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ORIGINAL RESEARCH

Factors Associated with the Acceptance of COVID-19 Vaccines in Citizens of Northern Peru: Cross-Sectional Study

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Video abstract

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Purpose: The presence of the COVID-19 coronavirus in Peru, and especially in northern Peru, was very fast and caused many deaths. As a result, vaccination proved to be the most immediate option to control it. However, a sector of the population was reluctant to vaccination. Therefore, this study aimed to analyze the factors associated with the acceptance of COVID-19 vaccines by citizens of northern Peru.

Patients and Methods: The study was observational, descriptive-correlational and the sample was stratified and consisted of 516 citizens from eight departments of northern Peru, who answered an online questionnaire regarding sociodemographic, cultural and health aspects. The data were analyzed using statistical tests of association and a logistic model was estimated to identify factors predicting vaccine acceptance.

Results: Among the factors associated with vaccine acceptance, sociodemographic factors such as age and family income, cultural factors such as level of knowledge, and health factors such as having another chronic disease and a vaccine with a higher confidence ($p<0.05$) were found. In addition, 12% of the population do not trust them, 10% are afraid that they may cause thrombosis, 13% disagree with vaccination for children, 7% think that a chip will be implanted and 8% believe that their DNA will be changed. However, most people accept vaccination and consider it necessary. A multivariate analysis was also performed for the acceptance of vaccines, which presented a percentage of 80.2% correct in the prognosis.

Conclusion: The multivariate analysis allowed a conclusion that the predictor variables for vaccine acceptance are household income of less than 1000 Peruvian soles per month, low or medium levels of knowledge, and having another chronic disease.

Keywords: COVID-19, vaccination, Peru, pandemic

Introduction

Throughout the 2019 coronavirus pandemic (COVID-19), multiple restrictions have been put in place to reduce the spread of SARS-CoV-2.[1] However, the mainstay is vaccines, which decrease both the transmission of beta-coronavirus and the severity of the disease by stimulating antibody formation.[2,3]

For decades, vaccines have been used as the main public health weapon to eliminate or reduce the risk of complications leading to death, as well as to reduce hospital costs, thus proving to be the most cost-effective and cost-beneficial intervention.[4] The success of this strategy depends largely on the effectiveness of the vaccines and the level of acceptance by the population, which enables the attainment of herd immunity through direct protection.[5] Therefore, in any disease the success of vaccines depends not only on their availability, but also on their acceptability for application.[6] Consequently, although there are several vaccines against SARS-Cov2, doubt and rejection by the population has been

felt in many countries worldwide. The United States, one of the countries with the greatest availability and resources to achieve herd immunity, has been severely affected with new waves of COVID-19 infection,[7] due to 40% of its total population not vaccinating.

The reality in Peru is not very different. By April 2022, 88.4%, 81.2% and 52.8% of the target population had been vaccinated for the first, second and third doses, respectively. However, intensive care units are still insufficient and there is a risk of a potential new wave. In addition, Peru has a COVID-19 positivity rate of 12.08% and a case fatality rate of 5.98%.[8]

Understanding the factors that may influence vaccine acceptance is critical to improving this important aspect of COVID-19 prevention. Vaccine hesitancy, which has been recognized as one of the top ten public health threats, is defined as the resistance or simply the refusal to be vaccinated even when vaccines are available for use.[9] Consequently, it has been determined that the willingness to receive COVID-19 vaccine ranged from 28% to 91% worldwide.[10] Factors such as residence, occupation, race/ethnicity and health insurance were some of the risk factors present, which can be very different in each country and/or region. Also, vaccine hesitancy is determined by a complex combination of sociodemographic factors - perception, personal risk awareness, cost factors, mode of administration,[6] fear of adverse effects, microchip implantation, possible mutation, racism and foreign attack, scientifically unfounded claims - disseminated and amplified through online social networks, which lessen the willingness among various groups to vaccinate.[11]

