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ABSTRACT

Vaccination programs, such as the Brazilian National Immunization Program (PNI in Portuguese), are extremely important for the health and development of children, constituting a key element in combating lifelong disease exposure; in this way, activities that go against these programs reduce their effectiveness. In this context, discussing the impact of anti-vaccine movements gains significance, evident in their recent influence amid the COVID-19 vaccine rollout, prompting queries about vaccination program legitimacy. This study consists of presenting an integrative literature review (hereafter, ILR), following all six fundamental steps for the elaboration of an ILR, focusing on the guiding question “What is the impact of anti-vaccine movements in the Brazilian immunization program for children and adolescents?”. We selected 13 articles to obtain the discussion and conclusion of our work, and, based on these studies, we concluded that the influence of movements in the context of childhood vaccination was notorious, since it was demonstrated that parents are directly and indirectly influenced by this ideology to take the decision not to vaccinate their children, being influenced by means of communication without scientific basis, mainly the Internet. Hence, this study has revealed that anti-vaccine movements are not confined to particular locales; rather, they detrimentally impact children's adherence to vaccination schedules. Consequently, investigating the ramifications of anti-vaccine ideology on pediatric health becomes imperative.

Keywords: Anti-vaccine. Children. Health.

RESUMO

Programas de vacinação, como o programa nacional de imunização (PNI), possuem extrema importância para a saúde e o desenvolvimento de crianças, sendo fator fundamental para combater doenças as quais elas serão expostas ao longo da vida, entretanto atividades que vão contra esses programas diminuem a sua eficiência. Nesta vertente, é importante discutir os impactos causados por movimentos antivacina, pois observou-se, recentemente, a influência desses movimentos durante o período da implementação de vacinas para combater a pandemia da Covid-19, responsáveis por colocar em questionamento a legitimidade de programas vacinais. Este trabalho consiste em apresentar uma revisão integrativa da literatura (doravante, RIL), seguindo todos os seis passos fundamentais para a elaboração de uma RIL com foco na pergunta norteadora “Qual é o impacto dos movimentos contra vacinas no programa de imunização do público infante-juvenil?”. Sendo assim, foi possível selecionar 13 artigos para obtenção da discussão e da conclusão do trabalho e, com base nesses estudos, foi notória a influência dos movimentos no quadro de vacinação infantil, pois os pais demonstraram sofrer influência direta e indireta dessa ideologia antivacina para a tomada de decisão de deixar de vacinar os filhos, influenciados por meios de comunicação sem base científica, principalmente a internet. Foi possível, portanto, evidenciar ao longo deste trabalho que os movimentos antivacina já passaram de ser apenas um problema pontual e local, visto que impactam negativamente na adesão de crianças ao esquema vacinal, em virtude desses movimentos. Assim, faz-se necessária uma investigação sobre os efeitos da ideologia antivacina na saúde infantil.

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INTRODUCTION

The Brazilian National Immunization Program (PNI in Portuguese) is the method adopted by Brazil to regulate the rules and laws regarding the vaccination schedule for the population, offering about twenty types of vaccines free of charge and targeting individuals of different age groups, such as children and the elderly. It is an essential program to combat and control numerous diseases that harm the health and protection of Brazilians (Brasil, 2022).

Immunization through vaccines symbolizes a means of preventing infectious diseases. In the younger population, the impact of the introduction of vaccines in pregnant women and children is evident, with a significant reduction in the number of diseases and complications of infectious diseases in children (Sousa, Vigo & Palmeira, 2012). An example of this is the polio vaccine, which can cause paralysis of the lower limbs in children. With high adherence to the vaccination schedule, there has been a notable decrease in the number of cases and severity of this disease (Couto, Barbieri & Matos, 2021).

In 2020, the Chinese government confirmed a new variant of the coronavirus. Following the identification of COVID-19, a public health emergency of international concern was declared by the World Health Organization (WHO), initiating a search for the development and application of a vaccine against this disease (Barbosa, Silva, Martins & Lima, 2022).

It is important to emphasize that the release of vaccines to the population requires numerous controlled tests. According to the Brazilian Society of Immunization (SBIM, 2021), it is possible to determine a minimum number of events and, from this, to confidently assert the efficacy of vaccines. Nevertheless, during the pandemic, a resistance movement against vaccines was observed, referred to as the anti-vaccine movement, which led to behaviors ranging from hesitation to outright refusal of the vaccine. The main reasons for these reactions were a crisis of public trust, conspiratorial perspectives and misinformation (Couto et al., 2021).

