COVID-19 vaccination hesitancy among Brazilian adult population

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Abstract

Background: This study assessed the perceptions and attitudes of the Brazilian adult population about COVID-19 vaccines, seeking to identify which factors are associated with vaccine hesitancy and lack of trust in vaccines, in order to support individual or collective strategies for welcoming and guidance. Methods: This is a national survey using a self-report web instrument in a representative sample of the Brazilian adult population (N=1700). The survey included sociodemographic and quality of life (QoL) questions, general information on COVID-19, and a vaccine-specific questionnaire. Results: The vast majority of our sample expressed favourable opinions regarding COVID-19 vaccination, but there was also a small fraction (2.2%) of respondents who are hesitant about COVID-19 vaccination. Most of them were males within age range of 30 to 59 years and reported that their reasons for vaccine hesitation are mainly due to uncertainty about safety (57.9%) and efficacy (36.8%) of vaccines, followed by concern with how they were developed, that is, the issue of timing and the adoption of a new development technology (28.9%). Further, while the impact of groups and peers on those who hesitate to vaccinate was not clear, their perception of a low risk of contracting the disease is evident. Conclusions: The uncertainty about the safety and efficacy of vaccines, the issue of timing and the adoption of a new development technology and the effect of these perceptions on the vaccine COVID-19 acceptance suggests the need to develop targeted strategies to increase effective communication about the risks and benefits of COVID-19 vaccines.

1. Introduction

The year 2019 was marked by the emergence of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) which has gained worldwide exposure since the beginning of 2020. [1] The coronavirus disease 2019 (COVID-19) has spread around the world in an extremely short period and, despite the passing of the months, the number of infected people is still increasing rapidly on a global scale.

While the rapid escalation of the COVID-19 continues, the world has taken several measures to contain the disease spread, especially vaccines. [2] Vaccines are one of the most important contributions to public health in the 20th century and are responsible for the sharp decline in vaccine-preventable diseases worldwide. However, achieving herd immunity to SARS-CoV-2 through vaccines will require a joint effort to understand and address people's attitudes and beliefs regarding vaccination.

Recently, the Wellcome Global Monitor 2018 study showed that 97% of Brazilians agree or strongly agree that it is important to vaccinate children. [3] However, despite being higher than the global average (92%), the need to address the relationship between vaccine hesitancy and an ineffective communication remains explicit as there is a drop to 80% among those who expressed themselves positively when asked if vaccines are effective and safe. Nevertheless, there are a number of factors that can influence behaviour towards vaccination such as, but not limited to: (i) confidence in the efficacy and safety of vaccines; (ii) trust in the system that provides them, and (iii) trust in the motivations of policy makers who decide on the vaccines offered.[4] Yet, the COVID-19 pandemic have repeatedly put to the test these and a number of other factors that can influence the decision to accept vaccination and similar results on COVID-19 vaccine acceptance

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have been reported around the globe, including England[5], Australia[6], Poland[7], Malaysia[8], Jordan[9], Hong Kong[10] and Nepal[11] among others. However, until now we are unaware of the Brazil population's perceptions towards vaccination for COVID-19. This is especially important, as the Brazilian Unified Health System (also known as SUS, for its initials in Portuguese) is one of the largest public health systems in the world, with an excellent track record on vaccination coverage. Through the SUS, the National Immunization Program makes available, free of charge, a series of vaccines that guarantee the immunization of children, adolescents, adults, older adults and pregnant women. Currently, four vaccines for COVID-19 are available at SUS: Astrazeneca/Oxford and Pfizer/BioNTech have definitive registration by the Brazilian National Health Surveillance Agency (Anvisa), while Janssen and Coronavac are only approved for emergency use.

Therefore, the aim of this study was to assess the perceptions and attitudes of the Brazilian adult population about COVID-19 vaccines, seeking to identify which factors are associated with vaccine hesitancy, in order to support individual or collective strategies for welcoming and guidance.

