INTRODUCTION

In March 2020, the World Health Organisation warned of the alarming levels of spread and severity of the new coronavirus SARS-CoV-2, characterising the global epidemic of COVID-19, while signalling the serious worldwide consequences if there were no quick and strategic actions for its containment (Cucinotta & Vanelli, 2020; World Health Organization, 2020).

The first confirmed case of COVID-19 in Brazil took place in the city of São Paulo in February 2020 (Rodriguez-Moraes et al., 2020). To date (17 June 2021), 1 year and 4 months after the first case, the epidemic in Brazil remains uncontrolled, with more than 17.6 million cases diagnosed in total, most of which are concentrated in São Paulo State (3.51 million). With regard to deaths due to COVID-19, Brazil has accumulated the sorrowful number of more than a half million deaths in total and continues to record nearly a thousand deaths per day (Castro et al., 2021). Despite Brazil’s global recognition as an exemplary country in immunisation policies (Brazilian Ministry of Health, 2003), the vaccination as a strategy to control the COVID-19 pandemic unfortunately started late. It is kept slowly
in the country, and only a small portion of the population has been immunised so far (approximately 28% of the population received the first dose of the vaccine, and only about 11% received both doses).

As it is known in the scientific literature and according to the accumulated practical experiences from past epidemics, the success of policies to slow down the rapid transmission of a highly infectious disease relies primarily on the public to have accurate perceptions of personal and social risk factors (Abbas, 2021). In the midst of a political, sanitary and economic crisis, Brazil remains without a practical and efficient plan to control the pandemic, which leaves the population increasingly vulnerable both to the disease and to ideological influences, fraught with misinformation, lack of leadership and perspectives (Gramacho & Turgeon, 2021). Furthermore, denial movements persist despite the country facing the worst phase of the pandemic with catastrophic consequences reaching the apex, while there is a lack of control and policies to deal with the current crisis. A sea of fake news invaded the country, contradicting science and encouraging anti-vaccine attitudes, disregarding basic preventive measures such as the use of masks, and casting doubt on the disease data (Gramacho et al., 2021; Lopes, 2021).

Risk perceptions have been strongly associated with intentions to act to keep oneself healthy, being generally assessed through two dimensions: personal susceptibility and perceptions of severity (Weinstein, 1993). Recent studies in the context of the COVID-19 pandemic have shown evidence of associations of both dimensions with the likelihood of vaccinating oneself and those under their care. Individuals believing they were more vulnerable to COVID-19 and that the effects would be serious were more inclined to get vaccinated (Khubchandani et al., 2021; Schneider et al., 2021; Viswanath et al., 2021).

Vaccine hesitancy and confidence are among the main challenges to ensuring global access to immunisation (Wouters et al., 2021.), and studies on risk perception and vaccine confidence are vital for observing changes in community behaviour. In addition, developing a panoramic view of the disease’s dispersion can aid in the identification of population specificities, which can help with the challenge of vaccination. In this sense, the objective of the present study was to draw a panorama of COVID-19 in São Paulo State and investigate the population’s risk perception about the new coronavirus, attitudes concerning preventive measures and vaccine confidence.

2 | METHODS

2.1 | Study design and settings

This cross-sectional study is characterised as an open web survey, with data collection carried out by electronic questionnaires. An electronic version of the data collection instrument was developed on the Research electronic data capture (REDCap) platform (Harris et al., 2009), which stores the database on a server at the Ribeirão Preto Medical School—University of São Paulo (USP). REDCap is a secure application for creating and managing online surveys and databases (http://project-redcap.org).

What is known about this topic

- The success of policies to slow down the rapid transmission of infectious diseases relies, primarily, on an accurate perception of the public about risk factors.
- In 2021, Brazil remained without an efficient plan to control the pandemic, which leaves the population increasingly vulnerable both to the disease and to ideological influences, fraught with misinformation, lack of leadership and perspectives.

What the paper adds

- The proximity to the disease and its outcomes may have generated a higher consciousness of self-care and empathy with close people, increasing the risk perception.
- Despite the high confidence in the COVID-19 vaccine, more than 25% have doubts whether they will get vaccinated or doubt vaccine safety.

The online questionnaire was administered to a sample of 15 individuals who are part of the study’s target population as a pre-test step. Both the understanding of the questions and the use of the online platform and its functionalities were evaluated. It should be emphasised that these individuals were not included in the study’s final sample.

Invitations for participation in the study were posted on social networks (Facebook, Twitter, Whatsapp and others). The disclosure text posted together with the link to access the electronic questionnaire described the objectives of the survey and the target audience and provided information on the confidentiality of the responses. In addition, the participants were requested to share the link with their contacts after completing the survey in order to increase the participation levels and thus obtain a broader sample. Participation in this survey was voluntary, and no compensation was provided.

The first page of the electronic questionnaire contained the Informed Consent Form (ICF), and the participants could decide whether or not to participate in the study after reading it. When accepting participation, the first questions of the questionnaire referred to the inclusion and exclusion criteria. Age of 18 years or older, place of residence (some municipality in the State of São Paulo), and proficiency in Portuguese language were used as inclusion criteria. If any of these criteria were not met, the survey ended with a message of thanks. Those participants who did not answer all the questions in the questionnaire were not included in the final sample. Data collection was carried out from September 2020 to December 2020.

