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Factors associated with the intention to participate in COVID-19 vaccine clinical trials: A cross-sectional study in Peru

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ABSTRACT

Objective: To evaluate the factors associated with the intention to participate in COVID-19 vaccine clinical trials in the Peruvian population.

Methods: Cross-sectional study and secondary analysis of a database that involved Peruvian population during September 2020. The Poisson regression model was used to estimate the associated factors.

Results: Data from 3231 individuals were analyzed, 44.1% of whom intended to participate in COVID-19 vaccine clinical trials. Factors associated with the outcome were being male (RPa: 1.25; 95% CI: 1.15–1.35), being from the highlands region (RPa: 1.18; 95% CI: 1.09–1.28) or jungle (RPa: 1.30; 95% CI: 1.15–1.47), having a relative that is a healthcare professional (PRa: 1.16; 95% CI: 1.06–1.28), using a medical source of information (PRa: 1.28; 95% CI: 1.17–1.41), and trusting in the possible effectiveness of vaccines (PRa: 1.40; 95% CI: 1.29–1.51). The main reason for not participating in the trial was the possibility of developing side effects (69.80%).

Conclusion: There is an urgent need to generate a perception of safety in COVID-19 vaccine clinical trials, to increase the population’s intention to participate in these studies, and to provide evidence-based information about the vaccine.

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1. Background

Since the beginning of the Coronavirus Disease 2019 (COVID-19) pandemic, approximately 430 million confirmed cases and about 6 million deaths have been reported worldwide, conducting a sanitary, political, and economic crisis around the world [1–3], which has required the scientific community to develop preventive measures and possible treatments [4]. Among them, the accelerated development of vaccine candidates has represented one of the most promising measures for the early control of the pandemic [5].

In January 2020, the genetic sequence of Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) was published, encouraging the world to develop a potential vaccine [6]. Since then, more than 190 vaccines have been developed in the preclinical phase and more than 130 candidates have reached the clinical...
evaluation phase [7]. In the case of Peru, the clinical trials started between September to December 2020 for the evaluation of the vaccines of Sinopharm, AstraZeneca, Johnson & Johnson, and CureVac [8–10]. Of this, only one vaccine (Sinopharm) was approved based on national data, the other three vaccines (Pfizer, Johnson & Johnson, and AstraZeneca) were introduced in the country considering the results of international studies [11]. Due to the high demand for vaccines worldwide, the scarce resources of middle and low-income countries, like Peru, and the uncertainty on the efficacy of vaccines against coronavirus variants more prevalent, there is still a need to continue developing more vaccine candidates and conducting national trials to explore the efficacy and safety in a specific population [12,13]. Therefore, it will become very relevant to promote the participation of the population in clinical trials.

However, the rapid development of potential vaccines has led to mistrust and concern about their quality and safety in the population [14,15], creating barriers to participation in vaccine clinical trials. Previous studies show that the factors associated with participate in a clinical trial of the COVID-19 vaccine are older age, male gender, being a health care worker, and perceived individual risk [16,17], which can change considering the culture and idiosyncrasy of the population.

In the Peruvian context, some studies postulated that intention to vaccinate could be low for concern about safety [18], despite that is often that phases two and three reported a prevalence of serious adverse effect less than 1% [19], and the potential benefits outweigh the harm. Knowing this, the Peruvian government implements some strategies for people to participate in COVID-19 vaccine trials, like providing quality information through official media and use the prestige of quality institutions to host the clinical trial [20,21]. However, there are no evaluations of the characteristics to contribute the participation and the trends in the Peruvian population. This study evaluate the factors associated with the intention to participate in COVID-19 vaccine clinical trials in the Peruvian population during the year 2020.

2. Materials and methods

2.1. Study design, space, and participants

A cross-sectional analytical study was conducted, based on a previously collected database with the intention of knowing the frequency of prevention and control practices against COVID-19 in the population ≥18 years of age in Peru. The primary study was conducted during the first wave of the pandemic for a period of 14 days (starting on September 7, 2020) prior to the approval of any of the vaccines against COVID-19 and during the full state of emergency and focused quarantine, the methodology of the primary study has been previously reported [22]. For the present study, persons older than 18 years of residence and Peruvian nationality were included, and those with a history of COVID-19 were excluded, because the variable of interest was not considered in the questionnaire for this group.

