COVID-19 vaccine hesitancy in a national sample of older Brazilians: the ELSI-COVID Initiative, March 2021

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ABSTRACT

Objective: To determine prevalence and factors associated with intention to get vaccinated against COVID-19 among older Brazilians. **Methods:** This was a cross-sectional study based on telephone interviews with participants of the Brazilian Longitudinal Study of Aging (ELSI-Brazil) aged 60 years and over, conducted in 70 municipalities in March 2021. **Results:** Among the 4,364 participants (mean age = 70.1 years), 91.8% intended to get vaccinated or had already been vaccinated, 2.5% did not intend to get vaccinated and 5.7% were undecided. Participants living in the North and Southeast regions were more likely to want to get vaccinated, as were those with two or more chronic diseases. Those who learned about COVID-19 from friends/family/social media were more likely to be undecided about vaccination (*odds ratio* = 3.15; 95%CI 1.28;7.77). **Conclusion:** The study identified one of the highest prevalence of intention to get vaccinated against COVID-19 described in the literature to date.
Keywords: COVID-19; Vaccines; Vaccination Refusal; Aged; Cross-Sectional Studies; Brazil.

INTRODUCTION

In the global context, Brazil stands out as one of the countries most affected by the COVID-19 pandemic, coming in second place in terms of number of deaths: 401,186, as at April 29th 2021.[1,2] Vaccines against COVID-19 are the most important strategy for controlling the pandemic.[2] However, it is imperative that they be available and adhered to by the population. A meta-analysis based on 28 studies conducted in 2020 showed that the intention to get vaccinated against COVID-19 varied widely, from 50% to 90% across populations, with an overall average of 73%.[2] In some scenarios, lower propensity to get vaccinated was observed among non-Whites or immigrants and/or among those with lower levels of education.[2]

Vaccination against COVID-19 in Brazil began in January 2021, through the Ministry of Health National Immunization Program. The populations selected as a priority for vaccination were health professionals, indigenous and quilombola communities and, successively, the different age groups among the elderly.[3] The vaccines approved by the National Health Surveillance Agency (*Agência Nacional de Vigilância Sanitária - ANVISA*) and available in Brazil at the time of the study, were CoronaVac® and Oxford/AstraZeneca®.[4,5]

The objective of this study was to determine prevalence and factors associated with the intention to get vaccinated against COVID-19 among elderly Brazilians.

METHODS

Design

This was a cross-sectional study of data on participants of the Brazilian Longitudinal Study of Aging (ELSI-Brazil). ELSI-Brazil is a household-based survey, conducted with a national sample representing the population aged 50 years or more. The survey is conducted in 70 municipalities, distributed over Brazil's five major regions. In 2015-2016 the baseline cohort had 9,412 participants. The 2nd wave of ELSI-Brazil began in August 2019

Study contributions	
Main results	91.8% of the elderly informed that they intended to get vaccinated against COVID-19, by means of telephone interviews conducted in March 2021 with elderly people living in 70 Brazilian municipalities.
Implications for services	The results reinforce the importance of the Brazilian National Health System (*Sistema Único de Saúde - SUS*) for meeting this expectation.
Perspectives	It is important that SUS actions keep pace with the rapid evolution of scientific evidence about vaccines against COVID-19, so that its actions are based on the best available evidence.

and was interrupted in March 2020, due to the SARS-CoV-2 pandemic. More details about ELSI-Brazil can be seen on the survey website and in a previous publication.[6]

The ELSI-COVID-19 initiative is based on telephone interviews with participants of the 2nd wave of ELSI-Brazil,[7] conducted in five rounds (Figure 1). All participants aged 60 years and older who were reached by the telephone survey conducted in March 2021 (Round 5) were selected for our analysis.

Variables

The study's dependent variable was the intention to get vaccinated (yes; no; does not know/is undecided), measured by asking interviewees *Do you intend to get vaccinated when the vaccine against COVID-19 becomes available?* Those who had received at least the first dose of the vaccine were included in the 'yes' group.