2.2 | Variables

The online questionnaire was developed by the responsible researchers, including variables relevant to draw the panorama of COVID-19
in the territory based on the literature review. Sociodemographic and behavioural variables were collected to characterise the sample. To investigate health conditions, variables such as self-perception of health, chronic disease and comorbidities for COVID-19, smoking and practice of physical exercises were considered. A panorama of SARS-CoV2 infection and COVID-19 was assessed through questions on previous test, type of test, diagnosis and type of infection (considering the symptoms of the disease), isolation level and presence of any sequel after the cure. To investigate the perception of the risk of contracting COVID-19, some common everyday situations were presented to the participants, and they were asked to classify each of them, considering transmission risk as low, moderately low, moderate, moderately high or high. The last block of the questionnaire referred to attitudes regarding preventive measures, opinions about the efficacy of treatment and vaccination, and concerns about contracting COVID-19.

2.3 | Statistical analysis

Data from REDCap were exported to R software version 3.6.2 for descriptive analysis. The strength of the association between dependent and independent variables of interest was measured by using the Cramér’s V coefficient (Everitt, 1992). Effect sizes were thus interpreted by using Rea and Parker (2014), in which references below 0.10 mean negligible association; between 0.10 and below 0.20 mean weak association; between 0.20 and below 0.40 mean moderate; and between 0.40 and 0.60 mean as a relatively strong association. P-values for these associations were computed for a Monte Carlo test with 20,000 replicates, as proposed by Hope (1968). The “chisq.test” function of the R software with the argument “simulate.p.value = TRUE” was used to obtain these p-values at a level of significance of 0.05.

2.4 | Ethical issues

The study was approved by the Research Ethics Committee of Clinical Hospital of Ribeirão Preto Medical School (CAAE: 36947720.0.0000.5440). The informed consent form was presented on the first page of the online questionnaire and the participants were also informed that they could end their participation at any time. In addition, all the questions included the option “I prefer not to answer” between the response categories, i.e., participants were not required to answer any questions with which they were uncomfortable.

The research was carried out according to guidelines set by the Checklist for Reporting Results of Internet E-Surveys (CHERRIES) (Eysenbach, 2004), and the applied methodology followed the guidelines for research procedures with any stage in a virtual environment made available by the National Research Ethics Commission (CONEP) in Circular Letter No. 1/2021-CONEP/SECNS/MS.

3 | Results

The questionnaire was accessed by 1759 individuals during the data collection period. Of these, 227 individuals dropped out of the questionnaire before the end and were excluded from the total sample. Of the 1532 individuals who reached the end of the online questionnaire, 1111 were residents in the State of São Paulo (study inclusion criterion) and were part of the study sample. Of these, 796 were female (71.6%) and 313 were male (28.2%), and two individuals did not want to answer about their sex in the birth register (0.2%). Table 1 shows the characterisation of the sample according to sociodemographic variables.

Despite the higher frequency of female participants, it was observed that the participation of individuals of all age groups was similar. Most households consisted of up to four people, with 12.3% of the participants reporting living alone. The sample was primarily composed of people with complete higher education, and almost 70% of the participants declared themselves registered workers or self-employed. Considering the type of work performed since March 2020, almost 45% worked from home, followed by nearly 20% who maintained normal activities at the workplace as usual. However, more than 15% of the participants declared to be unemployed or not be engaged in any gainful activity, almost 6% declared to have lost their jobs during the pandemic, and more than 30% declared that they suffered a decrease in their monthly income during the period.

Questions on health conditions and health behaviours are shown in Table 2. Most participants classified their health as good. However, almost 40% considered themselves part of the risk group for COVID-90, which is a similar frequency of participants who declare having a chronic disease. The frequency of self-reported obesity in the sample was approximately 18% (similar among males and females) and almost 45% declared they did not practice physical exercise. The prevalence of smoking in the total sample was approximately 9%, being higher among males (11.5%).

Table 3 shows a panorama of SARS-CoV2 infection and COVID-19 disease in the São Paulo State population. In the investigation of the SARS-CoV2 infection and COVID-19 diagnosis, only almost 32% of the participants were tested sometime in 2020. A total of 125 (11.3%) participants reported a confirmed diagnosis, most frequently in July, August, September 2020 or after. Of the confirmed cases, most participants classified the type of infection as mild symptomatic and reported some sequel, whereas almost 5% declared the need for hospitalisation. As for the isolation level after the confirmed diagnosis, most participants continued to live only with people in the same residence for 14 days, whereas approximately 5% declared that they did not stay isolated.

