

COVID-19 Vaccine Hesitancy in Healthcare Workers and Attitude Changes During the Pandemic

Semiha Solak-Grassie¹ , Ferhat Baş² , Egemen Ünal³ 

¹ Infectious Diseases Clinic, Ankara Yıldırım Beyazıt University Yenimahalle Training and Research Hospital, Ankara, Türkiye

² Department of Health Management, Ankara Yıldırım Beyazıt University, Ankara, Türkiye

³ Department of Public Health, Ankara Yıldırım Beyazıt University School of Medicine, Ankara, Türkiye

ABSTRACT

Objective: Many healthcare workers (HCWs) hesitated or refused to receive the COVID-19 vaccines during the pandemic. The attitudes of HCWs toward vaccines have an impact on society and patients. In this study, we aimed to investigate the reasons for vaccine hesitancy and refusal among HCWs during the COVID pandemic.

Materials and Methods: We planned a two-step descriptive survey study. In the first step, we surveyed the unvaccinated HCWs in our hospital face-to-face after the first vaccination program. After eight months, we conducted another survey with the unvaccinated HCWs over the phone. We investigated the changes in their attitudes between the two surveys and the relationship of vaccine hesitation with their occupation and COVID-19 history.

Results: After the first vaccine program, 325 (21.2%) HCWs out of 1532 did not get vaccinated in our hospital. We found that there was a significant relationship between vaccine hesitancy and occupation. In our study, the group of “non-HCWs” had the highest vaccine hesitancy rate at the beginning. The most common reasons for vaccine hesitancy were breastfeeding and pregnancy (29.5%) and side effects, especially allergic reactions (18.0%). After eight months, in the second survey, vaccine hesitancy dropped to 5.6%. We found that 80.1% of the HCWs who stated they were planning to get vaccinated in the first survey were vaccinated, and 62.4% of those who were not planning it were vaccinated. In the second survey, 1.8% of HCWs were still planning the vaccination, but 3.8% of HCWs refused the COVID-19 vaccine. Not believing in the efficacy of the vaccine in the first survey was associated with vaccine refusal in the second survey ($p=0.001$).

Conclusion: The overall rate of vaccine refusal was low among HCWs. Nevertheless, vaccine refusal among HCWs having more information about the vaccine and disease than the community may be related to cultural, psychological, and political reasons other than efficacy and safety. Future studies on the cultural, psychological, and political reasons for vaccine refusal will contribute to understanding vaccine refusal and increasing vaccine acceptance.

Keywords: COVID-19 pandemic, COVID-19 vaccine, vaccine hesitancy, healthcare workers

Corresponding Author:

Semiha Solak Grassie

E-mail:

semihasolak@yahoo.com

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INTRODUCTION

The development of a vaccine was a big step in the fight against COVID-19. However, with the introduction of vaccines in a short time, there were many people in society and among healthcare workers (HCWs) who did not want to get vaccinated (1, 2, 3).

Although efficacy levels have changed with newly emerging variants, vaccination has remained an effective solution for controlling the disease and preventing deaths. It was difficult to comprehend why people refused vaccines when there was no effective treatment and deaths occurred even at young ages (4, 5). Despite more information about the disease and vaccines, many HCWs hesitated or refused to receive vaccines (2, 6). Although the number of hesitant HCWs decreased in time, some HCWs insisted on vaccine refusal and they lost their jobs or lives (7, 8).

The attitudes of HCWs have a significant impact on society and patients (9). In this study, we aimed to investigate vaccine hesitancy rates and reasons among HCWs by conducting two surveys at different times to contribute to developing strategies for increasing vaccine acceptance.

MATERIALS AND METHODS

Study Design

When the first COVID-19 vaccine, CoronaVac, arrived in January 2021, HCWs were the first group in the vaccination program. They had a limited period to get vaccinated from January 14 to 20. Before the arrival of the vaccine, an information meeting was organized for all HCWs in our hospital on the efficacy and possible side effects of vaccines available worldwide. After the first vaccination period, we investigated the HCWs who were not vaccinated.

All hospital staff was grouped according to their occupations as doctors, nurses, cleaning staff, “other HCWs,” and “non-HCWs.” The “other HCWs” group included staff such as laboratory technicians and radiology technicians. Those who were not related to healthcare and worked in administrative units were grouped as “non-HCWs.”