The independent variables were: age group (in years: 60-69; 70-79; 80 and over); sex (male;

female); years of schooling (up to 4; 5-8; 9-11; 12 and over); living in a rural zone or an urban zone; major Brazilian region of resident (North; Northeast; Midwest; Southeast; South); number of chronic diseases present (none; one; two or more), being registered with the Family Health Strategy; the main source from which interviewees obtained information about COVID-19 (Ministry of Health, traditional media – TV channels and newspapers – , family members, friends or social media; other sources); main reasons for vaccine hesitancy, among those who reported being hesitant (afraid of adverse reactions; does not feel sufficiently informed about the benefits; does not believe that vaccination protects against COVID-19; afraid that vaccination will harm you; not afraid of getting infected with coronavirus; doctor advised against vaccination; relatives and friends think you should not get vaccinated; have had COVID-19; afraid of injections; other reason). Chronic diseases considered were those previously described as being associated with increased risk of COVID-19 complications,[8] namely: cardiovascular diseases (myocardial infarction, heart failure and/or angina pectoris); diabetes mellitus; chronic pulmonary diseases; obesity [body mass index (BM) ≥30 kg/m^2]. Obesity was confirmed by taking physical measurements, while presence of the remaining conditions was based on self-reported medical diagnosis.

The answers to questions about COVID-19 were obtained in the fifth round of the telephone survey, while the remaining information was taken from the second face-to-face wave of ELSI-Brazil.

Statistical analysis

The descriptive analyses were based on means, standard deviation and estimates of prevalence along with their respective confidence intervals (95%CI). In order to examine the magnitude of differences between groups, odds ratios (ORs) were estimated by means of multinomial logistic regression, using models adjusted for sex and age, taking the 'wants to get vaccinated/has been vaccinated' category as the reference category. All the analyses took into consideration the weightings specifically derived for the telephone survey respondents and the sample parameters.[7] The analyses were performed used Stata® (v.14).

Ethical aspects

The study projects were approved by the Research Ethics Committee of the Fundação Instituto Oswaldo Cruz in Minas Gerais, Certificate of Submission for Ethical Appraisal, No. 34649814.3.0000.5091, Opinion No. 2.111.911, issued on June 9th 2017, and Certificate of Submission for Ethical Appraisal, No. 33492820.3.0000.5091, Opinion No. 4.138.284, issued on July 6th 2020, respectively.

RESULTS

Out of the 9,177 participants of the second face-to-face wave of ELSI-Brazil (August 2019 to March 2020), 6,309 (68.7%) answered the fifth round of telephone interviews (March 1st to 14th 2021) (Figure 1); 4,364 of these respondents were aged 60 or over and were included in this analysis (mean age was 70.1 years; standard deviation 7.9); 3,202 of the latter intended to get vaccinated, while 798 had already been vaccinated, totaling 4,000 individuals (91.8%; 95%CI 89.5;93.5). Prevalence of those who did not intend to get vaccinated was 2.5% (95%CI 1.9;3.4), while prevalence of those who did not know whether they would get vaccinated or who were undecided was 5.7% (95%CI 4.2;7.6), corresponding to 135 and 229 individuals, respectively (Table 1).