2. Material and methods

2.1 Study design, setting and participants

This is a report on an ongoing nationwide survey of perceptions and attitudes about COVID-19 vaccines, conducted among people aged 18 and over, living in Brazil. The study uses social media as a recruitment platform and the survey will remain open until December, 2021 to capture temporal trends. This study has been conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving research study participants were approved by the UFSCar's Research Ethics Committee (Number: 45530521.2.0000.5504). Electronic informed consent was obtained from all subjects.

2.2. Measurements

The survey included sociodemographic and quality of life (QoL) questions, general information on COVID-19, and a vaccine-specific questionnaire. Self-reported QoL was measured using the culturally validated scale of the EQ-5D-3L Health States instrument.[12] The scale consists of a descriptive system for self-reported health status with 5 dimensions (mobility, self-care, usual activities, pain/discomfort, and anxiety/depression) with a 3-level response option for each dimension (no problems, some problems, and extreme problems). The EQ-5D-5L index scores ranges at 1 (full health) and 0 (dead), and allows for scores less than 0 representing health states that the population considers worse than being dead.[12]

2.2.1. Vaccine-specific questionnaire

A vaccine-specific questionnaire was designed by a panel of psychologists and clinicians to access the perceptions and attitudes of the Brazilian adult population about vaccination for COVID-19, and to identify which factors are associated with vaccine hesitancy and lack of confidence in vaccines. To do so, vaccine hesitancy was defined and construed according to the definitions set forth by the SAGE Working Group on Vaccine Hesitancy, which defines vaccine hesitancy as the delay in acceptance or refusal of vaccination despite availability of vaccination services. [4] To this end, vaccine acceptance was assessed by the responses to the question: "If you have not yet received a dose of the COVID-19 vaccine, do you plan to get vaccinated?" with the answer options "yes", "no" and "not sure". Responses "no" and "not sure" were coded into one variable to indicate refusal of vaccination. Moreover, the full questionnaire consisted of three main sections, including questions on (1) contextual, (2) individual and group, and (3) vaccine/vaccination-specific influences on COVID-19 vaccination.

2.3. Sample size

Based on previous findings on the overall prevalence of a positive response on the importance of getting vaccinated in the Brazilian population, we assumed that the prevalence of vaccine hesitancy would be around 4% (3% - 5%). [3] Therefore, we calculate a required sample size of at least 1476 respondents with an allowable error margin of 1% and 95% CI.

2.4. Data analysis

Categorical variables are presented as counts (percentages). Comparisons between groups were performed using Pearson's Chi-squared test with Yates' continuity correction for categorical variables. All analyses were conducted using R version 4.0.3 (The R Foundation for Statistical Computing, Vienna, Austria) in R-Studio 1.3.1093 (RStudio Inc., Boston, USA).

3. Results

From 1st to 30th June 2021, data were collected from a nationally representative sample of the Brazilian adult population (N=1700). There were no invalid responses. Sociodemographic and health characteristics of the study population are shown in Table 1. Respondents were mostly females (67.9%), within the age range of 30 and 59 years. About three-fourths of them had professional training (74.9%), reported a very good to excellent self-perceived health status (73.8%) and had no personal history of previous infection by COVID-19 (83.3%) nor among their household familiars (76.4%).

3.1. Vaccine hesitancy

More than a half of the participants have already been vaccinated (56.2%; 956/1700). Accordingly, the overall prevalence of vaccine hesitancy was rather low, 2.2% (IC 95% 1.5% – 2.9%) of participants responded negatively about COVID-19 vaccination intention. When considering only those who haven't received a dose of the COVID-19 vaccine, 5.1% (IC 95% 3.5% – 6.7%) of the participants were resistant to COVID-19 vaccination. Moreover, there was a significant variation in the prevalence of vaccine hesitancy among certain population subgroups. (Figure 1) Higher proportions of vaccine hesitancy was observed among males (p < 0.001), those aged between 45 and 59 years (p < 0.001) and lower levels of self-reported QoL (p = 0.05). Other characteristics, such as levels of schooling, self-perceived health status, type of healthcare assistance, and personal history of past COVID-19 infection or among household familiars were not significantly associated with variations in vaccine hesitancy.

