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Can Financial Incentives Reduce Declared COVID-19 Vaccine Refusal? Survey Evidence from Poland

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Abstract

Aim: To examine the declared potential of financial public-policy instruments among Polish vaccine refusers and identify behavioural factors associated with vaccination status.

Methodology: A cross-sectional CAWI survey (Poland, 2021, *N* = 800) distinguished four vaccination-attitude levels. Declared responses to financial instruments were tested with non-parametric methods, incentive susceptibility with rank correlation and linear regression, and vaccination status with exploratory models.

Findings: The vaccination lottery was rated low across all groups. Differences among the vaccinated, the hesitant, and those intending to get vaccinated were not significant. For vaccine refusers, no tested financial incentive was rated as likely to change their reported decision; loss-framed incentives were rated higher than gain-framed ones, yet both remained near the lower end of the scale.

Implications: The results indicated the limited declared potential of individual financial incentives among vaccine refusers, raising questions about the efficiency of public spending for this group.

Originality/value: The article adds a behavioural perspective to research on COVID-19 vaccination incentives. Refusers placed little importance on financial benefits, while exploratory models linked vaccination status to vaccine safety beliefs, severe COVID-19 in someone close, and political identification.

Keywords: COVID-19 vaccination, financial incentives, behavioural factors, Poland

1. Introduction

During the COVID-19 pandemic, persuading citizens to vaccinate became a healthcare policy and also a public finance problem. The rapid development of COVID-19 vaccines, supported by initiatives such as Operation Warp Speed (Winch et al., 2021) and the EU Advance Purchase Agreements (European Court of Auditors, 2022), enabled rapid vaccine availability but also strengthened safety concerns among hesitant individuals (Griffith et al., 2021). Public authorities therefore sought measures that could reduce fears and increase uptake, some of which required public spending.

Vaccination served both health and economic policy goals as it reduced severe illness and deaths while facilitating the lifting of restrictions. By the end of 2021 nearly 20 million adults in Poland had been vaccinated, yet coverage remained lower than in many EU countries, particularly among older adults at the highest risk of dying from COVID-19 (Lewandowski & Madoń, 2022, p. 2). In response, the state introduced financial instruments to promote vaccination. Some targeted local governments through three competitions in which prizes depended on the level of or increase in residents' vaccination coverage (Podlaski Urząd Wojewódzki w Białymstoku, 2021a, 2021b), as well as funding for local vaccination promotion (Opolski Urząd Wojewódzki, 2021). The only financial incentive offered directly to citizens was the National Vaccination Program Lottery, with prizes including cash, electric scooters, and cars.

Financial instruments are public expenditures, hence their evaluation also raises an economic question about the efficiency of resource allocation. The question was whether the money allocated for incentives actually increased vaccination rates or primarily reached people who would have been vaccinated anyway. Campos-Mercade et al. (2021) found that a small guaranteed payment raised vaccination uptake by several percentage points, while Walkey et al. (2021) did not identify any effect of Ohio's "Vax-a-Million" lottery. These contrasting findings lead to the question of whether public spending on incentives reached those whose decisions it had intended to change.

Behavioural economics gives two reasons to expect a conditional effect. Loss aversion implies that an incentive framed as an avoided loss may motivate more than the same amount as a gain (Kahneman & Tversky, 1979), while the crowding out of intrinsic motivation implies that an external reward can weaken a prior health-promoting impulse (Deci et al., 1999).

The existing Polish analyses focused on population-level dynamics rather than individual responses to financial instruments based on vaccination attitudes. The impact of the National Vaccination Program Lottery was assessed using aggregated data on daily doses administered, and the model showed an immediate but short-term increase (Kuznetsova et al., 2022).

The survey results also indicated that non-financial motives mainly drove pro-vaccination decisions, with responsibility for the health of others the leading declared reason (Polski Instytut Ekonomiczny, 2021). What is still missing is an individual-level analysis showing which groups reported greater susceptibility to financial instruments, which forms of incentive they considered more persuasive, and whether alternatives to lotteries were viewed more favourably.

This article examines how the respondents rated the declared potential of financial public policy instruments, including the National Vaccination Program Lottery, to motivate COVID-19 vaccination in Poland, and how these ratings differed by vaccination attitude. The author drew on a CAWI survey of 800 Polish adults conducted in 2021, in which vaccination attitudes were summarised into four stages, ranging from outright refusal to acceptance. The contribution was to show how individuals with different attitudes assessed financial instruments, whether alternatives to the lottery had greater declared potential among refusers, and how susceptibility to incentives was associated with vaccine safety beliefs. Exploratory models of vaccination status provided the context and were not the main focus.