2.2. Survey

The survey consisted of the following sections: 1) sociodemographic characteristics (sex, age, comorbidities), 2) preventive practices and perspectives on the COVID-19 for persons without a history of COVID-19 (including intention to vaccinate), 3) practices and perspectives on the COVID-19 in persons with a history of COVID-19, only sections 1 and 2 were used for this study (Supplementary file 1). This survey was constructed considering previous studies [23]. The validity of the questionnaire was reviewed by a group of clinicians and/or researchers. The Cronbach’s Alpha showed good survey reliability (0.70).

The questionnaire was disseminated through social networks (Facebook, WhatsApp, Instagram and Telegram) using the personal accounts of the authors and collaborators. In addition, the survey was published every 3 days in digital groups representative of universities, localities, among others. Convenience sampling was used, reaching adults in the 24 departments of Peru.

2.3. Outcome: Intention to participate in a COVID-19 vaccine clinical trial

The intention to participate in vaccine clinical trials was defined as an individual’s desire to participate in an experimental study related to the evaluation of potential vaccines against COVID-19, in which he or she may receive a candidate vaccine or a placebo, taking into account that the intervention being evaluated may or may not have health benefits for the participant. We assessed participants’ self-reported intention to participate using the following question: “Would you volunteer to have the new vaccine tested with you?”, with a two-choice response possibility of “no” and “yes”. Such a question was previously evaluated in a previous study in France [16]. In addition, the answer to this question was contrasted through the participants’ opinion about the vaccine candidates (I am not informed, it is not effective, it is effective) and for the reasons for not participating in a clinical trial (because it may cause other evils, because it would be of foreign origin, because I do not believe in the efficacy of vaccines, because it would have microchips to track people, among others).

2.4. Other variables

Other evaluated variables were: sex (female, male), age (under, adult or older adult), marital status (single, married or cohabiting), educational level (higher education, secondary education or a lower level), region (coast, highlands, jungle), area of residence (urban and rural), employment status (no, yes), social class (low, medium–high), healthcare professional within the family (no, student of health sciences, healthcare professional), source where the information about COVID-19 was obtained (social networks, press media, medical information, friends and family), comorbidities for COVID-19 (no, yes), family member diagnosed with COVID-19 (no, yes), family member died of COVID-19 (no, yes), and perspectives about the disease (none or little and a lot).

2.5. Data entry, processing, and analysis

Data processing and statistical analysis were performed in Stata v16.0 (StataCorp, TX, USA). Absolute and relative frequencies of categorical variables were estimated, and the chi-square test was used to compare the proportions between groups. To assess the factors associated with the intention to participate in vaccine clinical trials, Poisson regression models were used to calculate the crude (RPc) and the adjusted (RPa) prevalence ratios with their respective 95% confidence intervals. For the adjusted analysis, an epidemiological model was followed, including all the variables evaluated in the crude analysis.

2.6. Ethics approval

The primary study was evaluated and approved by the Institutional Ethics Committee of the Universidad Peruana Unión (Code: 2020-CEUPeU-00020). The initial survey was anonymous, and had extended consent for the use of respondents’ data for future research.
3. Results

3.1. General characteristics of the study sample

The primary study evaluated a total of 3,630 individuals, of whom 399 were excluded because they did not respond to the outcome of interest, leaving 3,231 participants included in the present study. A total of 62.7% were female, the mean age was 25.07 ± 9.23, 87.6% were single, 76% had a higher education level, 48.9% belonged to the coast region, 84.8% were from the urban areas, and 85.3% had no comorbidity for COVID-19 (Table 1).

3.2. Prevalence of intention to participate in COVID-19 vaccine clinical trials

The prevalence of intention to participate in COVID-19 vaccine clinical trials was 44.1%. Regarding the reasons for not participating in a clinical trial, 70.42% of participants thought that the biologic could cause side effects, while 8.81% was doubtful of its efficacy, 2.6% considered that the vaccine could contain tracking microchips, 2.27% stated that the main reason was the foreign origin of the biologic, and finally 3.93% gave other reasons.