Those who responded resistant to COVID-19 vaccination were predominantly males (71.1%), within the age range of 30 and 59 years (79%). About three-fourths of them had professional training (73.7%), reported a very good to excellent self-perceived health status (76.3%) and had no personal history of previous infection by COVID-19 (78.9%) nor among household familiars (68.4%). Notably, when assessed for their reasons for vaccine hesitancy the responses were mainly due to uncertainties about the safety (57.9%) and efficacy (36.8%) of the vaccines, followed by concerns about how they were developed i.e., problem of timing and the adoption of a new development technology (28.9%), contraindications for health reasons (10.5%) and personal history of COVID-19 infection (7.9%). No significant differences for reasons for the vaccine hesitancy between population subgroups.

3.2. Perceptions and attitudes

We also assessed perceptions and attitudes about COVID-19 vaccination considering a set of factors that may influence the decision to accept or not to be vaccinated. To this end, we explored some of the key determinants in each category of the SAGE Working Group on Vaccination Hesitance Matrix among those who responded resistant to COVID-19 vaccination.

3.2.1. Contextual influences

Influences arising from historical, sociocultural, environmental, health system / institutional, economic or political factors are presented in Table 2. According to the table, those who are resistant to COVID-19 vaccination ranked healthcare workers (78.9%) as the ones they trust most for information while social media (50%), government (21.1%) and pharmaceutical companies (18.4%) as the least trustworthy. Although most indicate that community leaders and influencers support COVID-19 vaccines (97.4%), a significant portion was neutral (47.4%) to the position of some in not agree to vaccination for different reasons. Moreover, most also pointed to know someone who does not take a COVID-19 vaccine because of religious or cultural reasons (76.3%). Mostly, they do not disagree with these people (52.6%) nor do they think they are risking their health or the community health if they do not take the COVID-19 vaccine (78.9%). Notably, most are

convinced that the government purchases the highest quality vaccines available (47.4%), but they do not believe that vaccine producers are interested in their health (84.2%).

3.2.2. Individual and group influences

Influences arising from personal perception of the vaccine or influences from the social environment are presented in Table 3. Most participants reported knowing anyone who had a bad reaction to the COVID-19 vaccine (78.9%). Although most do not think vaccines overload the immune system (71.1%), a notable portion was neutral (50%) on whether it is better to develop immunity by getting sick than getting vaccinated. Moreover, most pointed out that they do not feel they have enough information about vaccines and their safety (81.6%) and that mass immunization campaigns do not provide sufficient information to address concerns around vaccination (57.9%). Yet, although these individuals think that vaccines are still needed even when the disease is no longer prevalent (68.4%), only a tiny majority indicated that it is important to get a vaccine to protect those that cannot get vaccinated (55.3%).

3.2.3. Vaccine/vaccination-specific influences

Influences arising directly related to the vaccine or vaccination are presented in Table 4. The fear of pain or needles when receiving a vaccine does not significantly influence hesitancy to be immunized (92.1%), however the majority of participants indicated that before administering the vaccine, the healthcare worker does not always have provided enough information on the side-effects that might follow (44.2%). Moreover, for the most part they do not believe that the new COVID-19 vaccine has been trialed to the same rigorous standard as any normally prescribed drug (55.3%), and that they are concerned that the COVID-19 vaccine does not prevent the disease (71.1%). They also disagree (50%) that vaccines made in Europe or America are safer than those made in other countries such as Russia, India, China and Brazil.

4. Discussion

This is the first study to assess the perceptions and attitudes of the Brazilian adult population about COVID-19 vaccines. Although the vast majority of our sample expressed favourable opinions regarding COVID-19 vaccination, there was also a small fraction (2.2%) of respondents who were hesitant. Among these, most were males within age range of 30 to 59 years and reported that their reasons for vaccine hesitation are mainly due to uncertainty about safety (57.9%) and efficacy (36.8%) of vaccines, followed by concern with how they were developed, that is, the issue of timing and the adoption of a new development technology (28.9%).