According to Nassarala et al. (2019), the anti-vaccine movement is based on a group of people who spread their ideology through social media and “scientific” journals, making it difficult to control diseases. This anti-vaccine movement has had a global impact, being directly linked to outbreaks of mumps in the United States of America (USA) and Mongolia. In Brazil, the movement has been linked to a resurgence of smallpox cases.

Anti-vaccine movements perpetuate the idea that vaccines do more harm than good. They seek to portray vaccination as a threat and an attempt to control the population, often using political, philosophical, or faith-based arguments and emotions (Araújo, Silva, Carneiro, Neves & Barbosa, 2022).

The growth of this movement poses a challenge

to public health, as it contradicts the objectives of PNI, established in 1973. The PNI has contributed to the reduction of mortality and disability caused by vaccine-preventable diseases (Araújo, 2020).

Given the above, the purpose of this study is to conduct a literature review to analyze and discuss the impact of anti-vaccine movements on childhood immunization schedules. Therefore, the selected topic becomes relevant and allows for a discussion of the hypothesis that there is a negative association between anti-vaccine movements and vaccine schedule adherence. This situation is potentially of public health concern.

MATERIALS AND METHODS

This work is an integrative literature review (ILR) and, therefore, for the construction of the study, the six stages for this type of scientific approach were used: topic and question selection, inclusion and exclusion criteria, data collection from studies, critical analysis of the selected articles, results interpretation and discussion, and ILR presentation (Sousa, Firmino, Marques-Vieira, Severino & Pestana, 2018).

First, the research question was formulated using the research acronym PICo, in which *P* represents the study population, *I* represents the phenomenon of interest to be studied and discussed in the article, and *Co* represents the context in which the population and the phenomenon of interest are located (Araújo, 2020). Thus, the population selected for this study was the child and adolescent public; the phenomenon of interest was the impact of the anti-vaccine movement on health care; the context selected was the decline in vaccination rates in the study population.

Then, the health science descriptors platform (DeCS/MeSH) was used to select the descriptors for the research: anti-vaccine; health; and child. This allowed the guiding question to be formulated: “What is the impact of anti-vaccine movements on the immunization program for children and adolescents?”. Based on the formulated question, a search was conducted in virtual health libraries, including the National Library of Medicine (PubMed), the Virtual Health Library (VHL), and the Portal of Journals of the Coordination for the Improvement of Higher Education Personnel (CAPES Journals).

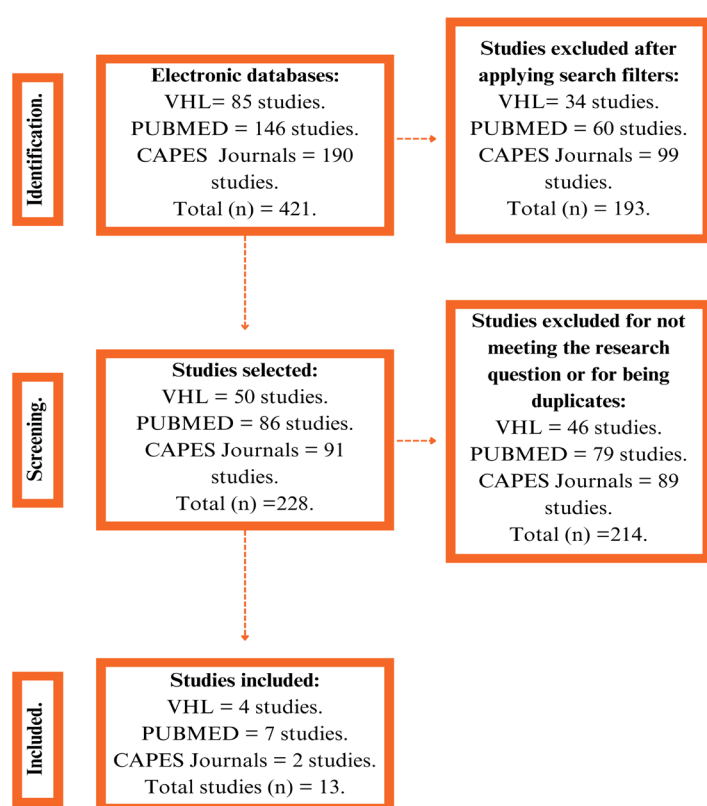
In addition, the Boolean operator “AND” was used to create the search strategy “anti-vaccine AND health AND child”. In this context, inclusion and exclusion criteria were selected for this article. Inclusion criteria were texts in English and Portuguese, studies conducted within the last five years, academic papers with participants ranging from newborns to twelve-year-old children, and freely available full texts. Exclusion criteria included narrative studies, integrative and systematic reviews, duplicate studies in virtual libraries, and incomplete or unavailable studies.