3.3. Factors associated with the intention to participate in COVID-19 vaccine clinical trials

Factors associated with the intention to participate in COVID-19 vaccine clinical trials were being male (PRa: 1.25; 95% CI: 1.15–1.35), being from the highlands (PRa: 1.18; 95% CI: 1.09–1.28) or jungle (PRa: 1.30; 95% CI: 1.15–1.47), having a healthcare professional in your family (PRa: 1.16; 95% CI: 1.06–1.28), using a medical source for information about COVID-19 (RPa: 1.28; 95% CI: 1.17–1.41), and trusting in the possible effectiveness of vaccines (RPa: 1.40; 95% CI: 1.29–1.51) (Table 2).

4. Discussion

4.1. Main findings

Around the world, clinical trials are the cornerstone for the development of COVID-19 vaccines. In Latin America, implementation of multisite clinical trials had face challenges, such as to limited facilities, fake news about vaccines and insufficient number of participants [24]. Additionally, political scandals could have affected the credibility of COVID-19 vaccines clinical trials [25] and generated less participation of the population in these studies [26].

Our study revealed that 44% of respondents intended to participate in COVID-19 vaccine clinical trials. Detoc M et al. reported 47% in France [16] and Abu-Farha RK et al. found 36% of intention in Jordan, not very different from the present study [27]. The variation among different reports could be explained by cultural and religious factors [28], and by the COVID-19 pandemic impact on these countries. Under these circumstances, countries with higher morbidity and mortality from COVID-19 [4] such as Peru and France, could have a population with higher intention to participate in clinical trials, given the urgency for a faster development of COVID-19 vaccines [16]. Interestingly, these studies [16,27] included recovered COVID-19 cases; therefore, the intention to participate in clinical trials may be overestimated [29].

Before the COVID-19 pandemic, only a minority of clinical trials had been conducted in Peru [30]. For this reason, the knowledge and confidence level to participate in clinical trials among Peruvian population could be lower than those reported in other region countries of South America. On another hand, in the context of COVID 19 pandemic, the participation in vaccines clinical trials may be considered a potential therapeutic intervention and an opportunity to collaborate with the community [31]. It is worth mentioning that the Peruvian government has had a crucial role in the pandemic to fight misinformation and to increase the acceptance of clinical trials by providing correct information [32], emphasizing the contribution of clinical trials in people’s health and highlighting that trials are regulated by local and international ethics committees [30].

In 2020, approximately 29 COVID-19 clinical trials were conducted in Peru, 5 of them about COVID-19 vaccines [33]. Frequently, younger population are enrolled in these trials, which was also noted in previous studies and the current one [34]. The higher intention to participate of this age group is probably due to altruism and the adequate information received by public health personnel [34]. Another potential explanation for this finding may be that the majority of young people were on an education system [35], therefore they may have an acceptable knowledge about COVID-19 vaccines. In addition, comorbidities are lower in this age group; thus, risk of potential side effects could be perceived as low by the participants. However, the massive enrollment of young population in COVID-19 vaccine clinical trials could provoke potential bias of representative sample sizes, making very difficult to extrapolate the results to the elderly and population with comorbidities [36].

Interestingly, more than half of the respondents did not intend to participate due the possible development of side effects from the vaccine candidate. Some studies attribute this finding to the poor access of information about study processes, and lack of knowledge of ethical and legal aspects of COVID-19 vaccine clinical trials [37]. In order to improve this aspect, we believe that the Peruvian Ministry of Health should take the lead in educating the population about COVID 19 clinical trials through social media, newscasts, social networks, personalized messages to telephone numbers and others [38].

Another interesting finding of the present study was the small proportion of population that believed COVID-19 vaccines contained tracking microchips. This conspiracy theory originated from internet forums where it was mentioned that the Microsoft founder contributed with vaccine development to spread microchips around the world and control human population [39]. This theory spread through internet, especially by social networks that do not have regulations against fake news [40]. There are some strategies that have been implemented worldwide to control this problem, such as public health campaigns for social networks users, autoregulation of social network companies [40], spreading official information by government channels [32] and imprisonment for fake news promoters [41]. However, such efforts have not been sufficient [42].

