

Covid-19: Public Policies and Society's Responses



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Policy Brief 31

The Scope and Depth of Attacks on the CoronaVac Vaccine by the President of the Republic and Politicians on Social Media is greater than imagined and may affect Vaccination in Brazil with the Strengthening of Anti-vaccine Groups.

Main Conclusions

- The most considerable volume of Twitter posts related to the CoronaVac vaccine occurred in January 2021 when vaccination started in Brazil and this manufacturer was the primary vaccine source.
- Throughout 2020 and 2021, the increase in the absolute volume of CoronaVac-related Twitter activity was driven by attacks against the vaccine. Between September 29 and November 14 (epidemiological weeks 39 and 46), there was an escalation in the frequency of Twitter posts, and concomitantly, of publications attacking the CoronaVac vaccine.
- Among the 75 speeches by President Bolsonaro published on the presidency's official government website which mentioned the pandemic, 19 of these official announcements included references to vaccines and vaccination. Among these, the CoronaVac vaccine was mentioned four times. The predominant forms adopted to refer to the vaccine in these messages are "that vaccine" and "from that country."
- On his personal Twitter profile, President Jair Bolsonaro mentioned the CoronaVac in posts to express his opposition to the procurement of the vaccine by the Ministry of Health and to the vaccination of the Brazilian people using this vaccine. The president also made a point of not acknowledging the state of Sao Paulo's efforts to procure the vaccine and refused to call the vaccine by its correct name.

- Social media influencers and state and federal congressional representatives played an important role in the digital debate on CoronaVac by sharing messages that questioned the vaccine's efficacy.
- Five delays in delivering Active Pharmaceutical Ingredients (API) from China required to produce CoronaVac doses have occurred. The delay in the arrival of these raw materials resulted from bureaucratic processing times at Beijing's airport and not because of complications in the vaccine supply from Sinovac to Butantan. On two of these occasions, the shipments never arrived. The available data suggests a deficit in delivering 7 thousand liters of API within this period, which corresponds to 10.5 million vaccine doses. Additionally, another 4 thousand liters of API are still in transit and have not yet arrived in Brazil.
- Using the updated planning schedule provided by the Ministry of Health and considering the delays in API deliveries from China to the Butantan Institute, we find a deficit of 12 million doses that should have been distributed to Brazil's Unified Health System (SUS).

Introduction

Since the onset of the COVID-19 pandemic, countries from across the globe have adopted measures to reduce infections and deaths and to seek to return to the so-called return to normality. Given the lack of drugs with proven efficacy for treating patients infected with SARS-CoV-2, vaccines have become an effective and essential solution to protect people from the risk of developing more aggressive forms of the disease and, above all, to prevent death. In addition to saving lives, vaccines also reduce pressure on health systems and ensure that patients with other diseases may receive proper care. Communication is an important government tool to establish trust-based relationships with society. Government and political communication are vital to creating engagement in society during vaccination campaigns. Equally, disinformation and fake news greatly hinder vaccination programs and coverage.

Immunization has been a politicized issue in Brazil since the first COVID-19 cases in the country were detected in February 2020. The São Paulo state government announced a partnership between the Butantan Institute and the Chinese pharmaceutical company Sinovac Life Science to perform clinical trials of a vaccine against COVID-19, named CoronaVac, in June 2020. Since then, President Jair Messias Bolsonaro and his followers have criticized and undermined this partnership, as well as the CoronaVac vaccine itself.

Throughout most of 2020, the federal government insisted on the promise to vaccinate the Brazilian population based on an agreement between the Oswaldo Cruz Foundation (Fiocruz) and the pharmaceutical company AstraZeneca to import, and eventually produce, the COVID-19 vaccine developed by AstraZeneca/Oxford University.¹ This formal agreement was signed with Fiocruz in September 2020, three months after an agreement between the Butantan Institute and Sinovac to begin clinical trials in Brazil.

In addition to these partnerships, on September 24, 2020, Brazil joined the Covax Facility alliance, coordinated by the World Health Organization (WHO), to acquire 42.5 million doses. Although doses to vaccinate up to 50% of the population could have been secured via Covax, the Brazilian government insisted on a minimum coverage of 10% of the population and only belatedly. After signing with AstraZeneca and joining the Covax Facility, the Federal Government did not sign other agreements, insisting throughout 2020 that vaccines must have prior authorization from the National Health Surveillance Agency (Anvisa in the Portuguese acronym).

In the first week of 2021, the federal government signed an agreement to distribute 100 million doses of CoronaVac (covering less than 50 million people). Other contracts were not signed as the federal government alleged that Brazilian legislation required companies to have performed clinical trials in the national territory in 2020². for authorization from Anvisa for the emergency use of the immunizing agent. This requirement was no longer mandatory as of February 3, 2021. In February and March 2021, the federal government signed agreements to import vaccines from Bharat Biotech, Pfizer, and Janssen.

Decisions concerning the use of vaccines in Brazil, including CoronaVac, have generated much activity on social media, an important environment for shaping overall public opinion. In this policy brief, we analyze the debate on CoronaVac as conveyed in official discourses in which President Bolsonaro mentioned the virus, the pandemic, vaccines, and communications in his social networks. We also analyze declarations by other political actors holding public office and social media influencers. We complemented our analysis of 75 official discourses available on the presidency's official government website (from March 9, 2020, to March 14, 2021) with content collected on Twitter and Facebook (between April 2020 and March 2021) shared by different politicians and influencers. This analysis allowed us to gather a confluence of narratives against the CoronaVac vaccine and vaccination, including detecting the disclosure of false and inaccurate information.

We relied on the Meltwater tool for posts on Twitter, through the use of Boolean operators. We defined a set of keywords and possible word combinations to guide the search performed by the tool. In the analysis, we considered searches containing the following words and relationships: *"*vachina*" OR "Chinese vaccine" OR "*Chinesevaccine" OR "*coronavac" OR "*sinovac" OR "doria vaccine" OR "butant vaccine*" OR ("vaccine*" AND "institute butant*")*. We analyzed the scope and relevance of the collected posts by counting the number of shares and interactions in each publication. Altogether, circa 5,203,933 Twitter users posted CoronaVac-related material within the analyzed period. On average, 115,642 tweets per week cited the vaccine and related terms. In lesser granularity, we also analyzed posts on Facebook. In this case, interactions were understood as reactions to a particular publication, expressed by likes, such as "loved," "haha," "wow," "anger," and "sad," in addition to comments and shares.

We also explore public opinion data towards vaccination provided by the PoderData platform. PoderData conducts biweekly surveys about the main political issues in the country. In this policy brief we used the answers to the question "Do you plan on taking any of the coronavirus vaccines?" We used the results from the question rounds conducted by PoderData from July 2020 to March 2021, through telephone interviews using the Interactive Voice Response³ method. The sample comprises 2,500 respondents and the response rate is 5%.

¹ See "Fiocruz signs a contract for 100 million doses of the vaccine. Fiocruz, September 10, 2020." Available at: <https://portal.fiocruz.br/noticia/fiocruz-assina-contrato-de-100-milhoes-de-doses-da-vacina>.

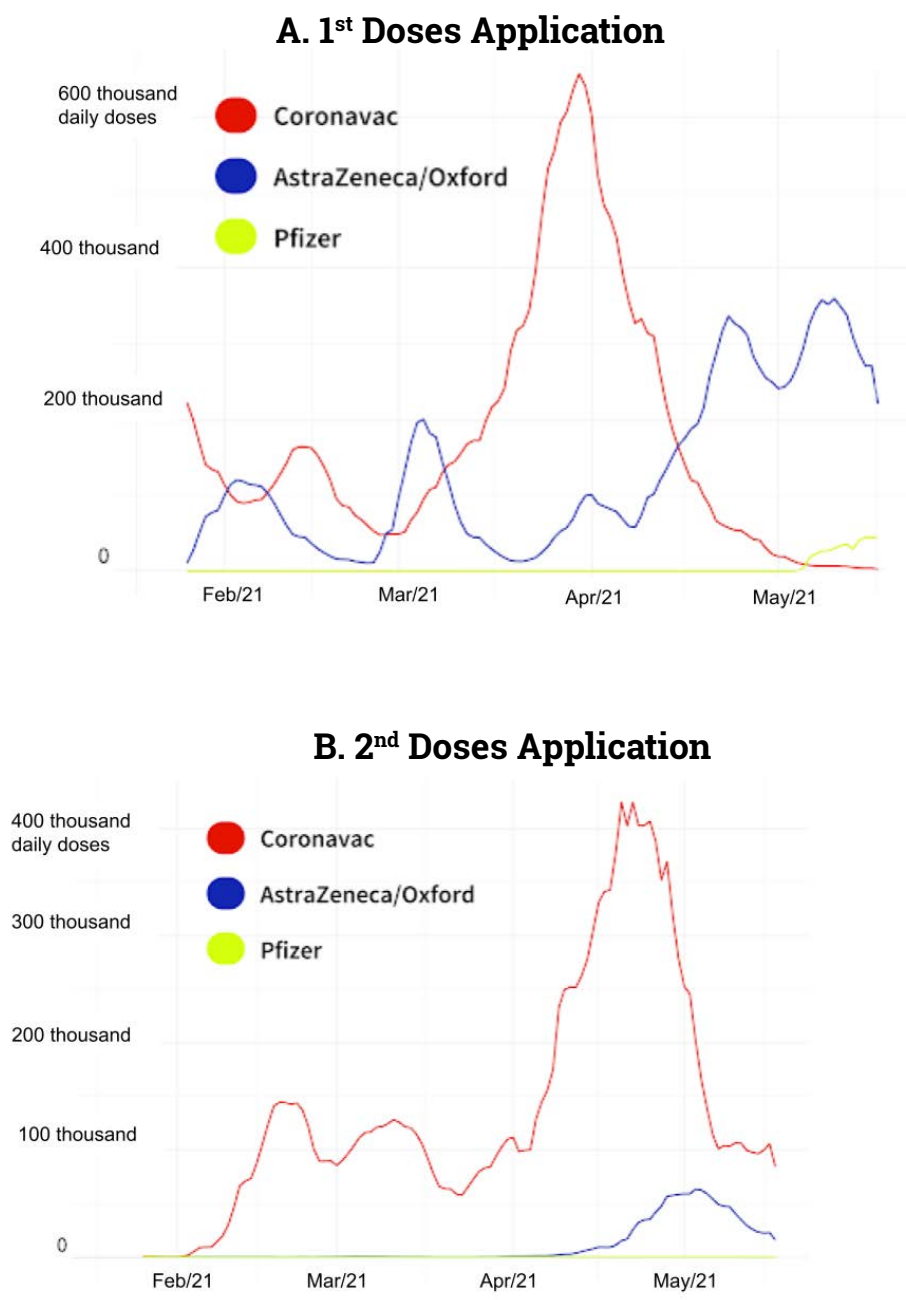
² The only COVID-19 vaccines with clinical trials in Brazil were those of Janssen, Pfizer, AstraZeneca, and CoronaVac.