For the third phase, information was collected including article title, author names, years of publication, study designs, objectives, results, and conclusions. Given the research question, 13 articles were identified that met the inclusion and exclusion criteria and were most relevant to the guiding question. This made it appropriate to collect data for the results and discussion of the article. Thus, the completion of all these stages can be observed in the flow chart shown in Figure 1.

Finally, the development of this ILR study was achieved, encompassing all the necessary requirements, and the information obtained is presented in the “Results and Discussion” section of this review.

Figure 1

Flowchart of study selection according to the inclusion and exclusion criteria.



Source: The authors.

RESULTS AND DISCUSSION

A total of 228 articles were identified after searching the databases. After applying inclusion and exclusion criteria and screening titles, abstracts, objectives, methods, results, and conclusions, 13 articles were identified and selected for the study. These are listed in Table 1.

In terms of language, all selected articles are written in English. During the database search, there were few studies in Portuguese and none met all the necessary criteria for inclusion in the ILR. In terms of methodology, four articles used a mixed approach, while nine articles used a qualitative approach.

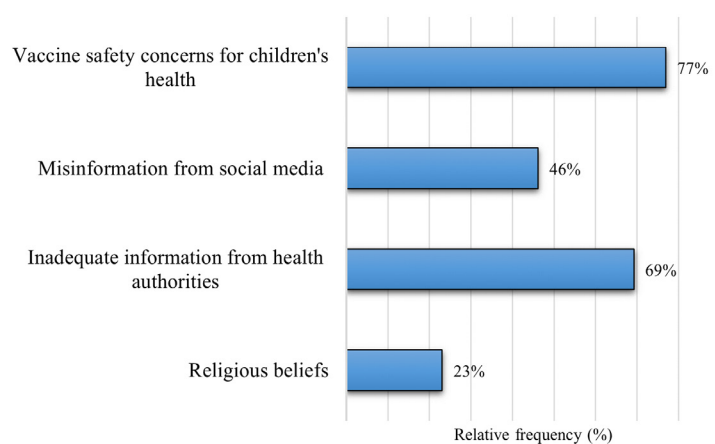
It's worth noting that there was consistency in the data provided by the selected articles, allowing for

the identification of similarities in the factors leading to resistance to childhood vaccination. Four main groups of elements described in the articles could be identified: vaccine safety concerns for children's health, misinformation from social media, inadequate information from health authorities, and religious beliefs.

Figure 2 illustrates the relative frequencies of these factors as determinants in the decision to withhold child vaccination. The data is based on the 13 selected studies. In terms of publication dates, two articles were published in 2022, five in 2021, three in 2020, and three in 2019. Table 1 provides a summary of the articles used in the integrative review.

Figure 2

Core factors and triggers for resistance to childhood vaccine hesitancy based on the results of selected studies.



Source: The authors.

This research showed that parents' main sources of information about vaccines are social media and their community, including relatives and close friends. They prefer to research the topic on their own, rather than seeking help from qualified professionals who could provide accurate information. This exposes them to conflicting texts, anti-vaccine rhetoric, and fake news, which are increasingly prevalent on social platforms (Hughes et al., 2021).

According to Mayerová and Abbas (2021), 30% of study participants reported looking for information about vaccines online. This means that nearly one-third of parents make the crucial decision of whether or not to vaccinate their children based on information found online, which often lacks scientific validation. Another important finding of the study is that mothers who use the Internet as their primary source of information about childhood vaccines tend to have less confidence in vaccination.

It's clear that the opinions of health care professionals play a critical role in parents' decisions about vaccinating their children. Professionals in the field should consistently emphasize the importance of childhood immunization for the well-being of young people and their families (Bankiewicz, Dworakowska, Makarewicz-Wujec & Kozłowska-Wojciechowska, 2022).