Several studies have identified similar results on COVID-19 vaccine acceptance around the globe, including England[5], Australia[6], Poland[7], Malaysia[8], Jordan[9], Hong Kong[10] and Nepal[11] among others. In all of these studies, those likely to delay or refuse vaccines share common reasons with our results: uncertainties about safety and efficacy of vaccines, the issue of timing and the adoption of a new development technology. But how do these reasons articulate with perceptions and attitudes that can influence their decision to accept or not be vaccinated?

Most respondents to our study reported that before administering a vaccine, they did not always receive sufficient information about the vaccines and their safety and the side effects that may occur. Such notes reflect an ineffective communication about the risks and benefits of vaccines. Therefore, it is essential to think about how the population is receiving information about COVID-19 vaccines. A survey conducted in the United States with a nationally representative sample (n = 1600) of parents with children <6 years of age showed that there are three main resources parents use when seeking information about immunizations: their healthcare providers, the media, and the Internet. [13,14] Our results also identified health professionals as the most reliable source for obtaining information, but the vast majority also pointed a lack of confidence in the content propagated in social media, by government and pharmaceutical companies. Thus, many of the barriers mentioned can be overcome or mitigated by timely and effective communication between the healthcare workers and the population. Our results point to the need to strengthen this bond. While social media platforms have become a common source of health information around the world, they have also been

recognized as an unreliable source. But confidence that vaccination can reduce the chance of contracting the disease and that the vaccine is safe are not the only aspects to be addressed.

Rosenstock *et al.* performed one of the first studies on vaccine hesitancy. Although more than half a century has passed, our results show that little has changed. According to Rosenstock *et al.* , four psychosocial domains influence parents' decisions to vaccinate their children for polio: (1) parents' assessment of their child's risk of contracting the disease; (2) parental assessment of whether the disease was a sufficient health concern to warrant vaccination; (3) parental assessment of whether their child's vaccination may reduce their child's chance of contracting the disease and whether the vaccine is safe; and (4) the concerns and influences that facilitated or discouraged parents' decision to vaccinate their children.[15] Therefore, personal perception about the disease and the vaccine or influences from the social environment are fundamental aspects to be considered.

Traditionally, groups and peers play an important role in shaping an individual's thinking and decision making. However, although most of those hesitant affirmed that leaders (religious, political, teachers, healthcare workers) in their community support COVID-19 vaccines, they position themselves neutral when asked if agree or disagree with some groups or leaders who do not agree to vaccination for different reasons such as religious or cultural. Likewise, they do not perceive it as a risk to their health or the community health if these groups or leaders do not take the COVID-19 vaccine. Therefore, while the impact of groups and peers on those who hesitate to vaccinate is still unclear, the perception of a low risk of contracting the disease is evident.

Our research has some limitations. Our results are not fully generalizable to the Brazilian adult population, due to the high level of education and self-reported QoL of the participants and the high rate of people already vaccinated. Therefore, there is little information available about the population belonging to the most vulnerable social groups, which are often the ones who have difficulty in accessing information about vaccines and who are at greater risk of contracting the disease for various reasons. However, our sample provided a significant picture of the relevant perceptions and attitudes of this population, which can inform the development of individual or collective support strategies for embracement and guidance. In addition, the decision to keep the survey open until December, 2021 will be important to capture temporal trends, object of further analysis.

5. Conclusions

In conclusion, despite the vast majority of our sample expressing favourable opinions regarding COVID-19 vaccination, the uncertainty about the safety and efficacy of vaccines, the issue of timing and the adoption of a new development technology and the effect of these perceptions on the vaccine COVID-19 acceptance suggests the need to develop targeted strategies to increase effective communication about the risks and benefits of COVID-19 vaccines. These strategies should focus on strengthening the relationship between healthcare workers and the population, and on the search for alternative strategies to provide adequate information to the population, in order to contribute to the maintenance of high levels of vaccination coverage.

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.

7. References

1. Zhu N, Zhang D, Wang W, et al. A Novel Coronavirus from Patients with Pneumonia in China, 2019. *N Engl J Med.* 2020;382(8):727-733.

2. Hodgson SH, Mansatta K, Mallett G, Harris V, Emary KRW, Pollard AJ. What defines an efficacious COVID-19 vaccine? A review of the challenges assessing the clinical efficacy of vaccines against SARS-CoV-2.*Lancet Infect Dis.* 2021;21(2):e26-e35.