Figure 1 presents the participants’ risk perception in common everyday situations, considering the transmission of the virus. For each situation, the participants were asked to classify the transmission risk of contracting the SARS-CoV2 as low, moderately low, moderate, moderately high or high. Situations in which there are crowds of people, such as attending bars, cinemas, barbecues, events, concerts, religious meetings and buffet parties, were considered those with the highest frequencies
| Variables | Response categories | Females | Males |
|-----------|---------------------|---------|-------|
| **Age groups** | Up to 30 years | 263 (24.1%) | 196 (25.0%) | 66 (21.5%) |
| | 31–40 years | 345 (31.6%) | 261 (33.3%) | 84 (27.4%) |
| | 41–50 years | 232 (21.2%) | 146 (18.6%) | 85 (27.7%) |
| | 51–60 years | 153 (14.0%) | 108 (13.8%) | 45 (14.7%) |
| | Over 60 years | 100 (9.1%) | 73 (9.3%) | 27 (8.8%) |
| **Marital status** | Married/Live together | 618 (55.6%) | 430 (54%) | 188 (60.1%) |
| | Single | 397 (35.7%) | 295 (37.1%) | 101 (32.3%) |
| | Divorced | 78 (7%) | 58 (7.3%) | 20 (6.4%) |
| | Widowed | 15 (1.4%) | 12 (1.5%) | 3 (1%) |
| | I do not want to answer | 3 (0.3%) | 1 (0.1%) | 1 (0.3%) |
| **Number of people in the same residence** | Live alone | 137 (12.3%) | 99 (8.9%) | 38 (3.4%) |
| | Two people | 327 (29.4%) | 244 (30.7%) | 82 (26.2%) |
| | Three people | 313 (28.2%) | 222 (27.9%) | 91 (29.1%) |
| | Four people | 229 (20.6%) | 162 (20.4%) | 66 (21.1%) |
| | Five people | 79 (7.1%) | 50 (6.3%) | 29 (9.3%) |
| | Six to nine people | 24 (2.2%) | 17 (%) | 7 (1.6%) |
| | Ten people or more | 2 (0.2%) | 2 (0.3%) | 0 (0%) |
| **Piped water in the residence** | Yes | 1108 (99.7%) | 793 (99.6%) | 313 (100%) |
| | No | 3 (0.3%) | 3 (0.4%) | 0 (0%) |
| **Live on an asphalt street** | Yes | 1106 (99.5%) | 793 (99.6%) | 311 (99.4%) |
| | No | 5 (0.5%) | 3 (0.4%) | 2 (0.6%) |
| **Educational level** | Elementary school Incomplete | 15 (1.3%) | 11 (1.4%) | 4 (1.3%) |
| | Elementary school complete | 23 (2.1%) | 16 (2.1%) | 7 (2.2%) |
| | High school incomplete | 24 (2.2%) | 20 (2.5%) | 4 (1.3%) |
| | High school complete | 129 (11.6%) | 103 (12.9%) | 26 (8.3%) |
| | Higher education incomplete | 161 (14.5%) | 106 (13.3%) | 55 (17.6%) |
| | Higher education complete | 759 (68.3%) | 540 (67.8%) | 217 (69.3%) |
| **Current working condition** | Unemployed/no gainful activity | 170 (15.3%) | 138 (17.3%) | 32 (10.2%) |
| | Registered or self-employed work | 777 (69.9%) | 527 (66.2%) | 248 (79.2%) |
| | Pensioner or retired | 88 (7.9%) | 73 (9.2%) | 15 (4.8%) |
| | Informal work | 58 (5.2%) | 43 (5.4%) | 15 (4.8%) |
| | I do not want to answer | 18 (1.6%) | 15 (1.9%) | 3 (1%) |
| **Frontline professional in the pandemic** | Yes | 375 (33.8%) | 272 (34.2%) | 102 (32.6%) |
| | No | 723 (65.1%) | 512 (64.3%) | 210 (67.1%) |
| | I do not want to answer | 13 (1.2%) | 12 (1.5%) | 1 (0.3%) |
| **Type of work between March 2020 and currently** | Working from home | 495 (44.6%) | 350 (44%) | 144 (46%) |
| | Continued to work normally, but on a reduced workload | 120 (10.8%) | 86 (10.8%) | 34 (10.9%) |
| | Keep normal activities at workplace as usual | 218 (19.6%) | 133 (16.7%) | 84 (26.8%) |
| | Did not work during the pandemic | 267 (24%) | 216 (27.1%) | 51 (16.3%) |
| | I do not want to answer | 11 (1%) | 11 (1.4%) | 0 (0%) |
| **Job loss during the pandemic** | Yes | 66 (5.9%) | 49 (6.2%) | 17 (5.4%) |
| | No | 1034 (93.1%) | 737 (92.6%) | 295 (94.2%) |
| | I do not want to answer | 11 (1%) | 10 (1.3%) | 1 (0.3%) |
of “high risk” responses (approximately 70% or more). Sending children to school, camps or daycare centres was also among the activities considered of high risk by 74% of the participants. The situations less frequently perceived as of “high risk” were fueling the car at a gas station, outdoor walking, running or cycling and receiving a correspondence or a delivery (frequency of classification as “high risk” less than 6%). However, participants were quite divided regarding rating these situations as low risk, moderate-low risk, moderate risk or moderate-high risk.

Table 4 presents the participants’ opinions about the efficacy of treatment and vaccination, and concerns about contracting COVID-19 according to sex and educational level. With regard to the efficacy of the treatment available for COVID-19, more than 60% of the participants considered it to have a medium efficacy, and more than 70% considered that the chance of a big outbreak of COVID-19 in the city is high where they live. As for the concern with the possibility of contracting COVID-19, it was observed a higher concern with contamination of family members than of themselves. Almost 23% of the participants doubted whether they would take the vaccine if available and do not know if the COVID-19 vaccine will be safe for the population. These variables were not associated with sex or educational level. The study of associations according to other independent variables were presented as supplementary material.

### DISCUSSION

In the present study, we tried to explore some demographic and behavioural variables regarding the COVID-19 pandemic in population if the State of São Paulo, which can help to explain the current situation in Brazil and draw panorama of the disease in this state (Brazilian Ministry of Health, 2021; SAEDE, 2021).