First, we conducted a face-to-face survey with the staff who agreed to participate. The occupations, demographic features, health problems, history of COVID-19 disease, and history of antibody tests were questioned in the survey. There were also possible reasons for vaccine hesitation and the future plans for COVID-19 vaccination. After the first survey, we organized several meetings about COVID-19 vaccines. We announced the phone numbers that the staff asked questions about the vaccine, and we answered all questions in light of current scientific information.

From January 14 to April, CoronaVac was the only vaccine option in Turkey. Pfizer-BioNTech arrived in April. After people at high-risk were vaccinated, the Ministry of Health activated the vaccination system for HCWs a second time. At the end of July, the Ministry of Health reactivated the vaccination system for the booster dose for HCWs. The HCWs who did not receive vaccines before could get the primary vaccination with Pfizer-BioNTech. The others could get the booster dose.

In August 2021, we investigated the vaccination status of HCWs for the second time. The HCWs who received the vaccine between the two periods and their vaccine preferences were investigated, and we detected HCWs who were not vaccinated. We conducted a mini survey with unvaccinated staff on the phone, investigating the reasons for vaccine refusal or hesitancy and their vaccination

HIGHLIGHTS

- The vaccine hesitancy in healthcare workers with the first vaccine arrival was 21.2%, dropping to 5.6% after eight months.
- The vaccine rejection rate was 3.8% among healthcare workers eight months after the first vaccination program.
- The fear of side effects, especially during pregnancy and breastfeeding, was the most common reason for vaccine hesitancy.
- Not believing in the efficacy of the vaccine was found to be associated with vaccine refusal.

plans. In the second survey, we identified the rate of hospital staff who refused and were still planning the vaccination.

Statistical Analysis

The relationship between the vaccine hesitation reasons and occupation, age, gender, health problems, COVID-19 history, and antibody test history was investigated using SPSS version 26.0 (SPSS Inc., Chicago, USA). Descriptive statistics were used for demographic features, vaccination rates, and plans. The relationship between vaccine hesitancy and occupation was investigated with the Mann-Whitney U test and Chi-Square. The Student’s T-test was used to investigate the relationship between age and vaccination. The Chi-Square test was used to determine the effect of gender on vaccination. The statistical significance was set as $p < 0.05$.

RESULTS

In January 2021, after the healthcare worker’s vaccination period, 1532 HCWs, including 251 physicians and 322 nurses, were investigated. Among them, 325 (21.2%) HCWs were not vaccinated (Table 1) (Figure 1). The mean age was 37.45 ± 8.12 (21-61). In the first survey, the group of non-HCWs (27.7%) included the most unvaccinated participants according to the occupation (Table 1).

A total of 309 HCWs agreed to participate in the first survey. Two hundred twenty-three (68.4%) of them

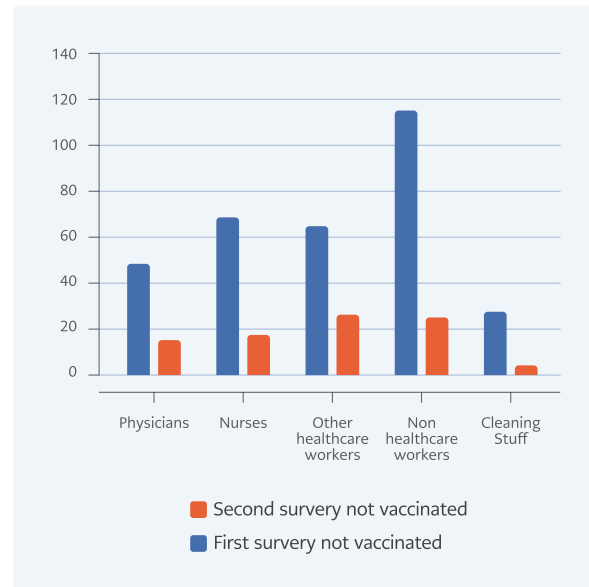


Figure 1. The professional distribution of unvaccinated healthcare workers

were female. Seventy-five (23.9%) had a chronic disease. Before the first survey, 109 HCWs (35.3%) were infected with COVID-19. One hundred ninety-one (61.8%) of them were planning the vaccination for the future (Table 2).