3. Wellcome Trust TGOL. *Wellcome Global Monitor, 2018.* UK Data Service;2019. SN 8466.

4. MacDonald NE, Hesitancy SWGoV. Vaccine hesitancy: Definition, scope and determinants. *Vaccine.* 2015;33(34):4161-4164.

5. Bell S, Clarke R, Mounier-Jack S, Walker JL, Paterson P. Parents' and guardians' views on the acceptability of a future COVID-19 vaccine: A multi-methods study in England. *Vaccine.* 2020;38(49):7789-7798.

6. Seale H, Heywood AE, Leask J, et al. Examining Australian public perceptions and behaviors towards a future COVID-19 vaccine. *BMC Infect Dis.* 2021;21(1):120.

7. Rzymski P, Zeyland J, Poniedzialek B, Malecka I, Wysocki J. The Perception and Attitudes toward COVID-19 Vaccines: A Cross-Sectional Study in Poland. *Vaccines (Basel).* 2021;9(4).

8. Syed Alwi SAR, Rafidah E, Zurraini A, Juslina O, Brohi IB, Lukas S. A survey on COVID-19 vaccine acceptance and concern among Malaysians.*BMC Public Health.* 2021;21(1):1129.

9. El-Elimat T, AbuAlSamen MM, Almomani BA, Al-Sawalha NA, Alali FQ. Acceptance and attitudes toward COVID-19 vaccines: A cross-sectional study from Jordan. *PLoS One.* 2021;16(4):e0250555.

10. Wong MCS, Wong ELY, Huang J, et al. Acceptance of the COVID-19 vaccine based on the health belief model: A population-based survey in Hong Kong. *Vaccine.* 2021;39(7):1148-1156.

11. Paudel S, Palaian S, Shankar PR, Subedi N. Risk Perception and Hesitancy Toward COVID-19 Vaccination Among Healthcare Workers and Staff at a Medical College in Nepal. *Risk Manag Healthc Policy.*2021;14:2253-2261.

12. Santos M, Cintra MA, Monteiro AL, et al. Brazilian Valuation of EQ-5D-3L Health States: Results from a Saturation Study. *Med Decis Making.* 2016;36(2):253-263.

13. Pineda D, Myers MG. Finding reliable information about vaccines.*Pediatrics.* 2011;127 Suppl 1:S134-137.

14. Gellin BG, Maibach EW, Marcuse EK. Do parents understand immunizations? A national telephone survey. *Pediatrics.*2000;106(5):1097-1102.

15. Rosenstock IM, Derryberry M, Carriger BK. Why people fail to seek poliomyelitis vaccination. *Public Health Rep.* 1959;74(2):98-103.

Table 1. Sociodemographic and health characteristics of the study population.

Variable	n (%)
Sex	
Female	1154 (67.9)
Male	546 (32.1)
Age range	
18 to 29 years	459 (27)
30 to 44 years	655 (38.5)
45 to 59 years	389 (22.9)
60 to 74 years	180 (10.6)
75+ years	17 (1.0)
Schooling	
Primary school	5 (0.3)
Secondary school	43 (2.5)
High school	379 (22.3)
Professional degree	1273 (74.9)
Self-perceived health status	
Excellent	482 (28.4)
Very good	772 (45.4)
Good	428 (25.2)

Variable	n (%)
Poor	18 (1.1)
Healthcare assistance	
Public healthcare system	356 (20.9)
Health insurance plan	1300 (76.5)
Private Doctor	44 (2.6)
Self-reported QoL by EQ-5D-3L Health States index	?¿?
0.75	1497 (88.1)
0.50 − 0.74	193 (11.4)
0.25 − 0.49	10 (0.6)
Personal history of past COVID-19 infection	
Past infection	284 (16.7)
No history of infection	1416 (83.3)
History of COVID-19 infection among household familiars	
Yes	401 (23.6)
No	1299 (76.4)

Table 2. Contextual and individual / group influences on COVID-19 vaccination. (N=38)

