Factors that interfere with belief in and adherence to non-pharmacological measures adopted to combat the pandemics - factors against non-pharmacological measures for COVID-19

Fatores que interferem na crença e adesão a medidas não farmacológicas adotadas para combater as pandemias - fatores contra medidas não farmacológicas para a Covid-19

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ABSTRACT  
Non-pharmacological measures are fundamental to combat the pandemics. However, the population’s adherence is necessary in this process and, therefore, knowing their position and impressions about the effectiveness of these measures is fundamental to formulate public policies. Thus, the objective of this study was to collect the opinion of Brazilians about the non-pharmacological measures adopted to combat the COVID-19 pandemic.  
From March to May 2022, a cross-sectional study was carried out, of the opinion survey type, in which 703 people answered an online questionnaire containing 20 multiple-choice questions. Data were analyzed using BioEstat 5.3, Epi Info 7.2.5, and Open Epi 3.01 software. Being female, having low income, and being a public transport user were factors associated with the requirement of a vaccination card, while having a college degree, having higher income, and being a public transport user were associated with greater confidence in the non-pharmacological measures. On the other hand, not being vaccinated and having a low level of knowledge about the pandemic were factors associated with non-adherence. In the formulation of public policies aimed at controlling the pandemic, the responsible entities must emphasize the importance of non-pharmacological measures, expanding access to information in a safe, clear, and objective way for the Brazilian population.

Keywords: Brazil, personal protective equipment, social distancing, vaccine, non-pharmacological.

RESUMO  
Medidas não farmacológicas são fundamentais para combater as pandemias. No entanto, a adesão da população é necessária nesse processo e, portanto, conhecer sua posição e impressões sobre a eficácia dessas medidas é fundamental para a formulação de políticas públicas. Assim, o objetivo deste estudo foi coletar a opinião dos brasileiros sobre as medidas não farmacológicas adotadas para combater a pandemia da Covid-19. De março a maio de 2022, foi realizado um estudo transversal, do tipo de inquérito de opinião, no qual 703 pessoas responderam a um questionário em linha contendo 20 perguntas de escolha múltipla. Os dados foram analisados com os softwares BioEstat 5.3, Epi Info 7.2.5 e Open Epi 3.01. Ser mulher, ter baixa renda e ser usuária de transporte público...
foram fatores associados à exigência de carteira de vacinação, ao grau universitário, ter renda mais alta e ser usuária de transporte público foram associados a uma maior confiança nas medidas não farmacológicas. Por outro lado, não ter sido vacinado e ter um baixo nível de conhecimento sobre a pandemia foram fatores associados à não adesão. Na formulação de políticas públicas voltadas ao controle da pandemia, as entidades responsáveis devem enfatizar a importância de medidas não farmacológicas, ampliando o acesso à informação de forma segura, clara e objetiva para a população brasileira.

**Palavras-chave:** Brasil, equipamento de proteção individual, distanciamento social, vacina, não-farmacológico.

1 INTRODUCTION

The COVID-19 pandemic has already caused more than 6.9 million deaths worldwide since it broke out in 2019 (WHO, 2023). Epidemiological studies have already demonstrated how easily SARS-CoV-2 can spread through the air (Guo et al., 2020; Sommerstein et al., 2020). Thus, despite the advancement of vaccination around the world (Tregoning et al., 2021), non-pharmacological measures (NPM), such as wearing face masks, are fundamental to containing the spread of the virus (Zhang et al., 2021). These findings are supported by a recent meta-analysis (Li et al., 2020).

In Brazil, epidemiological studies have shown great population adherence to NPM in 2020, such as people of different ages wearing a mask (Brasil, 2020; Lima-Costa et al., 2020; Pereira-Ávila et al., 2021). However, with the advancement of new variants such as Alpha, Beta, Delta, and Omicron (Karim; Karim, 2021) and the need to maintain NPM for a longer period, it is necessary to reassess the population’s attitude towards the permanence of these measures aiming at the promotion of public policies.