Table 1

Summary of articles.

Title / Authors / Year	Objective	Main findings	Conclusion
Drivers and barriers for measles rubella vaccination campaign: a qualitative study / Krishnendhu and George (2019).	To analyze accelerators and barriers to measles and rubella vaccine acceptance in a primary health care center.	The biggest barriers were social media and religious affiliations. The biggest accelerators were the efforts of health professionals.	It is necessary to map anti-vaccination advertisements and include people interested in promoting vaccination campaigns.
Influence of political and medical leaders on parental perception of vaccination: a cross sectional survey in Australia / Zhang et al. (2019).	To investigate parental attitudes towards vaccination related to media messages from medical and political leaders.	Parents with a fixed idea about vaccination constituted 23.8% of the total and parents with a more open view were 76.2%. The latter were more likely to change their position on vaccination after viewing media messages on the topic.	Most parents are subject to the influence of social media messages from political and medical leaders.
Knowledge of human papillomavirus (HPV), attitudes and practices towards anti-HPV vaccination among Israeli pediatricians, gynecologists and internal medicine doctors / Khamisy-Farah et al. (2019).	To address the knowledge gap that exists among health professionals regarding the recommendation of vaccination for HPV.	Knowledge about HPV and the anti-HPV vaccine is moderate among health professionals, and it is possible to observe a knowledge gap and doubts about the anti-HPV vaccine.	Among Israeli pediatricians, gynecologists, and internal medicine physicians, knowledge was generally moderate. However, it is worth mentioning that the recommendation of vaccination by professionals in the area resulted in an increase in the intention of parents to vaccinate their children.
Unvaccinated children as community parasites in national qualitative study from Turkey / Yalçın, Bakacak and Topaç (2020).	To identify beliefs and socioeconomic, cultural and environmental risk factors that influence vaccination refusal.	The main reasons used as a justification for not vaccinating are: vaccine safety, freedom of choice, hesitation of health professionals, lack of information about the vaccine, lack of confidence in the health system and anti-vaccine publications in the media.	The solution to vaccine rejection is to take the right approach during pregnancy.
Trait reactance and trust in doctors as predictors of vaccination behavior, vaccine attitudes, and use of complementary and alternative medicine in parents of young Children / Soveri et al. (2020).	To investigate whether anti-vaccine attitudes and positive behavior towards complementary and alternative medicine (CAM) are driven by traits of immunization resistance and distrust of physicians.	Parents with greater resistance had: less confidence in doctors, more negative attitudes towards vaccines, non-acceptance of vaccinating their children and themselves and more likely to use CAM treatments.	Greater resistance and distrust of doctors, by people of different profiles, results in attitudes against conventional medicine. Resulting in an anti-vaccine movement and an increase in unconventional treatment.
The state of vaccine confidence in Poland: a 2019 nationwide cross-sectional survey / Furman et al. (2020).	To assess attitudes and behaviors towards mandatory childhood vaccination, with particular emphasis on socioeconomic factors that determine vaccine confidence among adults in Poland, and to identify the impact of the antivaccine movement on immunization coverage of children and adolescents.	There was a positive correlation between trust in doctors and trust in the vaccine. In addition, there was also a positive correlation between scientific knowledge and adherence to vaccination. And a negative relationship was observed between beliefs in horoscopes and acceptance of immunizers.	There is a significant correlation between confidence in the vaccine and confidence in medicine and scientific knowledge, pointing to the importance of the role of health professionals in strengthening public awareness of vaccines.
The influence of socio-demographic characteristics on attitudes towards prophylactic vaccination in Poland / Włodarska, Gujski, Pinkas and Raciborski (2021).	To determine the association of several factors sociodemographic effects on attitudes towards vaccination.	People with better financial conditions, higher education and age above 65 years were associated with vaccination support. In addition, 31% of respondents believe that vaccines are promoted with interest from the pharmaceutical industries and 22% believe that vaccines can cause serious problems in child development, including autism.	Most socioeconomic factors analyzed had little or no influence on the population's vaccination choices. Anti-vaccination beliefs were closely associated with religiosity and small and medium-sized cities.
Public health practitioner perspectives on dealing with measles outbreaks if high anti vaccination sentiment is present / Robinson, Wiley and Degeling. (2021).	To identify priorities when facing a measles outbreak in a region with a large number of anti-vaccination movements.	Priorities should be moving unvaccinated people out of the region with the outbreak and tackling misinformation about vaccines.	These findings can be used to form communication strategies and guided information in cases of outbreaks.