2. Literature Review

2.1. Financial Instruments in Vaccination Policy

Financial incentives are among the instruments used to increase vaccination uptake. They shift the decision-making balance by offering a monetary reward, a chance to win a prize, or the prospect of losing a benefit, thereby reducing decision-related frictions, increasing the immediate reward for vaccination, or raising the cost of remaining unvaccinated. Volpp and Cannuscio (2021) argued that such instruments are warranted when behaviour change can reduce future health costs, an argument of particular weight during the COVID-19 pandemic. In vaccination policy, these costs most often took the form of direct payments, benefit conditionality, or lotteries.

Direct payments consist of a guaranteed payment upon vaccination. An experiment in Sweden showed that a payment of SEK200, approximately USD24, increased first-time vaccination rates by 4.2 percentage points from a baseline of 71.6% (Campos-Mercade et al., 2021). In another study, guaranteed payment increased uptake by 13 percentage points, while a lottery increased it by about 9% relative to the control (Campos-Mercade et al., 2024).

Benefit conditioning makes access to selected public transfers dependent on meeting vaccination requirements. Under the Australian “No Jab, No Pay” policy, the effect was mainly a catch-up among partially vaccinated children (Beard et al., 2024).

Lotteries appeal to the tendency to overestimate small probabilities, but the results of studies on vaccine lotteries are weaker and less stable than those of studies on guaranteed payments. Milkman et al. (2022), in their Philadelphia experiment, found at most a small increase in vaccinations after the first drawing, which disappeared when combining the results of the three drawings. Walkey et al. (2021) revealed no increase in adult vaccinations in Ohio relative to national trends or to states without a lottery, attributing earlier reports of the success of “Vax-a-Million” to the concurrent expansion of vaccine eligibility.

In Poland, no direct cash payments to individuals were introduced for COVID-19 vaccination. Analyses of the package, which included the lottery and the competitions for municipalities, showed a temporary increase of 25,196 daily doses administered and a decrease of 24,368 doses in the subsequent period (Kuznetsova et al., 2022). Medical personnel surveyed as part of the National Vaccination Programme assessed the lottery negatively, both in terms of its effectiveness and its tone, arguing that vaccination should be motivated by health and the common good rather than by material benefit (Wróblewski et al., 2022). In the literature on Poland, no studies examined how citizens assessed the lottery itself or whether the short-term increase observed in aggregate data translated into a lasting increase in vaccination. Accordingly, it was hypothesised that among the vaccinated, those intending to get vaccinated, and the hesitant, the lottery had a lower declared importance than health and prosocial motives (H1).

2.2. Financial Incentives, Prior Beliefs, and Crowding out Intrinsic Motivation

Vaccination against infectious diseases has a prosocial dimension because it reduces the risk of severe disease in an individual and the risk of infection in the entire population. The question arises whether financial incentives can weaken intrinsic or prosocial motivation. This mechanism is well described in research on prosocial behaviour. Mellström and Johannesson (2008) demonstrated, using voluntary blood donation, that payment can reduce willingness to act when the act has moral or reputational value, a pattern Kamenica (2012) attributed to a weakened signal of selflessness. Karing et al. (2024) found the same mechanism in a programme incentivising timely childhood vaccination. Once the incentive was withdrawn, parents who had been exposed to it were 5% to 11% less likely to vaccinate their next child.

The study by Huynh et al. (2026) showed that this mechanism also applies to financial incentives during the COVID-19 pandemic, as hesitant individuals sometimes interpreted the incentive as a signal that the vaccine was unsafe or carried a hidden cost. Offering money reduced the subjective sense of vaccine safety by 9 pp, and one in seven respondents withdrew a previously declared willingness to vaccinate for free. A similar resistance appeared in Polish data, where 74% of vaccine refusers believed that vaccination should not be associated with any privileges (Polski Instytut Ekonomiczny, 2021). Li et al. (2024) likewise found that among respondents with a fixed mindset, framing non-vaccination as a loss was more effective than framing vaccination as a gain.

The evaluation of the lottery may depend on prior attitudes through this signaling channel. The hesitant respondents were more likely to read the incentive as a sign of hidden risk. It was therefore hypothesised that they rated the lottery lower than the vaccinated respondents and those intending to get vaccinated (H2).

2.3. Loss Framing

According to prospect theory, people evaluate outcomes relative to a subjective reference point, and losses typically weigh more heavily than equivalent gains (Kahneman & Tversky, 1979). In health communication, this theory enables examining whether it is more effective to highlight the benefits of taking an action or the costs of inaction. Rothman and Salovey (1997) suggested that gain frames suit prevention behaviour, and loss frames suit detection behaviour. Subsequent meta-analyses weakened this rule, showing that the gain-frame advantage in prevention was detectable but small. In contrast, the loss-frame advantage in detection was mainly observed in breast cancer screening (O'Keefe & Jensen, 2007, 2009).

In the context of the COVID-19 pandemic, both gain and loss-framing affected preferences for public interventions, with the direction of the effect depending on the type of decision and being stronger in scenarios with higher health stakes (Hameleers & Boukes, 2021). The reaction also depended on prior beliefs. Among entity theorists, loss-framing increased vaccination intentions relative to gain framing (Li et al., 2024).