³ Poder360 (2020). Available online at: <https://www.poder360.com.br/poderdata/entenda-como-foi-realizada-a-pesquisa-datapoder360/> (Accessed on April 21, 2021).

The Approval, Development and Administration of Vaccines against COVID-19 in Brazil

Delays in the arrival of raw materials from AstraZeneca and vaccines from the Covax Facility have made CoronaVac the primary vaccine available to vaccinate the Brazilian population since January 2021. As shown in Figure 1, the data available on the OpenDataSus platform, updated by the Ministry of Health, reveals that 56.2% of the population who received the first dose and 92.6% of those who received the second dose were vaccinated with CoronaVac.

Figure 1 - Advance in the Speed of Vaccination against COVID-19 in Brazil (seven-day moving average as of May 19, 2021. First and Second administered doses.)



Source: OpenDataSus (2021).

The Delay in the Speed of CoronaVac Vaccination as a result of AFI Shortages

To identify the progress in the CoronaVac vaccination plan, we traced the number of doses expected to arrive throughout 2020 and 2021 and the expected volume of AFI in each shipment. As shown in Table 1, 33.200 liters of the active pharmaceutical ingredient (AFI) should have arrived between February and May 2021. However, as of March 2021, the volume of AFI received by Instituto Butantan has been lower than expected. Thus, on May 21, 2021, we registered a shortage of 11 thousand liters of AFI.

Table 1. Expected and delivered volume of AFI (thousand liters) between February and May, 2021.

	February 2021	March 2021	April 2021	May 2021
Total expected AFI	11	12,2 *	6	4
Total delivered AFI	11	8,2	3	Not yet delivered

Source: Data compiled by the authors based on news articles.
* Total calculated based on the average dose value per AFI liters.

In total, 13 deliveries of AFI or vaccine doses were expected by May 2021. Among these deliveries, we identified five delays in AFI shipments coming from China for producing CoronaVac vaccines, all of them in 2021. The delay in the arrival of these raw materials resulted from bureaucratic processing times at Beijing's airport and not because of complications in the vaccine supply from Sinovac to Butantan. In two of these cases, the shipments never arrived. As detailed in Table 2, the deficit was 7,000 liters of AFI in this period, equivalent to 10.5 million doses. In addition, another 4,000 liters are still in transit to Brazil.

Table 2. Number of deliveries and quantity of doses and/or CoronaVac AFI expected and received in 2020 and 2021.

Expected Deliveries	Delivery Situation	Quantity of doses delivered	Quantity of AFI delivered	Available doses / Doses' Production Capacity considering the delivered AFI volume
November 19	Doses delivered on this date	120 thousand	-	120 thousand
December 3	AFI delivered on this date	-	600 hundred	1 million
December 18	Doses delivered on this date	2 million	-	2 million
December 24	Doses and AFI delivered on this date	2,1 thousand	2,1 thousand	5,5 million
December 28	Doses delivered on this date	500 thousand	-	500 thousand
December 30	Doses delivered on this date	1,6 million	-	1,6 million
January 31	Late delivery on February 4, 2021.	-	5,4 thousand	8,6 million
February 10	AFI delivered on this date	-	5,6 thousand	8,7 million
March 2	Late delivery on March 4, 2021.	-	8,2 thousand	14 million
March 30	Not delivered.	-	-	-

Expected Deliveries	Delivery Situation	Quantity of doses delivered	Quantity of AFI delivered	Available doses / Doses' Production Capacity considering the delivered AFI volume
April 7	Not delivered.	-	-	-
April 10	Late delivery on April 19, 2021, of a reduced quantity - half of the original expected quantity (6 thousand)	-	3 thousand	5 million
May 15	Not delivered.	-	-	-

Source: Data compiled by the authors based on news articles.

According to the schedule released by the Ministry of Health (MH) in February 2021 and the number of doses delivered to the MH from the Butantan Institute by May 20, 2021, Table 3 shows that there is currently a shortage of over 12 million doses in the SUS. Considering that the first doses were administered to high-priority groups, i.e., the most vulnerable population – such as the elderly – and the most exposed groups – such as health professionals working on the frontline in Covid-19 patient care – the delay in delivering these immunization agents jeopardizes vaccination coverage of the general population as well as vulnerable groups more susceptible to hospitalization and death.

Table 3. Schedule of Expected CoronaVac Deliveries, Delays in Deliveries and Administered Doses, between January and May, 2021.

	Until January 31	Until February 28	Until March 31	Until April 30	Until May 30*	Total
Total Expected Deliveries (according to the Ministry of Health's Schedule from February 17, 2021)	8.700.000	9.305.000	18.065.000	15.962.258	6.032.258	58.064.516
Total Expected Deliveries + Previous Months' Deficit		10.697.744	23.909.744	17.113.032	17.345.290	69.065.810
Doses delivered by Butantan Institute to the Ministry of Health (May 15) - (according to the Ministry of Health)	7.307.256	4.853.000	22.758.970	5.800.000	5.100.010	45.819.236
Differences between Expected and Delivered Doses (according to the Ministry of Health)	1.392.744	5.844.744	1.150.774	11.313.032	12.245.280	12.245.280
Actual Administered Doses	2.146.574	4.958.229	13.840.855	13.404.140	1.437.712	35.787.510

Sources: Ministry of Health (2021) and OpenDataSus (2021)

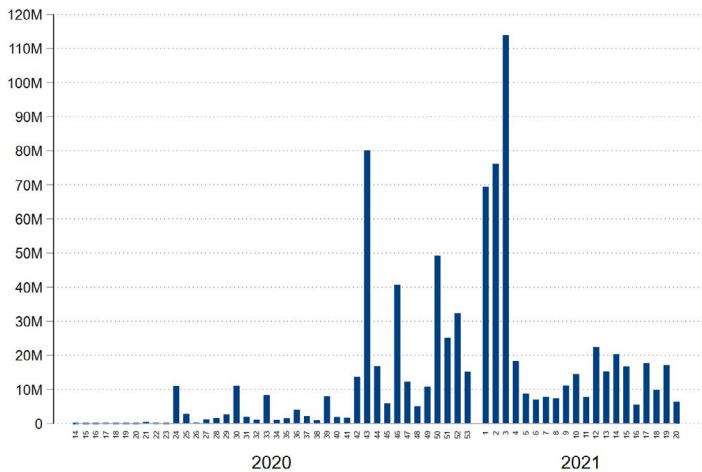
*Purchases in May have not been delivered, to the moment of our analysis.

CoronaVac attacks in Social Media

Brazil ranks as the 4th country globally with the highest engagement on Twitter, with over 14 million registered users. Twitter is a privileged source for observing interactions and narratives in social media due to the platform's publicly available data. In this policy brief, we used this data to proxy the public debate about vaccination and CoronaVac in particular. As shown in Figure 2, we found approximately 5,203,933 publications addressing these topics between April 2020 and March 2021.