It is likely that the latest generation of vaccines are considered less acceptable, due to the use of genetic material, which has been labeled by some with false claims that the vaccine can alter human DNA.[12] In addition, the rapid development of COVID-19 vaccines has given rise to considerable public concern about their mid- and long-term effects.[13,14] This is because people's attitudes, perceptions and knowledge of COVID-19 are essential for public health decision-makers to identify and address for an acceleration in both acceptance and promotion among the population.[15] Questions surrounding the durability of the immune response after vaccination and the efficacy of vaccines in limiting asymptomatic spread remained unanswered in clinical trials.[16]

According to the conclusion of the Advisory Committee on Immunization Practices (ACIP) regarding the July 22, 2021 risk-benefit assessment, vaccination with any of the available COVID-19 vaccines, authorized by the Emergency Use Authorization (EUA) of the US Food and Drug Administration (FDA), continues to be recommended.[17]

Consequently, it is essential that specific research be undertaken to examine the acceptance of the COVID-19 vaccine. For this reason, the objective of the present study was to analyze the factors associated with the acceptance of COVID-19 vaccines in citizens from northern Peru.

Materials and Methods
Study Design
The study was observational, descriptive correlational, cross-sectional since the information was taken at one single time.[18]

Population and Sample
The population consisted of citizens living in the northern part of Peru and the sample consisted of 516 citizens, using sampling by strata as follows (See Table 1).

The sampling technique was non-probabilistic, by snowball, since each surveyed citizen answered the questionnaire, with a multiplier effect on other citizens who met the selection criteria until the required sample size was reached. Each participant expressed their acceptance through the informed consent provided in the virtual questionnaire, which specified the timing, the research team and the purpose of the study, not requiring personal information that would violate their confidentiality. The sample size was calculated taking into account the study population, an error of 5% and a confidence level of 95%, was at least 385, reaching a coverage of 516 respondents, with a higher accessibility in the department of La Libertad.[19] Citizens over the age of 18 were included and those who did not agree to participate in the study and those who did not complete the virtual form were excluded.

Table 1 Distribution of the Study Sample by Departments of Northern Peru

Northern Part Of The Country	Population	Sample
Tumbes	251,363	16
Piura	1,914,346	78
Lambayeque	1,309,731	64
La Libertad	1,973,446	184
Ancash	1,177,080	56
Cajamarca	1,544,325	64
San Martin	894,564	37
Amazonas	427,202	17
TOTAL	**9,493,057**	**516**

Notes: Data from Population Estimates and Projections by Department, Sex and Five-Year Age Groups 1995–2025 (National Institute of Statistics and Informatics).[41]

Data Collection

For data collection, the technique used was the survey and the instrument used was the questionnaire prepared by the authors. This questionnaire is divided into five sections:

The first section identified the sociodemographic factors of the citizens. It included variables such as age, sex, marital status, whether they work in the health sector, family income, chronic diseases, number of children, whether they have children under 18 years of age. The second section included the cultural factors of the citizens where variables such as level of education and level of knowledge were included and was evaluated with 6 true and false option questions. The third section identified the health-related factors of the surveyed citizens by considering whether they were infected with COVID-19 and whether they suffered from any chronic disease. The fourth section identified the acceptance of the COVID-19 vaccine, which included 10 Likert-scale questions. Additionally, questions are included to identify the most-trusted vaccine. In the fifth section, aspects related to COVID-19 vaccination were identified.

In order to measure the acceptance variable, the questionnaire included a total of 10 items, with options of disagreement, neutral and agreement; favorable responses to acceptance were scored with 3 points, uncertain responses with 2 points and unfavorable responses with 1 point. In order to measure the acceptance variable, the questionnaire included a total of 10 items with options in disagreement, neutral and agreement; favorable responses to acceptance were scored with 3 points, uncertain responses with 2 points and unfavorable responses with 1 point. Respondents who scored between 10 to 20 points were considered as not accepting the vaccine, and respondents who scored between 21 to 30 points were considered as accepting the vaccine.