In previous studies, low education level, coming from rural areas, and low socioeconomic level were associated with a decreased intention to participate in COVID-19 vaccine clinical trial [23,43]. In Peru, these findings were found in the highlands and jungle [44]. However, in our study, coming from the highlands or jungle were associated with a higher intention to participate in COVID-19 vaccine clinical trials, which is surprising given the disproportionate higher incidence of COVID-19 infection in the coast of Peru that could make us think that this population would be more interested in participating in clinical trials. A possible explanation could be that the population from coast of Peru has more access to conspiracy theories by the media, leading to a lower intention to participate [44,45].

Also, we found the male gender was independently associated to intention to participate in COVID-19 vaccine clinical trial. Similar results were reported in France [16]; however, in China the intention in female population was significantly higher [31]. We
believe that specific communication strategies are needed in Peru to decrease the gender difference. This finding may be secondary to the traditional education in Peru, where men feel responsible for protecting the members of their family [46].

Given the low intention to participate in clinical trials found in this study, strategies are needed to address this issue. To achieve this objective, it should be taken into account that there are modifiable factors (misinformation) and non-modifiable factors (sex).

Table 1: Bivariate analysis of factors associated with the intention to participate in the clinical trial for COVID-19 vaccine (N = 3,231).

| Variables                          | N (%) | Intention to participate in a clinical trial for the COVID-19 vaccine |
|------------------------------------|-------|---------------------------------------------------------------------|
|                                    | No (N = 1,805) | Yes (N = 1,426) |
| Gender                             |       |                                                                     |
| Female                             | 2027 (62.74) | 1199 (66.43) | 828 (58.06) | <0.001 |
| Male                               | 1204 (37.26) | 606 (33.57) | 598 (41.94) |       |
| Age **                            | 25.07 ± 9.23 | 23.98 ± 7.78 |
| 18 to 25 years old                | 2462 (76.20) | 1318 (73.02) | 1144 (80.22) |       |
| 26 to 29 years old                | 271 (8.39) | 155 (8.59) | 116 (8.13) |       |
| 30 to 49 years old                | 352 (10.89) | 226 (12.52) | 126 (8.84) |       |
| 50 to 64 years old                | 127 (3.93) | 92 (5.10) | 35 (2.45) |       |
| 65 to 100 years old               | 19 (0.59) | 14 (0.78) | 5 (0.35) | <0.001 *** |
| Marital status                    |       |                                                                     |
| Single                             | 2832 (87.65) | 1535 (85.04) | 1297 (90.95) |       |
| Married or cohabiting             | 399 (12.35) | 270 (14.96) | 129 (9.05) | <0.001 |
| Grade of education                |       |                                                                     |
| High school or less               | 773 (23.92) | 408 (22.60) | 365 (25.60) |       |
| Higher (technical or university)  | 2458 (76.08) | 1397 (77.40) | 1061 (74.40) | 0.048 |
| Region                             |       |                                                                     |
| Coast                              | 1581 (48.93) | 938 (51.97) | 643 (45.09) | <0.001 |
| Highlands                         | 1369 (42.37) | 732 (40.55) | 637 (44.67) |       |
| Jungle                            | 281 (8.7) | 135 (7.48) | 146 (10.24) |       |
| Area of residence                  |       |                                                                     |
| Urban                             | 2741 (84.83) | 1529 (84.71) | 1212 (84.99) |       |
| Rural                             | 490 (15.17) | 276 (15.29) | 214 (15.01) | 0.823 |
| Work relationship                  |       |                                                                     |
