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## COVID-19 VACCINATION AMONG PEOPLE WITH DRUG ADDICTIONS: A CROSS-SECTIONAL STUDY

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### Abstract

**Background:** The challenges of the coronavirus infection (COVID-19) pandemic dictate the need to ensure equal access to treatment and prevention services. This has become especially relevant in the context of widespread campaigns for vaccination of the population. Meanwhile, significant issues arise in the coverage of immunoprophylaxis for vulnerable social groups and in particular those who use psychoactive substances (PS). The uptake of and attitudes to COVID-19 vaccines in people with drug addictions remain uncertain.

**The aim** of the study is to assess the coverage of COVID-19 vaccination and its determinants among people with drug addictions.

**Materials and methods:** a cross-sectional study was conducted among 427 individuals with drug addictions by means of paper and electronic questionnaires. Socio-demographic characteristics, history of COVID-19, attitudes towards the pandemic, sources of information on preventive and therapeutic measures were recorded. Comparisons were made between two groups of respondents with different COVID-19 vaccination status. Descriptive statistical procedures included the calculation of the median and interquartile range, as well as proportions. The comparison was made using the Mann-Whitney test, contingency tables and the chi-square test. With logistic regression, the quantitative values of the abovementioned characteristics (odds ratio – OR- with 95% confidence interval) were determined for the probability of receiving COVID-19 vaccines.

**Results:** The proportion of those who reported receiving at least one dose of the vaccine was 61.4%. Persons who did not receive COVID-19 vaccines (n=165) were more likely to have lower level of education ( $\chi^2=17.17$ ;  $p=0.004$ ) and problems with employment ( $\chi^2=6.45$ ;  $p=0.01$ ), as well as to report lower monthly income ( $\chi^2=22.48$ ;  $p<0.001$ ). They less often indicated severe consequences and mortal cases due to COVID-19 among family members ( $\chi^2_{\text{complications}}=12.93$ ;  $p=0.002$ ;  $\chi^2_{\text{mortal}}=10.31$ ;  $p=0.006$ ). Only a fifth of all the respondents adequately assessed the high risks of contracting COVID-19 when using PS. Regression analysis revealed the following factors that increase the likelihood of receiving COVID-19 vaccines: annual GP visits (at least once a year) – OR = 2.06 (1.27; 3.35), receiving information about vaccines from physicians – OR = 2, 23 (1.24; 4.03), trust in medical specialists – OR=1.9 (1.15; 3.16).

**Conclusions:** insufficient access to reliable information about COVID-19 treatment and prevention among people with drug addictions, as well as their underestimation of the risks of the infection, dictates the need for educational interventions among this population group.

**Key words:** COVID-19, vaccination, drug addiction, attitude.

### Резюме

## ВАКЦИНАЦИЯ ПРОТИВ КОРОНАВИРУСНОЙ ИНФЕКЦИИ СРЕДИ ЛЮДЕЙ С ХИМИЧЕСКИМИ ЗАВИСИМОСТЯМИ: ПОПЕРЕЧНОЕ ИССЛЕДОВАНИЕ

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**Актуальность.** Вызовы пандемии коронавирусной инфекции (COVID-19) диктуют необходимость обеспечения равного доступа к лечебно-профилактическим услугам. Это стало особенно актуальным в условиях широких кампаний по вакцинации населения. Между тем значительные вопросы возникают при охвате иммунопрофилактикой уязвимых социальных групп и, в частности, тех, кто употребляет психоактивные вещества (ПАВ). Остаются

неопределенными масштабы вакцинации, отношение зависимых людей к вакцинам против COVID-19.

**Цель исследования:** оценка охвата вакцинацией против COVID-19 и ее детерминант среди лиц, страдающих химическими зависимостями.

