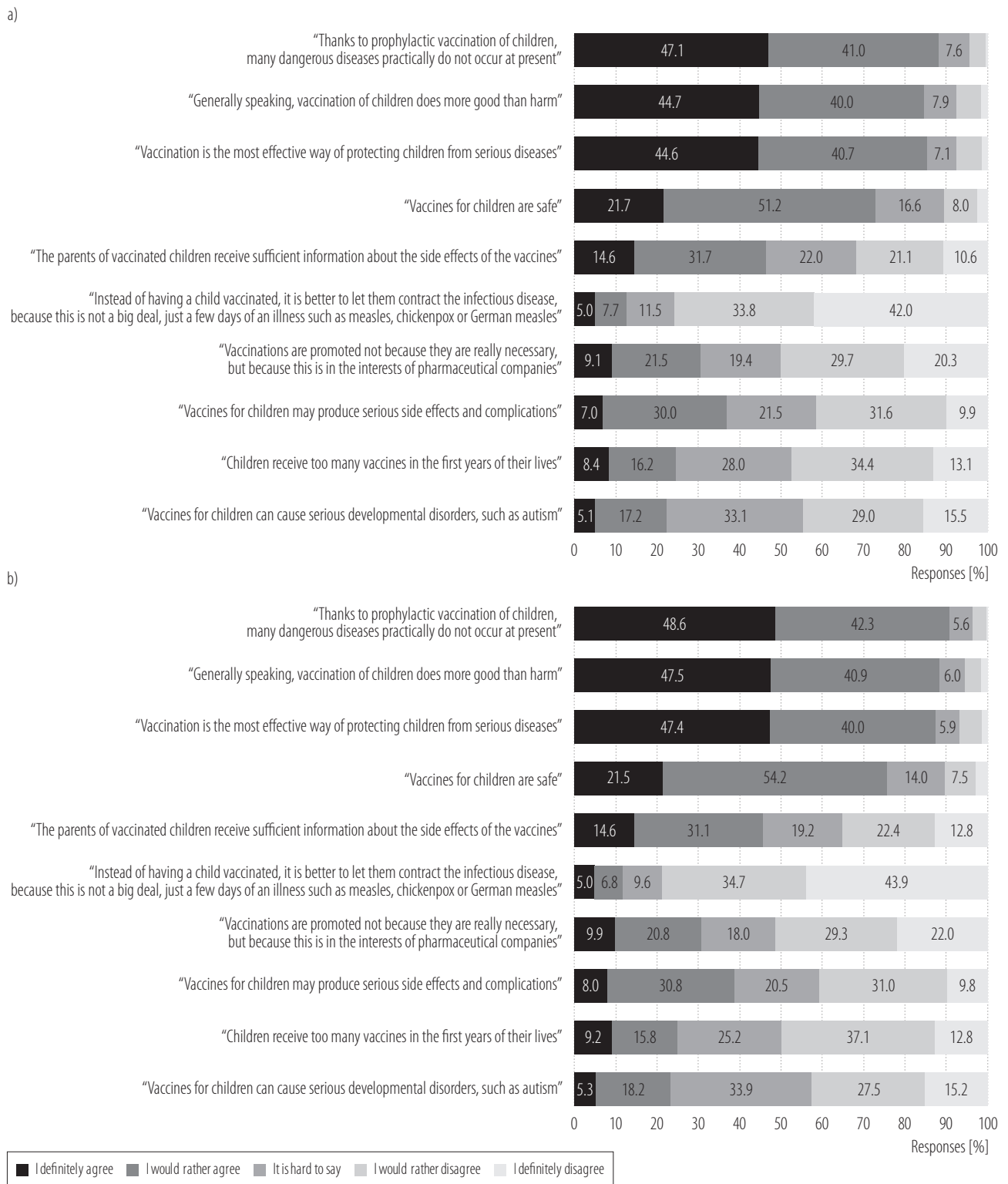