In addition to the sanitary crisis, the country is currently experiencing severe consequences of the pandemic, namely: an increase in unemployment to rampant levels and, consequently, an increase in poverty and social vulnerability (Freitas et al., 2020; Neves et al., 2021; Tavares & Betti, 2021). In our sample, more than 15% of the participants declared to be unemployed or not engaged in any gainful activity, almost 6% declared to have lost their jobs during the pandemic, and more than 30% declared that they suffered a decrease in their monthly income during the period. Considering data from the Brazilian Institute of Geography and Statistics (IBGE, 2020), in the third trimester of 2020, there were 13.7 million unemployed, and in the first 5 months of 2020, there was an increase of 12.4% in the requests for unemployment insurance compared to 2019. According to studies by Costa (2020) and Souza et al. (2020), the economic crisis in the context of the pandemic affected the population who lives in informality and resides in deprived areas of Brazil with greater intensity. Despite that, our results show that even populations with a higher level of education (almost 70% of our sample completed higher education) and better standards of living were somehow economically affected by the pandemic.

It was observed in our study that almost 32% of the participants reported being tested for COVID-19 sometime in 2020. This percentage is higher than the national proportion of testing, that is, approximately 14.3%, according to the National
LUCINDO ZUCOLOTO et al. Household Sample Survey—PNAD COVID19 (IBGE, 2020; Kameda et al., 2021). Since the pronouncement of the World Health Organisation declaring the COVID-19 pandemic in March 2020, both health authorities and scientists around the world have pointed to the mass testing of the population as a crucial strategy for the control of the pandemic, especially in suspected cases when general testing is not feasible (Lopes-Junior et al., 2020). However, massively testing the population can be difficult to implement in practice, especially in low-middle-income countries (Kameda et al., 2021). More than a year later and at a time when epidemiologists are warning of the risk of a new collapse in winter (June to September in Brazil), massive testing against COVID-19 in Brazil remains low and disorganised.

Brazil performs 7857 tests per 100,000 inhabitants, according to the Ministry of Health’s epidemiological bulletin, ranking behind countries such as India and its neighbours in South America (Brazilian Ministry of Health, 2021).

The proportion of diagnosed cases of COVID-19 in the sample was 11.3%, lower than data from PNAD COVID-19, which indicated that approximately 23% of the tested individuals received a positive diagnosis until November 2020 (IBGE, 2021). In addition, interesting data on the disease sequels and persistent symptoms were identified in our study as nearly 55% of the participants who had COVID-19 reported them. Several studies have been conducted to investigate the consequences of COVID-19 to the human body. However, information on symptoms persisting after recovery is

### TABLE 2

| Variables                          | Response categories | Females | Males |
|-----------------------------------|--------------------|---------|-------|
| Good                              | 903 (81.3%)        | 647 (81.3%) | 254 (81.2%) |
| Self-perception of health         |                     |         |       |
| Consider yourself part of the risk group in relation to COVID-19 |                |         |       |
| Regular                           | 192 (17.3%)        | 137 (17.2%) | 55 (17.6%) |
| Poor                              | 16 (1.4%)          | 12 (1.5%)  | 4 (1.3%)  |
| Yes                               | 422 (38%)          | 299 (37.6%) | 123 (39.3%) |
| No                                | 647 (58.2%)        | 463 (58.2%) | 182 (58.1%) |
| I do not know                     | 42 (3.8%)          | 34 (4.3%)  | 8 (2.6%)   |
| Chronic disease                   | 418 (37.6%)        | 282 (35.4%) | 135 (43.1%) |
| No                                | 693 (62.4%)        | 514 (64.6%) | 178 (56.9%) |
| Obesity                           | 200 (18.0%)        | 140 (17.6%) | 59 (18.8%)  |
| No                                | 911 (82.0%)        | 656 (82.4%) | 254 (81.2%) |
| Physical exercises                | 497 (44.7%)        | 363 (45.6%) | 133 (42.5%) |
| Do not practice                   | 308 (27.7%)        | 211 (26.5%) | 97 (31%)   |
| Practice 3–5 times a week         | 258 (23.2%)        | 189 (23.7%) | 68 (21.7%)  |
| Practice 6–7 times a week         | 45 (4.1%)          | 30 (3.8%)   | 15 (4.8%)   |
| Do not want to answer             | 3 (0.3%)           | 3 (0.4%)    | 0 (0%)      |
| Smoker                            | 97 (8.7%)          | 61 (7.7%)   | 36 (11.5%)  |
| No                                | 1013 (91.2%)       | 734 (92.2%) | 277 (88.5%) |
| Do not want to answer             | 1 (0.1%)           | 1 (0.1%)    | 0 (0%)      |
| Number of cigarettes (among smokers) |                |         |       |
| Up to 5 cigarettes                | 24 (24.7%)         | 15 (24.6%)  | 9 (25%)    |
| Between 6–10 cigarettes           | 26 (26.8%)         | 17 (27.9%)  | 9 (25%)    |
| Between 11–20 cigarettes          | 32 (33%)           | 17 (27.9%)  | 15 (41.7%) |
| More than 20 cigarettes           | 12 (12.4%)         | 10 (16.4%)  | 2 (5.6%)   |
| Do not want to answer             | 3 (3.1%)           | 2 (3.3%)    | 1 (2.8%)   |
| Passive smoker<sup>a</sup>         | 184 (18.2%)        | 144 (19.6%) | 38 (13.7%)  |
| No                                | 829 (81.8%)        | 590 (80.4%) | 239 (86.3%) |
| Ex smoker<sup>a</sup>             | 153 (15.1%)        | 102 (13.9%) | 51 (18.4%)  |
| No                                | 860 (84.9%)        | 632 (86.1%) | 226 (81.6%) |
| Time after quitting smoking (among ex smokers) |               |         |       |
| Less than 1 year                  | 23 (15%)           | 16 (15.7%)  | 7 (13.7%)  |
| Between 1 and 5 years             | 28 (18.3%)         | 16 (15.7%)  | 12 (23.5%) |
| Between 6 and 10 years            | 20 (13.1%)         | 15 (14.7%)  | 5 (9.8%)   |
| More than 10 years                | 82 (53.6%)         | 55 (53.9%)  | 27 (52.9%)  |