This is because Brazil experienced a very unique situation during the pandemic. The fight against COVID-19 in the country was marked by political disputes that led to five different health ministers holding the position in less than a year, in addition to negationist discourses being disseminated by the country’s main authority, which reduced the perception of the severity of COVID-19 symptoms and outcomes and discredited the NPM implemented to fight the pandemic (Lima-Costa et al., 2020). In addition, on April
1, 2022, the Brazilian federal government published interministerial decree number 17 that revoked the mandatory use of face masks (Brasil, 2022).

Thus, the objective of this study was to collect the opinion of Brazilians on the NPM adopted to combat the COVID-19 pandemic. We hypothesize that higher socioec-

onomic status, schooling, and exposure to the virus are factors that influence adherence to these measures.

2 MATERIAL AND METHODS

2.1 RESEARCH CHARACTERIZATION

This is a cross-sectional, quantitative study of the public opinion survey type carried out according to the STROBE protocol (STROBE, 2022). This type of research is a “one-time, verbal or written consultation carried out through a specific methodology, through which the participant is invited to express their preference, evaluation, the meaning they assign to themes, and the performance of people and organizations or products and services; without the possibility of identifying the participant” (Brasil, 2016).

2.2 DATA COLLECTION

Data were collected from March to May 2022, through a structured, online questionnaire containing twenty multiple-choice questions, available on the Google Forms Platform (https://forms.gle/mz7JUNrqgMfWpK9FA). The questionnaire was also disclosed on the social networks (Instagram, Facebook, and WhatsApp) of a higher education institution in the countryside of the state of Ceará, Brazil. For the authors’ convenience, the survey was disseminated through the “snowball” method, in which the participants/respondents invited other people to answer the questionnaire after having completed it (Biernacki; Waldorf, 1981).

Individuals over 18 years of age, who were Brazilians, who felt they were able to complete the questionnaire, and had access to the Internet or/and mobile telephony services were considered eligible to participate in the research.
2.3 DATA ANALYSIS

Data analysis was performed with the help of BioEstat 5.3, Epi Info 7.2.5, and Open Epi 3.01 software, which enabled the performance of descriptive analysis and statistical tests for the analysis of dependence between the variables. The chi-square test was used when the data distributions met the criteria required for its application, and the G test with Williams’ correction was used as an alternative to the chi-square test, with a significance level of 0.05.

The relationship of predictor variables: gender, education, income, region, use of public transport, risk conditions, morbidity and mortality from COVID-19, vaccination, level of knowledge, and self-reported risk level regarding two outcome variables. The first, the requirement of a vaccination card, and the second, the effectiveness of NPM against COVID-19. Outcome variables with more than two categories were dichotomized. Of the answers referring to the requirement of a vaccination card, only those who were in favor of the requirement in any establishment and those who were totally against it.

As for the variable effectiveness of NPM, originally, participants should assess the effectiveness of each type of measure based on a 10-point scale, with 1 meaning ‘not effective’ and 10 meaning ‘very effective’. For the dichotomization of the variable, these two responses were adopted. The NPM indicated for evaluation were: face mask or other face covering, surgical mask, N95 or PFF2 mask, hand washing/hygiene, cleaning/disinfection of surfaces, workplaces, schools, companies, and other establishments closed, distancing between people in places with crowds, and staying at home. In Table 2, these measurements were represented by the letters A, B, C, D, E, F, G, and H.

2.4 ETHICAL ISSUES

According to the Resolution of the National Health Council number 510/2016, public opinion surveys do not require the consideration of a human research ethics committee (Brasil, 2016). However, it is reiterated that the ethical precepts in the
Declaration of Helsinki, the Human Research Ethics Committee (Conep), and the Brazilian Human Research Ethics Committee were followed.