In order to measure the knowledge variable (awareness), 6 items of the questionnaire with true and false alternatives were considered, enabling the measurement of the respondents' knowledge about COVID-19 vaccines, doses and possible consequences. Incorrect answers were assigned 0 points and correct answers were 2 points. Three levels of knowledge were assigned: low from 0 to 4 points, medium from 6 to 8 points and high from 10 to 12 points.

Validation was performed by expert judgment (4 health professionals and 1 methodologist), obtaining Aiken's V of 0.95 as acceptable, as well as a reliability by Cronbach's Alpha index of 0.742. To obtain reliability, a pilot sample of 30 participants was selected, in which tests of usability and technical functionality of the virtual questionnaire were made. No economic incentive was provided to the participants, to avoid biases that may have conditioned the answers.[20]

The questionnaire was applied virtually through social networks such as WhatsApp, Facebook, email, Telegram and YouTube during the period January-February 2022, as a filter only considering one response per respondent.

Statistical Analysis

The database was downloaded into a spreadsheet for data analysis and exported to the statistical software SPSS version 28. A descriptive analysis of the study variables was performed using statistical measures such as mean, standard deviation, tables

and statistical graphs. Likewise, to identify the sociodemographic, cultural and health factors associated with vaccine acceptance, the bivariate statistical analysis of association was applied taking into account the nature of the variables. The chi-square test enabled identification of the association between the variables, however, when the data did not meet the requirements for their application, the lambda test was used, which is also an association measure that applies to any type of table with different numbers of categories per variable. In addition, for the multivariate statistical analysis, a binary logistic model was estimated to identify factors that predict vaccine acceptance, and was complemented by analysis of the model's predictive power using the Receiver Operating Characteristic curve (ROC).[19,20]

Ethical Considerations

This study has been approved by the ethics committee Report 069-CEI-EPM-UCV-2021 of the Professional School of Medicine of the César Vallejo University. The principles of autonomy, credibility, reliability, privacy and applicability set out in the Declaration of Helsinki were taken into account. In addition, the informed consent of each of the participants was considered, explaining to them the objective of the research, without compromising their identity.

Results

A total of 516 participants completed the survey, their mean age was 35.3 ± 13.2 years, 60.9% were female, 56.6% were single, 45.5% had no children, and 97.1% had already been vaccinated. As for demographic factors associated with vaccine acceptance we have age and family income ($p<0.05$) (See Table 2).

Important data considered in the questionnaire is that of the percentage of vaccinated people mentioned above, 1.2% have only the first dose, 40.52% have up to the second dose and 58.28% have up to the third dose.

In the cultural factors, only the level of knowledge is associated with the acceptance of vaccines (See Table 3).

Table 2 Sociodemographic Factors Associated with Acceptance of COVID-19 Vaccines in Citizens of Northern Peru

Sociodemographic Factors		Acceptance of Vaccine				Total		p
		Yes		No				
		n	%	n	%	n	%	
Age:	< 35 years old	201	39.0%	69	13.4%	270	52.3%	0.048[a]*
	35–59 years	189	36.6%	38	7.4%	227	44.0%	
	60 years or more	16	3.1%	3	0.6%	19	3.7%	
	Mean ± DS	(35.8 ± 13.5)		(33.6 ± 11.9)		(35.3 ± 13.2)		
	Median	35		30.5		33		
	Min	18		19		18		
	Max	76		71		76		
Number of children	No children	180	34.9%	55	10.7%	235	45.5%	0.314[a]
	1 or 2 children	155	30.0%	42	8.1%	197	38.2%	
	3 children or more	71	13.8%	13	2.5%	84	16.3%	
	Mean ± DS	(1.2 ± 1.3)		(0.9 ± 1.1)		(1.1 ± 1.3)		
Sex:	Male	155	30.0%	47	9.1%	202	39.1%	0.386[a]
	Female	251	48.6%	63	12.2%	314	60.9%	
Marital status:	Single	226	43.8%	66	12.8%	292	56.6%	0.819[a]
	Married/domestic partner	154	29.8%	39	7.6%	193	37.4%	
	Separated/Divorced	21	4.1%	4	0.8%	25	4.8%	
	Widow/widower	5	1.0%	1	0.2%	6	1.2%	

(*Continued*)

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Table 2 (Continued).