Survey questions to assess contextual influences on COVID-19 vaccination

Who do you trust the most for information?
Healthcare workers
Government
Social media
Friends / Family
Who do you trust the least for information?
Social media
Government
Pharmaceutical companies
Drugstores
Friends / Family
Healthcare workers
Do leaders (religious, political, teachers, healthcare workers) in your community support COVID-19 vaccines?
Yes
No
Some groups or leaders do not agree to vaccination for different reasons. In general, do you agree or disagree with these gro
0 (Strongly disagree)
1
2
3
4 (Strongly agree)
Do you know anyone who does not take a vaccine because of religious or cultural reasons?
Yes
No
Do you agree or disagree with these persons?
0 (Strongly disagree)
1
2
3
4 (Strongly agree)

Survey questions to assess contextual influences on COVID-19 vaccination

Do you think they are risking their health or the community health if they do not take the COVID-19 vaccine?
Yes
No
I'm convinced that my government purchases the highest quality vaccines available.
0 (Strongly disagree)
1
2
3
4 (Strongly agree)
Do you believe the vaccine producers are interested in your health?
Yes
No

Table 3. Individual and group influences on COVID-19 vaccination. (N=38)

Survey questions to assess individual and group influences on COVID-19 vaccination	n (%
Do you know of anyone who has had a bad reaction to a COVID-19 vaccine?	
Yes	30 (7
No	8 (21
Do you think vaccines overload the immune system?	
Yes	11 (2
No	27 (7
It is better to develop immunity by getting sick than to get vaccinated.	
0 (Strongly disagree)	6 (15
1	2 (5.
2	19 (5
3	3 (7.9
4 (Strongly agree)	8 (21
Do you feel you get enough information about vaccines and their safety?	
Yes	7 (18
No	31 (8
Mass immunization campaigns provide you with sufficient information to address your concerns around vaccination.	
0 (Strongly disagree)	16 (4
1	6 (15
2	9 (23
3	4 (10
4 (Strongly agree)	3 (7.9
Vaccines are still needed even when diseases are rare.	
0 (Strongly disagree)	3 (7.9
1	1 (2.6
2	8 (21
3	7 (18
4 (Strongly agree)	19 (5
Do you think it's important to get a vaccine to protect those that cannot get vaccinated?	
Yes	21 (5
No	17 (4

Table 4. Vaccine/vaccination-specific influences on COVID-19 vaccination. (N=38)