In the first survey, 36 HCWs expressed vaccine hesitancy because they preferred the other vaccine options other than the one available in Turkey ($p=0.019$) (Table 2). Sixty-four of those who were not vaccinated had an antibody test for SARS-CoV-2,

Table 1. Vaccine hesitancy and refusal among healthcare workers and their occupational distribution in the first and last surveys.

	First survey	Second survey		Total HCWs (n)	
	Not vaccinated n (%)	Not vaccinated n (%)	Refusing the vaccine n (%)		Vaccinated (n)
Physicians	48 (19.1)	14 (5.6)	13 (5.2)	237	251
Nurses	69 (21.4)	17 (5.3)	15 (4.6)	305	322
Other HCWs	65 (20.5)	26 (8.2)	16 (5)	291	317
Non-HCWs	116 (27.7)	25 (5.9)	12 (2.9)	394	419
Cleaning staff	27 (12.1)	4 (1.8)	2 (0.9)	219	223
Total	325 (21.2)	86 (5.6)	58 (3.8)	1446	1532

HCWs: Healthcare workers.



Table 2. Vaccine hesitancy reasons and occupations in the first survey.

The reasons not to get vaccinated	Physicians n (%)	Nurses n (%)	Other HCWs n (%)	Non-HCWs n (%)	Cleaning staff n (%)	Total* (n)	p**
Having caught COVID-19 disease	20 (18.3)	33 (30.3)	22 (20.2)	28 (25.7)	6 (5.5)	109	0.01
Having been tested for SARS-CoV-2 antibodies	19 (29.7)	20 (31.3)	15 (23.4)	10 (15.6)	0 (0)	64	0
Thinking they had immunity	18 (21.4)	21 (25)	8 (9.5)	27 (32.1)	10 (11.9)	84	0.937
Possible vaccine side effects	17 (14.2)	34 (28.3)	16 (13.3)	39 (32.5)	14 (11.7)	120	0.011
Not believing in the vaccine's efficacy	5 (7.7)	10 (15.4)	16 (24.6)	28 (43.1)	6 (9.2)	65	0.183
Negative information about the vaccine	4 (6.5)	17 (27.4)	10 (16.1)	22 (35.5)	9 (14.5)	62	0.043
Preferring another vaccine	8 (22.2)	4 (11.1)	13 (36.1)	8 (22.2)	3 (8.3)	36	0.019
Planning to get vaccinated in the future	34 (17.8)	36 (18.8)	38 (19.9)	71 (37.2)	12 (6.3)	191	<0.001

HCWs: Healthcare workers.

*It was evaluated based on the responses of 309 HCWs. **Chi-square test was used.

Table 3. Some side effects were declared as a reason for the vaccine hesitancy.

	n (%)
Allergic reaction	22 (18)
Pregnant woman and negative effects on the baby	24 (19.7)
Breastfeeding and adverse effects on the baby	12 (9.8)
Long-term damage	9 (7.4)
Shortness of breath	6 (4.9)
Infertility	3 (2.4)
Not clear	38 (31.1)
Others	8 (6.5)
Total	122

and 84 HCWs did not want to get vaccinated because they thought they were immune to the disease. One hundred twenty-two of them were afraid of the side effects (Table 2). The vaccine hesitancy reason given by 29.5% of HCWs was pregnancy or breastfeeding. Fear of severe allergic reactions was a common reason for vaccine hesitancy (18.0%) (Table 3).

Not accepting the vaccination due to side effects and negative news about the vaccine was associ-

ated with the participants' occupations ($p=0.011$, $p=0.043$). The cleaning staff was the most affected by potential side effects and negative news (51.9%; 33.3%) in the first survey.

While 62.4% of those who stated that they were not planning to be vaccinated in the first survey were vaccinated between the two surveys, 80.1% of the health workers who said they were planning the vaccination were vaccinated (Table 4). They had 54 (16.6%) CoronaVac, 138 (42.5%) Pfizer-BioNTech, 33 (10.2%) 2 CoronaVac, and 1 Pfizer-BioNTech, 14 (4.3%), 3 CoronaVac vaccines. There was a relationship between vaccination status and occupation in two surveys. While 87.9% of the cleaning staff were vaccinated, 72.3% of the non-HCWs group were vaccinated ($p=0.045$) in the first survey.