**Материалы и методы:** проведено поперечное исследование среди 427 зависимых людей путем бумажного и электронного анкетирования. Регистрировались социально-демографические характеристики, история заболевания COVID-19, отношение к пандемии, источники информации о профилактических и лечебных мероприятиях. Проводились сравнения между двумя группами респондентов с различным статусом вакцинации против COVID-19. Описательные характеристики включали расчет медианы и межквартильного размаха, а также долей. Сравнение произведено с помощью критерия Манна-Уитни, таблиц сопряженности и критерия хи-квадрат. С помощью логистической регрессии определено количественное значение вышеуказанных характеристик (отношение шансов – ОШ с 95% доверительным интервалом) для вероятности получения вакцины от COVID-19.

**Результаты:** Доля зависимых, которые указали на получение хотя бы одной дозы вакцины, составила 61,4%. Лица, которые не получили вакцину ( $n=165$ ) от COVID-19, чаще имели более низкий уровень образования ( $\chi^2=17,17$ ;  $p=0,004$ ), проблемы с занятостью ( $\chi^2=6,45$ ;  $p=0,01$ ), сообщали о более низком месячном доходе ( $\chi^2=22,48$ ;  $p<0,001$ ). Они реже указывали на тяжелые последствия COVID-19 и смертельные исходы инфекции среди членов семьи ( $\chi^2_{\text{осложнения}}=12,93$ ;  $p=0,002$ ,  $\chi^2_{\text{летальные}}=10,31$ ;  $p=0,006$ ). Лишь пятая часть всех опрошенных адекватно оценивала высокие риски заражения COVID-19 при употреблении ПАВ. Регрессионный анализ выявил следующие факторы, повышающие вероятность получения вакцины от COVID-19: хотя бы однократное в году посещение участкового врача – ОШ = 2,06 (1,27; 3,35), получение информации о вакцинах от медиков – ОШ=2,23 (1,24; 4,03), доверие медицинским специалистам – ОШ=1,9 (1,15; 3,16).

**Выводы:** недостаточный доступ к достоверной информации о методах лечения и профилактики COVID-19 среди зависимых людей, а также недооценка рисков заражения диктует необходимость образовательных мероприятий среди данной группы населения.

**Ключевые слова:** COVID-19, вакцинация, химическая зависимость, отношение.

Түйіндеме

## ХИМИЯЛЫҚ ТӘУЕЛДІЛІГІ БАР АДАМДАР АРАСЫНДА КОРОНАВИРУСТЫҚ ИНФЕКЦИЯҒА ҚАРСЫ ВАКЦИНАЦИЯ: ЖАППАЙ (КӨЛДЕНЕҢ) ЗЕРТТЕУ

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**Өзектілігі.** Коронавирустық инфекцияның (COVID-19) пандемияға ұласуы емдік алдын-алу шараларының бәріне бір деңгейде қолжетімді болуы керек екенін тағы бір ескертті. Бұл әсіресе халықты вакцинациялау бойынша кең ауқымды іс шараларда өзекті болды. Бұл ретте халықтық осал әлеуметтік топтарын, әсіресе психоактивті заттарды пайдаланатындарды иммундық алдын алу кезінде айтарлықтай сұрақтар туындатты. Вакцинацияның ауқымы, тәуелді адамдардың COVID-19-ға қарсы вакцинацияға көзқарасы белгісіз болып қалуда.

**Зерттеудің мақсаты:** химиялық тәуелділіктен зардап шегетін адамдар арасында коронавируспен оның детерминантарына қарсы вакцинациямен қамтуды бағалау

**Материалдар және әдістер:** қағаз жүзінде және электронды түрдегі сауалнамалар арқылы тәуелділіктен зардап шегетін 427 адам арасында сауалнама жүргізілді. Әлеуметтік сипаттамалар, COVID-19 ауруының тарихы, пандемияға көзқарастары, профилактикалық және емдік іс шаралар туралы ақпарат көздері тіркелді. COVID-19-ға қарсы вакцинация статусы әртүрлі респонденттердің екі тобы арасында салыстырулар жүргізілді. Міндетті сипаттамаларға медиана мен кварталаралық ауқымды және үлемтерді есептеу кіреді. Салыстырулар Манн-Уитни критерийлерімен, қарсыласу кестемімен және хи-квадрат критериялары көмегімен жүргізілді. Логистикалық регрессияны қолдана отырып, COVID-19-ға қарсы вакцинаны алу ықтималдығы үшін жоғарыда айтылған сипаттамалардың сандық мәндері анықталды (мүмкіндік қатынасы – МҚ 95% сенімділік аралығында).