Most standard financial incentives in the public sector, including performance bonuses and lotteries, utilise gain framing by offering rewards for meeting specified conditions. Behavioural economics research indicates that loss-framed financial incentives may possess greater motivational potential. For example, a study involving teachers found that bonuses paid upfront and subject to repayment if students failed to progress improved achievement in maths more than equivalent gain-framed bonuses. However, this effect was not replicated in a subsequent wave (Fryer et al., 2022). In the context of COVID-19 vaccination, Jacobson et al. (2022) reported that financial and other behavioural incentives did not increase vaccine uptake among hesitant individuals and, in some subgroups, may have even reduced it. These findings highlighted the need for further testing among Polish vaccine refusers, therefore it was hypothesised that, within this group, loss-framed incentives would be rated more favourably than gain-framed incentives (H3).

2.4. Vaccine Safety and Political Identification

Financial instruments may have limited potential when vaccine refusal stems from beliefs about the vaccine's safety or necessity. In this case, the incentive is evaluated together with the risk the respondent attributes to the vaccination itself. A monetary reward, lottery, or material benefit may then act as an additional incentive, but it may also be interpreted as a signal of a hidden cost.

One of the main barriers to vaccine acceptance is belief in their safety and necessity. Dubé et al. (2015) noted that vaccination, despite its high effectiveness as a public health tool, is sometimes perceived as unsafe or unnecessary, and that anti-vaccination movements reinforce vaccine refusal and hesitancy. In the case of COVID-19 vaccination, these beliefs may have been particularly important as the rapid

development of the vaccines and the prominent role of the topic in public debate increased the likelihood that incentives would be interpreted as a signal of hidden risk. This reasoning suggests that individuals less likely to question vaccine safety may be more susceptible to financial incentives. Consequently, it was hypothesised that – among vaccine refusers – susceptibility to financial incentives was positively associated with vaccine safety beliefs (H4).

This article also includes exploratory analyses of the demographic, health, and political correlates of vaccination status. Previous research showed that attitudes toward vaccination may be associated with age, experience of disease, institutional trust, and political identification. Pink et al. (2021) showed that pro-vaccination messages may work differently depending on the sender's political identity, and Wróblewski and Meler (2024) discovered an association between partisan polarisation and self-reported vaccination and vaccination intentions in European countries. Here, these factors serve to contextualize the findings on financial incentives.

The literature review showed that financial instruments differ in their mechanism of action and in the strength of their effects. The effects of guaranteed payments were the best documented, whereas the findings on the lotteries were weaker and less stable. The literature also indicated that responses to financial incentives depend on prior beliefs, the possible crowding out of prosocial motivation, and the framing of the incentive.

3. Methodology

The study used Computer-Assisted Web Interviewing (CAWI) on a sample of 800 adult respondents, quota-matched to the Polish adult population by gender and age, drawn from the fieldwork provider's online panel (Biostat).

The survey took place from 18 to 22 of August 2021, during the National Vaccination Program Lottery and the period of relative epidemiological stability that preceded the autumn wave of infections.

The survey questionnaire included closed-ended single-choice and multiple-choice questions, open--ended questions, and rating scales (1 to 7, and 1 to 10). The author inductively coded open-ended responses about reasons for vaccination, creating categories based on recurring themes and assigning each response to the category that best matched its meaning. Multiple coding was permitted, hence the sum of responses exceeds the number of the respondents, and the coding results were treated as a descriptive supplement to the Friedman test. Coding was performed by a single coder and subsequently reviewed and refined by the same coder. No independent second coder was involved, so intercoder reliability was not assessed.

The questionnaire had a branching design. Vaccinated, intending, and hesitant respondents assessed factors that could influence their decision, whether already made or likely to be made, while vaccine refusers assessed hypothetical conditions that could change theirs. Therefore each analysis covered only the subsample to which a given question was asked, and items from different paths were not combined into a common scale.

The influence of the vaccine lottery on decision-making was measured using a scale item among vaccinated individuals, those intending to be vaccinated, and those who were hesitant (n = 659). This lottery item was also included among the eleven motives examined in H1. For vaccine refusers, the lottery was presented as a hypothetical incentive and assessed through a separate item in another section of the questionnaire.

For vaccine refusers, the gain-framed index represented the average of cash payment, lottery, and discounted cultural tickets. In contrast, the loss-framed index averaged the loss of social benefits, loss of tax relief, and the cost of COVID-19 treatment. Items were rated from 1 to 7; “not applicable” was treated as missing. Both scales demonstrated high reliability, with Cronbach's alpha values of 0.887 for

the gain scale and 0.827 for the loss scale. The combined scales formed a summary financial incentive index, which was used to analyse predictors of incentive susceptibility.