In September 2021, 86 (5.6%) HCWs were still not vaccinated. The group of other HCWs included the most unvaccinated staff in the second survey (8.2%). Twenty-eight (32.5%) of them stated that they had an excuse for delaying it and they were planning to receive the vaccine. According to the second survey, pregnancy and breastfeeding were the most common reasons for vaccine hesitation (42.8%) among the 28 HCWs who were still planning to get vaccinated. In addition, we found that

Table 4. Vaccination plans in the first survey and vaccination status in the second survey.

First survey decisions	Second survey behavior		Total
	Not vaccinated n (%)	Vaccinated n (%)	
Not want to get vaccinated	35 (37.6)	58 (62.4)	93
Planning to get vaccinated	38 (19.9)	153 (80.1)	191
Indecisive	8 (32)	17 (68)	25
Total	81 (26.2)	228 (73.8)	309

58 (3.8%) of HCWs were still refusing the vaccine and not planning to be vaccinated. Vaccine refusal was common mostly among physicians (5.2%). Not believing in vaccine efficacy in the first survey was associated with vaccine refusal in the second one ($p=0.001$). Other reasons for vaccine hesitancy, such as side effects, negative news, and belief that they were already immune, in the first survey were not significantly associated with the vaccine decision in the second survey ($p=0.30$, $p=0.08$, $p=0.88$, respectively). In addition, there was no significant relationship between age, gender, chronic disease history, and vaccination rate in the second survey ($p=0.85$, $p=0.40$, $p=0.24$, respectively).

DISCUSSION

The vaccine hesitancy among the HCWs at the first vaccine arrival was 21.2%, dropping to 5.6% in eight months. Some (3.8%) stated they were refusing the vaccine and not planning to be vaccinated. In studies from different countries, the vaccine hesitancy rates were between 2% and 30% among HCWs (2, 10-12). The rates were initially higher and expected to decrease in time (11).

In several studies, vaccine hesitancy was related to sex, age, education, income level, and health problems (2, 12-16). However, we found no relation between age, sex, having a chronic disease and vaccine hesitancy.

In our study, there was an association with the HCW's occupation. The highest vaccine hesitancy rate was in the group of non-HCWs (27.7%). After eight months, the "other HCWs" group had the

highest vaccine hesitancy rate (8.2%). In both surveys, the lowest rate was among the cleaning staff (12.1%; 1.8%). In the second survey, the highest rates of vaccine refusal were among physicians. Contrary to our study, physicians had the highest compliance rates in some other studies (3, 6, 10, 16).

Vaccine hesitancy is related to cultural reasons, local problems, influencers other than efficacy, and side effects (2, 7, 14, 17). As in other studies, the most common reason for vaccine hesitancy was possible side effects (38.8%) (7, 11, 13, 18). Breast-feeding (9.8%) and pregnant (19.7%) HCWs were the most likely to be hesitant about the possible side effects and postpone the vaccination in our study (7, 16); in the second survey, the rate was 42.8%. Of the HCWs stated that the reason for their vaccine hesitancy was the possible side effects, 31.4% could not have expressed which side effect it was. Another common reason for hesitation was allergic reactions to vaccine components. Another study showed that this hesitancy was not due to a history of allergic reactions (10).

Our results were similar to other studies regarding not believing in vaccine efficacy (21.0%) and the effect of negative information about the vaccine (20.1%) (11). In our study, some HCWs reported that they preferred different vaccines. Having more options could be another reason for the increase in the acceptance of vaccines in time.

The number of HCWs who already had COVID-19 was high among the group with vaccine hesitancy (35.3%) in the first survey. Not having a COVID-19 history was associated with high vaccine accep-

tance in a study (6). Expecting natural immunity protection after having COVID-19 could be another reason for vaccine hesitancy (19), especially when there was no clear information about immunity after the disease. Waning immunity and multiple COVID-19 experiences could be another reason for the decrease in vaccine hesitancy.

While 80.1% of workers who planned to get vaccinated in the first survey were vaccinated in the second, (62.4%) not planned were vaccinated in the last. After witnessing experiences with the vaccine, more information about the efficacy and safety changed the hesitancy rates in a few months (11, 19). The lack of knowledge and trust were the main problems for some HCWs (2, 7, 18, 19). There was not enough time to persuade them and disseminate the correct information. In the beginning, effective communication and information could eliminate fear and distrust (7, 20). In our study, most of those who did not plan to be vaccinated in the beginning were vaccinated at the last survey as a result of training, one-on-one interviews, and observing experiences related to vaccination.