**Нәтижесі:** Вакцинаның кем дегенде бір дозасын алғысы келетін тәуелділердің үлесі 61,4%-ді құрады. COVID-19-ға қарсы вакцинаны алмаған тұлғалар ( $n=165$ ) көп жағдайда білім деңгейі төмен ( $\chi^2=17,17$ ;  $p=0,004$ ), жұмысқа орналасу бойынша қиыншылықтары бар ( $\chi^2=6,45$ ;  $p=0,01$ ), айлық есеп көрсеткіші төмен екенін айтты ( $\chi^2=22,48$ ;  $p<0,001$ ). Олар COVID-19-дың ауыр салдарын және отбасы мүшелері арасындағы инфекция салдарынан болған өлім көрсеткіші туралы ( $\chi^2_{\text{асқынулар}}=12,93$ ;  $p=0,002$ ,  $\chi^2_{\text{өлімге әкелетін}}=10,31$ ;  $p=0,006$ ) сирек айтты. Барлық респонденттердің бестен бір бөлігі ғана психоактивті заттарды пайдаланған кезде COVID-19-ты жұқтырудың жоғары қаупін адекватты түрде бағалады.

Регрессиялық талдау COVID-19-ға қарсы вакцина алу ықтималдығын арттыратын келесі факторларды анықтады: жылына кемінде бір рет учаскелік дәрігерге бару –  $M\bar{X} = 2,06$  (1,27; 3,35), дәрігерлерден вакциналар туралы ақпарат алу –  $M\bar{X} = 2,23$  (1,24; 4,03), медицина мамандарына сенім –  $M\bar{X} = 1,9$  (1,15; 3,16).

**Қорытынды:** тәуелді адамдар арасында COVID-19 емдеу және алдын алу әдістері туралы сенімді ақпаратқа қол жетімділіктің жеткіліксіздігі, сондай-ақ жұқтыру қаупін жете бағаламау халықтың осы тобы арасында ағарту іс-шараларының қажеттілігін туындатады.

**Түйінді сөздер:** COVID-19, вакцинация, химиялық тәуелділік, қатынас.

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#### Introduction

The last three years saw unprecedented challenges for the global public health. The coronavirus infection (COVID-19) pandemic, officially announced by the World Health Organization (WHO) on March 11, 2020, determined the extent of socio-economic predicaments for the entire world community [13]. In response to that, the development of a range of COVID-19 vaccines has been a significant public health achievement, helping to slow the spread and curtail persistence of pandemic outbreaks.

Meanwhile, the issues of organization and coverage of vaccination remain extremely relevant. Among other challenges, public health practice reflects the lack of equal access to this service among different population groups [27]. In addition, significant threats are presented in the form of widespread circulation of inaccurate and unreliable information [17], going beyond the scientific evidence-based scope and indiscriminately calling for the rejection of vaccinations. The general alertness in social networks, the appearance of screaming anti-social advertising is aimed at creating a negative image of vaccines. Attitudes towards vaccines against COVID-19 largely repeat the patterns of immunization against other infectious diseases. According to world data, the issues of insufficient adherence to vaccination have not lost their relevance over the past three decades, regardless of the degree of epidemic threats [24]. Hesitance and distrust in vaccines and vaccination is observed in various countries with very different living standards. Doubtless, social status and financial well-being significantly affect the readiness and willingness to receive vaccines against infections [8]. However, in this case, the availability of these medical services are of utmost pertinence, which points to the aforementioned problems of vaccination associated with access inequality and social barriers.