Background variables included age, gender, place of residence, education, and declared political sympathies. Vaccination-related measures included status and stated plans, motives and barriers, and attitudes toward vaccine safety, effectiveness, and risk.

3.1. Predictors

Confidence in vaccine safety was measured with an item assessing the extent to which COVID-19 vaccines have been thoroughly tested and are safe. The respondents' political affiliation was measured using a multiple-choice question, allowing selection of more than one party. In line with this design, the parties were grouped into five ideological blocs: the then ruling camp (PiS), the liberal opposition (KO), the left, the centre and agrarian bloc, and the right(wing)-libertarian bloc (Confederation), with affiliation coded as a dummy variable for each bloc. These variables were not mutually exclusive because the respondents could indicate parties belonging to more than one political bloc.

3.2. Contextual Variables

The previously undergone COVID-19 illness and knowing someone who became seriously ill or died from COVID-19 were measured with separate questionnaire items and used as predictors of vaccination status in the exploratory regression described below. Motives for vaccination were measured with an 11-item series addressed jointly to vaccinated, intending, and hesitant individuals (n = 539). These groups were pooled because each rated the same eleven motive items on the same seven-point scale; H1 concerned their within-person hierarchy, whereas H2 tested between-group differences.

3.3. Analytical Procedure

The nature of the dependent variable measurement, based on ordinal scales, and deviations from normal distribution justified the use of nonparametric methods. Table 1 lists the test applied to each hypothesis. Friedman post hoc comparisons used the critical difference in mean ranks with a Bonferroni correction, and a sign test confirmed the Wilcoxon signed-rank test result. The assumptions of the linear regression were assessed formally. Variance inflation factors did not exceed 1.3, and Cook's distance remained below 1, indicating no serious multicollinearity or highly influential observations. Residuals departed from normality (Shapiro-Wilk W = 0.935, $p < 0.001$). The tests provided mixed evidence of heteroskedasticity (White $p = 0.002$; Breusch–Pagan $p = 0.082$), alongside a pronounced floor effect (53% at the minimum). Ordinary least squares was retained for the interpretability of its coefficients and reported together with three robustness checks: heteroskedasticity-robust (HC3) standard errors, bootstrap confidence intervals from 5,000 resamples, and a Tobit model treating the floor as left--censoring. Predictors of vaccination status in the entire sample were estimated using logistic regression, with a binomial distribution and a logit link function. In all subsample analyses, cases were filtered by vaccination-attitude category, and the sample size was indicated with each result.

Table 1. Analytical samples and statistical methods

Analytical scope	Hypothesis or status	Respondent group	Routed to path	Valid cases	Method
Vaccination--attitude classification	Descriptive classification	Full sample	800	800	Descriptive statistics
Vaccination lottery among declared motives	H1	Vaccinated respondents, respondents intending to get vaccinated, and hesitant respondents	695	539	Qualitative coding of open--ended answers, Friedman test with Bonferroni--corrected post-hoc comparisons

Analytical scope	Hypothesis or status	Respondent group	Routed to path	Valid cases	Method
Lottery rating by vaccination attitude	H2	Vaccinated respondents, respondents intending to get vaccinated, and hesitant respondents	695	659	Kruskal-Wallis test, median test
Gain- and loss--framed financial incentives	H3	Vaccine refusers	105	100	Wilcoxon signed-rank test, sign test
Susceptibility to financial incentives	H4	Vaccine refusers	105	103	Spearman's rank correlation, linear regression
Correlates of vaccination status	Exploratory analysis	Full sample	800	777	Logistic regression

Source: own elaboration. The respondents were routed by questionnaire branching; valid cases reflected the analysis-specific exclusion of missing responses. The qualitative coding is a descriptive supplement based on 547 vaccinated respondents and was not part of the n = 539 Friedman test. H1 and H2 drew on the same sample of 695 respondents, but the eleven-item motives battery retained fewer complete cases than the single lottery item (659: 534 vaccinated, 41 intending, 84 hesitant).

4. Results

The study sample comprised 547 vaccinated individuals and 253 unvaccinated individuals, of whom 43 intended to get vaccinated, 105 were still hesitant, and 105 did not intend to get vaccinated. The results are presented in the order of the four hypotheses, followed by an exploratory section on factors related to vaccination status.

4.1. The Lottery as One of Vaccination Motives

When asked about their reasons for vaccination, only two of 547 vaccinated respondents cited a financial motive: one referring to the lottery prize and the other to money. Health and prosocial motives dominated, including protection from disease (24.3% of respondents), health and health concern (18.6%), fear of illness (13.0%), and safety (10.2%). These were followed by pragmatic (with the desire to travel at the forefront) and prosocial motives. The near-absence of financial motives among spontaneously reported reasons is descriptive support for H1. A similar pattern emerged when comparing the importance of the eleven factors on a seven-point scale (Figure 1). Importantly, the respondents first answered open-ended questions to avoid being led to a cafeteria-style choice.