3 RESULTS

The sample consisted of 703 people with a mean age of 34.23 years (SD 12.2), a predominance of females (448; 63.7%), Catholic (435/691; 62.9%), with a monthly income (in minimum wages) of 1-2 minimum wages (361/685; 51.2%), followed by 3-5 (21.8%); 62.9% (441/701) stated that they had completed higher education.

Most individuals were from the Northeast region of Brazil (85.4%; 599/701), while the minority belonged to the North region (eight participants). Regarding participants’ occupations, the following categories stood out: students (27.1%; 185/683); health professionals (22.4%; 153/683), and education professionals (19.6%; 134/683). As for the use of public transport, 67.6% answered no (472/698). Of the 139 who answered yes, obesity predominated, reported by 44 people (31.6%), and hypertension, mentioned by 43 respondents (30.9%).

A small number of participants, only 90 (12.8%), claimed not to have contracted the virus and neither did their family members. Of 700 respondents, 412 (58.8%) mentioned the death of someone close as a result of COVID-19. Seven people were not vaccinated and 397 (56.5%) were immunized with the two doses and the booster dose.

Regarding the requirement of a vaccination card, 502 (71.4%) were in favor of it in any establishment and 66 (9.4%) admitted being totally against it. As for the use of a face mask, 669 people (95.2%) believed in its protective effect against contagion by COVID-19, and 547 (77.8%) reported always wearing their masks correctly (covering mouth and nose) outside their home in their daily activities during the pandemic.

As for the level of knowledge to prevent the spread of the coronavirus, 441 (62.7%) considered it to be high, and less than 1%, low. Regarding the level of risk of being infected with the virus or COVID-19, 43.2% (302/699) indicated it is medium risk. The answers referring to high and low risk coincided (142 people, corresponding to 20.3%) and almost 10% considered it a very high risk.
When asked if they would wear a mask if it was not mandatory, 85% (597/702) of the people responded that they would. Regarding agreement or disagreement with the mandatory use of face masks, 548/693 participants agree with the mandatory use in all environments (open and closed) that have people coming and going. However, regarding the categories “only indoors”, “for those who were not vaccinated” and “in symptomatic cases”, the majority disagreed (427/672, 569/660, and 560/662 people, respectively).

According to data in Table 1, which evaluated clinical and sociodemographic factors, access to transport and people’s opinion about the use of a vaccination card, the female gender was a predisposing factor for the adoption of this measure (349; 92%; p=0.0002), as well as having a lower income (less than 7 minimum wages, p=0.0004). In this case, 93% of the participants with an income lower than 7 minimum wages were in favor of using a vaccination card, while among those with an income greater than this amount, a lower proportion (80%) was observed.

There was a significant relationship of dependence between the region of residence of the participants and the requirement of a vaccination card (p=0.0101), with emphasis on the North and South regions, where 100% of the participants were favorable. A similar relationship was also observed regarding the use of public transport (p=0.0224). The proportion of respondents being favorable was significantly higher among users (93%) (Table 1).

Table 1 - Opinion of the participants concerning the requirement of a vaccination card.