Table 1 also shows the participants' characteristics and the results of the analyses of association. After adjusting for age and sex, lower odds of indecision were found among those aged 80 years or older (≥80 *versus* 60-69 years) (OR = 0.29; 95%CI 0.13;0.66) and among those with 5 to 8 years of schooling (5-8 *versus* ≤4 years) (OR = 0.61; 95%CI 0.39;0.95). Those living in the Northern region (OR = 0.08; 95%CI 0.01;0.46) and the Southeast region (OR = 0.45; 95%CI 0.22;0.94) were less likely not to want to get vaccinated, and a similar
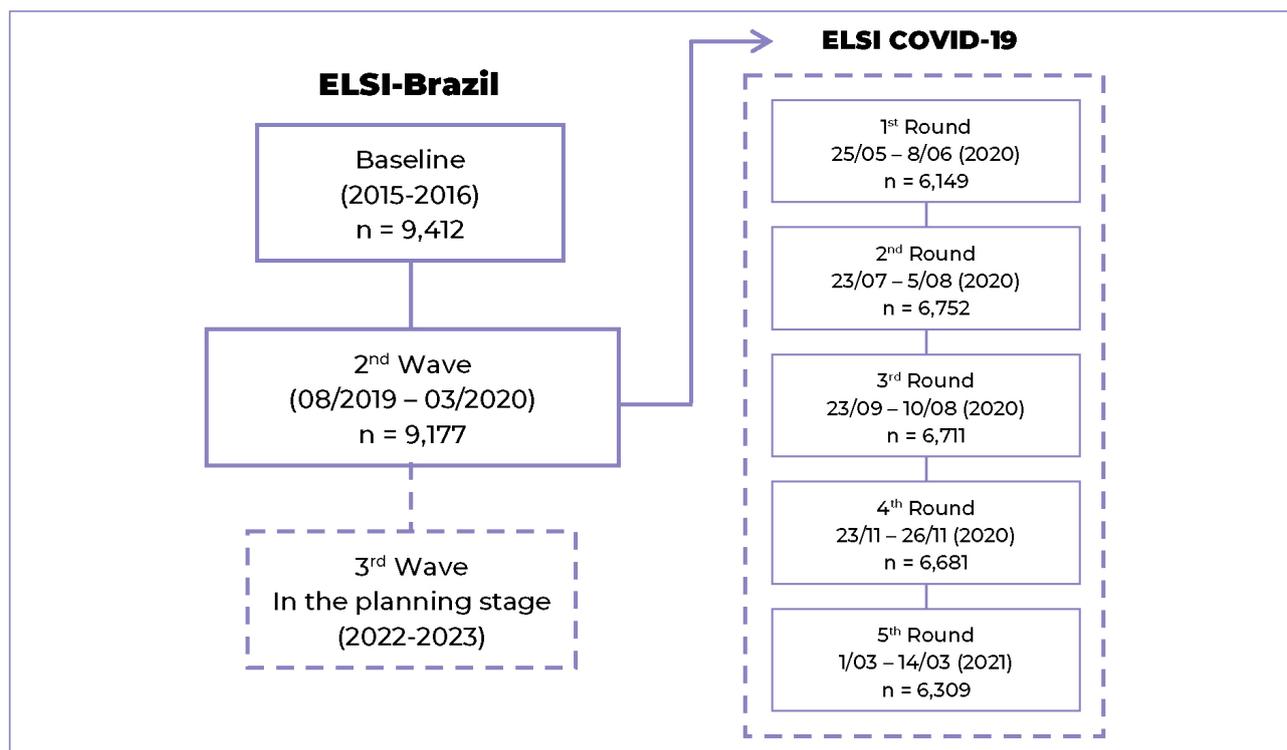
Figure 1 – Schematic diagram of the Longitudinal Study of the Health of Older Brazilians (ELSI-Brazil) and the ELSI-COVID-19 Initiative

Table 1 – Relative frequencies and results of the multivariate analysis and factors associated with intention to get vaccinated, among adults aged 60 or over, the ELSI-COVID-19 Initiative, March 1st to 14th, 2021

Characteristics	n (%)[a]	Intention to get vaccinated against COVID-19				
		Already vaccinated or intention to get vaccinated (reference)	Does not intend to get vaccinated		Undecided or does not know	
		%[b] (95%CI[c])	%[b] (95%CI[c])	OR[d] (95%CI[c])	%[b] (95%CI[c])	OR[d] (95%CI[c])
Total sample	4,364 (100.0)	91.8 (89.5;93.5)	2.5 (1.9;3.4)	–	5.7 (4.2;7.6)	–
Age group						
60-69	2,270 (55.6)	91.5 (88.6;93.7)	2.3 (1.6;3.4)	1.00	6.2 (4.4;8.7)	1.00
70-79	1,447 (30.6)	90.0 (84.3;93.7)	3.5 (2.0;5.9)	1.53 (0.77;3.02)	6.5 (3.4;12.2)	1.08 (0.48;2.47)
≥80	647 (13.8)	96.7 (94.5;98.0)	1.4 (0.8;2.6)	0.58 (0.28;1.20)	1.9 (0.9;3.9)	0.29 (0.13;0.66)
Sex						
Female	2,638 (49.3)	92.4 (90.3;94.1)	2.7 (2.0;3.7)	1.00	4.9 (3.5;6.9)	1.00
Male	1,726 (50.7)	91.2 (87.3;93.9)	2.4 (1.4;4.0)	0.87 (0.48;1.57)	6.5 (4.0;10.4)	1.35 (0.70;2.60)