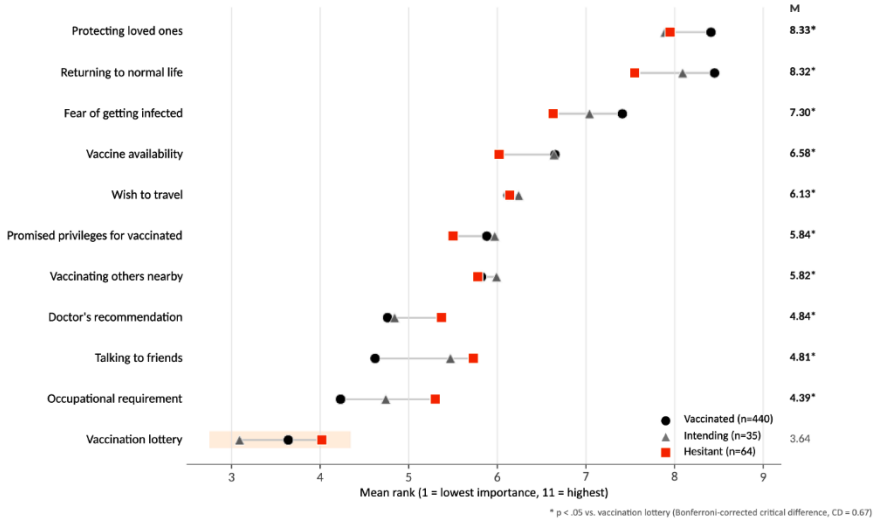


Fig. 1. Hierarchy of vaccination motives

Note: Within-person mean ranks for the eleven-item set, shown for the pooled sample and separately by vaccination attitude (vaccinated: n = 440; intending: n = 35; hesitant: n = 64), while the Friedman test on the pooled sample (n = 539, df = 10, χ^2 = 1412.64, p < 0.001); no between-group tests were performed.

Source: own elaboration.

The Friedman test showed significant differentiation of ratings ($p < 0.001$), and Kendall's coefficient of concordance was 0.26. In the Bonferroni-corrected post-hoc comparisons (critical difference in mean ranks, CD = 0.67), the vaccination lottery (mean rank 3.64) ranked significantly below every other motive, including the occupational requirement (4.39). It ranked significantly below every health and prosocial motive, including protecting loved ones (8.33), returning to normal life (8.32), fear of getting infected (7.30), and vaccinating others nearby (5.82). The result supported H1. The lottery received the lowest mean rank in each attitude group separately (Figure 1), hence the predominance of the vaccinated respondents did not drive the pooled hierarchy.

4.2. Lottery Evaluation and Attitudes Toward Vaccination

The lottery evaluation was compared between vaccinated individuals, those intending to get vaccinated, and those hesitant ($n = 659$). The Kruskal-Wallis test revealed no significant differences between the groups, as confirmed by the median test. The median was 1 among vaccinated and the hesitant respondents and 2 among those intending to get vaccinated; the ratings nevertheless remained strongly concentrated near the lower end of the scale, a strong floor effect that limited the test's ability to detect between-group differences. The study therefore did not identify reliable differences between the three groups. Descriptively, intending respondents had the highest mean rank in the Kruskal–Wallis test and hesitant respondents the lowest. However, this ordering carried no inferential weight (these between-person ranks were not comparable with the within-person ranks in Figure 1). H2 was not supported.

Table 2. Lottery rating by attitude toward vaccination (the Kruskal-Wallis test)

Group	N	KW mean rank	Median
Intends to get vaccinated	41	343.99	2.00
Hesitant	84	290.64	1.00
Vaccinated	534	335.12	1.00
Total	**659**		

Source: own elaboration. $H(2, N = 659) = 4.90$, $p = 0.086$, $\varepsilon^2 = 0.004$; median test $\chi^2(2) = 3.06$, $p = 0.217$.

4.3. Gain-Framed and Loss-Framed Incentives Among Vaccine Refusers

Among those who refused vaccination, the gain-framed incentive index was compared with the loss-framed incentive index ($n = 100$; 39 non-tied pairs). The Wilcoxon signed-rank test showed that loss-framed incentives were rated higher than gain-framed incentives ($T = 194$, $Z = 2.74$, $p = 0.006$), which was confirmed by the sign test ($Z = 2.88$, $p = 0.004$). However, both indices were near the lower end of the scale (gain: M = 1.59, SD = 1.13; loss: M = 1.84, SD = 1.29, with a minimum of 1 for both indices). The result supported H3 regarding the direction of the difference. The mean difference was 0.25 points on the 1–7 scale, and 61 of 100 pairs were tied.