<sup>a</sup>This question contains missing data.
lacking (Peramo-Álvarez et al., 2021). A study performed by Carfi et al. (2020) found that in Italian patients who had recovered from acute COVID-19, 87.4% reported persistence of at least one symptom, particularly fatigue and dyspnea. In Brazil, a few studies on this issue have been published, which does not allow any comparison of our findings with those from clinical and controlled studies. A systematic review conducted by Nasserie et al. (2021) discussed that despite the need for studies with longer follow-up periods to better understand the multifactorial nature of COVID-19 manifestations and reliably quantify the risks, there is already consistent evidence that the symptoms of the disease commonly persist beyond the acute phase of infection, with implications for health-associated functioning and quality of life.

With regard to the risk perception, the participants reported that high-risk situations are those in which there are crowds of people, such as attending bars, cinemas, barbecues, events, concerts, religious meetings and buffet parties, in addition to sending children to school, camps or daycare centres. Thus, we can observe a coherent perception of what is known about the transmissibility of the SARS-CoV-2 virus in the sample, which evidenced by the risk classifications for the situations described in Figure 1. In a study conducted by Dryhurst et al. (2020), who presents comparative

| Variables | Response categories | n (%) | Females n (%) | Males n (%) |
|-----------|---------------------|-------|---------------|-------------|
| Did any test for SARS-CoV2 /COVID-19 | Yes | 353 (31.8%) | 253 (31.8%) | 99 (31.6%) |
| | No | 758 (68.2%) | 543 (68.2%) | 214 (68.4%) |
| Type of test (among those who were tested)$^a$ | Serology (blood test) | 171 (15.4%) | 123 (15.5%) | 47 (15.0%) |
| | Serology (finger stick – fast test) | 94 (8.5%) | 69 (8.7%) | 25 (8.0%) |
| | PCR | 187 (16.8%) | 137 (17.2%) | 50 (16.0%) |
| Confirmed diagnosis of COVID-19 / positive SARCOV2 infection test | Yes | 125 (11.3%) | 93 (11.7%) | 32 (10.2%) |
| | No | 981 (88.3%) | 701 (88.1%) | 278 (88.8%) |
| | Do not want to answer | 5 (0.5%) | 2 (0.3%) | 3 (1.0%) |
| Type of infection (among those with confirmed diagnosis) | Asymptomatic | 10 (8%) | 6 (6.5%) | 4 (12.5%) |
| | Mild symptomatic | 67 (53.6%) | 53 (57%) | 14 (43.8%) |
| | Strong symptomatic | 42 (33.6%) | 29 (31.2%) | 13 (40.6%) |
| | Severe symptomatic - hospitalised | 6 (4.8%) | 5 (5.4%) | 1 (3.1%) |
| Isolation level after diagnosis (among those with confirmed diagnosis) | 100% isolated (alone) for 14 days | 33 (26.4%) | 26 (28%) | 7 (21.9%) |
| | 100% isolated (alone) for less than 14 days | 9 (7.2%) | 6 (6.5%) | 3 (9.4%) |
| | Continued to live only with people in the residence for 14 days | 70 (56%) | 55 (59.1%) | 15 (46.9%) |
| | Continued to live only with people in the residence for less than 14 days | 7 (5.6%) | 3 (3.2%) | 4 (12.5%) |
| | Not isolated | 6 (4.8%) | 3 (3.2%) | 3 (9.4%) |
| Sequel of COVID-19 | Yes | 68 (54.4%) | 50 (53.8%) | 18 (56.2%) |
| | No | 57 (45.6%) | 43 (46.2%) | 14 (43.8%) |
| Number of people you know who had a confirmed diagnosis of covid-19 | None | 211 (19%) | 147 (18.5%) | 64 (20.4%) |
| | Between 1 and 5 people | 600 (54%) | 425 (53.4%) | 174 (55.6%) |
| | Between 6 and 10 people | 210 (18.9%) | 156 (19.6%) | 54 (17.3%) |
| | Between 11 and 20 people | 54 (4.9%) | 45 (5.7%) | 8 (2.6%) |
| | More than 20 people | 30 (2.7%) | 19 (2.4%) | 11 (3.5%) |
| | I do not know | 6 (0.5%) | 4 (0.5%) | 2 (0.6%) |
| Lost a family member or close to COVID-19? | Yes | 164 (14.8%) | 109 (13.7%) | 55 (17.6%) |
| | No | 945 (85.1%) | 686 (86.2%) | 257 (82.1%) |
| | Do not want to answer | 2 (0.2%) | 1 (0.1%) | 1 (0.3%) |
| The actions of health authorities in my country are being effective in combating COVID-19 | I agree | 112 (10.1%) | 74 (9.3%) | 38 (12.1%) |
| | Maybe/Not sure | 249 (22.4%) | 179 (22.5%) | 70 (22.4%) |
| | I disagree | 750 (67.5%) | 543 (68.2%) | 205 (65.5%) |