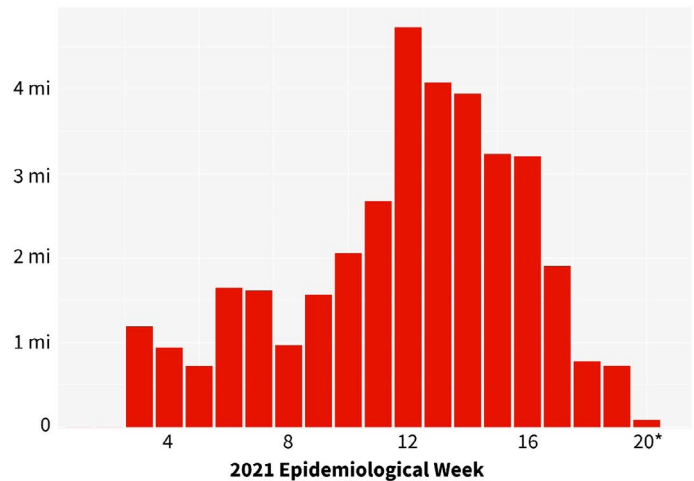
Figure 2. CoronaVac Twitter posts and Volume of CoronaVac doses administered by epidemiological week

A. Number of CoronaVac Twitter posts

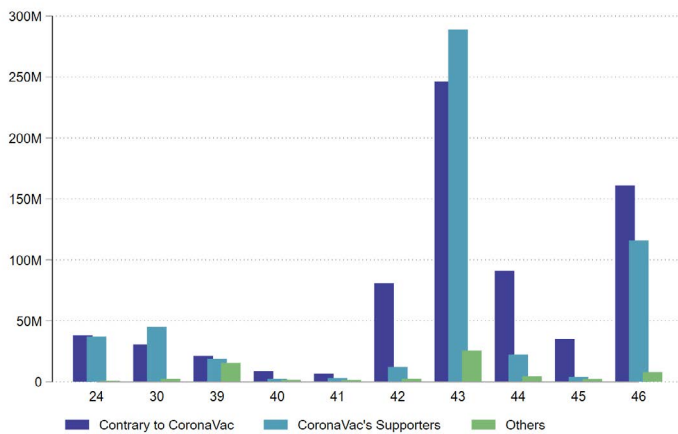


B. Number of CoronaVac administered doses. Considering all doses.

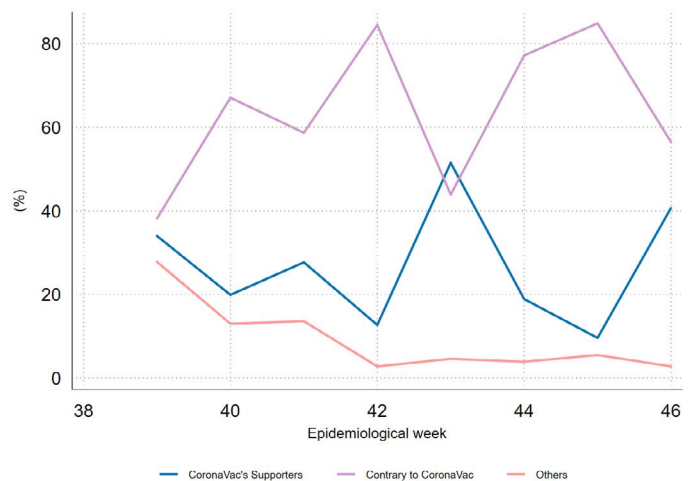
*Epidemiological Week 20 is not complete.



C. Volume of Twitter posts in favor and against CoronaVac (specific epidemiological weeks).



D. Percentage of Twitter posts in favor and against CoronaVac in specific epidemiological weeks.



Sources: Twitter (2021) and OpenDataSus (2021)

We found a predominance of negative references to CoronaVac, equally identified in the statements by President Jair Bolsonaro, who has constantly expressed distrust in the CoronaVac vaccine, as further detailed below. The promotion of distrust of CoronaVac was a trend observed in posts on the president's personal social media profiles as much as in his public statements reproduced in the media and news.

On epidemiological week 24, in June 2020, we detected a rise in mentions to CoronaVac on Twitter (total of 77,093,000), shortly after Governor João Doria announced an agreement between the Butantan Institute and Sinovac for the CoronaVac clinical trial.⁴ At that time, criticism of the CoronaVac vaccine relied on two main arguments:

(i) The notion that no Brazilian citizen should be forced to take “Doria’s Chinese vaccine,” as expressed in a post by the head of the Palmares Foundation, belonging to the Secretariat of Culture,⁵ in reply to Bolsonaroian influencer Joubberth Souza (@Joubberth19), who even devised a hashtag to scorn the immunizing agent (#VacinaChinesaNão)⁶. The tone of these messages reveals the xenophobic nature of the content.

(ii) The spread of a fake news story regarding an alleged contract signed between Governor Joao Doria and Chinese authorities sometime in 2019, i.e., before the pandemic, inferring that the pandemic was manufactured by China and the Chinese Communist Party, with the collaboration of the São Paulo governor. This fake news became the subject of posts from parliamentarians of the Bolsonaroian base such as Federal Congresswoman for São Paulo Carla Zambelli⁷ or Federal Congresswoman for Rio de Janeiro Major Fabiana⁸, both on Twitter.

On epidemiological week 30, in July 2020, with the announcement of the commencement of tests and actual progress in developing the vaccine, there was a prevalence of posts in favor of the immunizing agent (57.8%). However, vaccine critics (39.3%) shared disinformation about CoronaVac and counted with the help of prominent social media influencers. At that time, the most shared posts belonged to the profiles of Federal Attorney Ailton Benedito (@AiltonBenedito), who questioned if the vaccine was actually ready to begin clinical trials in Brazil,⁹ and Luiz Acacio Galeazzo Vareta (@oiluiz), who compared taking CoronaVac to “asking your rapist for a morning-after pill,”¹⁰ and who was even considered to head the Social Media operations of the Federal Government’s Communication Ministry. Furthermore, parliamentarian Bia Kicis (@Biakicis), belonging to the Bolsonaroian base in Congress, asked on Twitter if people would accept to volunteer for testing¹¹.

On epidemiological week 39, in September 2020, the São Paulo state government announced that CoronaVac tests on Chinese volunteers identified the efficacy of the vaccine and confirmed the lack of adverse side effects in more than 94% of volunteers, substantiating the safety of the immunizing agent. We collected 56,197 mentions on Twitter regarding this issue, with a post by Douglas Garcia,

⁴ See “Today is a historic day for science in Brazil and São Paulo. We will announce that São Paulo will produce the coronavirus vaccine, through a partnership between the Butantan Institute and the international laboratory Sinovac Biotech.” João Doria on June 11, 2020. Available at: <https://twitter.com/jdoriajr/status/1271064512003821568>, accessed on May 19, 2021.

⁵ See “I’m from São Paulo and I hereby plea to my family, to whom I wish all the best: don’t take Doria’s Chinese vaccine!” Sergio Camargo on January 12, 2021. Available at: <https://twitter.com/sergiodireita1/status/1271285968281075712>, accessed on May 19, 2021.

⁶ See “Hey Brazil, are you going to take Doria’s Chinese vaccine? #VacinaChinesaNAO” Joubberth Souza on June 11, 2020. Available at: <https://twitter.com/Joubberth19/status/1271198322930352128>, accessed on May 19, 2021.

⁷ See “Governor, could you explain why the contract with Sinovac dates from August 2019?” Carla Zambelli on June 13, 2020. Available at: <https://twitter.com/CarlaZambelli38/status/1271835708047732741>, accessed on May 19, 2021.

⁸ See “Governor, could you explain why the contract with Sinovac dates from August 2019?” Major Fabiana on June 13, 2020. Available at: <https://twitter.com/majorfabianadep/status/1271932585766277122>, accessed on May 19, 2021.

⁹ See “the US accuse China of trying to steal vaccine data. If this accusation is true, is the alleged Chinese vaccine against #Covid19 in fact ready to be tested in Brazil? Or does it still depend on the “stolen data”? Ailton Benedito on July 24, 2020. Available at: <https://twitter.com/AiltonBenedito/status/1286637421464084480>, accessed on May 19, 2021.

¹⁰ See “Taking the Chinese vaccine is like asking your rapist for the morning-after pill” @oiluiz on July 20, 2020. Available at: <https://twitter.com/oiluiz/status/1285337759390093314>. Accessed on May 19, 2021.

¹¹ See “The Chinese vaccine arrived. Do you volunteer?” Bia Kicis on July 20, 2020. Available at: <https://twitter.com/Biakicis/status/1285323835378728967>, accessed on May 19, 2021.

a congressman from São Paulo (with over 320 thousand followers on Twitter) who claimed to be radically against mandatory vaccination generating a high share of activity.¹²

Furthermore, the most shared news story on Facebook was published by Rádio CBN, with the headline: "Sao Paulo government announces that the CoronaVac vaccine has been proven safe."¹³ The publication had 64,400 interactions on Facebook. Governor João Dória also participated in the announcement.

On this same epidemiological week, on September 24, 2020, the newspaper Cidade Online, an active proponent of the Bolsonaro administration, published an article on their website titled "A catastrophic analysis of the vaccines against the Chinese virus: they directly affect our genetic material." The content included a fake news story claiming that CoronaVac could "alter people's DNA," an already widespread argument on social media at the time. After verification by fact-checking agencies, however, the article was removed from the website on September 29, and a note was published in its place to confirm that the shared content was false. Five days after the original article's publication, the newspaper published a retraction titled "On vaccines against the Chinese virus." At that time, however, the news had already amassed circa 196,701 interactions on Facebook.

On epidemiological week 40, late September and early October 2020, there were fewer posts on Twitter, with circa 13,016 CoronaVac-related publications. However, there was a proportional increase in the participation of the president's group of supporters, which represented 67.1% of our analyzed mentions. Within this period, arguments against CoronaVac cited a publication that suggested testing the vaccine on prison inmates. The following week (epidemiological week 41, October 2020), the low volume of posts on Twitter continued (11,757 posts). This week, anti-CoronaVac groups represented 58.1% of the mentions, and anti-CoronaVac profiles continued to spread anti-vaccine content, including using the hashtag #VachinaNaoPresidente (*No Chinese Vaccine, President*).

