Anti-Vaccine Movement and its Implications for Vaccination Coverage of the Brazilian Population: A Scoping Review

Amanda Dagnon da Silva, Marília Dagnon da Silva, Camila Tiemi Wassano, Rafaela Freitas Gonzalez, Elisângela Aparecida da Silva Lizzi, Roberta Cristina Barboza Galdêncio, Sidney Marcel Domingues[1]

[1] University of Marília

Abstract

Our intention was to analyze production on the anti-vaccine movement and its implications for vaccination of the Brazilian population in the indexed scientific literature.Methods: We used the systematic scoping review to search the following databases: PubMed, Scopus, Web of Science, Burry, Lilacs/BVS and Scielo.JBI and PRISMA-SCR international protocols were adopted for the search and screening of scope-related articles. The guiding question was built through the acronym PCC (population, concept and context). The information was extracted, categorized regarding the relationship with the theme of the anti -vaccine movement and the implications for vaccination coverage of the Brazilian and/or general population.

Index terms— movement against vaccination; vaccination coverage; public health; systematic review.

1 Introduction

he so-called "Anti-Vaccine Movement" gained strength from a fraudulent study published in The Lancet in 1998. In that article, physician Andrew Wakefield described that, after vaccination with the Triple Virus, an intestinal inflammatory condition would occur that would make the individual susceptible to mercurial toxins, which would lead to autism. The fraud was exposed sometime later by the General Medical Council, but the theory had already gained supporters worldwide. 1 Anti-vaccine movements are not recent and, as already mentioned, had their greatest demonstration over a century ago in Brazil, with similar episodes in different parts of the world such as England and the United States. Recently, worldwide cases of eradicated diseases have started to be reported. Like tetanus in children described in 2017 in Italy and the United States, generating in the latter an approximate cost of one million dollars spent on treatment, which could have been avoided with adequate vaccination, whose price revolves around thirty dollars. 2 Failure to vaccinate has disastrous consequences 1 and is directly related to the concepts of vaccine hesitancy, vaccine refusal and the antivaccination movement itself, 3 which has resulted in a reduction in vaccine coverage in Brazil. For example, from 2015 to 2020, there was a reduction of 41.72%, and in 2018, seven of the eight mandatory vaccines for children did not reach their coverage target, with the exception of BCG (Bacillus Calmette-Guérin). 1 According to Dubé et al (2014), 3 vaccine hesitancy consists of a heterogeneous group of individuals who demonstrate doubts about vaccination and therefore may delay, be reluctant, but still accept or refuse some or all vaccines. On the other hand, vaccine refusal, a term closely linked to the context, is related to the traditions, health and religion of a given population, and in low-and middle-income countries, it can be used to obtain other social services interventions that meet the needs of the community. The anti-vaccination movement, on the other hand, opposes any and all types of vaccination, including individuals who allocate part of their time and resources to express, mainly through digital media, their position with regard to vaccines since this movement also has the aim to attract new fans. Still according to the authors, the participants call themselves defenders of freedom of choice in relation to getting vaccinated and the transparency of public information with an anti-vaccination rhetoric, addressing controversial

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issues to legitimize their decisions. With the assumption that if the subject is in high proportion in the media, there is greater generation of fear in the population, resulting in the decline of immunizations.

In the present scoping review, based on the assumption presented, our intention was to analyze the production on the anti-vaccination movement and its implications for vaccination coverage of the Brazilian population in the indexed scientific literature.

2 II.

3 Methods

4 a) Search Strategy and Selection Criteria

The OR "Anti-Vaccination Movement" OR "Vaccination Refusal" OR "Vaccine Hesitancy" OR "Anti-Vaccine Movements") AND (tw:"Single Health System" OR "public health" OR "Public health" OR "Unified Health System" OR "SUS" OR "international health" OR "national health" OR "collective health");SCIELO - (Tw:"Movement against Vaccination" OR "Refusal of Vaccination" OR "Anti-Vaccination Movement" OR "Vaccination Refusal" OR "Vaccine Hesitancy" OR "Anti-Vaccine Movements") AND (tw:"Single Health System" OR "public health" OR "Public health" OR "Unified Health System" OR "SUS" OR "international health" OR "national health" OR "collective health");SCOPUS -TITLE-ABS-KEY("Public Health" OR "Unified Health System") AND ("Anti-Vaccination Movement" OR "Anti-Vaccination Movements" OR "Antivaccination Movements" OR "Antivaccination Movement" OR "Anti-Vaccine Movement" OR "Anti-Vaccine Movements" OR "Vaccination Refusal" OR "Vaccination Refusals" OR "Vaccine Refusals" OR "Vaccine Refusal" OR "Vaccination Hesitancy" OR "Vaccine hesitancy" OR "refusal of vaccination"); Web of Science -TS=("Anti-Vaccination Movement" OR "Anti-Vaccination

Movements" OR "Antivaccination Movements" OR "Antivaccination Movement" OR "Anti-Vaccine Movement" OR "Anti-Vaccine Movements" OR "Vaccination Refusal" OR"Vaccination Refusals" OR "Vaccine Refusals" OR "Vaccine Refusal" OR "Vaccination Hesitancy" OR "Vaccine hesitancy" OR "refusal of vaccination") AND TS=("Public Health" OR "Unified Health System").

As for the eligibility criteria, only scientific articles from primary studies were considered eligible to compose our sample. Searches were not carried out in gray literature sources -OpenGray, Catalog of annals of events -CIN/CNEN, theses and dissertations -BDTD and general sources such as Google Scholar, as well as possible non-indexed works. Studies in English, Spanish and Portuguese were accepted, and there was no time frame in the present study.