4.4. Predictors of Susceptibility to Financial Incentives

Susceptibility to incentives, measured by a summary index, was associated with vaccine safety beliefs. The Spearman rank correlation was positive and moderate, $\rho = 0.41$ ($n = 103$). In a linear regression including vaccine safety beliefs and five non-exclusive political-bloc dummy variables, the model explained 37% of the variance in the index ($R^2 = 0.37$; adjusted $R^2 = 0.327$). Safety beliefs remained the only robust predictor ($\beta = 0.49$, $b = 0.39$, $p < 0.001$), retaining significance under HC3 robust standard errors, in the bootstrap confidence interval [0.235, 0.533], and in the Tobit specification. No political bloc was a robust predictor. The ruling-camp and liberal-opposition coefficients were nominally significant under classical errors ($p = 0.034$ and 0.012), but neither remained significant with HC3 or

bootstrap estimates; only the liberal-opposition remained nominally significant in the Tobit model (p = 0.034). The result supported H4: susceptibility to incentives was positively associated with safety beliefs. The refusers also provided open-ended reasons for their decisions, which were inductively coded into 23 categories. Safety-related categories dominated: fear of post-vaccination complications (26 of 105 respondents), vaccines insufficiently researched (16), and vaccination as a medical experiment (15)[1].

Table 3. Predictors of susceptibility to financial incentives among vaccine refusers (multiple linear regression)

Predictor	*n* in bloc	*b*	*β*	95% CI	*t*	*p*	VIF
Constant		0.755	—	[0.383, 1.126]	4.032	<0.001	–
Belief that vaccines are safe	—	0.385	0.486	[0.253, 0.517]	5.787	<0.001	1.07
Ruling camp (PiS)	26	0.442	0.177	[0.033, 0.852]	2.145	0.034	1.03
Liberal opposition (KO)	12	0.801	0.236	[0.183, 1.418]	2.573	0.012	1.28
Left	4	−0.014	−0.003	[−1.016, 0.988]	−0.028	0.978	1.22
Centre and agrarian	22	−0.014	−0.005	[−0.447, 0.419]	−0.064	0.949	1.03
Right-libertarian (Confederation)	30	−0.169	−0.071	[−0.561, 0.223]	−0.858	0.393	1.03

R^2 = 0.367, adjusted R^2 = 0.327, F(6,96) = 9.27, p < 0.001, n = 103; political blocs were non-exclusive dummies (VIF ≤ 1.28). Robustness checks confirmed vaccine-safety beliefs, while political coefficients were not robust to HC3 or bootstrap; only liberal opposition remained nominally significant in the Tobit model (p = 0.034).

Source: own elaboration.

4.5. Exploratory Factors Related to Vaccination Status

Vaccination status was estimated among 777 valid cases from the full sample using logistic regression (Figure 2). Belief in vaccine safety was strongly associated with vaccination status; each 1-point increase in the rating was associated with higher odds of vaccination (OR = 2.28, p < 0.001). Knowing someone who had become seriously ill or died from COVID-19 was also associated with higher odds of vaccination (OR = 2.45, p < 0.001). Status was also associated with age: respondents aged 40 and over had higher odds than those aged 18–29 (OR 2.17–3.16). Urban residents also had higher odds than rural residents, with the largest estimate for cities with more than 500,000 inhabitants (OR = 3.89, p < 0.001). Gender and education were not significant. Having had COVID-19 itself was associated with vaccination status in the bivariate analysis ($\chi^2(3) = 9.25$, p = 0.026). However, after taking into account the remaining predictors, this relationship ceased to be significant, which may be due to covariation with age, size of the town, and belief in safety.

[1] Examples of responses translated into English: post-vaccination complications – “I am afraid of complications”, “I am afraid of side effects after vaccination”; insufficient research – “The vaccines have not been tested”, “The vaccine was developed too quickly”; medical experiment – “It is a medical experiment”, “I do not want to take part in an experiment”, “I am not a guinea pig”.