Continuation

Table 1 – Relative frequencies and results of the multivariate analysis and factors associated with intention to get vaccinated, among adults aged 60 or over, the ELSI-COVID-19 Initiative, March 1st to 14th, 2021

Characteristics	n (%)[a]	Intention to get vaccinated against COVID-19				
		Already vaccinated or intention to get vaccinated (reference)	Does not intend to get vaccinated		Undecided or does not know	
		%[b] (95%CI[c])	%[b] (95%CI[c])	OR[d] (95%CI[c])	%[b] (95%CI[c])	OR[d] (95%CI[c])
Years of schooling						
<4	2,704 (35.9)	91.9 (89.4;93.9)	2.9 (1.9;4.4)	1.00	5.2 (3.9;6.8)	1.00
5-8	754 (27.2)	94.1 (91.6;95.9)	2.3 (1.4;3.8)	0.75 (0.38;1.49)	3.6 (2.2;5.8)	0.61 (0.39;0.95)
9-11	627 (8.1)	91.9 (88.1;94.5)	4.6 (2.6;8.0)	1.55 (0.72;3.33)	3.6 (2.1;5.9)	0.61 (0.36;1.05)
≥12	279 (28.8)	89.3 (81.1;94.2)	1.7 (0.5;5.5)	0.60 (0.15;2.37)	9.0 (4.6;16.7)	1.68 (0.66;4.28)
Zone of residence						
Urban	3,682 (85.1)	91.9 (89.5;93.8)	2.5 (1.8;3.4)	1.00	5.6 (4.1;7.7)	1.00
Rural	682 (14.9)	90.9 (85.8;94.2)	3.0 (1.7;5.4)	1.28 (0.66;2.48)	6.1 (3.5;10.6)	1.10 (0.58;2.11)
Region						
Midwest	531 (9.8)	90.2 (84.3;94.1)	3.6 (2.1;6.0)	1.00	6.3 (3.4;11.1)	1.00
North	148 (6.1)	97.2 (93.4;98.8)	0.3 (0.0;1.6)	0.08 (0.01;0.46)	2.5 (0.1;6.2)	0.33 (0.10;1.02)
Northeast	1,225 (25.6)	92.6 (89.2;94.9)	3.4 (2.1;5.4)	0.90 (0.43;1.88)	4.1 (2.6;6.4)	0.63 (0.28;1.39)
Southeast	1,831 (41.4)	91.5 (87.2;94.4)	1.7 (1.1;2.7)	0.45 (0.22;0.94)	6.8 (4.2;10.8)	1.02 (0.47;2.21)
South	629 (17.1)	90.2 (83.2;94.5)	3.5 (1.6;7.4)	0.97 (0.38;2.48)	6.3 (3.3;11.7)	0.97 (0.38;2.48)
Number of chronic diseases[d]						
None	2,042 (50.4)	92.3 (89.8;94.2)	2.7 (2.0;3.7)	1.00	5.0 (3.4;7.4)	1.00
One	1,411 (34.7)	90.0 (84.8;93.5)	1.9 (1.0;3.5)	0.69 (0.36;1.33)	8.1 (4.7;13.6)	1.66 (0.82;3.39)
Two or more	555 (14.9)	96.0 (93.2;97.7)	1.2 (0.6;2.3)	0.41 (0.20;0.83)	2.8 (1.4;5.6)	0.54 (0.24;1.21)
Household registered with the Family Health Strategy						
No	1,502 (39.5)	90.1 (85.5;93.4)	2.8 (1.6;5.0)	1.00	7.1 (4.3;11.5)	1.00
Yes	2,783 (60.5)	92.7 (90.7;94.3)	2.4 (1.7;3.4)	0.85 (0.42;1.91)	4.9 (3.6;6.6)	0.69 (0.38;1.26)

Continuation

Table 1 – Relative frequencies and results of the multivariate analysis and factors associated with intention to get vaccinated, among adults aged 60 or over, the ELSI-COVID-19 Initiative, March 1st to 14th, 2021