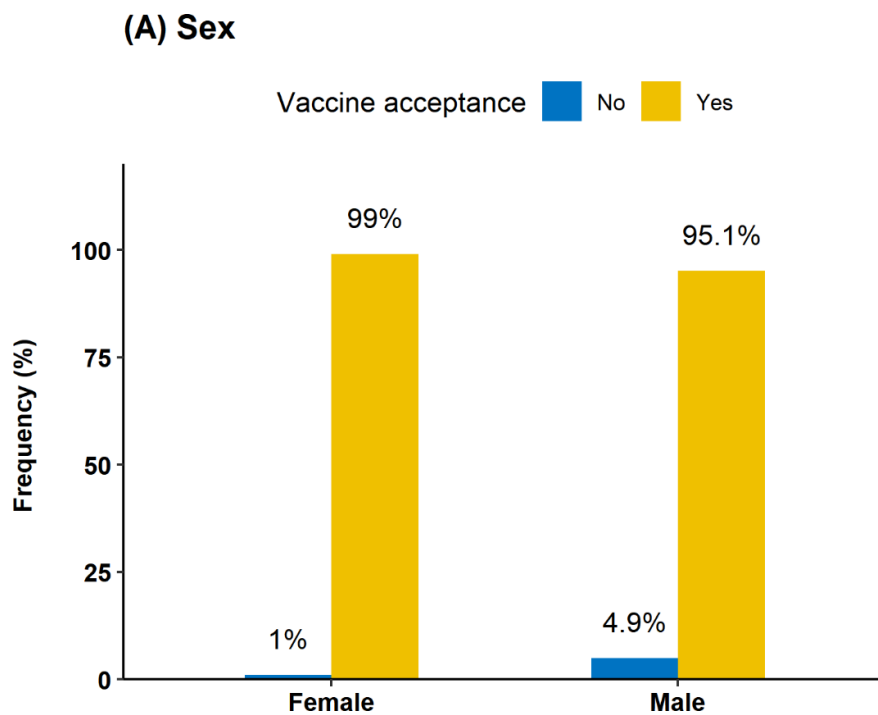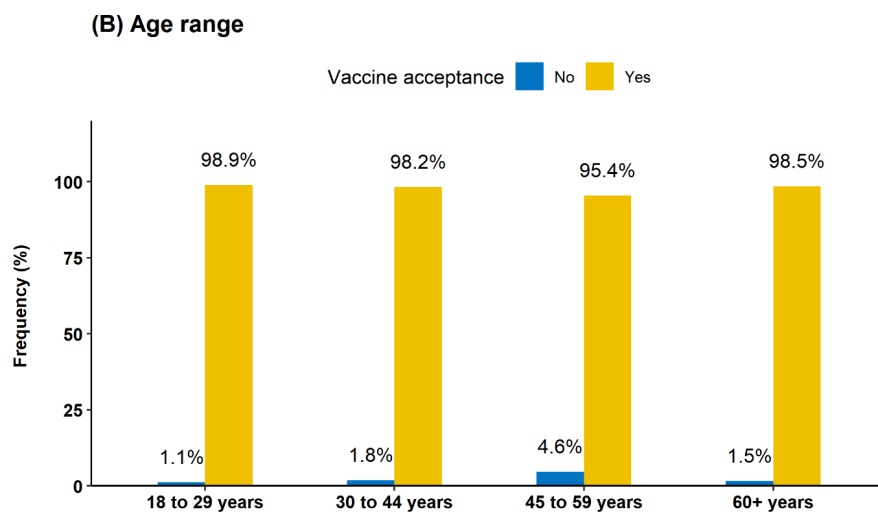| Survey questions to assess vaccine/vaccination-specific influences on COVID-19 vaccination |
|---|
| Before administering the vaccine, the healthcare worker always provided me with enough information on the side-effects tha |
| 0 (Strongly disagree) |
| 1 |
| 2 |
| 3 |
| 4 (Strongly agree) |
| Do you believe that the new COVID-19 vaccines are trialed to the same rigorous standard as any normally prescribed drug? |
| 0 (Strongly disagree) |
| 1 |
| 2 |
| 3 |
| 4 (Strongly agree) |
| Are you concerned that the COVID-19 vaccine does not prevent the disease? |
| Yes |
| No |
| Do you feel that the fear of pain or needles when receiving a vaccine make you hesitate to be immunized? |
| Yes |
| No |
| Vaccines made in Europe or America are safer than those made in other countries such as Russia, India, China and Brazil. |
| 0 (Strongly disagree) |
| 1 |
| 2 |
| 3 |
| 4 (Strongly agree) |

Figure 1. Proportions of vaccine acceptance according to (A) sex, (B) age range, and (C) levels of self-reported QoL. (N=1700)