Sociodemographic Factors		Acceptance of Vaccine				Total		p
		Yes		No				
		n	%	n	%	n	%	
Family income (with whom you live) Approximate total in soles	< S/1000	83	16.1%	34	6.6%	117	22.7%	0.012[b]*
	S/1000 to < S/ 3000	171	33.1%	52	10.1%	223	43.2%	
	S/3000 to < /5000	88	17.1%	15	2.9%	103	20.0%	
	S/5000 or more	64	12.4%	9	1.7%	73	14.1%	
Do you have children under 18?	Yes	160	31.0%	39	7.6%	199	38.6%	0.450[a]
	No	246	47.7%	71	13.8%	317	61.4%	
Have you been vaccinated?	Yes	405	78.5%	96	18.6%	501	97.1%	<0.001[b]*
	No	1	0.2%	14	2.7%	15	2.9%	
Total		**406**	**78.7%**	**110**	**21.3%**	**516**	**100%**	

Notes: The sample and tests used in our investigation are listed in the Northern Peru population survey, January-February 2022.[19,20] [a]Chi-square test was applied. [b]Lambda test was applied. *Significant (p < 0.05).

Table 3 Cultural Factors Associated with the Acceptance of COVID-19 Vaccines in Citizens of Northern Peru

Cultural Factors		Acceptance of Vaccine				Total		p
		Yes		No				
		n	%	n	%	n	%	
Level of education	No instruction	0	0.0%	0	0.0%	0	0.0%	0.096[a]
	Primary school	0	0.0%	1	0.2%	1	0.2%	
	Secondary school	24	4.7%	7	1.4%	31	6.0%	
	Incomplete higher education	107	20.7%	37	7.2%	144	27.9%	
	Complete higher education	275	53.3%	65	12.6%	340	65.9%	
Level of knowledge	Low	2	0.4%	7	1.4%	9	1.7%	<0.001[a]*
	Average	147	28.5%	55	10.7%	202	39.1%	
	High	257	49.8%	48	9.3%	305	59.1%	
Total		**406**	**78.7%**	**110**	**21.3%**	**516**	**100%**	

Notes: The sample and tests used in our investigation are listed in the Northern Peru population survey, January-February 2022.[19,20] [a]Chi-square test was applied. *Significant (p < 0.05).

In the health factors analyzed, we found that having another chronic disease and a vaccine with higher confidence is associated with its acceptance (p<0.05) (See Table 4).

Most of the citizens surveyed consider vaccination to be necessary. However, 12% do not trust the safety of vaccines, 10% are afraid because it may cause thrombosis, 13% disagree with vaccination for children, 7% consider that a chip will be implanted and 8% that their DNA will be changed (See Figure 1).

The binary logistic regression model for vaccine acceptance has been established, entering the variables: household income of less than 1000 soles (-approximately 263 US dollars), low and medium level of knowledge, and having another chronic disease. The variables entered show Odds Ratios lower than 1, as well as their confidence intervals, which would indicate that they reduce the possibility of accepting the vaccine. The Hosmer and Lemeshow test leads us not to reject the null hypothesis, indicating that the model fits the data well (See Table 5).