<table>
<thead>
<tr>
<th>Epidemiological and social characteristics</th>
<th>Vaccination card requirement</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>Agree (349) Disagree (30)</td>
<td>0.0002</td>
</tr>
<tr>
<td>Male</td>
<td>153 (84)</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elementary School</td>
<td>Agree (8) Disagree (1)</td>
<td>0.5215</td>
</tr>
<tr>
<td>High school</td>
<td>71 (92)</td>
<td></td>
</tr>
<tr>
<td>University education</td>
<td>422 (88)</td>
<td></td>
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<tr>
<td>Income (in minimum wages)</td>
<td></td>
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<tr>
<td>1-2</td>
<td>Agree (270) Disagree (19)</td>
<td>0.0004</td>
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<tr>
<td>3-4</td>
<td>98 (82)</td>
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<tr>
<td>5-6</td>
<td>43 (88)</td>
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<tr>
<td>≥7</td>
<td>80 (80)</td>
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<tr>
<td>Brazilian Region</td>
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<td>0.0101</td>
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</table>
Midwest 13 (72) 5 (28) 0.0224
North 429 (88) 56 (12)
Northeast 6 (100) 0 (0)
Southeast 42 (89) 5 (11)
South 10 (100) 0 (0)
Public transport user
Yes 172 (93) 13 (7)
No 325 (86) 53 (14)
Comorbidities
Yes 106 (93) 8 (7)
No 393 (87) 58 (13)
Morbidity (COVID-19)
Yes 434 (87) 62 (13)
No 68 (94) 4 (6)
Mortality (COVID-19)
Yes 299 (88) 40 (12)
No 200 (88) 26 (12)
Received vaccination
Yes 502 (89) 60 (11)
No 0 (0) 6 (100)
Knowledge level
High 320 (87) 48 (13) 0.3377
Reasonable 179 (91) 18 (9)
Low 3 (100) 0 (0)
Risk level
High-Very High 145 (90) 17 (10)
Medium 229 (89) 29 (11)
Low-Very Low 126 (87) 19 (13)
Font: the authors

Education did not exert a statistically significant influence on people’s opinion. However, higher percentages were seen in the High School and Higher Education categories (92% and 88%, respectively, p=0.5215). The presence of any self-reported risk condition for the aggravation of COVID-19 and death (whether the person, family, friends, neighbors, or co-workers) among the participants did not influence the opinion (p=0.1159; 0.08576; 0.9787, respectively).

There was a significant dependence relationship between the variables being vaccinated or not and adherence to the use of a vaccination card. Among those vaccinated, 11% were against the requirement, in contrast to 100% of those not vaccinated (p ≤ 0.0001). As for the level of knowledge about COVID-19 and the level of risk for infection by the virus, self-assessed by the participants, their opinion was independent of these factors (p=0.3377 and 0.7675, respectively) (Table 1).
Table 2 outlines people’s opinions regarding the level of confidence in the NPM indicated for the prevention of COVID-19 and its relationship with other variables.

No significant difference was observed in any of the evaluations of any control measure concerning gender (p>0.05). However, schooling influenced the assessment of measures: B=Surgical mask; C=N95 or PFF2 mask; F=Closing of workplaces, schools, companies, and other establishments; G=Distancing between people in places with crowds; H=Staying at home (p<0.05). Most of those who found such measures quite effective belonged to the upper level.

Participants’ income was significantly associated with two measures: A=Face mask or other face covering and G=Distance between people in places with crowds (p=0.0142 and 0.0294, respectively). For category A, the majority who considered this measure to be quite effective was in the group that earns 7 or more minimum wages. In category G, this prevalence was observed among those earning from 5 to 6 minimum wages. In this group, everyone considered social distancing to be a very effective measure.

As for the participants’ region of residence, significant differences were observed only in the categories F= Closing of workplaces, schools, companies, and other establishments; and H: Staying at home (p=0.0145 and 0.0206, respectively). All participants from the North and South considered the F measure to be ineffective. Those who most believed in its effectiveness were in the Southeast region. Regarding the “Staying at home” measure, most of those who considered it to be quite effective belonged to the Southeast and Northeast regions.

The opinion of the participants was also influenced by the use of public transport concerning four measures: C=N95 or PFF2 Mask; F=Closing of workplaces, schools, companies, and other establishments; G=Distancing between people in places with crowds; and H=Staying at home (p<0.05). For category C, most participants (public transport users or not) believed that the use of N95 or PFF2 masks was quite effective; but among transport users, this proportion was significantly higher (p=0.0240).

As for category F, most of those who did not believe in its effectiveness were among non-users of public transport (p=0.0014). This changes when it comes to social
distancing, as most of those who considered it quite effective belonged to the user group (p=0.0256). The measure “Staying at home” was considered by most non-users as ineffective (p=0.0050).