| No                                | 2509 (77.65) | 1343 (74.40) | 1166 (81.77) | <0.001 |
| Yes                               | 722 (22.35) | 462 (25.60) | 260 (18.23) |       |
| Socioeconomic level               |       |                                                                     |
| Low                               | 851 (26.34) | 507 (28.09) | 344 (24.12) |       |
| Medium High                       | 2380 (73.66) | 1298 (71.91) | 1082 (75.88) | <0.001 |
| Health professionals within the family |       |                                                                     |
| No                                 | 1257 (38.9) | 780 (43.21) | 477 (33.45) |       |
| Health science student            | 518 (16.03) | 297 (16.45) | 221 (15.50) |       |
| Health professional               | 1456 (45.06) | 728 (40.33) | 728 (51.05) | <0.001 |
| Source where you acquire information about COVID-19 |       |                                                                     |
| Social networks                   | 1098 (33.98) | 639 (35.40) | 459 (32.19) |       |
| Press media                       | 1173 (36.3) | 720 (39.83) | 453 (31.77) |       |
| Medical information               | 847 (26.21) | 371 (20.55) | 476 (33.38) |       |
| Friends and family                | 113 (3.5) | 75 (4.16) | 38 (2.66) | <0.001 |
| Comorbidities for COVID-19        |       |                                                                     |
| No                                 | 2757 (85.33) | 1534 (84.99) | 1223 (85.76) |       |
| Yes                               | 474 (14.67) | 271 (15.01) | 203 (14.24) | 0.535 |
| Family member with COVID-19 diagnosis |       |                                                                     |
| No                                 | 2397 (74.19) | 1339 (74.18) | 1058 (74.19) |       |
| Yes                               | 834 (25.81) | 466 (25.82) | 368 (20.81) | 0.994 |
| Do you consider COVID-19 to be a dangerous and deadly disease? |       |                                                                     |
| Not at all or a little            | 750 (23.21) | 423 (23.43) | 327 (22.93) |       |
| A lot                             | 2481 (76.79) | 1382 (76.57) | 1099 (77.07) | 0.736 |
| Do you consider that you are at increased risk of contracting COVID-19? |       |                                                                     |
| Not at all or a little            | 2419 (74.87) | 1358 (75.24) | 1061 (74.40) |       |
| A lot                             | 812 (25.13) | 447 (24.76) | 365 (25.60) | 0.588 |
| Do you think there are many cases of COVID-19 in your community? |       |                                                                     |
| Not at all or a little            | 1788 (55.34) | 1037 (57.45) | 751 (52.66) | 0.007 |
| A lot                             | 1443 (44.66) | 768 (42.55) | 675 (47.34) |       |
| Opinion on COVID-19 vaccine       |       |                                                                     |
| I am not informed                 | 1568 (48.53) | 988 (54.74) | 580 (40.67) |       |
| Not effective                     | 222 (6.87) | 146 (8.09) | 76 (5.33) |       |
| It is effective                   | 1441 (44.60) | 671 (37.17) | 770 (54.00) | <0.001 |

* Chi2 test.
** Mean ± standard deviation.
*** Mann–Whitney U test.
that can modify the intention to participate. Concerning modifiable factors, there is a need for strategies to decrease the amount of false news and increase the promotion of evidence-based medical information. This problem was also seen in developing countries, such as the US, where it has been recommended that there be a responsibility of the government to regulate health information [47]. In this case, the use of artificial intelligence for screening fake news and the incorporation of laws about health information regulation could be a solution [48].

For non-modifiable factors, strategies such as promoting participation by community leaders or influencers, or using economic and non-economic incentives could be used [49]. Taking in consideration that female participant could be more likely to ask for partners or family' advices before providing consent, previous