$^a$It is considered that a participant may have taken more than one test in the period.
evidence of how people perceive the risk of COVID-19 around the world, the authors point out that risk perception can be modulated by people’s experiences, values and trust in institutions, which are higher among those with direct personal experience of the virus and in those who hold naïve worldviews. This draws attention that in our sample, 54% of the respondents reported knowing between one and five people who had a confirmed diagnosis of COVID-19, and more than 26% know six people or more, whereas almost 15% reported that they lost a family member or someone close due to the disease. In this sense, we consider that the proximity to the disease and its outcomes may have generated a higher consciousness of self-care and empathy with close people due to the concern with the infection and its possible harmful consequences, increasing the risk perception. In addition, almost 70% of the participants disagreed with the statement that the health policies of the country’s authorities were effective in combating COVID-19, and more than 70% rated the chance of a major outbreak of COVID-19 in the city where they live as “high”.

Despite the high confidence in the COVID-19 vaccine and the high proportion of participants who responded that they would definitely take the vaccine, there is concern that more than 25% think otherwise or have doubts about whether to take the vaccine or whether the vaccine will be safe. The vaccination for COVID-19 started in Brazil in February 2020 and has been progressing at a slow pace. So far, no strong vaccination campaign has been conducted to inform, reassure and raise awareness about the importance of mass vaccination in Brazil. In addition to the low proportion of immunised individuals in the country (about 12%), Brazil is currently experiencing a delay in the search for the second dose. In May 2020, according to official data (Brazilian Ministry of Health, 2021), about 1 million people did not show up to take the second dose of the vaccine, which is extremely worrying data given the current situation in the country during the pandemic.

The present study is not free from limitations. Firstly, the sectional nature of the study does not allow cause-and-effect interpretations. In addition, the methodology of data collection inherent to the open web survey design can address participants who do not necessarily represent the studied population, thus hindering generalisations, as it is difficult to obtain an accurate sampling frame or an accurate estimate of the population characteristics. Another point is that self-reported bias can also affect the results. Individuals can easily hide, omit or lie about any information they report in the online survey, so there is no guarantee of accuracy. Furthermore, according to the most recent PNAD, 81.7% of the residents in São Paulo State have access to the internet, which is also a limitation of web surveys, which may not reach some layers of the population.

FIGURE 1 Participants’ risk perception in common everyday situations, considering the transmission of the SARS-CoV-2 virus. São Paulo State, Brazil, 2020.


**Table 4** Opinions about efficacy of treatment, vaccination and concerns about contracting COVID-19 according to sex and educational level. São Paulo state, Brazil, 2020

| Variables                                              | Response categories | Sex                                    | Educational level                      | Cramer’s V<sup>a</sup> |
|---------------------------------------------------------|---------------------|----------------------------------------|----------------------------------------|-------------------------|
|                                                         |                     | Females n (%)                          | Males n (%)                            |                         |
|                                                         |                     | (n) (%)                                | (n) (%)                                |                         |
| Opinion about efficacy of treatments for COVID-19      | High                | 118 (10.6%)                            | 36 (11.5%)                             | 0.07                    |
|                                                         | Medium              | 711 (64%)                              | 184 (58.8%)                            |                         |
|                                                         | Low                 | 282 (25.4%)                            | 93 (29.7%)                             |                         |
| Chance of a major outbreak of COVID-19 in the city where live | High               | 799 (71.9%)                            | 198 (63.3%)                            | 0.07                    |
|                                                         | Medium              | 268 (24.1%)                            | 89 (28.4%)                             |                         |
|                                                         | Low                 | 44 (4%)                                | 26 (8.3%)                              |                         |
| Concern with the possibility of contracting COVID-19<sup>a</sup> | Much concern       | 575 (58.6%)                            | 144 (51.8%)                            |                         |
|                                                         | Moderate concern    | 370 (37.7%)                            | 113 (40.6%)                            | 0.07                    |
|                                                         | No concern          | 36 (3.7%)                              | 21 (7.6%)                              |                         |
| Concern about family members contracting COVID-19      | Much concern        | 950 (85.5%)                            | 252 (80.5%)                            | 0.07                    |
|                                                         | Moderate concern    | 149 (13.4%)                            | 51 (16.3%)                             |                         |
|                                                         | No concern          | 12 (1.1%)                              | 10 (3.2%)                              |                         |
| Took all vaccines in the adult immunisation schedule   | Yes                 | 915 (82.4%)                            | 252 (80.5%)                            | 0.07                    |
|                                                         | No                  | 116 (10.4%)                            | 35 (11.2%)                             |                         |
|                                                         | Do not know         | 80 (7.2%)                              | 26 (8.3%)                              |                         |
| Would take the COVID-19 vaccine if available           | No                  | 37 (3.3%)                              | 11 (3.5%)                              | 0.07                    |
|                                                         | I doubt if I would take | 252 (22.7%)                            | 62 (19.8%)                             |                         |
|                                                         | I would take for sure | 822 (74%)                              | 240 (76.7%)                            |                         |
| COVID-19 vaccine will be safe for the population       | Yes                 | 808 (72.7%)                            | 243 (77.6%)                            | 0.07                    |
|                                                         | No                  | 53 (4.8%)                              | 15 (4.8%)                              |                         |
|                                                         | Do not know         | 250 (22.5%)                            | 55 (17.6%)                             |                         |