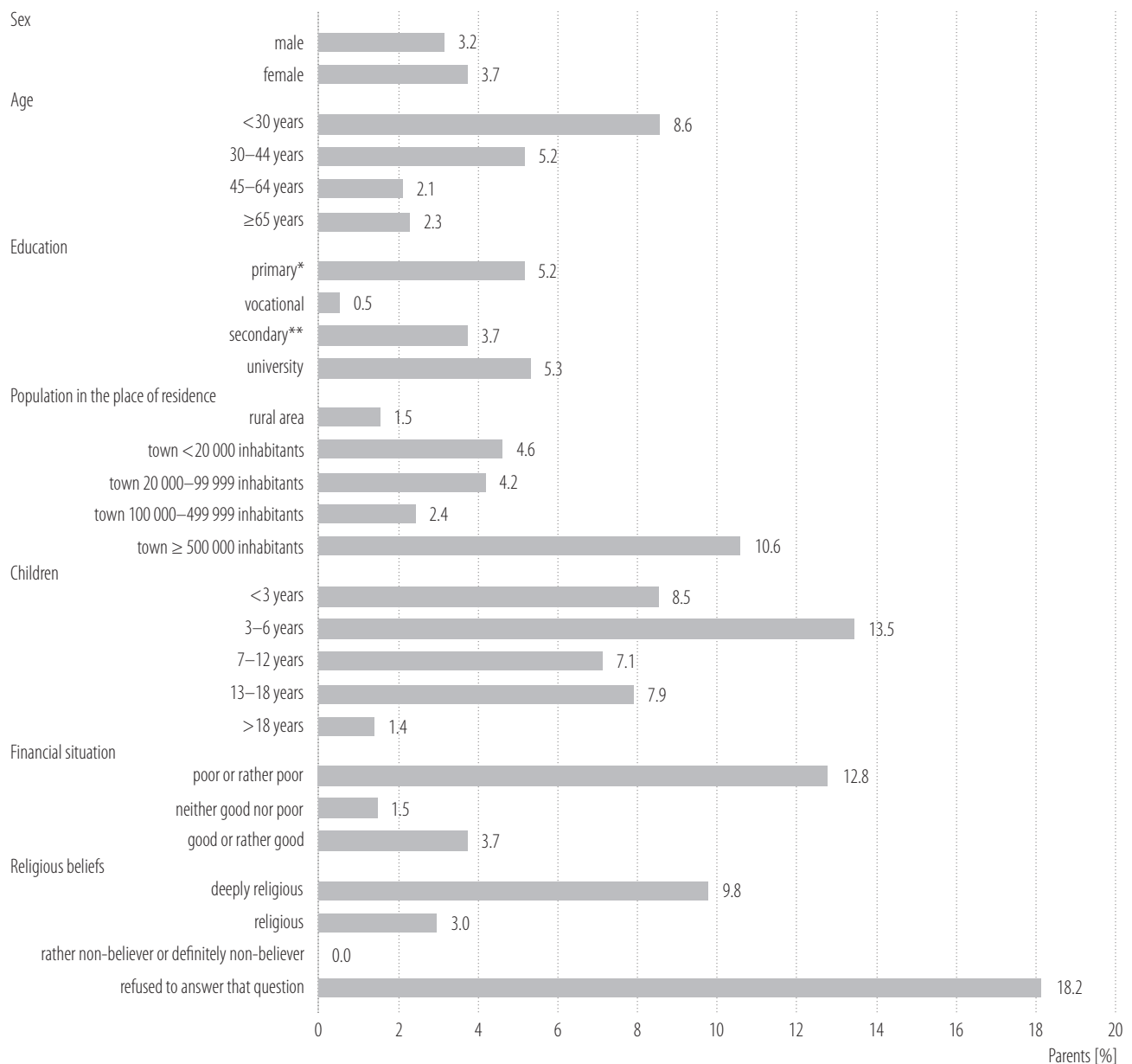