| Variables | Outcome: Intention to participate in a clinical trial for the COVID-19 vaccine |
|-----------|--------------------------------------------------------------------------------|
| Gender    | RPa* (CI 95%) | p | RPa* (CI 95%) | p |
| Female    | Ref.         |   | Ref.         |   |
| Male      | 1.22 (1.13–1.31) | <0.001 | 1.25 (1.15–1.35) | <0.001 |
| Age       |                |   |                |   |
| 18 to 25 years old | Ref. |   | Ref. |   |
| 26 to 29 years old | 0.92 (0.80–1.06) | 0.264 | 0.95 (0.81–1.1) | 0.488 |
| 30 to 49 years old | 0.77 (0.67–0.89) | <0.001 | 0.75 (0.68–1.09) | 0.287 |
| 50 to 64 years old | 0.59 (0.45–0.79) | <0.001 | 0.72 (0.52–0.98) | 0.038 |
| 65 to 100 years old | 0.57 (0.27–1.20) | 0.139 | 0.68 (0.3–1.49) | 0.335 |
| Marital status |                |   |                |   |
| Single    | Ref.         |   | Ref.         |   |
| Married or cohabiting | 0.71 (0.6–0.82) | <0.001 | 0.89 (0.74–1.07) | 0.215 |
| Grade of education |                |   |                |   |
| High school or less | Ref. |   | Ref. |   |
| Higher (technical or university) | 0.91 (0.84–1) | 0.044 | 0.96 (0.88–1.05) | 0.395 |
| Region    |                |   |                |   |
| Coast     | Ref.         |   | Ref.         |   |
| Highlands | 1.14 (1.05–1.24) | 0.001 | 1.18 (1.09–1.28) | <0.001 |
| Jungle    | 1.28 (1.12–1.45) | <0.001 | 1.3 (1.15–1.47) | <0.001 |
| Area of residence |                |   |                |   |
| Urban     | Ref.         |   | Ref.         |   |
| Rural     | 0.99 (0.89–1.1) | 0.824 | 1.04 (0.93–1.16) | 0.510 |
| Work relationship |                |   |                |   |
| No        | Ref.         |   | Ref.         |   |
| Yes       | 0.77 (0.7–0.86) | <0.001 | 0.89 (0.79–1.03) | 0.113 |
| Socioeconomic level |                |   |                |   |
| Low       | Ref.         |   | Ref.         |   |
| Medium High | 1.12 (1.03–1.23) | 0.013 | 1.08 (0.98–1.18) | 0.129 |
| Health professionals within the family unit |                |   |                |   |
| No        | Ref.         |   | Ref.         |   |
| Health science student | 1.12 (0.99–1.27) | 0.061 | 1.1 (0.98–1.25) | 0.143 |
| Health professional | 1.32 (1.21–1.44) | <0.001 | 1.16 (1.06–1.28) | 0.002 |
| Source where you acquire information about COVID-19 |                |   |                |   |
| Social networks | Ref. |   | Ref. |   |
| Press media | 0.92 (0.84–1.02) | 0.122 | 1 (0.9–1.1) | 0.963 |
| Medical information | 1.34 (1.23–1.47) | <0.001 | 1.28 (1.17–1.41) | <0.001 |
| Friends and family | 0.8 (0.62–1.05) | 0.112 | 0.84 (0.65–1.09) | 0.184 |
| Comorbidities for COVID-19 |                |   |                |   |
| No        | Ref.         |   | Ref.         |   |
| Yes       | 0.97 (0.86–1.08) | 0.539 | 1.02 (0.92–1.14) | 0.672 |
| Family member with COVID-19 diagnosis |                |   |                |   |
| No        | Ref.         |   | Ref.         |   |
| Yes       | 1 (0.91–1.09) | 0.994 | 1 (0.91–1.09) | 0.927 |
| Do you consider COVID-19 to be a dangerous and deadly disease? |                |   |                |   |
| Not at all or a little | Ref. |   | Ref. |   |
| A lot     | 1.02 (0.93–1.11) | 0.737 | 1.07 (0.98–1.18) | 0.134 |
| Do you consider that you are at increased risk of contracting COVID-19? |                |   |                |   |
| Not at all or a little | Ref. |   | Ref. |   |
| A lot     | 1.02 (0.94–1.12) | 0.587 | 1.05 (0.96–1.15) | 0.249 |
| Do you think there are many cases of COVID-19 in your community? |                |   |                |   |
| Not at all or a little | Ref. |   | Ref. |   |
| A lot     | 1.11 (1.03–1.2) | 0.006 | 1.07 (0.99–1.16) | 0.076 |
| Opinion on COVID-19 vaccine |                |   |                |   |
| I am not informed | Ref. |   | Ref. |   |
| Not effective | 0.93 (0.76–1.12) | 0.433 | 0.91 (0.75–1.1) | 0.322 |
| It is effective | 1.45 (1.33–1.57) | <0.001 | 1.4 (1.29–1.51) | <0.001 |
Table 3
Reasons for not participating in a clinical trial for the COVID-19 vaccine N = 1805.