<sup>a</sup>Results of Cramer’s V with asterisks correspond to p < 0.05.
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AUTHORS CONTRIBUTION
All authors contributed to the study conception, design and data collection. The analyses were performed by Edson Zangiacomi Martinez. The first draft was written by Miriane Lucindo Zucoloto and all authors revised, contributed and approved the final version of the manuscript.

CONFLICT OF INTEREST
All of the authors declare that there are no conflicts of interest in connection with this paper.

DATA AVAILABILITY STATEMENT
Research data are not shared.

ETHICAL ISSUES
The study was approved by the Research Ethics Committee of Clinical Hospital of Ribeirão Preto Medical School (CAAE: 36947720.0.0000.5440). The research was carried out according to the checklist for verification of the electronic research guidelines carried out on the Internet (CHERRIES), and the applied methodology followed the guidelines for research procedures at any stage in a virtual environment made available by the National Research Ethics Commission (CONEP) in Circular Letter No. 1/2021-CONEP/SECNS/MS.

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REFERENCES
Abbas, J. (2021). Crisis management, transnational healthcare challenges and opportunities: The intersection of COVID-19 pandemic and global mental health. Research in Globalization, 3(100037), 100037. https://doi.org/10.1016/j.resgl.2021.100037
Brazil. Brazilian Ministry of Health. Health Surveillance Department. Programa Nacional de Imunizações: 30 anos. Série C: Projetos, programas e relatórios. Brasília, 2003. Retrieved from https://bvms.saudae.gov.br/bvs/publicacoes/livro_30_anos_pni.pdf
Brazil. Brazilian Ministry of Health. COVID-19: Coronavirus Panel. Brasilia, 2021. Retrieved from https://covid.saude.gov.br/
Carfi, A., Bernabei, R., & Landi, F. (2020). Persistent symptoms in patients after acute COVID-19. JAMA, 324(6), 603–605. https://doi.org/10.1001/jama.2020.12603
Castro, M. C., Kim, S., Barberia, L., Ribeiro, A. F., Gurzenda, S., Ribeiro, K. B., Abbott, E., Blossom, J., Rache, B., & Singer, B. H. (2021). Spatiotemporal pattern of COVID-19 spread in Brazil. Science, 372(6544), 821–826. https://doi.org/10.1126/science.abh1558
Costa, S. S. (2020). The pandemic and the labor market in Brazil. Revista de Administração Pública, 54(4), 969–978. https://doi.org/10.1590/0034-7612202000170x
Cucinotta, D., & Vanelli, M. (2020). WHO declares COVID-19 a pandemic. Acta Biomed, 91(1), 157–160. https://doi.org/10.23750/abm.v91i1.9397
Dryhurst, S., Schneider, C. R., Kerr, J., Freeman, A. L. J., Recchia, G., Van der Bles, A. M., Spiegelhalter, D., & Van der Linden, S. (2020). Risk perceptions of COVID-19 around the world. Journal of Risk Research., 23(7-8), 994–1006. https://doi.org/10.1080/13669877.2020.1758193
Everitt, B. S. (1992). The analysis of contingency tables (2ndEdition ed.). Chapman and Hall.
Eysenbach, G. (2004). Improving the quality of web surveys: The checklist for reporting results of internet E-surveys (CHERRIES). Journal of Medical Internet Research., 6(3), e34. https://doi.org/10.2196/jmir.6.3.e34
Freitas, C. M. D., Silva, I. V. D. M., & Cidade, N. D. C. (2020). COVID-19 epidemic course. Instituto Brasileiro de Geografia e Estatística. (2021). PNAD COVID-19. Retrieved from https://biblioteca.ibge.gov.br/visualizacao/periódicos/2421/pnact_2020_3tri.pdf
Gramacho, W. G., Turgeon, M., Kennedy, J., Stabile, M., & Mundim, P. S. (2021). Political preferences, knowledge, and misinformation about COVID-19: The case of Brazil. Frontiers in Political Science, 3, 36. https://doi.org/10.3389/fpos.2021.646430
Gramacho, W. G., & Turgeon, M. (2021). When politics collides with public health: COVID-19 vaccine country of origin and vaccination acceptance in Brazil. Vaccine, 39(19), 2608–2612. https://doi.org/10.1016/j.vaccine.2021.03.080
Harris, P. A., Taylor, R., Thielke, R., Payne, J., Gonzalez, N., & Conde, J. G. (2009). Research electronic data capture (REDCap)— A metadata-driven methodology and workflow process for providing translational research informatics support. Journal of Biomedical Informatics, 42(2), 377–381. https://doi.org/10.1016/j.jbi.2008.08.101
Hope, A. C. A. (1968). A simplified Monte Carlo significance test procedure. Journal of the Royal Statistical Society Series B, 30(3), 582-598. https://doi.org/10.1111/j.2517-6161.1968.tb00759.x
Instituto Brasileiro de Geografia e Estatística. (2021). Indicadores IBGE: Pesquisa Nacional por Amostra de Domicílios Contínua: terceiro trimestre de 2020. 2020 Retrieved from https://biblioteca.ibge.gov.br/visualizacao/periodicos/2421/pnact_2020_3tri.pdf
Instituto Brasileiro de Geografia e Estatística. (2021). PNAD COVID-19. Retrieved from https://covid.ibge.gov.br/pnad-covid/saude.php
Kameda, K., Barbeitas, K. M., Caetano, R., Löwy, I., Oliveira, A. C. D., Corrêa, M. C. D. V., & Cassier, M. (2021). Testing COVID-19 in Brazil: Fragmented efforts and challenges to expand diagnostic capacity at the Brazilian unified National Health System. Cadernos de Saúde Pública, 37(3), e00277420. https://doi.org/10.1590/0102-311X00277420
Khubchandani, J., Sharma, S., Price, J. H., Wiblishauser, M. J., Sharma, M., & Webb, F. J. (2021). COVID-19 vaccination hesitancy in the United States: A rapid national assessment. Journal of Community Health, 46(2), 270–277. https://doi.org/10.1007/s10900-020-00958-x
Lopes, F. M. (2021). From denial to hope: Brazil deals with a prolonged COVID-19 epidemic course. Nature Immunology, 22(3), 256–257. https://doi.org/10.1038/s41590-021-00875-8
Lopes-Junior, C., Bonfim, E., Silveira, D. S. C., Pessanha, R. M., Schuab, S. I. P. C., & Lima, A. G. (2020). Effectiveness of mass testing for control of COVID-19: A systematic review protocol. BMJ Open, 10(8), e040413. https://doi.org/10.1136/bmjopen-2020-040413
Nasserlie, T., Hittle, M., & Goodman, S. N. (2021). Assessment of the frequency and variety of persistent symptoms among patients with COVID-19: A systematic review. JAMA Network Open, 4(5), e2111417. https://doi.org/10.1001/jamanetworkopen.2021.111417
Neves, J. A., Machado, M. L., Oliveira, H. D. A., Moreno, Y. M. F., Medeiros, M. A. T., & Vascencelos, F. A. G. (2021). Unemployment, poverty, and hunger in Brazil in Covid-19 pandemic times. Revista de Nutrição, 34, e200170. https://doi.org/10.1590/1678-9865202134e200170