Table 4 Health Factors Associated with Acceptance of COVID-19 Vaccines in Citizens of Northern Peru

Health Factors			Acceptance of Vaccine				Total		Sig.
			Yes		No				
			n	%	n	%	n	%	
Working in the health sector		Yes	100	19.4%	24	4.7%	124	24.0%	0.540[a]
		No	306	59.3%	86	16.7%	392	76.0%	
Chronic diseases	Diabetes	Yes	11	2.1%	2	0.4%	13	2.5%	0.597[a]
		No	395	76.6%	108	20.9%	503	97.5%	
	High blood pressure	Yes	39	7.6%	5	1.0%	44	8.5%	0.092[a]
		No	367	71.1%	105	20.3%	472	91.5%	
	Arthrosis	Yes	6	1.2%	2	0.4%	8	1.6%	0.798[a]
		No	400	77.5%	108	20.9%	508	98.4%	
	Rheumatoid arthritis	Yes	8	1.6%	5	1.0%	13	2.5%	0.126[a]
		No	398	77.1%	105	20.3%	503	97.5%	
	Dyslipidemias	Yes	53	10.3%	12	2.3%	65	12.6%	0.548[a]
		No	353	68.4%	98	19.0%	451	87.4%	
	Obesity	Yes	48	9.3%	10	1.9%	58	11.2%	0.421[a]
		No	358	69.4%	100	19.4%	458	88.8%	
	Asthma	Yes	27	5.2%	12	2.3%	39	7.6%	0.134[a]
		No	379	73.4%	98	19.0%	477	92.4%	
	Others	Yes	41	7.9%	24	4.7%	65	12.6%	0.001[a*]
		No	365	70.7%	86	16.7%	451	87.4%	
Had COVID-19		Yes	216	41.9%	58	11.2%	274	53.1%	0.929[a]
		No	190	36.8%	52	10.1%	242	46.9%	
Vaccine that gives you more confidence	None		9	1.7%	35	6.8%	44	8.5%	<0.001[b*]
	Pfizer		300	58.1%	59	11.4%	359	69.6%	
	AstraZeneca		15	2.9%	1	0.2%	16	3.1%	
	Sinopharm		65	12.6%	14	2.7%	79	15.3%	
	Modern		4	0.8%	0	0.0%	4	0.8%	
	Sputnik		0	0.0%	1	0.2%	1	0.2%	
	All of them		13	2.5%	0	0.0%	13	2.5%	
Total			**406**	**78.7%**	**110**	**21.3%**	**516**	**100%**	

Notes: The sample and tests used in our investigation are listed in the Northern eru population survey, January-February 2022.[19,20] [a]Chi-square test was applied. [b]Lambda test was applied. *Significant ($p < 0.05$).

Of the 110 citizens who do not accept the COVID-19 vaccine, the model classifies 11 well, representing 10%, and of the 406 citizens who do accept the vaccine, a total of 403 citizens are well classified by the model, representing 99.3%. It is expected that in the population the model would correctly classify 80.2% of the cases (See Table 6).

The AUC (area under the ROC curve) for the model is equal to 0.679 (IC: 0.623–0.736). The result leads to reject the null hypothesis of no discrimination (p<0.000). It is concluded that the model provides good prognostic power (See Figure 2).