Primary research data accumulated in relation to socially vulnerable population groups indicate their low coverage with vaccination programs and campaigns. A vivid example of this is the situation with people suffering from chemical addictions, whose life expectancy is reduced on average by more than 15 years [25]. Meanwhile, this group

of patients needs to get active anti-epidemic services where immunization plays a key role. A number of studies among socially disadvantaged groups in the COVID-19 era proved the vulnerability of people with substance addictions highlighting the need for access to the full range of treatment, diagnostic and preventive measures. Namely, according to a quantitative assessment, people with substance addictions are 9 times more vulnerable to COVID-19 compared to non-addicted counterparts. Outcomes of COVID-19 in people with addiction also have a high percentage of complications and are associated with large economic losses [29]. Self- and society stigmatization also create specific barriers that reduce the likelihood of willingness to receive a combination of COVID-19 prevention and treatment services [16]. Vaccination, as a key measure to reduce the burden of the COVID-19 pandemic among substance using people, has been actively included in policy plans to work with this category of the population over the past years [10].

A detailed assessment of the coverage and accessibility of COVID-19 preventive programs has just begun, focusing on high-income countries such as the United States, European Union states [18, 28]. However, it is worth considering that the willingness to receive vaccines also depends on the context of national health systems. It is sometimes difficult to extrapolate international scientific findings to the context of Eastern European and Central Asian countries, where specific system has developed in the supply and demand of medical and rehabilitation services for people with drug addictions [7, 9, 20, 23, 31]. At the time of writing this publication, the authors could not find data on coverage of and attitudes towards vaccination among people with drug addictions in Central Asia in general and Kazakhstan in particular. Given the above, **the aim of the study** was to assess the coverage of COVID-19 vaccination and its determinants among individuals with drug addictions.

#### Materials and Methods

*The study object* was the attitudes and barriers to COVID-19 vaccination in people with chemical addictions. *The study subjects* were people with drug addictions

(patients of the Pavlodar branch of the Republican Scientific and Practical Center for Mental Health, regional mental health centers, clients of harm reduction forums and chats). A *cross-sectional observational study* was carried out by surveying people with drug addictions. *Inclusion criteria were the following:* diagnosis of drug addiction, adult age, informed consent to participate. *Exclusion criteria* encompassed refusal to participate in the study (at any stage), minor age, language barrier and inability to understand the Kazakh and Russian languages, psychotic syndrome, mental retardation, uncompleted answers to a questionnaire (less than 50%).

The questionnaires were filled out both in paper and electronic forms. The paper forms were available for patients at the Pavlodar Branch of the Republican Center. The electronic questionnaires were distributed through forums and group chats of people with drug addictions, non-governmental organizations, and regional mental health centers. The field works were carried out from 26.01.2022 to 24.03.2022.

The questionnaire was developed by integrating the questions tested in the project of the Research Institute "Public Opinion", which studied the attitudes toward COVID-19 vaccines among residents of Central Asian countries (including Kazakhstan) [2]. The second part of the questionnaire related to the basic socio-demographic information about the respondents. The third block of the questionnaire assessed attitudes towards vaccination (in relation to any infections, including those from COVID-19) using the 5C model and its diagnostic scales: confidence, complacency, constraints, calculation, collective responsibility [11]. The analysis of 5C indicators is beyond the scope of the present publication.

Piloting and assessing the content validity of the whole questionnaire was carried out with an expert panel in the field of public health and drug addiction (5 persons), and 15 respondents (7 healthy volunteers and 8 patients with drug addictions) in the focus group format. Based on these procedures, the final version of the questionnaire was compiled.

The calculation of the planned number of respondents was carried out using the online calculator <http://www.openepi.com/SampleSize/SSPropor.htm>, which was provided to determine the sample size based on the desired proportion. The proportion was set to 25%, as determined from a previous study according to Mellis et al. [19]. For the calculation, the following indicators were entered into the calculator: the size of the general population: 12,837 that was the number of patients treated in drug addiction hospitals of the Republic of Kazakhstan in 2020 [5]; prognosis accuracy was defined as 95%; error rate was set at the level of 5%. Given the set parameters, the minimum sample size was 282 respondents.