Peramo-Álvarez, F. P., López-Zúñiga, M. A., López-Ruz, M. A. (2021). Medical sequels of COVID-19. Medicina Clinica, 2750025-7753(21)00289-X. doi: https://doi.org/10.1016/j.medcli.2021.04.023, 388, 394

Rea, L. M., & Parker, R. A. (2014). Designing and conducting survey research. Jossey-Boss.

Rodriguez-Morales, A. J., Gallego, V., Escalera-Antezana, J. P., Méndez, C. A., Zambrano, L. I., Franco-Paredes, C., Rodríguez-Enciso, H. D., Balbin-Ramon, G. J., Savio-Larriera, E., Risquez, A., & Cimerman, S. (2020). COVID-19 in Latin America: The implications of the first confirmed case in Brazil. Travel Medicine and Infectious Disease, 35, 101613. https://doi.org/10.1016/j.tmaid.2020.101613

São Paulo. Fundação SEADE. (2020). SP contra o coronavirus. Boletim Completo. Retrieved from https://seade.gov.br/coronavirus/

Schneider, C. R., Dryhurst, S., Kerr, J., Freeman, A. L., Recchia, G., Spiegelhalter, D., & van der Linden, S. (2021). COVID-19 risk perception: A longitudinal analysis of its predictors and associations with health protective behaviours in the United Kingdom. Journal of Risk Research, 24(3–4), 294–313. https://doi.org/10.1080/13669877.2021.1890637

Souza, C. D. F., do Carmo, R. F., & Machado, M. F. (2020). The burden of COVID-19 in Brazil is greater in areas with high social deprivation. Journal of Travel Medicine, 27(7), taaa145. https://doi.org/10.1093/jtm/taaa145

Tavares, F. F., & Betti, G. (2021). The pandemic of poverty, vulnerability, and COVID-19: Evidence from a fuzzy multidimensional analysis of deprivations in Brazil. World Development, 139, 105307. https://doi.org/10.1016/j.worlddev.2020.105307

Viswanath, K., Bekalu, M., Dhawan, D., Pinnamaneni, R., Lang, J., & McLoud, R. (2021). Individual and social determinants of COVID-19 vaccine uptake. BMC Public Health, 21(1), 1–10. https://doi.org/10.1186/s12889-021-10862-1

Weinstein, N. D. (1993). Testing four competing theories of health-protective behavior. Health Psychology, 12(4), 324–333. https://doi.org/10.1037/0278-6133.12.4.324

World Health Organization. (2020). WHO director-general’s opening remarks at the media briefing on covid-19. Retrieved from https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---29-june-2020

Wouters, O. J., Shadlen, K. C., Salcher-Konrad, M., Pollard, A. J., Larson, H. J., Teerawattananon, Y., & Jit, M. (2021). Challenges in ensuring global access to COVID-19 vaccines: Production, affordability, allocation, and deployment. The Lancet, 397(10278), 1023–1034. https://doi.org/10.1016/S0140-6736(21)00306-8

SUPPORTING INFORMATION

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