Not believing in vaccine efficacy was the only reason that affected the vaccination status we investigated in the second survey. It was related to complex vaccine refusal reasons such as psychology, political opinion, and religious belief (9, 15, 21). Most of the vaccine hesitancy reasons among HCWs at the beginning of the COVID-19 pandemic and vaccine refusal reasons at the end were not the same (21, 22).

Breastfeeding and pregnancy were the big concerns regarding vaccine hesitancy in the second survey; nevertheless, there was sufficient information about vaccine safety in pregnant and breastfeeding women. Most HCWs' vaccine hesitancy from the beginning to the end was related to wrong information and was preventable with correct information and teamwork at hospitals (7, 22).

Our study was conducted among HCWs, and it has limitations in terms of reflecting society. Although all unvaccinated HCWs in our hospital were included in the study, our survey population was small. In addition, there were no questions about psychological, political, religious, or cultural reasons for vaccine rejection in our survey.

In conclusion, the overall rate of vaccine rejection was low among HCWs. Nevertheless, despite having more information about the vaccines and more vaccine options, physicians, nurses, and other HCWs had higher vaccine refusal rates than the "non-HCWs" group. In both surveys, the most common reason for hesitancy was the fear of possible side effects, especially among pregnant and breastfeeding HCWs. However, vaccine refusal among HCWs having more information about the vaccine and disease than the community may be related to cultural, psychological, and political reasons other than efficacy and safety. Future studies on the cultural, psychological, and political reasons for vaccine refusal will contribute to understanding vaccine refusal and increasing vaccine acceptance.

Ethical Approval: The Clinical Research Ethical Committee of Yıldırım Beyazıt University Yenimahalle Research and Training Hospital approved the study, with the decision number E-2021-52.

Informed Consent: N.A.

Peer-review: Externally peer-reviewed

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Supervision – S.S.G., F.B., E.Ü.; Analysis and/or Interpretation – F.B., E.Ü., S.S.G.; Literature Review – S.S.G.; Writer – S.S.G.; Critical Reviews – S.S.G., E.Ü.

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REFERENCES

- 1 Khubchandani J, Sharma S, Price JH, Wiblishauser MJ, Sharma M, Webb FJ. COVID-19 vaccination hesitancy in the United States: A rapid national assessment. *J community health.* 2021;46(2):270-7. [[CrossRef](#)]