Statistical analysis included the calculation of the median (Me) and interquartile range (IQR) for quantitative variables, and frequencies (%) - for nominal variables. Comparative analysis was carried out using contingency tables with the calculation of Pearson's chi-square test for frequencies. The Mann-Whitney test was used to compare quantitative variables between two independent groups. The absolute value of statistical criteria was presented with

their significance (p). To assess the factors associated with COVID-19 vaccination, a logistic regression analysis was carried out. The input of variables into the regression model was made by Wald's inclusion method. The calculated odds ratios (ORs) were presented in interval estimates as 95% confidence intervals (95% CI). Statistical processing of the study material was performed using the SPSS software package, v.20.0 (SPSS Inc., Chicago IL, USA).

The approval of the study protocol was received from the Local Ethical Commission of NJSC "Semey Medical University" No. 5 dated 25.01.2022.

## Results

In total, 427 respondents with drug addictions took part in the survey, of which males made up the absolute majority: 285 people (66.7%). The median age of the respondents was 43 years (IQR: 34; 48). Overall, 262 respondents (61.4%) reported receiving COVID-19 vaccines, while 40 people (9.4%) received only one dose of a vaccine. Table 1 below presents the results of a comparative analysis of the main socio-demographic indicators by the parameter of COVID-19 vaccination. In that case, we dichotomized that indicator, considering the respondent report of receiving at least one dose of a COVID-19 vaccine as having been vaccinated.

Among the respondents who did not receive a COVID-19 vaccine, there were more often those who had a lower level of education, belonged to other ethnic groups than Kazakh and Russian, more often had problems with employment and, respectively, had a lower monthly income. In addition, more than half of the unvaccinated respondents did not visit their physicians over the past year - 84 people (50.9%). Among the vaccinated group, that percentage was lower, 105 persons (40.1%) -  $\chi^2=4.82$ ;  $p=0.03$ . Only in a fifth of the cases, the unvaccinated respondents reported receiving flu vaccines at least once in their lives - 35 people (21.2%). Their counterparts received flu vaccines twice as often - 135 people (51.5%).

The respondents from both groups reported that they experienced COVID-19 infection with equal frequency: 34 unvaccinated respondents (20.6%) versus 49 vaccinated respondents (18.7%) -  $\chi^2=0.27$ ;  $p=0.88$ . No differences were observed in the frequency of the COVID-19 infection among the respondents' family members: 59 unvaccinated respondents reported about infected relatives (35.8%) versus 107 vaccinated respondents (40.8%) -  $\chi^2=1.1$ ;  $p=0.29$ .

However, vaccinated respondents were 1.5 times more likely to report complications from COVID-19 among their relatives (60 respondents, 22.9%) and 2.4 times more likely to report deaths among their family members (30 respondents, 11.5%). Among unvaccinated respondents, complications in relatives were reported by 24 respondents (14.5%), deaths from COVID-19 - by 8 persons (4.8%):

$\chi^2_{\text{complications}} = 12.93$ ;  $p=0.002$ ,  $\chi^2_{\text{lethal}} = 10.31$ ;  $p=0.006$ .

The respondents who were not vaccinated against COVID-19 were more likely to believe that the pandemic did not exist - 43 people (26.1%), or was part of a "special conspiracy and artificially created" - 52 respondents (31.5%). Among the vaccinated respondents, those opinions were shared by 47 (17.9%) and 52 persons (19.8%) respectively -  $\chi^2=16.09$ ;  $p<0.001$ .

Table 1.

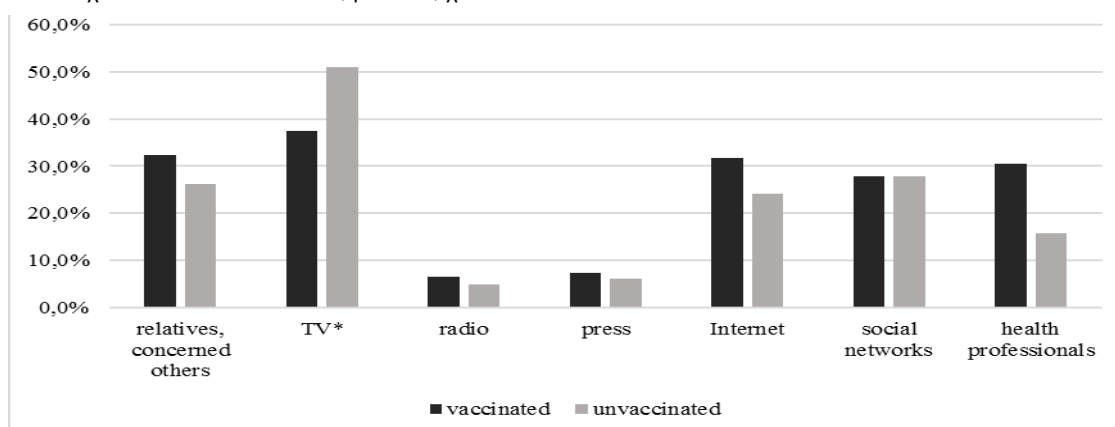
**Comparative characteristics of socio-demographic indicators of respondents with different status of COVID-19 vaccination.**