(A) Sex

Figure 1. Proportions of vaccine acceptance according to (A) sex, (B) age range, and (C) levels of self-reported QoL. (N=1700)
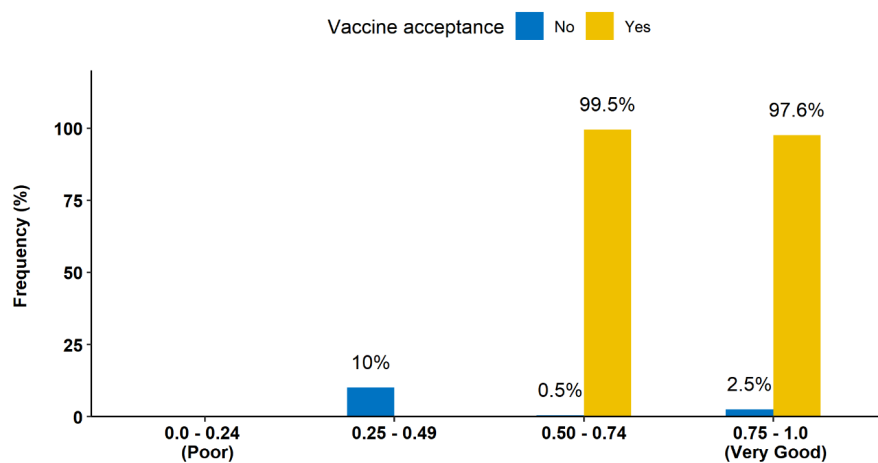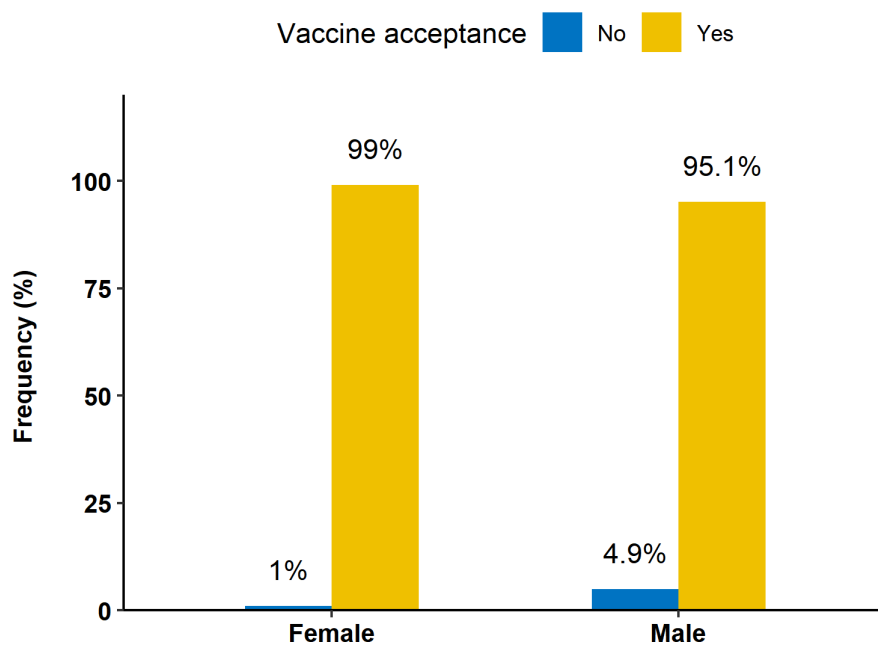
(B) Age range

Figure 1. Proportions of vaccine acceptance according to (A) sex, (B) age range, and (C) levels of self-reported QoL. (N=1700)
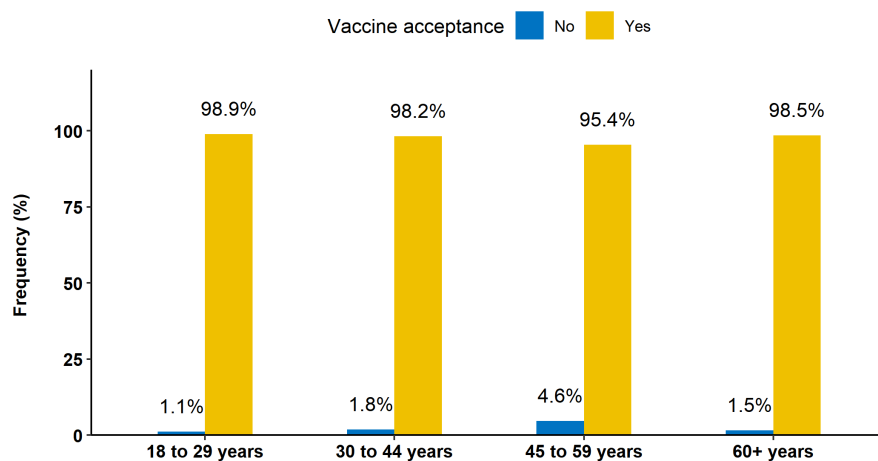
(C) Self-reported QoL

(A) Sex

(B) Age range

(C) Self-reported QoL