Discussion

Vaccine acceptance is a public health problem that affects every country in the world, and Peru is no exception. The present study shows a high acceptance rate (78.7%) among the surveyed citizens; however, there is a significant
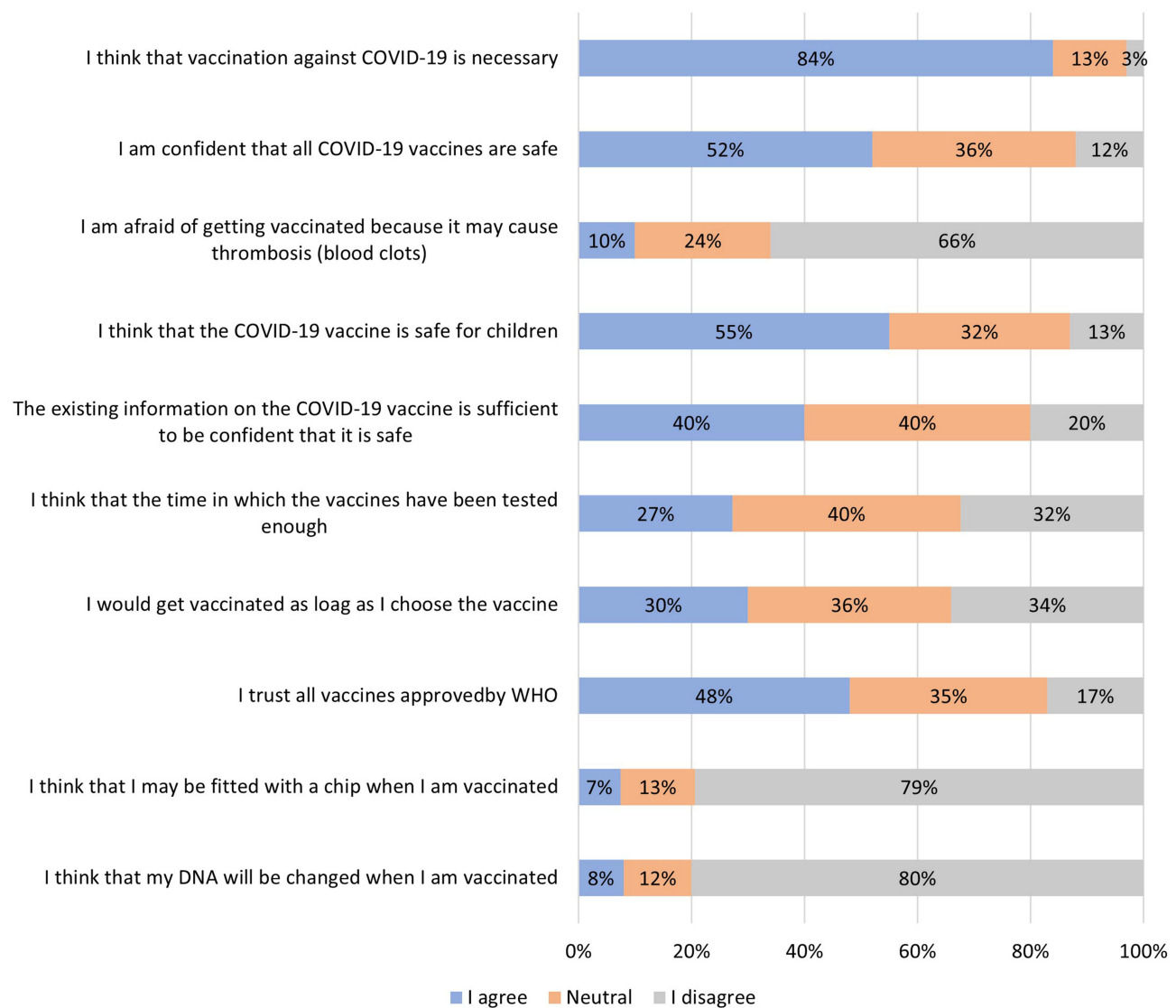
Figure 1 Perception for the acceptance of COVID-19 vaccines in citizens of northern Peru.

percentage of citizens who reject it (21.3%). Previous studies in different parts of the world also show a good acceptance rate, ranging from 50% to 85%.[21–26]

In Peru, the percentage of acceptance has increased in comparison with the study carried out during the first wave, which showed a 49.2% acceptance rate.[27] However, its acceptance is expected to be greater than 90%, as those currently suffering severely from COVID-19 disease are mainly those who have not been vaccinated or who have incomplete doses.[28]

In relation to sociodemographic factors, the findings of the present study are similar to those of the Malaysia study,[21] since the highest acceptance was found among women and in the lowest age group. Similarly, in Kuwait those who accepted vaccination were young people, but differed in terms of gender, as men were more likely to accept vaccination.[29] The results also show association to vaccine acceptance in the variables of age and household income.