| Characteristics                   | COVID-19 vaccination (at least one dose) |                 | Statistical criterion, p |
|-----------------------------------|--|-----------------|--------------------------|
|                                   | Yes (n=262)                              | No (n=165)      |                          |
| Age, Me (IQR:)                    | 42 (33.8; 49.0)                          | 44 (35.0; 48.0) | U=19278; p=0.10          |
| Male, %                           | 171 (65.3%)                              | 114 (69.1%)     | $\chi^2=0.67$ ; p=0.41   |
| Education                         |  |                 | $\chi^2=17.17$ ; p=0.004 |
| Incomplete secondary (grades 8-9) | 33 (12.6%)                               | 29 (17.6%)      |                          |
| Secondary general (grades 10-11)  | 47 (17.9%)                               | 31 (18.8%)      |                          |
| Secondary vocational              | 109 (41.6%)                              | 81 (49.1%)      |                          |
| Incomplete higher                 | 9 (3.4%)                                 | 9 (5.5%)        |                          |
| Higher                            | 62 (23.7%)                               | 14 (8.5%)       |                          |
| Academic degree                   | 2 (0.8%)                                 | 1 (0.6%)        |                          |
| Ethnicity                         |  |                 | $\chi^2=14.18$ ; p<0.001 |
| Kazakh                            | 103 (39.3%)                              | 69 (41.8%)      |                          |
| Russian                           | 142 (54.2%)                              | 68 (41.2%)      |                          |
| Other                             | 17 (6.5%)                                | 28 (17.0%)      |                          |
| Marital status                    |  |                 | $\chi^2=2.01$ ; p=0.57   |
| Single, not married               | 96 (36.6%)                               | 53 (32.1%)      |                          |
| Married                           | 89 (34.0%)                               | 53 (32.1%)      |                          |
| Divorced                          | 66 (25.2%)                               | 50 (30.3%)      |                          |
| Widow(er)                         | 11 (4.2%)                                | 9 (5.5%)        |                          |
| Religiosity                       |  |                 | $\chi^2=0.63$ ; p=0.73   |
| No                                | 92 (35.2%)                               | 52 (31.5%)      |                          |
| Yes                               | 133 (51.0%)                              | 89 (53.9%)      |                          |
| Not decided                       | 36 (13.8%)                               | 24 (14.5%)      |                          |
| Employment                        |  |                 | $\chi^2=6.45$ ; p=0.01   |
| Work and (or) study               | 169 (64.5%)                              | 86 (52.1%)      |                          |
| No work, neither study            | 93 (35.5%)                               | 79 (47.9%)      |                          |
| Monthly income (in tenge)         |  |                 | $\chi^2=22.48$ ; p<0.001 |
| Less than 10 000                  | 34 (13.1%)                               | 31 (19.0%)      |                          |
| From 10 000 to 50 000             | 32 (12.3%)                               | 42 (25.8%)      |                          |
| From 50 001 to 100 000            | 73 (28.1%)                               | 44 (27.0%)      |                          |
| From 100 001 to 200 000           | 89 (34.2%)                               | 37 (22.7%)      |                          |
| From 200 001 to 300 000           | 20 (7.7%)                                | 7 (4.3%)        |                          |
| More than 300 000                 | 12 (4.6%)                                | 2 (1.2%)        |                          |

Among those who already received a COVID-19 vaccine, three-quarters of respondents had information about the types of vaccines, a third engaged in a deliberate search for missing information. Among the unvaccinated respondents, 48.5% had information about vaccines, only 12.1% deliberately expanded their knowledge about vaccination:  $\chi^2_{\text{information awareness}} = 36.41$ ; p<0.001,  $\chi^2_{\text{information}}$

search = 26.93; p<0.001.