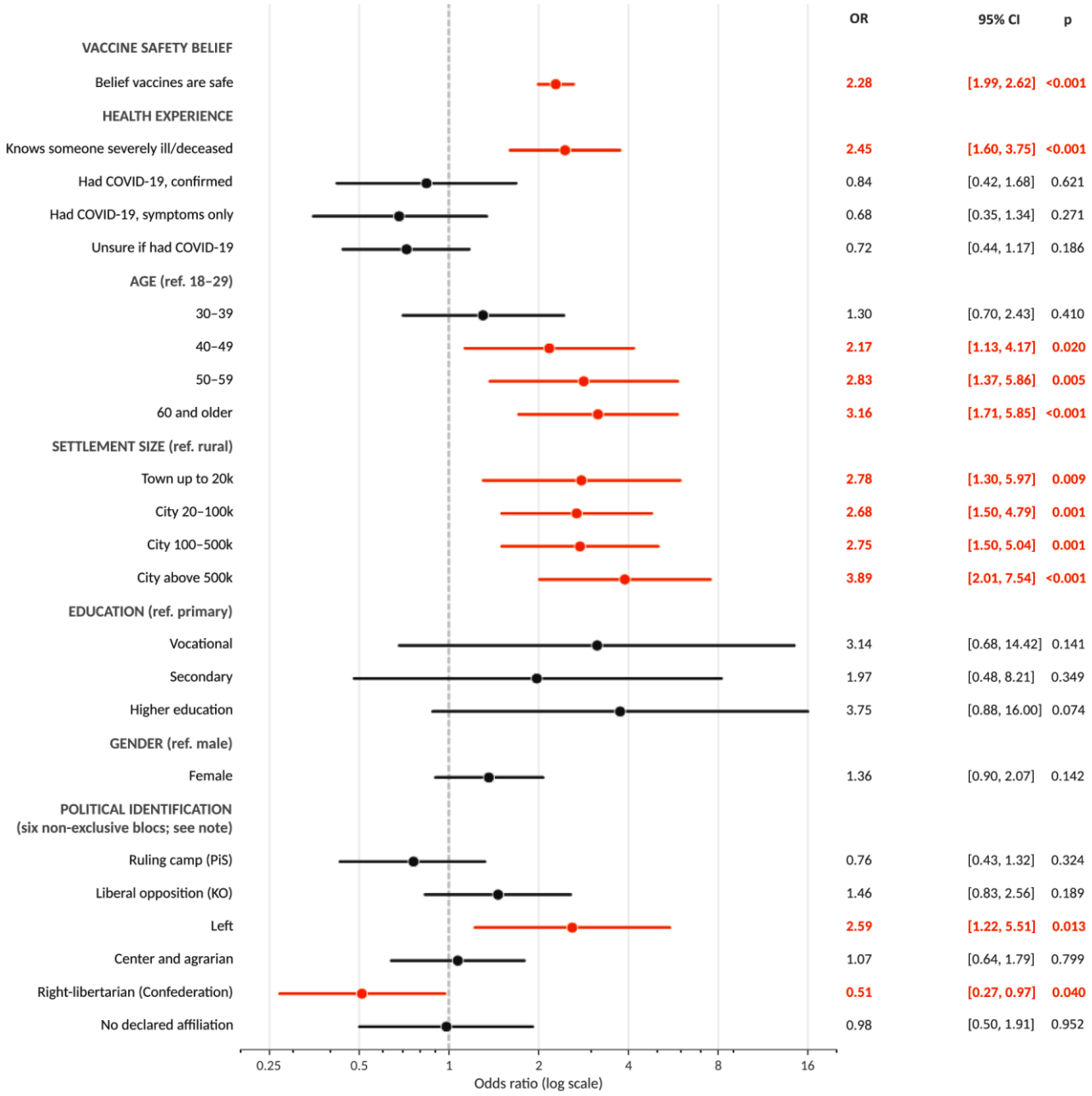


Fig. 2. Predictors of vaccination status (exploratory logistic regression, odds ratios)

N = 777; reference categories: male, age 18–29, rural residence, primary education, and no prior COVID-19; five political-bloc indicators plus a separate no-affiliation indicator were entered as non-exclusive binary variables, each contrasted with all others. ORs, 95% CIs, and exact *p*-values are shown; LR $\chi^2(23) = 346.1$, $p < 0.001$, McFadden $R^2 = 0.359$, AIC = 665.8; coefficients and SEs are available on request.

Source: own elaboration.

In the exploratory analysis, political identification differentiated vaccination status at the extremes of the spectrum. Individuals identifying with the left were more likely to be vaccinated (OR = 2.59, $p = 0.013$), whereas those identifying with the right-libertarian bloc were less likely to be vaccinated (OR = 0.51, $p = 0.040$). The coefficients for the ruling camp, the liberal opposition, the centre and agrarian bloc, and lack of political declaration were not statistically significant. Political identification therefore differentiated vaccination status, but did not reliably predict responsiveness to financial incentives among refusers. These associations were exploratory and cross-sectional, so they should be interpreted as tendencies requiring replication.

5. Discussion and Conclusion

The lottery, the only nationwide instrument aimed directly at citizens, had a low declared potential, ranking below every other motive and receiving uniformly low ratings across attitude groups. This corresponds to previous Polish findings, in which the short-term rise in daily doses after the lottery announcement (Kuznetsova et al., 2022) was not accompanied by evidence of lasting change, and medical personnel assessed the lottery negatively (Wróblewski et al., 2022).

Among vaccine refusers, the tested loss-framed incentives received higher ratings than the tested gain--framed incentives. Since the two sets differed in both substantive content and framing, their difference cannot be attributed to framing alone. This difference did not imply that either incentive was rated as likely to change the reported decision, as both indices remained near the lower end of the scale. This result is consistent with findings that financial and other incentives did not increase vaccination among hesitant individuals (Jacobson et al., 2022) and that offering money decreased the subjective feeling of vaccine safety for some individuals (Huynh et al., 2026).