Figure 2. Responses to questions concerning the respondent’s opinions about the prophylactic vaccination of children; data are shown a) for all respondents (N = 997) and b) for parents (N = 667)

Table 2. Attitudes to the anti-vaccination content measured on a scale of 0–32 (0 – no acceptance, 32 – high acceptance) in the study on the association of socio-demographic factors with the attitudes of the residents of Poland to prophylactic vaccination, June 29–July 6, 2017

Variable	n	M	Me	p
Sex				0.258
male	459	9.70	9	
female	517	9.42	9	
Age				0.484
<30 years	146	10.02	10	
30–44 years	278	9.88	9	
45–64 years	325	9.28	9	
≥65 years	228	9.23	9	
Education				<0.01
primary (including junior secondary)	187	10.50	10	
vocational	237	9.77	10	
secondary (including non-university-based post-secondary schools)	299	9.58	9	
university	253	8.62	8	
Population in area of residence				0.571
rural area	389	9.34	9	
town				
<20 000 inhabitants	149	9.75	10	
20 000–99 999 inhabitants	209	10.05	9	
100 000–499 999 inhabitants	133	9.60	9	
≥500 000 inhabitants	97	8.91	9	
Having children (including children aged >18 years)				<0.05
yes	665	10.13	10	
no	311	9.28	9	
Financial situation				0.138
poor or rather poor	66	11.03	10	
neither good nor poor	383	9.54	9	
good or rather good	527	9.37	9	
Religious beliefs				<0.01
deeply religious	73	10.49	9	
religious	826	9.59	9	
rather non-believer or definitely non-believer	61	7.51	7	
refused to answer that question	16	10.80	11	

Bolded are p-values of < 0.05.



* Including junior secondary.

** Including non-university-based post-secondary school.

Figure 3. Parents (N = 665) who provided affirmative responses to the question: “Has it ever happened that your child skipped a mandatory vaccination?” in the study on the association of socio-demographic factors with the attitudes of the residents of Poland to prophylactic vaccination, June 29–July 6, 2017

DISCUSSION

The majority of the respondents displayed a positive attitude towards vaccination, with 85–88% agreeing with the statements regarding the importance of vaccination

for the overall improvement of the population’s health. A similar majority (73%) were convinced that vaccination is safe, but the most popular answer indicated moderate acceptance (“I would rather agree”). Despite the high

Table 3. A logistic regression model for predicting the risk of being among the 5% of the respondents most opposed to mandatory prophylactic vaccination in the study on the association of socio-demographic factors with the attitudes of the residents of Poland to prophylactic vaccination, June 29–July 6, 2017

Variable	p	OR	95% CI	OR
Sex – male	0.659	0.863	0.448	1.663
Age				
30–44 years	0.582	1.327	0.485	3.632
45–64 years	0.514	0.689	0.226	2.105
≥65 years	0.019	0.168	0.038	0.749
Education				
vocational	0.016	0.236	0.073	0.763
secondary (including non-university-based post-secondary schools)	0.242	0.594	0.248	1.421
university	0.151	0.489	0.184	1.298
Place of residence – town				
<20 000 inhabitants	0.027	3.096	1.141	8.403
20 000–99 999 inhabitants	0.010	3.315	1.330	8.262
100 000–499 999 inhabitants	0.005	4.219	1.554	11.456
≥500 000 inhabitants	0.126	2.602	0.765	8.845
Child's age				
<3 years	0.167	0.409	0.115	1.454
3–6 years	0.338	1.586	0.617	4.073
7–12 years	0.420	0.663	0.244	1.799
13–18 years	0.887	1.074	0.400	2.884
>18 years	0.632	1.227	0.530	2.842
Declared financial situation				
neither good nor poor	0.005	0.224	0.080	0.630
good or rather good	0.016	0.308	0.118	0.803
Religiosity				
deeply religious	0.033	7.585	1.174	49.024
religious	0.318	2.388	0.433	13.175
refused to answer	0.999	0.000	0.000	–
Constant	0.015	0.068		

The reference comprises the following parameters: sex: female, age <30 years, level of education: primary, place of residence: rural area, no children, poor financial situation, declaration of being a non-believer (rather non-believer/definitely non-believer).

“–” Due to the low number of respondents, the exact value was impossible to estimate.

acceptance of the relevance of vaccination for the population's safety, nearly a third (31%) of the participants agreed that vaccination is promoted mainly because this is in the interests of pharmaceutical companies. Addition-

ally, more than a fifth (22%) of the respondents believed that vaccines for children can cause serious developmental disorders, including autism, with another third (33%) having no opinion in this regard.

The analysis of the scores reflecting an acceptance of the anti-vaccination content showed that such factors as sex, age, the population size in the place of residence or the financial situation did not significantly influence the results. Significant factors comprised the level of education, having children and religiosity. A more detailed multivariate analysis based on logistic regression revealed that deep religiosity (compared to being a non-believer) and living in a town with a population of 20 000–499 000 (compared to living in a rural area) were strongly associated with a very high acceptance of the anti-vaccination content. The reverse association was identified for an average and good financial situation (compared to a poor financial situation), vocational education (compared to primary education) and the age of ≥ 65 years (compared to the age of < 30 years).