On epidemiological week 42, October 2020, government supporters intensified their activities. We compiled 95,876 posts on this topic, among which 84.5% came from anti-CoronaVac groups. In addition to the debates about mandatory vaccination, a policy systematically attributed to Governor João Doria, the posted and shared contents incessantly attacked China and the Chinese people. One of such posts came from profile @taoquee1 (over 492,000 followers on Twitter). In the post, the user shared an image with a headline claiming that a Chinese company had sold fake vaccines for treating polio, tetanus, and diphtheria. The user then referred to the news to justify their choice for not receiving the "Chinese vaccine." The publication had a broad reach with more than 8,400 "likes" and over 2,600 retweets.¹⁴

Epidemiological week 43, still in October 2020, concentrated significant events regarding the CoronaVac vaccine. On October 20, 2020, in a meeting with governors, the Ministry of Health announced an agreement to purchase 46 million doses of the CoronaVac vaccine. The following day (21), President Bolsonaro stressed that he had not approved the agreement and ordered its cancellation.¹⁵

¹² See "If Doria decrees the mandatory *Vachina* to the state of São Paulo, we will file a collective action on the same day (which covers every citizen) in the Court of Justice against this outrageous decision. I won't be obliged! And I rally everyone from São Paulo who do not want to be vaccinated to civil disobedience!" Deputy Douglas Garcia on September 21, 2020. Available at: <https://twitter.com/DouglasGarcia/status/1308187202707427334>. Accessed on March 14, 2021

¹³ See "São Paulo state government declares the proven safety of the CoronaVac vaccine". O Globo Available at <https://glo.bo/3offvVL>. Accessed on May 10, 2021

¹⁴ See "Bárbara, why won't you take VaChina?" user TeAtualizei on October 16, 2020. Available at: <https://twitter.com/taoquee1/statuses/1317291728458702848>. Accessed on March 14, 2021

¹⁵ See <https://g1.globo.com/politica/noticia/2021/05/19/nunca-o-presidente-da-republica-mandou-eu-desfazer-qualquer-contratodiz-pazuello-sobre-a-coronavac.ghhtml>. Accessed on May 20, 2021.

Bolsonaro also detailed that he would not authorize the purchase of any Chinese vaccines and that he would not take any vaccines himself. The president's participation in the debate led to an upsurge of mentions on social networks. We collected 560,831 posts on Twitter for that week. The president himself posted on his Twitter profile about the decision, endorsing the arguments of his supporters and declaring that "The Brazilian people will not serve as guinea pigs."¹⁶

The news of Bolsonaro's refusal to authorize the purchase of CoronaVac also had wide reach on Facebook. Three articles on the subject garnered over 550,000 interactions on that social network. The president also spoke about the "huge discredit" of the Chinese vaccine¹⁷. Furthermore, the newspaper *Jornal da Cidade Online* criticized Governor João Doria for threatening "to take the matter to the Supreme Court" to assure the purchase of the vaccine by the federal government. In several news articles, the aforementioned newspaper only referred to CoronaVac in a derogatory tone as the "Chinese vaccine."

Opponents of the Bolsonaro administration, on the other hand, stood in defense of CoronaVac. Their participation reduced the proportional weight of anti-CoronaVac clusters in the debate to 43.9% of posts. Nonetheless, the absolute volume of mentions against CoronaVac recorded in this week of October 2020 was the highest within the analyzed period between March and December 2020.

During epidemiological week 44, late October 2020, there was a reduction in the absolute volume of posts, preserving the high threshold compared to the other analyzed weeks, with circa 118,132 posts. In that week, anti-CoronaVac groups once again dominated the debate, with 77.2% presence. Astrologer Olavo de Carvalho, an important influencer of the Bolsonaro administration, was responsible for the most prominent publication in the period, in which he stated that Brazil had no interest in "compulsory Chinese vaccines."¹⁸ Douglas Garcia also gained notoriety, rallying the population to a demonstration against the mandatory administration of the "vachina".¹⁹

In the subsequent period (epidemiological week 45, in November 2020), the anti-CoronaVac cluster gained even more ground in the digital debate (84.9%), even with a drop in the absolute volume of posts (41,648 mentions on Twitter). Digital influencer Oswaldo Eustáquio was responsible for the most relevant publication, regarding an alleged bribery scandal involving Sinovac employees, the laboratory responsible for the development of CoronaVac in China,²⁰ and Chinese government bureaucrats. The aforementioned influencer was arrested weeks later by order of the Supreme Court (STF) for participating in anti-democratic demonstrations.²¹

16 "JOÃO DORIA'S CHINESE VACCINE – In my Administration, before being available to the population, every vaccine must be SCIENTIFICALLY PROVEN BY THE MINISTRY OF HEALTH and CERTIFIED BY ANVISA. - The Brazilian people WILL NOT BE ANYONE'S GUINEA PIG. (continued)." Jair M. Bolsonaro on October 21, 2020. Available at: <https://twitter.com/jairbolsonaro/statuses/1318909799505985537>. Accessed on March 14, 2021.

17 "Every single vaccine is out of the question, says Bolsonaro" UOL. Available at: <https://bit.ly/3jm0RYD>. "I've already cancelled it', says Bolsonaro about the vaccine intentions protocol from the Butantan Institute in partnership with a Chinese pharmacist." G1. Available at <https://glo.bo/34igdZF>

18 "Brazil does not want a mandatory Chinese vaccine; the Supreme Court wants it. Who's the boss? Brazil does not want gender ideology in schools; The STF wants it. Who's the boss? BRAZIL HAS NO SAY IN ANYTHING." Olavo de Carvalho on October 27, 2020. Available at: <https://twitter.com/opropriolavo/statuses/1321138196256882689>. Accessed on March 14, 2021.

19 "The STF does not have the last word, it is the people who have the last word and the people say: NO TO MANDATORY VACCINATION. The act on NOV 1st now needs to be bigger than ever! Civil disobedience now! Everyone gathered at Av Paulista (MASP) at 14:00 on 11/01. The beginning of our democratic civil reaction!" Douglas Garcia on October 26, 2020. Available at: <https://twitter.com/DouglasGarcia/statuses/1320891381720776704>. Accessed on March 14, 2021.

20 "URGENT: Sinovac officials reportedly made three illegal payments and bribed Chinese Disease Control Center officials and several individuals in the vaccine industry, including CEO Weidong Yin. The crimes came to light in 2016 in the US. Follow the thread." <https://twitter.com/oswaldojor/status/1323018471400185856> Accessed on March 14, 2021.

21 "Moraes, from the Supreme Courte, grants house arrest to Bolsonaroian blogger Oswaldo Eustáquio." <https://www1.folha.uol.com.br/poder/2021/01/moraes-do-stf-concede-prisao-domiciliar-ao-blogueiro-bolsonarista-oswaldo-eustaquio.shtml>. Accessed on March 14, 2021.

Still, on week 46, November 2020, we identified 285,095 publications, among which 56.5% came from the anti- CoronaVac cluster. In this period, the most relevant event was the announcement of the death of one of the volunteers who took part in phase III of the clinical trials of the CoronaVac vaccine. When this fact came to light, Anvisa momentarily suspended the clinical trial and only resumed them the following day, after investigating the event. On this occasion, the President himself posted on Facebook that he had won “another one” against his opponent, João Doria. In the same post, Bolsonaro associated CoronaVac with “death, disabilities, and anomalies.” Even after ruling the cause of the volunteer’s death as suicide, and therefore unrelated to the vaccine, groups linked to the president on social networks spread the narrative that associated the individual’s death to the CoronaVac vaccine. Influencers from the cluster spread unscientific opinions and explanations suggesting that the vaccine caused the suicide.²²

Even after Anvisa’s decision to authorize the study to continue and the report from the city morgue (*Instituto Médico Legal*) attesting drug intoxication as the cause of death, thus unrelated to CoronaVac, President Bolsonaro insisted on the version associating the cause of death to the vaccine. During a live stream on his Facebook profile, the President declared: “It could be a side effect from the vaccine too. Anything could be. I’m not sure if they’ve reached a conclusion, but further clarification is needed and they should go back to research the vaccine, CoronaVac, from China.”²³