Susceptibility to incentives among the refusers was associated primarily with vaccine safety beliefs, as those who did not question safety rated the incentive higher. Money may therefore have some role once the safety barrier is absent, although a common cause is equally consistent with the data, since the same underlying attitude can drive both the safety belief and the rating of any incentive. The descriptive coding of spontaneous reasons for refusal points in the same direction, with fear of complications, insufficient testing, vaccination as a medical experiment, and distrust of the vaccine among the most frequent categories. This pattern is also visible in the literature on safety barriers (Dubé et al., 2015) and the signalling function of incentives, which hesitant individuals may interpret as a sign of hidden risk (Huynh et al., 2026).

Political identification did not provide stable evidence of differences in incentive receptivity among the refusers, partly because some political subgroups were very small. In the exploratory full-sample analysis, however, political identification was associated with vaccination status. The respondents sympathising with the left were more often vaccinated, whereas those identifying with the right-libertarian bloc were less often vaccinated. This result aligned with findings from studies linking political identity to vaccination attitudes (Pink et al., 2021; Wróblewski & Meler, 2024).

The exploratory analysis linked vaccination status to factors the incentive itself is unlikely to reach: safety beliefs, severe illness in a close person, age, and town size – the latter consistent with lower vaccination rates outside large centres (Lewandowski & Madoń, 2022).

From a public spending perspective, the results suggested limited potential for individual financial incentives targeting vaccine refusers. The National Vaccination Program Lottery prize pool was nearly PLN 22 million (PAP MediaRoom, 2021). However, the broader incentive package produced only a brief increase in daily doses, which was almost entirely offset soon after (Kuznetsova et al., 2022). The specific impact of the lottery cannot be determined from these data, so the cost per vaccination remains unknown. The available evidence does not indicate efficient targeting, as funds were spent on the general population, whereas those whose decisions the incentives aimed to influence rated the instrument the lowest. This finding was in line with mixed evidence on lotteries, which showed effects ranging from negligible (Walkey et al., 2021; Milkman et al., 2022) to substantial in some contexts (Campos-Mercade et al., 2024).

If a financial instrument is considered, the tested loss-framed incentives appeared to have greater declared potential than the tested gain-framed incentives, although neither type received ratings indicating substantial decision-changing potential. Thus the results support shifting attention from financial rewards to safety beliefs and to credible messengers tailored to the recipient.

The results should be interpreted with several caveats. The study was cross-sectional, therefore it does not allow for inferences about causal relationships. Assessments of incentives among vaccine refusers

were based on hypothetical instruments, and the declared responses may differ from actual responses. The sample was quota-matched only on age and gender and was unweighted, hence representativeness with respect to other characteristics cannot be assumed. The subsample of refusers was small, and some political blocs in this group numbered a dozen or just a few people, limiting the power of political analyses on the susceptibility side. Safety beliefs were measured using a single item, and reverse causality cannot be ruled out: vaccination itself may influence subsequent safety beliefs. The open-ended responses were coded by a single coder in one pass, with no second coder, therefore intercoder reliability was not assessed; these categories serve as a descriptive supplement to the quantitative results and carry no inferential weight. Missing responses reduced the motives analysis from 695 routed respondents to 539 complete cases, potentially introducing selection bias due to item nonresponse. The study was conducted in August 2021, during the lottery period and relative epidemic stabilisation that preceded the autumn wave, hence the results apply to this context.

Individual financial incentives, and lotteries in particular, had a low declared potential among vaccine refusers. In the exploratory analyses, vaccination status was associated with safety beliefs, with knowing someone who became seriously ill or died from COVID-19, with age, settlement size, and with political identification. Of these factors, safety beliefs were a more plausible target for communication about safety and trust than for monetary rewards. From a public finance perspective, this placed the limit of individual incentives outside the incentive mechanism itself.

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Ethical statement: The study was an anonymous, non-interventional CAWI survey of adults in Poland, conducted by Biostat through its online panel. Under the Polish Act of 5 December 1996 on the Professions of Physician and Dentist, approval from a bioethics committee is required for medical experiments. As this study measured opinions and attitudes and involved no medical intervention, it did not constitute a medical experiment; therefore, ethical approval was not required or sought. Panel members consented to participate in the research upon registration, and the respondents separately consented to the processing of personal data, including health-related data, before starting the survey. Participation was voluntary and could be discontinued at any time. The respondents received 30 panel points, equivalent to approximately PLN 1.50. Data were processed in accordance with the GDPR, and the dataset contained no directly identifying information.

Data availability: The anonymised survey data may be made available from the author upon justified request, subject to legal, ethical, and contractual restrictions related to respondent confidentiality and the fieldwork provider. The questionnaire, variable definitions, the coding frame for open-ended responses, and the analysis syntax are available from the author on request without restriction.

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