(Continued)

Table 1 (Continued)

Development of a codebook of online anti-vaccination rhetoric to manage COVID-19 vaccine misinformation / Hughes et al. (2021).	To identify prominent narratives and rhetorical styles common to anti-vaccine and COVID-19 denialist media.	They obtained 5 narrative texts and 4 texts with a rhetorical style as representative of all the evaluated materials.	It is essential that further studies be done in advance of upcoming public health campaigns to combat the antivaccine movement and misinformation about COVID-19.
Childhood immunisation timeliness and vaccine confidence by health information source, maternal, socioeconomic and geographic characteristics in Albania / Mayerová and Abbas (2021).	To estimate childhood immunization and vaccine confidence associated with the source of health information and characteristics of Albania.	78.1% of mothers of children under 5 years of age never refused to vaccinate their children. 1.3% of mothers always refused to vaccinate their children due to safety and side effects. Had a lower child immunization in situations where mothers used the internet and social media as a source of health information.	By reinforcing scientific evidence through virtual communication coupled with an assessment of anti-vaccination movements on social media, it should be beneficial to increase confidence in vaccines in Albania.
Attitudes of East Tennessee residents towards general and pertussis vaccination: a qualitative study / Tandy and Tree (2021).	To identify factors influencing attitudes about vaccination in East Tennessee.	The 8 participants who felt comfortable with vaccination reported following medical recommendations. All 3 participants reported concerns about safety and side effects. They reported that they refer to non-academic or professional sources.	Risk perception and attitudes of family and social groups are the primary influences on vaccine-related decisions.
Evaluation of anti-vaccination movement in Turkey: qualitative reports of family physicians / Ozen et al. (2022).	To evaluate the anti-vaccination movement based on communication between family physicians and parents who are against vaccination.	The most common concern of parents with vaccines was the side effects, followed by the origin of the vaccines, religious issues and distrust of vaccines.	By reinforcing communication with persuasive skills of health professionals, acceptance of vaccination in children should be increased.
Beliefs and sentiments of parents vaccinating their children - small town perspective in Poland: a preliminary study / Bankiewicz et al. (2022).	To understand the thinking and faith of parents who vaccinate their children and how this influences decision-making.	Factors related to a positive attitude towards vaccination are: effective disease prevention, safety, benefit greater than risk and concern for children.	Several factors affect parents' decision to vaccinate their children.

Source: The authors.

According to Bankiewicz et al. (2022), several factors contribute to vaccine hesitancy and parental anxiety when making the decision to immunize their children. Conflicting information in the media and communication channels fuels the belief that vaccines can cause disease or weaken the immune system. This leads to negative perceptions of vaccines, such as concerns about harmful side effects, suspicions that vaccines are a profit-driven strategy by the pharmaceutical industry, and fears that multiple doses are excessive and harmful to children.

A segment of the population relies on scientifically unreliable information to make health decisions. These individuals have a false sense of competence and confidence in their understanding of vaccination, a phenomenon known as the Dunning-Kruger effect. This leads them to decide whether or not to vaccinate based solely on their own limited knowledge (Furman et al., 2020; Tandy & Tree, 2021).

It was found that negative attitudes toward vaccination are particularly influenced by religious leaders and anti-vaccine physicians, who pose significant barriers to vaccine acceptance (Soveri et al., 2020; Özen et al., 2022). In addition, according to Zhang (2019), public figures such as celebrities and politicians influence public

views on vaccination, since many parents' perspectives can be swayed by these influential figures, who should ideally provide health information based on proper scientific evidence.

Certain factors encourage vaccination, while others discourage uptake. For example, for diseases such as measles and rubella, parental concerns, religious ideologies, and misinformation spread through social media contribute to lower childhood vaccination rates. On the other hand, proper guidance from health professionals who are well informed about vaccines is a key factor in increasing vaccination rates (Khamisy-Farah et al., 2019; Krishnendhu & George, 2019).

It is worth emphasizing that communication became more feasible when health care professionals actively engage with vaccine-hesitant parents. This approach fosters a strong doctor-patient relationship and ensures that information is delivered in an accessible manner. Thus, it is clear that the doctor-parent relationship facilitates vaccine acceptance (Özen et al., 2022). In addition, increasing knowledge about immunity has been crucial in increasing vaccine acceptance among healthcare professionals themselves (Paterson et al., 2016).