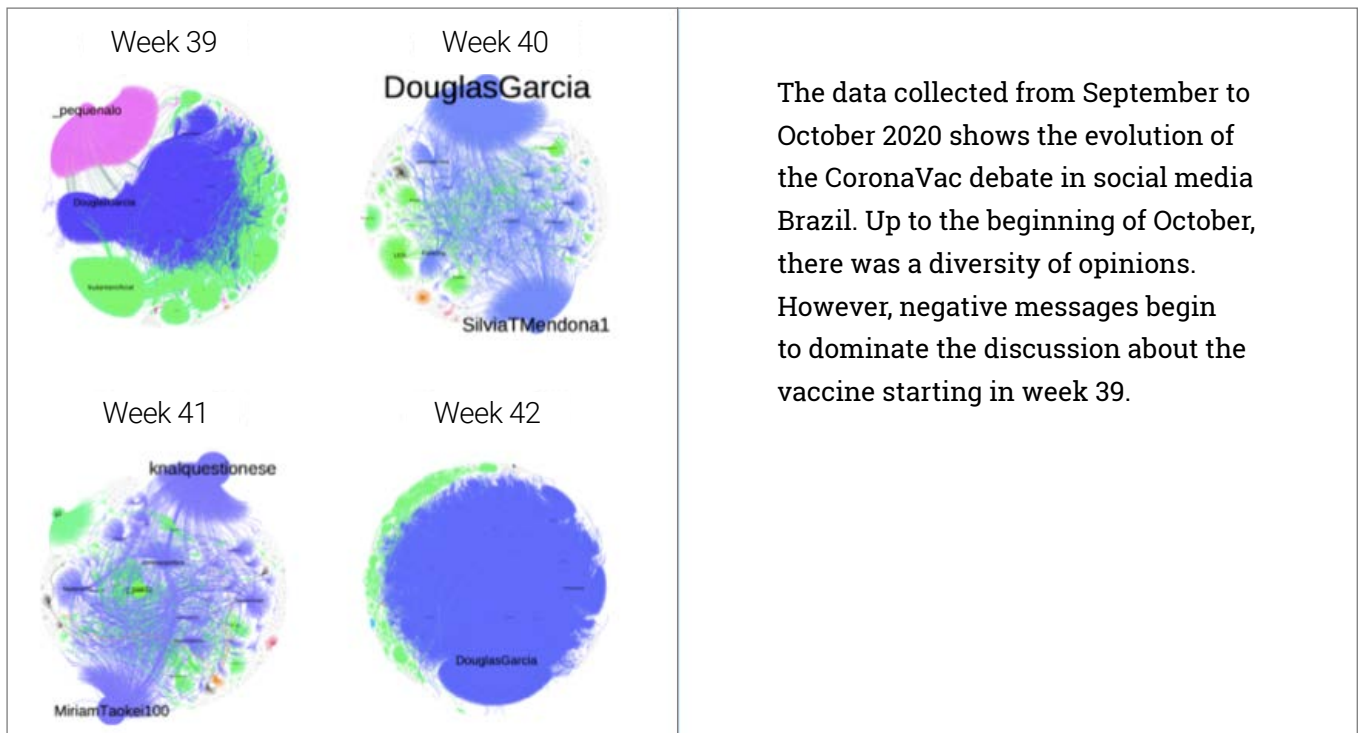
We built the graphs in Figure 3 about the social media profiles in these discussions, collected through the query keywords within the analyzed period. We divided the collected mentions according to the epidemiological weeks of the published posts. Additionally, clusters containing common arguments were formed, and the analysis sought to emphasize the main arguments employed within each cluster. The graphs represent the online social network. The “nodes” represent the users, and the “edges” represent the connections between them.

The escalation of posts began in epidemiological weeks 39 and 46, i.e., between September and November 2020. During this period, there was a change of behavior on Twitter, with a substantial increase of posts originating from profiles of Bolsonaro supporters, who comprised the majority in six of the seven weeks in the period. As stated above, the arguments of this group primarily focused on two axes: i) arguments against the possibility of mandatory vaccination, and ii) declarations against the alleged use of the Brazilian people as “guinea pigs” in clinical trials of the CoronaVac vaccine.

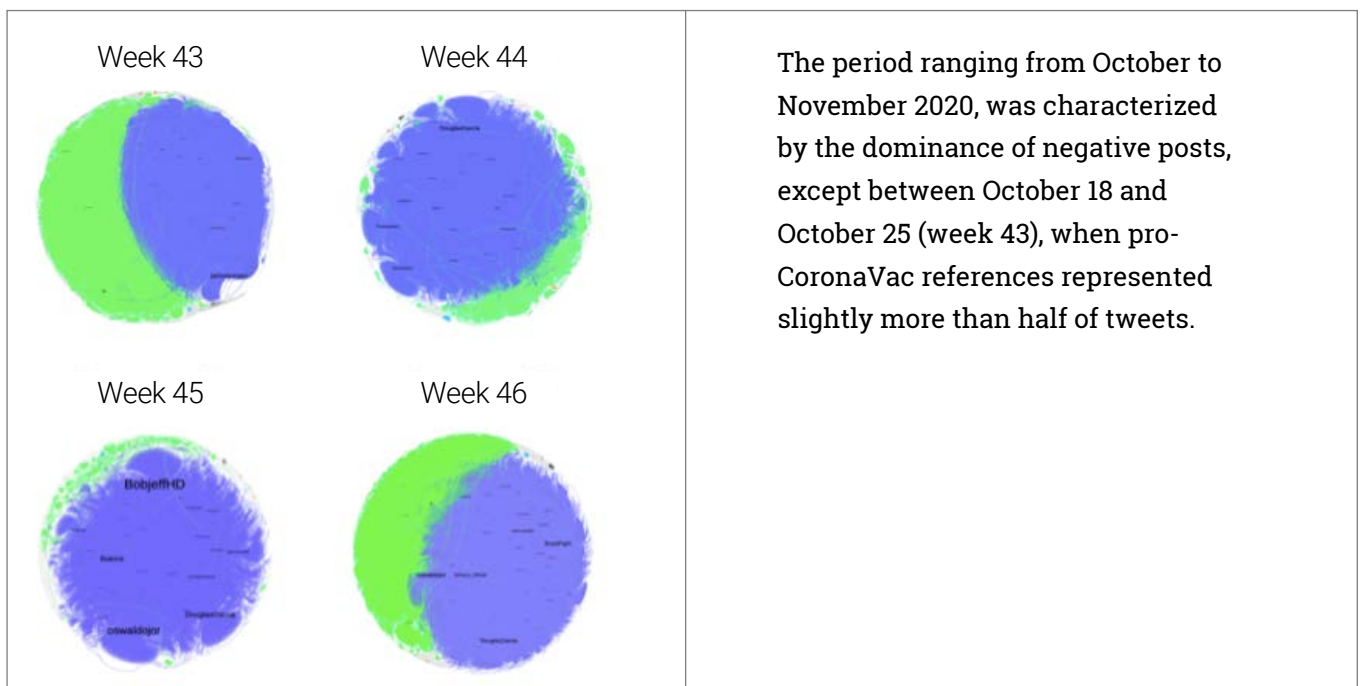
22 “URGENT: expert reports from the City Morgue (IML - Institute of Forensic Medicine) and the IC (Institute of Criminalistics) indicate that the CoronaVac volunteer died as a result of poisoning by chemical agents and not by suicide. The extreme press and the dictatorship will try to hide it. ASCOM OE” Oswaldo Eustáquio on November 12, 2020. Available at: <https://twitter.com/oswaldojor/status/1327008141616279557?s=20>. Accessed on March 14, 2021

23 Bolsonaro says CoronaVac may have caused volunteer suicide. Poder 360 on November 12, 2020. Available at: <https://www.poder360.com.br/coronavirus/bolsonaro-diz-que-coronavac-pode-ter-causado-suicidio-de-voluntario>

Figure 3. Evolution of CoronaVac Twitter posts between September and November 2020 (epidemiological weeks 39 and 46). Different opinion clusters are designated by different colors according to the prevalent type of publication: pro-CoronaVac posts are represented in green; anti-CoronaVac posts in blue; and neutral or non-categorized posts in pink.



The data collected from September to October 2020 shows the evolution of the CoronaVac debate in social media Brazil. Up to the beginning of October, there was a diversity of opinions. However, negative messages begin to dominate the discussion about the vaccine starting in week 39.



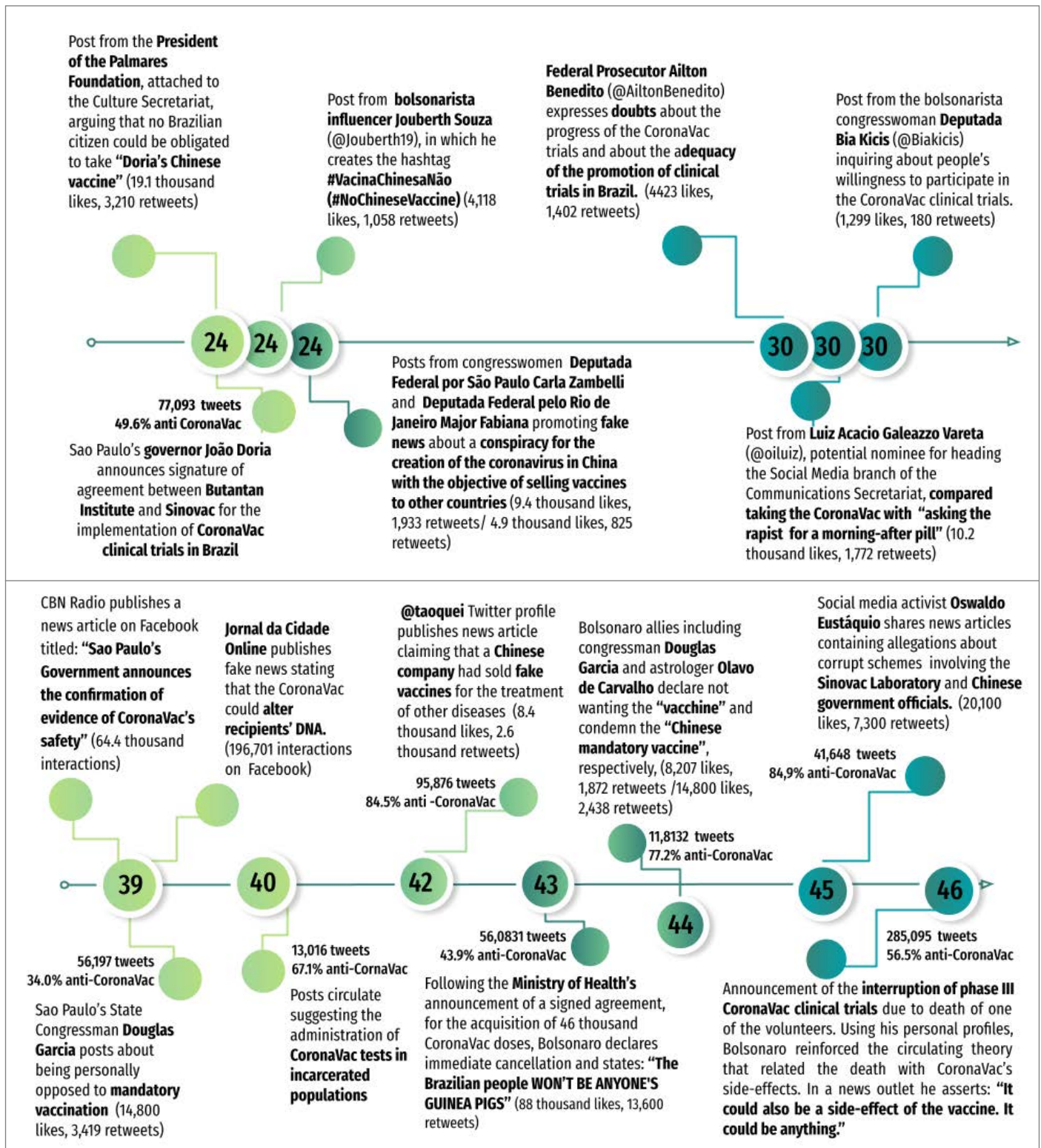
The period ranging from October to November 2020, was characterized by the dominance of negative posts, except between October 18 and October 25 (week 43), when pro-CoronaVac references represented slightly more than half of tweets.