The sources of information about vaccines and vaccination were largely the same among all surveyed people, with the exception of a significantly lower level of information from medical professionals among the unvaccinated group of the respondents (Figure 1).



\* - indicators by which a statistically significant difference was identified

**Figure 1. Source of information on COVID-19 vaccination.**

The respondents who had not been vaccinated against COVID-19 were less likely to trust medical specialists in the prevention and treatment of the infection - 75 unvaccinated respondents (45.5%) versus 172 vaccinated (65.6%) -  $\chi^2=16.93$ ;  $p<0.001$ . Those who did not receive the COVID-19 vaccine were substantially less likely to trust relatives and friends: 20 unvaccinated (12.1%) versus 54 vaccinated (20.6%) -  $\chi^2=5.09$ ;  $p=0.024$ . The unvaccinated respondents more often admitted that they did not trust anyone at all - 30 respondents (18.2%) versus 28 vaccinated respondents (10.7%) -  $\chi^2=4.85$ ;  $p=0.028$ .

Those respondents who did not receive COVID-19 vaccines were less likely to agree with the need for widespread vaccination campaigns among the general population - 51 respondents (30.9%) compared to 166 vaccinated respondents (63.4%) -  $\chi^2=52.69$ ;  $p<0.001$ . A third of the unvaccinated respondents distrusted all vaccines (regardless of a

preventable infection) - 49 persons (29.7%).

Regardless of COVID-19 vaccination, just a fifth of all respondents - 92 respondents (21.6%) - asserted that psychoactive substance use made them more vulnerable to the infection and its consequences. A third (149 respondents, 35.0%) denied any impact of addiction on the risk of contracting COVID-19. The same number of the respondents found it difficult to determine the impact of drug use on the infection risks - 118 respondents (27.7%). There were no differences between the groups of vaccinated and unvaccinated respondents in that indicator.

In the regression model, the likelihood of COVID-19 vaccination was associated with visits to physicians, getting information from health professionals and trust in that information, as well as with the income of respondents; an inverse association was found to be with distrust of all vaccines (Table 2).

Table 2.

Regression analysis of factors associated with the likelihood of receiving COVID-19 vaccines\*.

| Factors  | OR   | Confidence interval |             | p      |
|--|------|---------------------|-------------|--------|
|  |      | Lower bound         | Upper bound |        |
| Monthly income   | 1.26 | 1.04                | 1.52        | 0.018  |
| Visits to a physician (at least once in the last year)                     | 2.06 | 1.27                | 3.35        | 0.004  |
| Obtaining information about the COVID-19 vaccine from health professionals | 2.23 | 1.24                | 4.03        | 0.008  |
| Trust in medical advice on COVID-19 prevention and treatment               | 1.90 | 1.15                | 3.16        | 0.013  |
| Total distrust of all vaccines   | 0.26 | 0.13                | 0.51        | <0.001 |

\*R-square=20.1%

### Discussion

The present analysis showed a fairly high coverage of COVID-19 vaccination in the sample of people with drug addictions - 61.4%. At the time of writing this publication (25.03.2022), the vaccination rate among the general population in Kazakhstan was lower - 49.5% [4, 6]. According to a few international studies assessing the coverage of COVID-19 vaccination in similar social groups, contrast findings were discerned. In most previous cases, low enrollment into vaccine programs during pandemic has been established. Namely, according to New Zealand study, the difference in vaccination coverage among addicted people and the general population was 10% as of February 2022 [14]. A survey conducted at the American Forum of Addicted People revealed a quarter of those who did not want to be vaccinated, the same number expressed their uncertainty on this issue [19]. The low percentage of addicted people involved in hepatitis B immunization compared to the general population also testified in favor of the insufficient coverage of vulnerable groups with vaccine prevention programs [30]. The discrepancy between the data of our study and the global tendencies might be due to the specifics of the respondent recruitment for the present survey. We interviewed people who already received certain drug treatment services. In practice, among them, we expected a high proportion of those who were interested in vaccination by cause of external reasons. That specific stratum of drug addicted people had to fulfill the standard hospitalization requirements and receive COVID-19 vaccines to enter inpatient treatment courses. Otherwise, the patients were forced to provide laboratory certificates of COVID-19 seronegativity upon admissions at their own expense.