- 2 Troiano G, Nardi A. Vaccine hesitancy in the era of COVID-19. *Public Health*. 2021;194:245-51. [\[CrossRef\]](#)
- 3 Green-McKenzie J, Shofer FS, Momplaisir F, Kuter BJ, Kruse G, Bialal U, et al. Factors associated with COVID-19 vaccine receipt by health care personnel at a major academic hospital during the first months of vaccine availability. *JAMA Netw Open*. 2021;4(12):e2136582. Erratum in: *JAMA Netw Open*. 2022;5(1):e2147879. [\[CrossRef\]](#)
- 4 El-Sokkary RH, El Seifi OS, Hassan HM, Mortada EM, Hashem MK, Gadelrab MRMA, et al. Predictors of COVID-19 vaccine hesitancy among Egyptian healthcare workers: a cross-sectional study. *BMC Infect Dis*. 2021;21(1):762. [\[CrossRef\]](#)
- 5 Kwok KO, Li KK, Tang A, Tsoi MTF, Chan EYY, Tang JWT, et al. Psychobehavioral responses and likelihood of receiving COVID-19 vaccines during the pandemic, Hong Kong. *Emerg Infect Dis*. 2021;27(7):1802-10. [\[CrossRef\]](#)
- 6 Kaplan AK, Sahin MK, Parildar H, Adadan Guvenc I. The willingness to accept the COVID-19 vaccine and affecting factors among healthcare professionals: A cross-sectional study in Turkey. *Int J Clin Pract*. 2021;75(7):e14226. [\[CrossRef\]](#)
- 7 Toth-Manikowski SM, Swirsky ES, Gandhi R, Piscitello G. COVID-19 vaccination hesitancy among health care workers, communication, and policy-making. *Am J Infect Control*. 2022;50(1):20-5. [\[CrossRef\]](#)
- 8 Shemtob L, Ferris M, Asanati K, Majeed A. Vaccinating healthcare workers against covid-19. *BMJ*. 2021;374:n1975. [\[CrossRef\]](#)
- 9 Larson HJ, Gakidou E, Murray CJL. The Vaccine-hesitant moment. *N Engl J Med*. 2022;387(1):58-65. [\[CrossRef\]](#)
- 10 Paris C, Bénézit F, Geslin M, Polard E, Baldeyrou M, Turmel V, et al. COVID-19 vaccine hesitancy among healthcare workers. *Infect Dis Now*. 2021;51(5):484-7. [\[CrossRef\]](#)
- 11 Gakuba C, Sar A, Gaborieau I, Hanouz JL, Verger P. Willingness to get a COVID-19 vaccine among critical care non-medical healthcare workers and impact of a vaccine information session. *Anaesth Crit Care Pain Med*. 2021;40(3):100860. [\[CrossRef\]](#)
- 12 Castellano-Tejedor C, Torres-Serrano M, Cencerrado A. Unveiling associations of COVID-19 vaccine acceptance, hesitancy, and resistance: a cross-sectional community-based adult survey. *Int J Environ Res Public Health*. 2021;18(23):12348. [\[Cross-Ref\]](#)
- 13 Elharake JA, Galal B, Alqahtani SA, Kattan RF, Barry MA, Temsah MH, et al. COVID-19 vaccine acceptance among health care workers in the Kingdom of Saudi Arabia. *Int J Infect Dis*. 2021;109:286-93. [\[CrossRef\]](#)
- 14 Kwok KO, Li KK, Wei WI, Tang A, Wong SYS, Lee SS. Editor's Choice: Influenza vaccine uptake, COVID-19 vaccination intention and vaccine hesitancy among nurses: A survey. *Int J Nurs Stud*. 2021;114:103854. [\[CrossRef\]](#)
- 15 Walsh JC, Comar M, Folan J, Williams S, Kola-Palmer S. The psychological and behavioural correlates of COVID-19 vaccine hesitancy and resistance in Ireland and the UK. *Acta Psychol (Amst)*. 2022;225:103550. [\[CrossRef\]](#)
- 16 Hajure M, Tariku M, Bekele F, Abdu Z, Dule A, Mohammedhussein M, et al. Attitude towards COVID-19 vaccination among healthcare workers: a systematic review. *Infect Drug Resist*. 2021;14:3883-97. [\[CrossRef\]](#)
- 17 Edwards B, Biddle N, Gray M, Sollis K. COVID-19 vaccine hesitancy and resistance: Correlates in a nationally representative longitudinal survey of the Australian population. *PLoS One*. 2021;16(3):e0248892. [\[CrossRef\]](#)
- 18 Walker AN, Zhang T, Peng XQ, Ge JJ, Gu H, You H. Vaccine acceptance and its influencing factors: an online cross-sectional study among international college students studying in China. *Vaccines (Basel)*. 2021;9(6):585. [\[CrossRef\]](#)
- 19 Dzieciolowska S, Hamel D, Gadio S, Dionne M, Gagnon D, Robitaille L, et al. Covid-19 vaccine acceptance, hesitancy, and refusal among Canadian healthcare workers: A multicenter survey. *Am J Infect Control*. 2021;49(9):1152-7. [\[CrossRef\]](#)
- 20 Katzman JG, Katzman JW. Primary care clinicians as COVID-19 vaccine ambassadors. *J Prim Care Community Health*. 2021;12:21501327211007026. [\[CrossRef\]](#)
- 21 Bolsen T, Palm R. Politicization and COVID-19 vaccine resistance in the U.S. *Prog Mol Biol Transl Sci*. 2022;188(1):81-100. [\[CrossRef\]](#)
- 22 Muhajarine N, Adeyinka DA, McCutcheon J, Green KL, Fahlman M, Kallio N. COVID-19 vaccine hesitancy and refusal and associated factors in an adult population in Saskatchewan, Canada: Evidence from predictive modelling. *PLoS One*. 2021;16(11):e0259513. [\[CrossRef\]](#)