Source: Twitter (2021).

From the material collected and the tone of the debate, it becomes clear that the content published about CoronaVac and vaccination, in general, was the subject of fierce disputes and numerous fake news stories. During the purchase and testing of the vaccine, significant events were the subject of debate among groups in favor and against the federal government. The president himself played an important role in the debate, promoting ideas and opinions against the purchase and use of CoronaVac in Brazil. The reach of these publications, as indicated above, was very broad.

Figure 4 shows a timeline of the most significant manifestations in the period, posted and shared by political agents and officials, as well as digital influencers.

Figure 4. Timeline of the most relevant CoronaVac tweets and the vaccination debate in social media networks



Source: Compiled based on data compiled by Arquimedes (2021)

*Numbers in circles refer to the epidemiological weeks during which the posts made or shared by users. Weeks 32 to 51 of 2020 and weeks 4 to 20 of 2021 are included in this figure.

*The number of likes and retweets were recorded on May 19 2021 based on the consultation of individual original posts on Twitter.

President Bolsonaro's Attacks on CoronaVac

The 75 Presidential discourses, published on the presidency's official government website and analyzed in this note, contain 19 references to vaccines and vaccination, among which 4 are either direct or indirect references to CoronaVac. On his personal profile on Twitter, Jair Bolsonaro mentioned CoronaVac to contest the purchase of the vaccine by the Ministry of Health and to oppose its use by the population. Figure 6 presents a timeline with official statements in which the President addressed CoronaVac and vaccines in general, across different epidemiological weeks in 2020 and 2021. Alongside each statement, the figure also includes the number of new infections and the total number of deaths on the day of the declaration.²⁴

Event for Signing the Provisional Measure for the Coronavirus Vaccine (COVID-19) at the Presidential Palace on August 6, 2020 (epidemiological week 32). When President Bolsonaro first mentioned vaccination in August 2020, the country had officially registered 2,922,604 people infected with SARS-CoV-2 and was approaching the 100,000 deaths milestone.

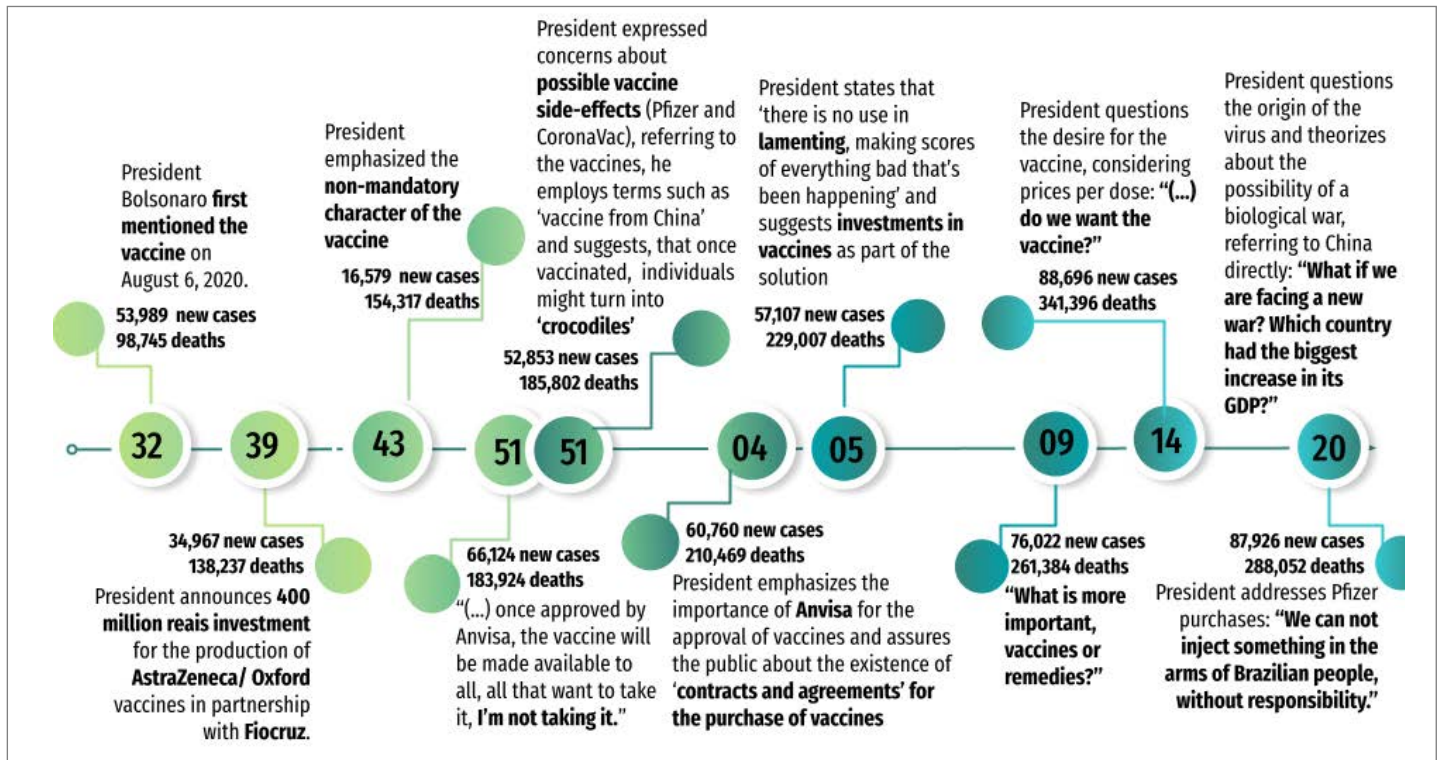
From then on, Bolsonaro began to express clashing opinions about vaccines and vaccination. His rare statements expressing explicit support for vaccination referred directly to the AstraZeneca/Oxford vaccine, but the issue was generally overlooked in presidential speeches. The President's mentions to CoronaVac were usually indirect and associated with negative judgments. Likewise, he frequently associated the vaccine with its country of origin, China.

The explicit condemnation of mandatory vaccination in the country and the promotion of early or off-label treatments – as characterized by the President – were recurrent themes in the declarations of the head of state. Furthermore, during a speech on December 18, 2020 (epidemiological week 51/2020), the President declared he was immunized as the virus had already infected him and, therefore, would not take any vaccine.

Figure 5 displays a timeline with some of the presidential stances regarding vaccines, CoronaVac, and vaccination, as expressed during official speeches since the beginning of 2020.

²⁴ We obtained data on the number of new infections per day and total number of deaths from: W. Cota, "Monitoring the number of COVID-19 cases and deaths in Brazil at municipal and federative units level", *SciELOPreprints*:362 (2020), 10.1590/scielopreprints.362.

Figure 5. President Bolsonaro's most relevant statements in official speeches available on the presidency's official government website for key epidemiological weeks in 2020 and 2021



Source: <https://www.gov.br/planalto/pt-br/acompanhe-o-planalto/discursos>.
*The numbered circles refer to the epidemiological weeks in which the speeches were made during weeks 32 to 51 of 2020 and weeks 4 to 20 of 2021.

*The number of likes and retweets were recorded on May 19 2021 based on the consultation of individual original posts on Twitter.