Along with that, we were able to identify the group of respondents who did not receive the preventive service during the year-long campaign for mass COVID-19 vaccination. Those people had a lower level of education,

had problems with employment and income, did not visit their local doctors, and were less likely to trust health professionals. It is noteworthy that among those whose relatives suffered complications from COVID-19 or died from that infection the vaccination coverage was higher.

The analysis also showed the importance of medical specialists in vaccination enrollment for people with addictions. Our data are in line with international recommendations stating the exceptional role of medical personnel in promoting the ideas of vaccination and establishing trusting contacts with communities and vulnerable population groups [21, 26]. At the same time, our study revealed that professionally accurate information about COVID-19 vaccines was significant only for a quarter of all respondents (24.8%). In comparison, quite a higher proportion of the surveyed persons highlighted the importance of COVID-19 information received from relatives (30.0%) and TV messages (42.6%).

Almost half of the surveyed respondents (44.3%) did not have contacts with their local doctors during the last year, while the integration of primary health care and specific drug treatment/psychiatric services is a priority for public health to overcome stigma and discrimination, as well as to ensure equal access to advanced services [1, 3, 12, 22]. Another important finding was an extremely high percentage of respondents who underestimated their own risks of contracting COVID-19 while using psychoactive substance. However, a growing number of international studies have indicated the elevated vulnerability to severe COVID-19 forms in addicted patients [16]. Our analysis displayed that a third of the respondents found it difficult to qualify their own risks of infection. This emphasizes the need to provide addicted people not only with immunization services, but also with reliable specific information received from qualified specialists (general practitioners and psychiatrists).

Finally, every sixth respondent with addiction revealed a

complete distrust of any type of vaccines, and every eighth respondent admitted a lack of trust in all people who could provide information about COVID-19 treatment and prevention. This observation might indicate psychological reasons and personal barriers in obtaining appropriate medical services. According to the model of Gerretsen and co-authors, such personal characteristics as emotionality, basic trust, locus of control explained the variability in vaccination readiness by 11% [15]. This warrants the use of specific psychological interventions to overcome distrust among the population in general and addicted people in particular [32].

The present study has some limitations. Firstly, non-random sampling reduces the possibility of result extrapolation, which has been already mentioned above. Meanwhile, the obtained data are primary in their kind for our country and make it possible to compensate for the lack of knowledge on COVID-19 vaccination coverage in vulnerable population groups. Secondly, the limited sample size did not allow the calculation of multivariate regression models that present overarching variety of all the possible determinants of vaccine coverage. However, it is worth noting that even the key socio-demographic indicators and associations revealed in the present regression analysis explained 20% of the variation of vaccination involvement. The data obtained from a comparative and regression analyses can serve as a starting point for further in-depth studies yielding insights about barriers to and facilitators for not only immunization, but also other medical services for people with drug addictions.

**Conclusion.** Despite relatively high COVID-19 vaccination coverage among people with drug addictions, the present study demonstrated the lack of access to accurate and reliable information on COVID-19 treatment and prevention. A high proportion of the respondents underestimated increased risks of the infection in association with drug use that necessitated educational activities in this population group. Several factors such as income, contacts with physicians, and trust in medical professionals could be considered as important modifiable target determinants to increase adherence to vaccination among people with drug addictions. Finally, the primary findings of this study warrant further in-depth study of the socio-demographic, psychological, and clinical determinants of vaccination and help understand attitudes to other medical services in people with drug addictions.

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