This study aimed to determine the influence of socio-demographic factors on the attitudes of Polish residents to prophylaxis vaccination. The analysis showed that the most important factors influencing the overall attitudes to vaccination were the level of education, religiosity and being a parent, where better educated, non-religious and childless individuals displayed generally more pro-vaccination attitudes. Other European studies have revealed other relationships. For example, in the Netherlands, vaccine hesitancy was more frequently encountered among those well-educated than among those who declared insufficient access to information [13].

Misgivings about vaccination are common. In 2016, a study of the opinions regarding prophylactic vaccination was conducted in 67 countries in the world. The highest levels of mistrust of vaccination were noted in European countries [6]. However, the support for vaccination was also found to vary within Europe. In Croatia, a positive attitude to prophylactic vaccination was held by just 62% of those polled [12]. Following the outbreak of the AH1N1 flu epidemic in France in 2009, the percentage of individuals displaying a negative attitude towards vaccination rose

from 8.5% in 2000 to 38.2% in 2010 [14]. In Sweden, despite the 98% vaccination coverage, 20% of parents expressed their uncertainty about at least 1 vaccination [15]. This study showed that at least 85% of those polled believed that vaccination helps improve the population's health and 73% were convinced that vaccination is safe.

The reasons for such hesitancy may be traced down to the content promoted by the so-called anti-vaccination movements. However, some research points to other causes, including mistrust of public institutions. A 2012 paper investigating the skeptical attitudes towards vaccination in the Netherlands stated that approximately 83% of the parents who would not have their children vaccinated believed that the government was manipulated by pharmaceutical companies manufacturing vaccines. More than 55% of the parents also said that they were afraid that the government would not strike particular vaccines off the mandatory vaccination list even in the face of multiple undesirable effects [16]. A third of the respondents in this study also pointed to a connection between the promotion of vaccination and the pharmaceutical companies' desire to make money.

The mistrust of vaccination-prescribing doctors is also a problem. Doctors themselves believe that this is due to a lack of time for patients. Many doctors believe that they are not knowledgeable or do not know the current guidelines well enough to give appropriate advice to parents or answer their most burning questions [14].

Vaccination refusals can be connected with the constant spreading of fake news which mostly occurs on social media platforms. People without basic medical knowledge cannot distinguish between fake news and news based on research [17]. Moreover, the mistrust about vaccination is still being considerably fuelled by reports linking vaccination with the onset of autism in children. Despite many scientific reports debunking that connection, this accusation is often advanced in the public debate. Moreover, it has been proved that the research data confirming

a link between autism and vaccination were fabricated by Andrew Wakefield to achieve material gains. His papers have been removed from the most prestigious medical journals [18–20]. The results presented in this paper indicate that Poland is not free from this problem as only 45% of adult Polish residents are aware of the lack of correlation between vaccination and autism, while others either have no definite opinion or believe that such a correlation actually exists.

The most important limitation of this study is the fact that the data are based solely on the respondents' declarations, which may not reflect their actual actions. However, as described above, a comparison of the study data with reports by the National Institute of Public Health/the National Institute of Hygiene indicated a good fit between the respondents' answers and population-level behaviors. The study was based on the results of a poll conducted in mid-2017. Public opinion may change as a result of various events (e.g., the emergence of the foci of measles around Warsaw in 2018) and their coverage by the media.

Disclosure of the social beliefs about vaccinations and socio-demographic factors affecting them can be used in practice to develop an effective strategy for vaccination campaigns in the future. Anti-vaccine movements use the knowledge of social concerns about vaccination to spread their theses and influence public opinion. The first step to counteract these practices is to learn about these social concerns and the state of public opinion, as presented in this article.

CONCLUSIONS

Most socio-demographic parameters analyzed did not influence the respondents' attitudes to prophylactic vaccination or there was only a minor influence. It can become a problem during designing future campaigns promoting vaccines and vaccination.

Involving church institutions in the activities promoting vaccination might be the key to reduce the influence of anti-vaccine movement, especially in rural areas.

The number of those refusing prophylactic vaccination in Poland has been growing significantly on a yearly basis. This phenomenon could become dangerous for herd immunity as well as for the health safety of all population.

The vast majority of the respondents were aware of the importance of vaccination for improving the population's health safety. At the same time, some of those beliefs were not strongly rooted. Action should be taken in order to strengthen those beliefs.

Despite easy access to information and an unequivocal position of the medical community, a part of the society is still convinced that there is a link between autism and vaccination. This problem indicates the importance of constant education of the population in all matters connected with vaccination, even those which are generally known.

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