Characteristics	n (%)[a]	Intention to get vaccinated against COVID-19				
		Already vaccinated or intention to get vaccinated (reference)	Does not intend to get vaccinated		Undecided or does not know	
		%[b] (95%CI[c])	%[b] (95%CI[c])	OR[d] (95%CI[c])	%[b] (95%CI[c])	OR[d] (95%CI[c])
Main source of information about COVID-19						
Ministry of Health	1,727 (40.7)	93.5 (91.0;95.3)	2.7 (1.6;4.6)	1.00	3.8 (2.5;5.9)	1.00
Traditional media (TV channels and newspapers)	1,499 (35.4)	93.5 (87.7;96.7)	1.2 (0.7;2.1)	0.44 (0.20;0.94)	5.3 (2.3;11.6)	1.36 (0.49;3.79)
Family members, friends or social media	275 (6.4)	85.8 (77.1;91.5)	3.6 (1.9;6.8)	1.39 (0.59;3.24)	10.6 (5.3;20.3)	3.15 (1.28;7.77)
Other source or does not trust any of them	677 (17.5)	88.1 (82.8;91.9)	4.2 (2.4;7.1)	1.66 (0.77;3.58)	7.7 (4.5;13.1)	2.10 (1.02;4.31)
Sample size	**4,364**	**4,000[e]**	**135**		**229**	

a) Percentages estimated taking column totals; b) Percentages estimated taking row totals; c) 95%CI: 95% confidence interval; d) OR: *Odds ratio*, estimated by multinomial logistic regression, taking the 'wants to get vaccinated/has been vaccinated' category as the reference category. Age group was adjusted for sex. Sex was adjusted for age group. The remaining estimates listed in the table are adjusted for sex and age group; d) Chronic diseases or conditions considered: cardiovascular disease (myocardial infarction, heart failure and /or angina pectoris), diabetes *mellitus*, chronic pulmonary diseases and obesity; e) 798 of these had already been vaccinated and were included in the 'intention to get vaccinated' category.
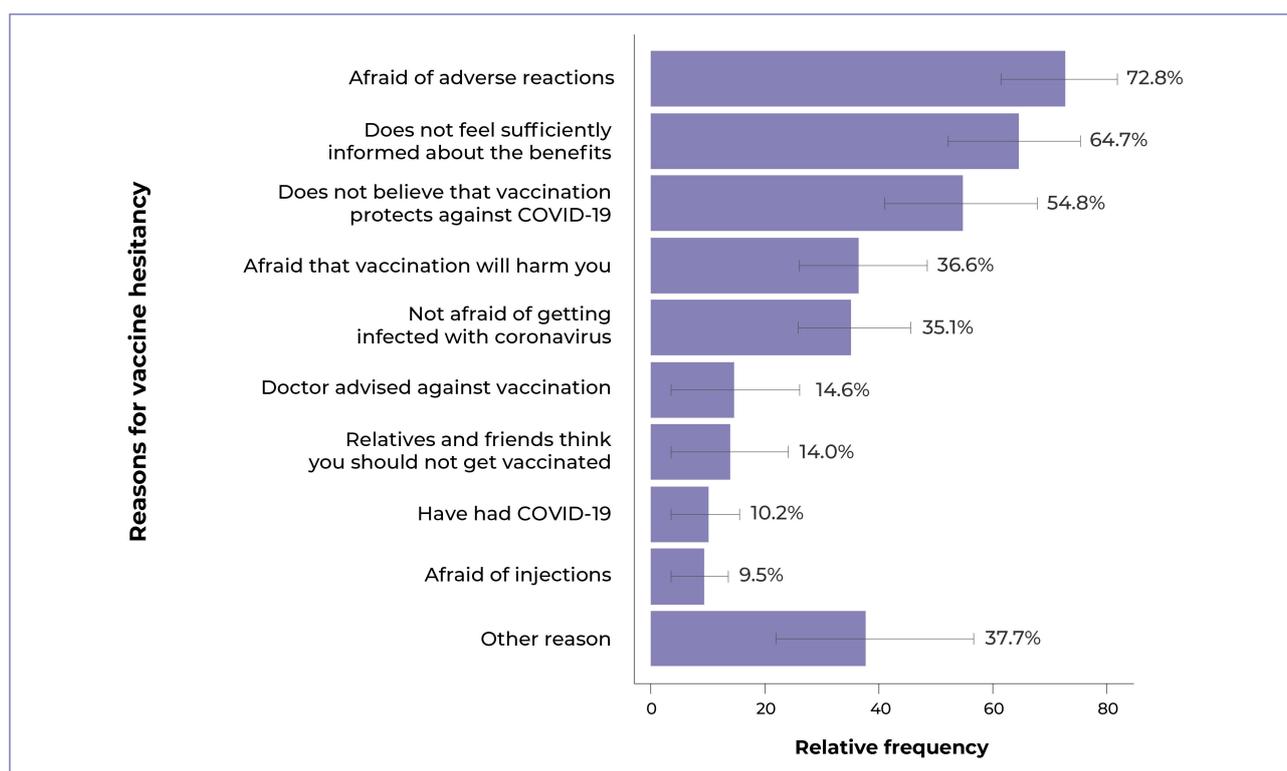Note: All estimates took into consideration the person's weight and the complex design of the sample.