References to CoronaVac in official presidential speeches:

1. President Bolsonaro questions the origin and destination of the technology used in the production of CoronaVac (week 32/2020):

"And what's most important: with this vaccine, unlike that vaccine a certain governor signed with another country, the technology will be available to us." ²⁵

2. President Bolsonaro discusses mandatory vaccination in the country and criticizes those supporting the measure. In the same speech, Bolsonaro questions the need for vaccinating individuals previously infected with COVID-19 (week 43/2020):

"The Covid vaccine – and the Ministry of Health is responsible for defining this issue, and it has already been defined – will not be mandatory; whoever is propagating this information is disregarding the health and life of other people. Furthermore, in the words of the Minister of Health, and I was with him a short while ago and he is very clear that any vaccine here in Brazil – Ricardo Barros – must have scientific proof and, more so, it must be approved by ANVISA and this won't be quick, it won't happen overnight; we know a lot of people were infected without even knowing, they are already immunized; they want to force that person to

²⁵ Speech by President Jair Bolsonaro, during the Solemn Event for Signing the Provisional Measure for the Coronavirus Vaccine (COVID-19) – Presidential Palace. Available at: <https://www.gov.br/planalto/pt-br/acompanhe-o-planalto/discursos/2020/discorso-do-presidente-da-republica-jair-bolsonaro-solenidade-de-assinatura-da-medida-provisoria-da-vacina-contra-ocoronavirus-covid-19-palacio-do-planalto>. Accessed on 05/17/2021.

take this vaccine.”²⁶

3. In a speech during the Ceremony for sanctioning support for the productive sector at the International Airport of Porto Seguro, President Bolsonaro speaks about the use of CoronaVac in Brazil (epidemiological week 51/2020):

“(…) and the Parliament has an obligation and continues to perfect things, they messed up overturning my veto, that’s true enough; it makes me want to go there and ask: who did it? Are you going to take the injection? Are you going to take the Chinese vaccine or not? You overturned my veto, so you should set the example!”²⁷

He continues and questions:

“And the worst part: messing with people’s immune systems. How can you force someone to take a vaccine that hasn’t yet completed the third stage, if it’s still experimental?”²⁸

Most relevant references to CoronaVac in the President’s personal profiles on social media:

1. Controversy regarding mandatory vaccination and immunization (epidemiological weeks 42 and 43/2020): After Governor João Doria’s declaration favors mandatory vaccination during a press conference, Bolsonaro and his allies criticized this position on social media. Once again, the President declared that people previously infected with the coronavirus are allegedly immunized against the virus and therefore have no need for vaccination. Bolsonaro argued that the Brazilian people are being exploited as “guinea pigs” in the CoronaVac clinical study on his social media profile. On this topic, the President declared

“The Brazilian people WILL NOT BE ANYONE’S GUINEA PIG.”²⁹

On Facebook, the news that Bolsonaro would not authorize the purchase of the vaccine had a broad reach. Three news articles on the subject gathered over 550,000 interactions on that social network. The president also emphasized the “huge discredit” of the Chinese vaccine.³⁰

2. President Bolsonaro speaks about the interruption of the CoronaVac clinical trial in Brazil, after an adverse incident (epidemiological week 46/2020): On November 10, the media reported the death of one of the volunteers participating in phase III of the CoronaVac trials in Brazil. ANVISA momentarily suspended the tests to investigate the event before authorizing them to recommence the following day. On his personal Facebook profile, President Bolsonaro posted that he had won “another one” against his opponent, João Doria. In the same post, he also associated CoronaVac with “death, disabilities, and anomalies”.

²⁶ Speech by the President of the Republic, Jair Bolsonaro, at the Announcement Ceremony of the Results of the COVID-19 Clinical Study - MCTI - Palácio do Planalto. Available at: <https://www.gov.br/planalto/pt-br/acompanhe-o-planalto/discursos/2020/discurso-do-presidente-da-republicajair-bolsonaro-na-cerimonia-de-anuncio-do-resultado-do-estudo-clinico-covid-19-mcti-palacio-do-planalto>. Accessed on: 05/17/2021.

²⁷ Speech by the President Jair Bolsonaro at the Ceremony for sanctioning support for the productive sector at the International Airport of Porto Seguro. Available at: <https://www.gov.br/planalto/pt-br/acompanhe-o-planalto/discursos/2020/discursodo-Presidente-da-republica-jair-bolsonaro-na-cerimonia-de-assinatura-de-acts-of-support-for-the-productive-sector-international-airport-of-safe-port>. Accessed on 05/17/2021.

²⁸ See “Bolsonaro speaks against immunization and reiterates that he will not be vaccinated”. Valor. Available at: <https://valor.globo.com/brasil/noticia/2020/12/17/bolsonaro-discursa-contra-imunizacao-e-repete-que-nao-ira-se-vacinar.ghtml>.

²⁹ The original publication can be found at: <https://twitter.com/jairbolsonaro/statuses/1318909799505985537>. Accessed on 05/05/2021.

³⁰ See ANDRADE, HANRRIKSON. “Every single vaccine is out of the question, says Bolsonaro.” Uol, October 21, 2020. Available at: <https://noticias.uol.com.br/saude/ultimas-noticias/redacao/2020/10/21/bolsonaro-cancela-acordo-por-coronavac-nao-abromao-da-minha-autoridade.htm>

Furthermore, during a live stream on the same platform, the president implied an association between supposed CoronaVac side effects and the participant's death:

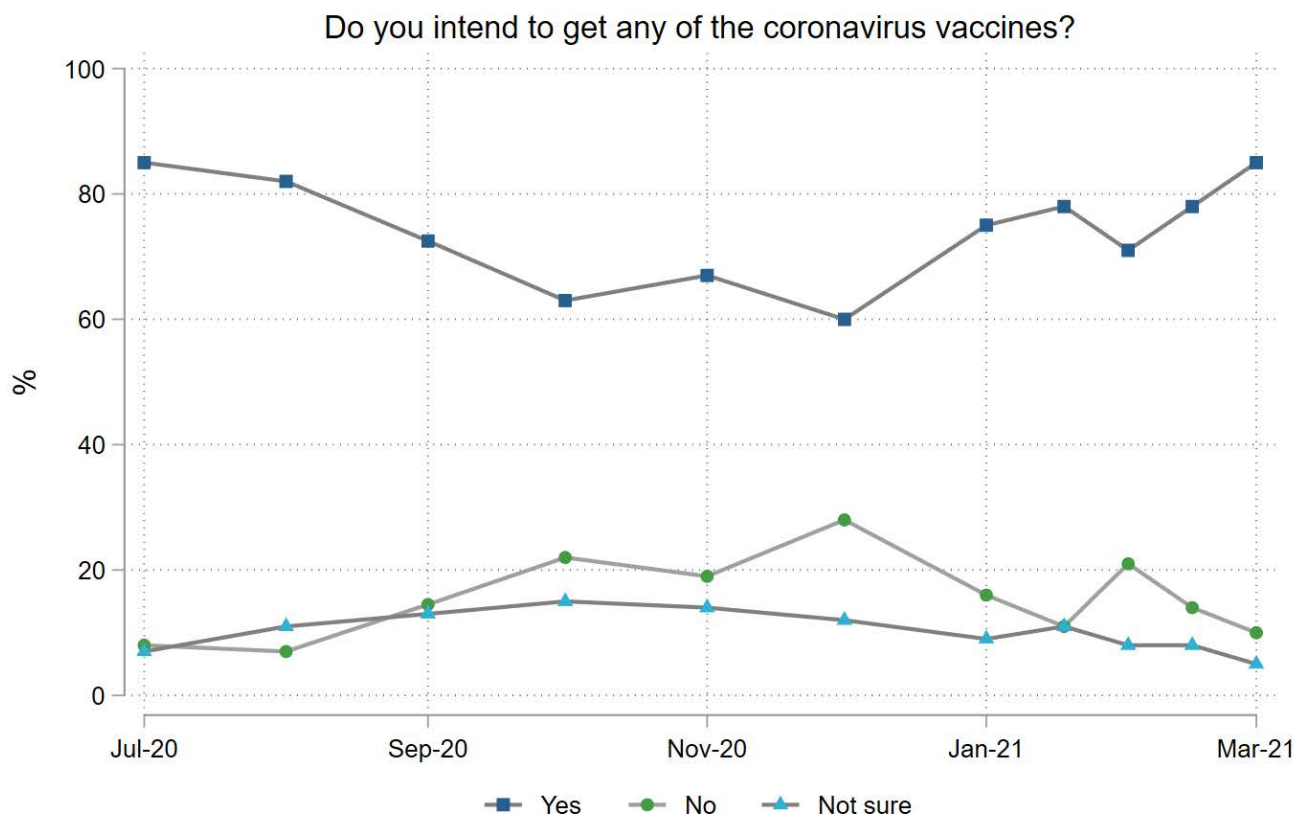
"It could be a side effect from the vaccine too. Anything could be. I'm not sure if they've reached a conclusion, but further clarification is needed and they should go back to research that vaccine, CoronaVac, from China."

Public Opinion Regarding Vaccination and Vaccine Hesitancy

Between July 2020 and March 2021, PoderData performed public opinion polls to gauge the intention of the Brazilian population to participate in the immunization campaign. More specifically, the company asked the following question: "Do you intend to take any of the coronavirus vaccines?"

Figure 6 shows the variation in willingness to accept a COVID-19 vaccine. The lowest adherence was registered in December 2020, the same month when the federal government announced the acquisition of CoronaVac doses produced by the Butantan Institute, which consolidated the prospect of using the immunizing agent in other states besides São Paulo. Furthermore, from January 2021, the month in which the National Health Surveillance Agency (Anvisa) approved the emergency use of CoronaVac, we find a rise in the number of respondents willing to be immunized, with a slight drop in February 2021 and a subsequent increase in March.