There was no dependence relationship between the factors: risk condition, illness and mortality by COVID-19, and the participants’ opinions about the effectiveness of NPM (p>0.05). However, the vaccination factor influenced their opinions concerning four measures: A=Face mask or other face covering; B=Surgical mask; C=N95 or PFF2 mask; and H=Staying at home. Among the unvaccinated, 100% of them considered all these measures to be ineffective (p=0.0462).

The participants’ level of knowledge about COVID-19 only influenced their opinions regarding the use of a surgical mask. Most of those who considered it to be ineffective correspond to the self-reported low level of knowledge. The opposite was observed among those who reported a high level, with a very effective response prevailing (p=0.0307).

Except for social distancing, the assessment of the other measures was not influenced by the level of risk self-reported by the participants. In this category, those with very low risk are the ones who most disbelieved in the effectiveness of this measure. While most of those who considered it to be quite effective considered its risk level high.

Table 2 - Participants’ opinion regarding the effectiveness of non-pharmacological measures adopted against the COVID-19 pandemic, according to predictive characteristics.

<table>
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<th>Non-pharmacological measures *</th>
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<th>1</th>
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<td>89</td>
<td>16</td>
<td>225</td>
<td>9</td>
<td>212</td>
<td>12</td>
<td>183</td>
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<td>38</td>
<td>12</td>
<td>75</td>
<td>38</td>
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<tr>
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<td>0.6013</td>
<td>0.8662</td>
<td>0.7009</td>
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<td>0.2644</td>
<td>0.1826</td>
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</table>
4 DISCUSSION

Being female, having a low income, being a public transport user, being vaccinated, and living in the North and South regions of Brazil were associated with the
requirement of a vaccination card. While having a college degree, having a higher income, and being a public transport user were associated with greater confidence in NPM to control the pandemic.

It is clear that those individuals who considered themselves more exposed to SARS-CoV-2 had a greater agreement with the NPM. As well as those who, in theory, have access to knowledge more easily because they have higher education and higher income.

Some studies point out that adherence to NPM such as wearing a face mask was associated with factors such as being female, advanced age, high levels of education, and urbanization (Badillo-Goicoechea et al., 2021). Similar findings were seen in studies conducted in Croatia (Hromatko; Tonković; Vranic, 2021) and Ethiopia (Haftom; Petrucka, 2021).

Not being vaccinated was associated with not using a vaccination card and they considered almost all NPM to be ineffective, except hand washing/hygiene and surface cleaning/disinfection. Only one-third of these believed social distancing in places with crowds was a very effective measure. It is possible that the decision of these people to take a stand against or disbelief in the proposed measures was influenced by the dissemination of fake news and the political polarization about COVID-19 in Brazil. The fake news spread covered from the mode of contagion to forms of prevention and treatment. With the development and administration of the vaccines, fake news incited people’s distrust through messages about the origin, composition, and mechanisms of action of the immunizers (Cândido Moreira et al., 2021).

Since the beginning of the pandemic in Brazil, the demand for the use of masks in collective environments has divided opinions. However, similar divergences occurred in several nations such as China, Singapore, Japan, the USA, UK, and Germany. “The US Surgeon General advised against buying masks for use by healthy people. One important reason to discourage the widespread use of face masks is to preserve limited supplies for professional use in healthcare settings. Universal face mask use in the community has also been discouraged with the argument that face masks provide no effective protection against coronavirus infection”. Germany: “There is not enough evidence to prove that
wearing a mask significantly reduces a healthy person’s risk of becoming infected. According to WHO, wearing a mask in situations where it is not recommended to do so can create a false sense of security because it might lead to neglecting fundamental hygiene measures, such as proper hand hygiene” (Feng et al., 2020).