odds ratio was observed among those who sought information about COVID-19 from traditional media (OR = 0.44; 95%CI 0.20;0.94). Participants who sought information about COVID-19 from family, friends or social media (OR = 3.15; 95%CI 1.28;7.77), or who sought information from other sources or did not trust any of the sources cited (OR = 2.10; 95%CI 1.02;4.31), were more likely to be undecided about vaccination.

Figure 2 describes the main reasons for not getting vaccinated, among those who did not intend to get vaccinated or were undecided about the relevance of vaccination. The main reasons reported were fear of adverse reactions from the vaccine (72.8%), not feeling sufficiently informed about its benefits (64.7%), and not believing that the vaccine protects against COVID-19 (54.8%).

DISCUSSION

The results of this study found one of the highest estimates of prevalence of intention to get vaccinated against COVID-19, compared to the findings of studies conducted in other countries, particularly in high-income countries.[2,9] Vaccine uptake of around 90% in this study was higher than that found in a previous study, which used data from the fourth round of the ELSI-COVID-19 survey, conducted in November 2020.[10] This increase is probably a consequence of the availability of vaccination in Brazil with effect from January 2021, the worsening of the epidemic and improvements in communication by different forms of media, including traditional media, given the recognition of the importance of immunization against COVID-19.

Figure 2 – Relative frequency of reasons for COVID-19 vaccine hesitancy, among adults aged 60 or over, the ELSI-COVID-19 Initiative, March 1st to 14th, 2021

It is important to note that in this study, contrary to what has been found by studies conducted in some high-income countries,[2,9] no significant disparities in the intention to get vaccinated among the Brazilian elderly were found according to level of education. Intention to get vaccinated varied little between the country's major regions, although prevalence of intention to get vaccinated was higher among those living in the Northern region. This result is consistent with the dramatic crisis caused by the pandemic in that region in the early weeks of 2021.[11]

The factor most strongly associated with the intention to get vaccinated against COVID-19 was the source from which the elderly got information about the pandemic. Those who usually got information from friends and social media were three times more likely to be undecided about vaccination compared to those who got their information from the Ministry of Health or traditional media. Those who did not trust any source, or who were informed by other sources, were twice as likely not to want to get vaccinated.

The main advantage of the ELSI-COVID-19 initiative lies in its large population base.[7] Despite this, its limitations include those inherent to surveys conducted by means of telephone interviews.[7] Telephone interviews have the advantage of not exposing participants to risk of infection; however, they are prone to bias due to valid telephone numbers not being provided and/or telephone calls not being answered. The ELSI-COVID-19 Initiative response rate was approximately 70%. Using the weightings specifically derived to compensate for these losses, the sociodemographic characteristics of the study participants were similar to those of the Brazilian population of the same age.[7] However, it is not possible to rule out the possibility of bias, due to factors not taken into consideration in our estimates.

Our results indicate wide adherence of Brazilian elderly people to vaccination against

COVID-19. One of the most relevant results of our analysis was the strong association observed between the source of information about the pandemic and the intention to get vaccinated. Coordinated actions by the Ministry of Health, based on the best available scientific evidence, are needed to expedite the availability of vaccines, as well as the production of comprehensive information campaigns, emphasizing the importance of vaccination and non-pharmacological prevention measures, even among vaccinated individuals and their contacts, until robust evidence emerges indicating that they are no longer necessary.

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