Regarding the cultural factors of people who accept vaccines, we found completed higher education and a high level of knowledge, coinciding with the findings of a study in Palestine, where high levels of knowledge and acceptance were detected.[30]

Analyzing health factors, vaccine acceptors are those who have no comorbidities, have not had COVID-19, and have greater confidence in the Pfizer vaccine, similar to the study conducted in Jordan[31] where Pfizer/BioNTech vaccine acceptance and knowledge were significantly different from all other vaccines. This result is reasonable, since the Pfizer/

Table 5 Selection of Variables Associated with Acceptance of COVID-19 Vaccines in Citizens of Northern Peru

Variables	B	Standard Error	Wald	gl	Sig.	Exp (B) OR	95% C.I. for EXP (B)	
							Inferior	Superior
Family income <1000 soles	−0.98	0.42	5.4	1	0.021	0.37	0.16	0.86
Low level of Knowledge	−3.04	0.83	13.4	1	0.000	0.05	0.01	0.24
Average level of knowledge	−0.68	0.23	8.9	1	0.003	0.51	0.32	0.79
Other chronic diseases	−0.96	0.29	10.9	1	0.001	0.38	0.22	0.68
Constant	2.39	0.38	38.7	1	0.000	10.96		

Summary of the Model:
−2log of plausibility −2: 492.088
Cox and Snell R-square: 0.079
Nagelkerke R square: 0.123
Hosmer and Lemeshow test:
Chi-square: 3.447
Significance: 0.841

Notes: The sample and tests used in our investigation are listed in the Northern Peru population survey, January-February 2022.[19,20] SPSS version 28, Wald forward method.

Table 6 Classification Table of Observed and Predicted Cases for the Model of Acceptance of COVID-19 Vaccines in Citizens of Northern Peru

Classification Table				
Observed		Predicted		
		Acceptance of vaccine		Correct percentage
		No	Yes	
Acceptance of vaccine	No	11	99	10.0
	Yes	3	403	99.3
Global percentage				80.2

Notes: The sample and tests used in our investigation are listed in the Northern Peru population survey, January-February 2022.[19,20] SPSS version 28, Wald forward method.

BioNTech vaccine was the first vaccine approved by the FDA to be used against the COVID-19 virus. Also, the effectiveness of the vaccine is an aspect that encourages citizens to be confident about getting vaccinated.[32] In Peru, this is a variable to which citizens give much importance, similar to the study in Mexico where it was found that the acceptance of the vaccine was related to its efficacy.[26]

It is now known that boosters of messenger RNA (mRNA)-type vaccines such as the Pfizer/BioNTech vaccine were highly effective against the symptomatology caused by the delta variant infection, but were less effective against the symptomatology caused by the omicron infection. However, it has been shown that for both variants, mRNA boosters lead to strong protection against COVID-19-related hospitalization and death.[33] These aspects make it possible for people not to lose acceptance of the vaccines. In the media, there were plenty of comments about the mutations and variants that were generated in the SARS CoV-2 virus, probably creating even more fear and/or distrust of vaccines. However, at this point the health authorities, based on research, together with the media, have established, at least in Peru, the importance of the need for the third dose.