| Reasons                                              | N (%)   |
|------------------------------------------------------|---------|
| Because it can cause other ailments (side effects)   | 1271 (70.42%) |
| Because it would be of foreign origin                 | 41 (2.27%)  |
| Because I do not believe in the efficacy of vaccines  | 159 (8.81%)  |
| Because it would have microchips for tracking people  | 47 (2.60%)  |
| Because I have a comorbidity                         | 20 (1.11%)  |
| Because I don’t want them to test the vaccine in my body | 39 (2.16%)  |
| Because clinical trials are being done in a very short time and I do not trust them | 27 (1.50%)  |
| Because I don’t have time and I’m not interested      | 20 (1.11%)  |
| Because I don’t know about clinical trials and I am not informed | 19 (1.05%)  |
| Because I did not catch Covid-19                      | 19 (1.05%)  |
| Because I consider myself a person at risk (age, gestation) | 19 (1.05%)  |
| Because I prefer to wait for an approved vaccine      | 27 (1.50%)  |
| Because I don’t want to risk it out of fear           | 35 (1.94%)  |
| Other                                                 | 71 (3.93%)  |

4.2. Strengths and limitations

The study had some limitations. First, our sample is not completely representative of the Peruvian general population. Second, the use of social networks to recruit surveys depends on the accessibility of participants’ internet services, and their willingness to participate in online surveys. Third, the phase of the clinical trial was not specified, and the intention to participate may vary between the different phases of the clinical trials. Despite these limitations, this is the first study in the Peruvian population to evaluate the factors associated with the intention to participate in the COVID-19 vaccine trial. This study involved a large sample size of 3,231 Peruvian participants from different regions of the country.

5. Conclusion

In conclusion, less than half of the participants had the intention to participate in COVID-19 vaccine clinical trials. The main reasons for not participating were the possible side effects of the vaccine candidates, distrust in its efficacy, and the belief that the vaccine candidate would contain microchips. Likewise, almost half of the participants were not informed about the preventive nature of a vaccine.

Among the factors associated with a higher intention to participate, we found that being informed from medical sources, having a healthcare professional in the family, being from the highlands or jungle region and being male increased the intention among individuals. These findings should alert the Peruvian government of the need to implement public policies to increase the awareness on vaccine clinical trials. We recommend targeting population with characteristics associated with high acceptance in vaccine trials to ensure an adequate enrollment in clinical studies.

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All authors attest they meet the ICMJE criteria for authorship.

CRediT authorship contribution statement

Abraham De-Los-Rios-Pinto: Conceptualization, Investigation, Methodology, Data curation, Formal analysis, Writing – original draft, Writing – review & editing. Daniel Fernandez-Guzman: Conceptualization, Investigation, Methodology, Data curation, Formal analysis, Writing – original draft, Writing – review & editing. David R. Soriano-Moreno: Conceptualization, Investigation, Methodology, Data curation, Formal analysis, Writing – original draft, Writing – review & editing. Lucero Gangster-Carrasco: Conceptualization, Investigation, Methodology, Data curation, Writing – original draft, Writing – review & editing. Noelia Moroch-Alburquerque: Investigation, Data curation, Writing – original draft. Antony Pinedo-Soria: Investigation, Data curation, Writing – original draft. Valentina Murrieta-Ruiz: Investigation, Data curation, Writing – original draft. Angelica Diaz-Corales: Investigation, Data curation, Writing – original draft. Jorge Alave: Supervision, Writing – original draft. Writing – review & editing. Wendy Nieto-Gutierrez: Project administration, Methodology, Formal analysis, Supervision, Writing – original draft, Writing – review & editing. Jose Armando Gonzales-Zamora: Supervision, Writing – original draft, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.vaccine.2022.04.003.

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