Figure 6. Intent to vaccinate, July, 2020 to March, 2021

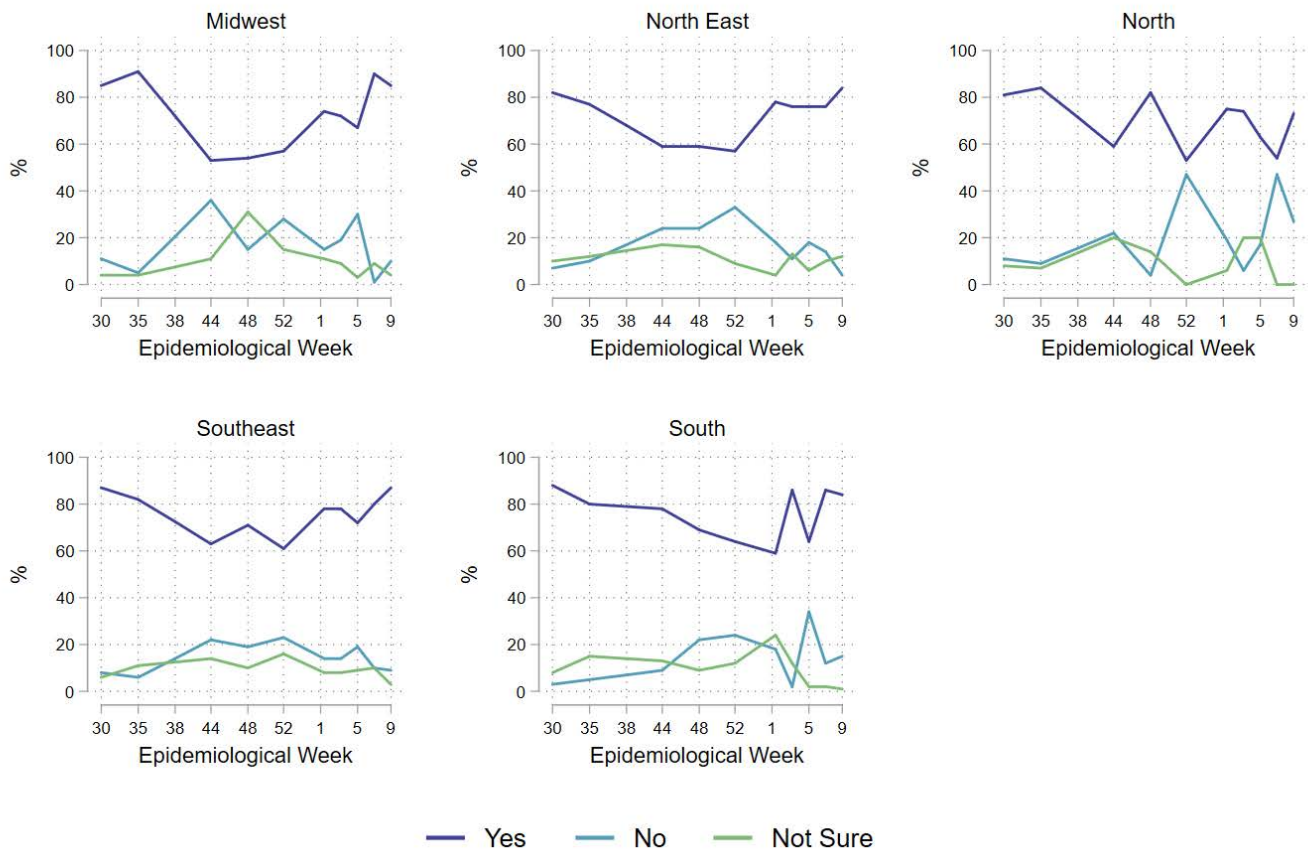


Source: PoderData (2020, 2021).

See DIAS, Carlos Henrique. RIBEIRO JR, Eduardo. "I've already cancelled it", says Bolsonaro about the vaccination protocol guidelines of the Butantan Institute in partnership with a Chinese pharmaceutical company". G1, October 21, 2020. Available at: <https://g1.globo.com/sp/sorocaba-jundiai/noticia/2020/10/21/jamandei-cancelar-diz-bolsonaro-sobre-protocolo-de-intencoes-de-vacina-do-instituto-butantan-em-parceria-com-farmaceutica-chinesa.ghtml> Matéria do G1: <https://glo.bo/34igdZF>; See "Bolsonaro says government will not buy CoronaVac even if Anvisa approves the vaccine". O Globo, October 22, 2020. Available at: <https://oglobo.globo.com/sociedade/coronavirus/bolsonaro-diz-que-governo-nao-comprara-coronavac-mesmo-se-vacina-for-aprovada-pela-anvisa-1-24705798> News story from O Globo: <https://glo.bo/2lOwTzJ>.

Figure 7 shows the population’s willingness to receive a vaccine by region. The pattern in the Southeast region is similar to the general pattern observed in Figure 7. Considering only the low willingness registered in December 2020, the pattern repeats itself across all regions of the country. The North region expressed the most significant refusal in December 2020, and the region also had the highest variation in the intent to vaccinate.

Figure 7. Intent to vaccinate by Region, July, 2020 to March, 2021



Source: PoderData (2020, 2021).

Conclusion

In a recent study, the Center for Countering Digital Hate (CCDH) analyzed over 812,000 vaccine-related posts on Facebook and Twitter. The report reveals that “anti-vaccine activists on Facebook, YouTube, Instagram, and Twitter reach more than 59 million followers, making these the largest and most important social media platforms for anti-vaxxers.” Significantly, even with overwhelming evidence of constant publication of fake news stories, the CCDH reports that only three of the 12 most influential social media activists were removed from at least one platform. However, none of these activists were removed from all social platforms.

Considering the Brazilian case, our policy brief provides vital information for us to discuss the role of activists in social networks in Brazil during a health and humanitarian crisis. Our policy brief shows evidence that the actions of these activists, who oppose COVID-19 vaccines, particularly the CoronaVac vaccine, were backed by the President of the Republic and as well as federal and state congressional representatives.

The volume and content of anti-vax protests trail the evolution of events in the country and the world, often setting the tone of the debate and the information mobilized and shared on a large scale about these issues. As noted in this policy brief, the information shared often conflicted with official scientific guidelines, with the widespread incidence of fake news. In this regard, an analysis of social networks may help us understand changes in public opinion and behaviors related to vaccination, and CoronaVac in particular, and how people adhere to anti-vaccine positions.

As we face a sanitary and humanitarian emergency, in which Brazil emerges as one of the leading countries in COVID-19 infections and deaths globally, the need for clear, transparent guidelines based on the best scientific evidence available is essential to reduce the number of cases and deaths. The information presented in this policy brief provides evidence of the widespread dissemination of negative mentions of the CoronaVac vaccine not based on available scientific data. This could induce the general population to refuse the immunizing agent and harm the country's relationship with important commercial partners and suppliers of necessary raw materials for producing the vaccine, such as China.

Equally significant is that public agents were responsible for disseminating much of the misleading or false information about CoronaVac on social media, such as federal and state congressional representatives and even the President of the Republic. These platforms catalyze the reach of these messages, spreading disinformation and fake news under the guise of the authority and prestige of the offices occupied by their interlocutors.

As of May 2021, Brazil has not yet completed the vaccination of priority groups and the odds of vaccinating the entire population by the end of the year seem like an increasingly distant reality. Amid this scenario, counter to those who reject the vaccine based on origin or fake news, different sectors of society have called for the approval, acquisition, and use of all available vaccines, regardless of their origin. An efficient and systematic evolution of the vaccination campaign against the coronavirus in the country will only happen with the sharing of scientifically-based information and education policies communicating the importance and necessity of the vaccine.

Policy Recommendations

- Information on the benefits, risks and other studies associated with COVID-19 vaccines must be transparently available;
- The veracity of the information disseminated by political leaders and social media influencers must be permanently monitored;
- Public authorities must focus their efforts on acquiring the most significant number of vaccines possible, regardless of their origin;
- Mass vaccination campaigns to mitigate the negative impacts of disseminating fake or negative messages associated with COVID-19 vaccines. Multi-platform communication strategies, with the participation of the SECOM (Special Secretariat for Social Communication) and the Ministry of Health, should focus on clear and precise dissemination of the importance of vaccination as well as the efficacy and adequate immunizing capacity of CoronaVac and other vaccines already authorized by ANVISA;
- Promote further transparency about ongoing processes in ethical and regulatory institutions, such as ANVISA and CONEP (National Commission on Ethics in Research), and strengthen such institutions.
- Politicians in office must be held responsible for disseminating false information through verification and accountability mechanisms;
- In strict cooperation with state and municipal governments, the Federal Government must promote efforts to combat fake news, creating a workgroup to coordinate appropriate guidelines and actions. Some important initiatives are already underway in the judicial system and congress, such as Bill 2,630/20, which establishes rules for the use and operation of online social networks and private messaging services;
- Social media platforms, such as Twitter, Facebook, and Instagram, should provide greater transparency of the information shared on their platforms, allowing access to social media data and activity of registered users and;
- Respecting privacy limits and personal identification, according to General Data Protection Law 13,709/18, such access should allow researchers, journalists, NGOs, and society, in general, to gather information and perform studies and analyses within this field to promote efforts against fake news and disinformation networks.

ABOUT

We are over 100 researchers, actively engaged in the task of improving the quality of public policies within federal, state, and municipal governments as they seek to act amidst the Covid-19 crisis to save lives. We dedicate our energies towards rigorous data collection, devising substantial information, formulating indicators, and elaborating models and analyses to monitor and identify pathways for public policies and review the responses presented by the population.

The Solidary Research Network has researchers from all scientific fields (Humanities as well as Exact and Biological Sciences) in Brazil and overseas. For us, the combination of skills and techniques is vital as we face the current pandemic. The challenge ahead is enormous, but it is particularly invigorating. And it would never have come to fruition if it weren't for the generous contribution of private institutions and donors who swiftly answered our calls. We are profoundly grateful to all those who support us.

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