Similar to our results, a study in Bangladesh also revealed that the acceptance rate was influenced by sociodemographic and health-related characteristics, as well as that people are not afraid of vaccines if they face lesser side-effects after vaccination.[34]
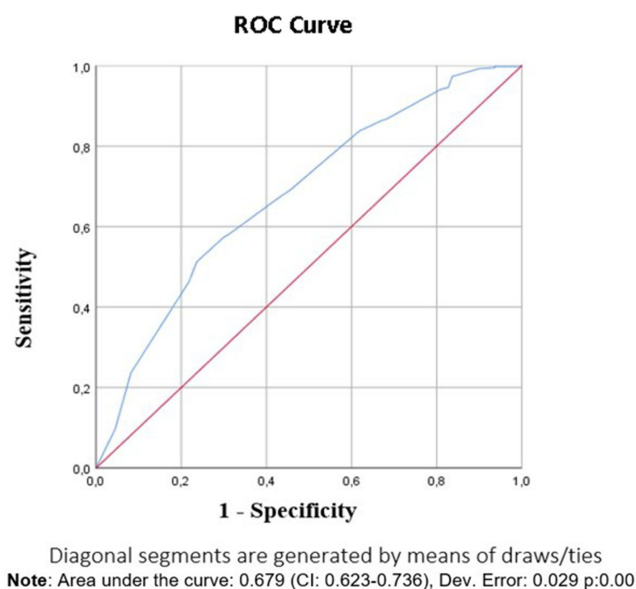
ROC Curve

Diagonal segments are generated by means of draws/ties
Note: Area under the curve: 0.679 (CI: 0.623-0.736), Dev. Error: 0.029 p:0.00

Figure 2 ROC curve of the estimated regression model for acceptance of COVID-19 vaccines in citizens of northern Peru.

Side-effects of approved viral vector vaccines are considered very rare. Also, previous studies indicate that in the case of Pfizer/BioNTech and Moderna mRNA Vaccines, they are considered safe and should continue to be used.[35]

Misinformation about these adverse effects, as well as beliefs, are factors that influence vaccine resistance, and have a negative impact on the intention to be vaccinated and protect oneself against the disease.[36] Therefore, the media used are very important because many citizens use social networks for their guidance, and on many occasions they may assimilate false news published there.[37] This reason would have much bearing on the non-acceptance responses to vaccines found in the present study. For example, in the special case of vaccine safety in children, results similar to those obtained in a study conducted in the United States, which indicated that 20% of parents do not accept the vaccine for their children.[38,39]

The logistic regression analysis for vaccine acceptance had the following variables as predictors: family income of less than 1000 soles, low and medium level of knowledge, and having another chronic disease. These results coincide with some models established in studies from other countries where similar variables were entered, such as knowledge of COVID-19 and of specific vaccines, in Bangladesh and Mexico,[26,34] as well as having a chronic disease and having a good knowledge of COVID-19 vaccine, in Ethiopia.[23]

On the other hand, it differs from Honduras, where independent variables included age, sex, previous diagnosis of COVID-19, personal concern, perceived severity and sense of belonging to the community.[40] Furthermore, in Turkey the factors were related to demographics, vaccination experiences and perceived risk of contracting COVID-19.[26]

These findings could be of support for the authorities in charge of vaccination policies to design and implement immunization strategies and dissemination of relevant health education, especially for people who were not vaccinated due to misinformation or inadequate information management.

The main limitation was in the data collection process, due to the impossibility for the research team to travel to the various departments selected for the sample because of the restrictions imposed by the state of emergency for health. For this reason, the use of referral or snowball sampling was considered as a strategy, which enabled securing a sample proportional to the population of each department in the north of the country, in this way being able to generalize the predictive model found for that population.

Conclusion

Factors associated with vaccine acceptance were found to be age, family income, level of knowledge, having another chronic disease, and a vaccine with higher trustworthiness.

The model fits the data well. Using logistic regression, we can conclude that the predictive variables of vaccine acceptance are family income of less than 1000 soles, low or medium level of knowledge, and having another chronic disease.

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Author Contributions

All authors made a significant contribution to the manuscript, in the conception, study design, execution, data acquisition, analysis and interpretation; participated in the writing and critical review of the article; gave final approval to the version to be published; agreed on the journal to which the article was submitted; and agreed to be accountable for all aspects of the work.

Disclosure

The authors report no conflicts of interest in relation to this work. No conflict of interest has arisen during the preparation of this paper by the authors.

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