Therefore, it's clear that disseminating knowledge

to anti-vaccine groups by healthcare professionals, whether in the clinic or via social media, is critical to increasing vaccination rates (Włodarska, Gujski, Pinkas & Raciborski, 2021). Clinical settings provide visual aids such as vaccination schedules and pamphlets detailing potential side effects and consequences of deviating from the recommended vaccination regimen. They also provide free information on vaccine mechanisms, safety, and herd immunity concepts (Yalçın, Bakacak & Topaç, 2020).

According to Yalçın et al. (2020), informative discussions about immunization during pregnancy can help raise parental awareness, reduce misconceptions, and promote greater vaccine acceptance. It's worth noting that the right to vaccination in Brazil, both during pregnancy and for newborns, has been guaranteed by the National

Immunization Program for about 50 years. This is crucial to ensure childhood immunization despite the challenges posed by anti-vaccination movements (Brasil, 2022).

Regarding the formulation of vaccination campaigns on media platforms, research suggests that organizations should target the “silent” audience—those who consume media content without necessarily sharing it. They also recommend concise and direct rebuttals of anti-vaccine ideas, combining scientific evidence with historical context to connect with the target audience (Robinson, Wiley & Degeling, 2021). At the same time, studies of vaccine refusal and cultural contexts should be conducted on a localized basis to enable tailored interventions for each region and to progressively increase vaccine uptake among the population (Yalçın et al., 2020).

CONCLUSION

Based on the studies analyzed in this review, it is possible to conclude that anti-vaccine movements have an impact on the immunization of young people, potentially leading to non-compliance with the recommended vaccination schedule. This could lead to an increased vulnerability to immunological threats in this population. It is clear that a segment of the population, particularly parents and guardians of children, lacks accurate information. The lack of proper guidance on vaccines makes them susceptible to deviating from vaccination schedules due to the influence of anti-vaccine ideals, thereby hindering the success of public health policies for children and adolescents.

The primary strategy to change this scenario and achieve vaccine safety in line with the studies analyzed is through health education led by professionals in the field. The Internet serves as one of the means to disseminate information to the population. The challenge is to use this tool intelligently and effectively to promote the benefits and importance of immunization and to combat anti-vaccine attitudes.

Integral collaboration between different sectors, both public and private, is essential to strengthen policies that support targeted strategies for basic health education, cultural awareness, and public policy. This approach, based on knowledge and the dissemination of evidence-based information, would lead to a reduction in the prevalence of ideas that fuel the existence of the anti-vaccine movement.

After researching and obtaining the results of this work, there is an obvious knowledge gap when it comes to directly and quantitatively measuring the impact of the anti-vaccine movement. In addition, the study was limited by the lack of analytical articles on the long-term consequences of the anti-vaccine movement.

For example, it is recommended that observational studies be conducted to determine and quantify whether there is a higher prevalence of disease and more severe symptoms in unvaccinated children. Research that analyzes the immunologic profiles of unvaccinated individuals and examines the impact on disease acquisition during childhood, adolescence, and adulthood would also be beneficial.

Therefore, it's important to conduct new studies that fill these gaps in knowledge and provide more accurate and comprehensive data on the impact of anti-vaccine ideologies on the effectiveness of public policies and social vaccination programs.

COMPETING INTERESTS

The authors declare that there are no conflicts of interest.

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The authors declare that they have no financial interests.

AUTHOR CONTRIBUTIONS

Conceptualization: G. G. O., J. O. C. *Data curation:* I. C. R. L., M. B. L. B. *Data curation:* G. G. O., G. R. N. D. *Investigation:* G. G. O., I. C. R. L., M. B. L. B. *Methodology:* G. G. O., G. R. N. D. *Project administration:* A. L. F. H. S., G. G. O. *Resources:* G. G. O., I. C. R. L., J. O. C. *Software:* F. C. V., J. O. C., M. B. C. R., M. B. L. B. *Supervision:* A. L. F. H. S., G. G. O. *Visualization:* F. C. V., I. C. R. L. *Writing the initial draft:* G. G. O., F. C. V., G. R. N. D., I. C. R. L., J. O. C., M. B. C. R., M. B. L. B. *Revision and editing of writing:* G. G. O.

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