The impacts of NPM are being researched, and several studies have demonstrated their benefits. A meta-analysis revealed that hand hygiene reduced the incidence of COVID-19 and disinfection of homes was 77% effective in reducing SARS-CoV-2 transmission, while social distancing also had a protective effect in several studies (Talic et al., 2021). On the other hand, in the work carried out in Ghana with 800 people, most of them men (60.1%), only 11.5% (92) performed hand washing and wore masks at the same time (Ameme et al., 2021).

Among people with a low level of knowledge and those who considered themselves at a very low risk of exposure, there were the highest proportions of those who rated the use of a mask and social isolation as ineffective, respectively. It is possible that the disbelief in these measures, as well as the low exposure risk self-assessment, is the result of the low level of knowledge pointed out by them. Corroborating this perception, a survey conducted with 970 people found that those with less knowledge were more likely to recognize their level of susceptibility to COVID-19 as low. On the other hand, respondents with greater knowledge more firmly believed in the effectiveness of personal hygiene practices, such as wearing a face mask, hand hygiene, and social distancing (Lee; Kang; You, 2021). Other authors also observed that the perception of a high personal risk was strongly associated with adherence to NPM to contain the disease (Hromatko; Tonković; Vranic, 2021).

As for the requirement of a vaccination card, whether for travel or guarantee of permanence in places of collective use, there are several issues involved in this context. On the one hand, for some, it conveys the idea of security, stimulates social normality, tourism, and, consequently, contributes to the restoration of the economy. But for others, this requirement violates the principle of autonomy and encourages discrimination and fraud, creating yet another barrier for the most disadvantaged (Corpuz, 2022). It is important to remember that getting vaccinated is not always an option. In many countries,
it is a question of access to the vaccine. While vaccines are currently available in Brazil for the entire population, including children, in the past, there was a delay in the purchase and distribution of vaccines while vaccination in other countries was already advanced (Souza; Buss, 2021).

The WHO argues that national authorities and conveyance operators should not introduce requirements of proof of COVID-19 vaccination for international travel as a condition for departure or entry, given that there are still critical gaps regarding the efficacy of vaccination in reducing transmission. In addition, considering that there is limited availability of vaccines, preferential vaccination of travelers could result in inadequate supplies of vaccines for priority populations considered at high risk of severe COVID-19 disease. The WHO also recommends that people who are vaccinated should not be exempt from complying with other travel risk-reduction measures (WHO, 2023).

The following stand out as the limitations of this study: (i) the scope of the questionnaires, which depend on Internet access / basic computer knowledge so that they can be answered; (ii) due to the method used for collection (“snowball”), there is the possibility of accessing similar arguments on the subject, since individuals will indicate people from their personal network and whom they deem fit for the task; (iii) impossibility of generalization, since the answers may not correspond to the reality of the population that lives in extremely vulnerable situations. Such a condition can affect not only access to basic services, but their own perception of the phenomena around them.

Therefore, low-income women, users of public transport, and residents of the North and Northeast regions of Brazil are more likely to adhere to the use of a vaccination card in the fight against COVID-19. Having higher education, higher income, and being a public transport user were associated with greater confidence in NPM to control the pandemic, such as wearing a face mask and social distancing measures (e.g. closing schools, workplaces, and staying at home).

Those who were not vaccinated considered all NPM to be ineffective and reported not adhering to the use of a vaccination card. Those with a low self-reported level of knowledge about COVID-19 considered the use of a surgical mask ineffective, and
individuals who considered themselves at very low risk of exposure to COVID-19 are the ones who most disbelieved the effectiveness of social distancing.

The lack of consensus among the population is understandable because when it comes to opinions, these can be driven by individual interests to the detriment of the collective, whether social, political, religious, or economic. Opinions can induce attitudes and vice-versa. Therefore, bringing about a change in this pattern is a major challenge faced in the formulation and enforceability of public policies to control morbidity and mortality from COVID-19.

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