5 b) Data Extraction and Analysis

Using the eligibility criteria, titles, abstracts and full-text articles were screened by the following researchers: MDS; ADS; RFG; CTW. Training exercises were performed with the four evaluators for each screening level. Subsequently, they selected citations and full articles for inclusion, in pairs of independent work and blindly. Discrepancies between the four evaluators were resolved by consensus meeting and validation for the final insertions were performed by the fifth evaluator and SMD specialist. The Rayyan 6 software was also used as a tool, which consists of a web application developed by QCRI (Qatar Computing Research Institute), which was responsible for the process of screening articles and removing duplicates.

We entered all selected articles into a spreadsheet and extracted the following data: title of publication, name of authors, title of journal, country of journal, original language of publication, year of publication, relation of publication to the theme of the anti-vaccine movement and vaccination coverage and, finally, whether the publication mentioned implications of the anti-vaccination movement on vaccination coverage of the Brazilian population and/or the general population. At the same time, we also built an excel spreadsheet with the summaries and conclusions from the studies selected as sources of evidence. Next, for data analysis, we categorized the publications included in the study according to the relationship with the theme (1-the publication has no direct relationship with the theme; 2-the publication has a partial relationship with the theme; 3-the publication presents direct relationship with the theme).

We also categorized the implications mentioned by the publications (1-the publication mentions implications in the vaccination coverage of the Brazilian population; 2-the publication mentions implications in the vaccination coverage of the general population; 3the publication does not mention implications in the vaccination coverage of the Brazilian population and/or in general).

And finally, the file with the summaries and conclusions of the included studies were imported into the Iramuteq software, 7 through which the textual corpus analysis was carried out, specifically the similarity analysis, which is anchored in graph theory. Similarity analysis is defined mathematically as a probabilistic network represented by a graphic structure composed of relationships between words and their precepts. Each "node" in the graph represents a word, and the links between the nodes are the edges, which represent the probabilistic dependencies between the words (which, from a mathematical point of view are understood as variables). 8 Thus, it is possible to demonstrate the relational structures in the form of acyclic and directed graphs (DAG's), as well as their probabilistic dependencies between the words in the nodes, 9 from the co-occurrence (frequency of occurrence and cooccurrence), between the words. 10 The significance level was established at 5% in this analysis.

6 III.

7 Results

Among the analyzed articles, 37 were included as sources of evidence (Figure **??**). It was evident that the journals that published these articles have different scopes, such as vaccines, microbiology, medical sciences, social and behavioral sciences, law, health policies, environment and health, as well as health information and communication. Among the 37 publications, the journals come from the American, European and Asian continents, most of them located in the United States, Brazil and Canada. Additionally, the original language of the publications is mostly English (34 articles), with only 2 articles in Portuguese and 1 article in Spanish.

It is interesting to note that the publications ranged from 2001 to 2022, with only 2 articles in the period between 2000 and 2010, 21 articles in the period 2011 and 2020 and 14 articles in the period between 2021 and 2023.

As for the similarity analysis from the abstracts of the publications selected as sources of evidence (Figure **??**), it was verified that there is a formation of a central nucleus that comprises the term "vaccine," and the division into four "branches of interest" that stand out in the graph which are identified with the terms: "vaccination," "public health", "information" and "antivaccination," the latter being divided into two branches with the terms "anti-vaccination movement" and "social." In the similarity analysis of the conclusions of these articles selected for the study (Figure **??**), again the term "vaccine" appears as a central term and there are four branches of interest with strong connectors with the terms: "vaccination", "public health," "social" and "information."

Figure 2

Figure **??** When we analyzed the relationship between the central theme of the 37 publications and the "Anti-Vaccine Movement" (Figure 4A), it was possible to observe that 28 (75.7%) had no direct relationship, 2 (5.4%) had a partial relationship with the theme and only 7 (18.9%) have a direct relationship.

And when we analyzed the mentions of the 37 publications regarding the implications of the "Antivaccine Movement" in the vaccination coverage of the Brazilian population and/or in general (Figure 4B), it was possible to observe that only 5 (IV.

8 Discussion

The present scoping review sought to analyze the production on the anti-vaccination movement and its implications for vaccination coverage of the Brazilian population in the indexed scientific literature.

The 37 articles selected as sources of evidence made it possible to identify that, in the last two decades, there has been a significant increase in publications that address the theme of the "Anti-Vaccine Movement," going from 2 publications identified in the period from 2000 to 2010, increasing to 21 publications between 2011 and 2020 (ten times more), and between 2021 and 2023, already a number of 14 publications, which points to an increasing trend on the subject in the coming years. movement," despite the articles having become increasingly present and gaining greater attention, 31 is shown peripherally in our similarity graphs. This peripheral location of the "anti-vaccination movement" theme, as well as the absence of a direct relationship with the theme in most of the publications in our scoping review (28, 75.7%), indicates how this subject has been presented in the indexed scientific literature.

The publications selected as sources of evidence allowed us to perceive that there is a prevalence of use of the concepts of vaccine hesitation, vaccine refusal, with little mention of the term "Anti-Vaccine Movement" and the implications for vaccination coverage of the Brazilian population and/or in general.

From the similarity analysis carried out in the present study, it was possible to identify that the theme "vaccine" is a central theme in the publications, which is corroborated by the presence of the term in the center of the graphs of the abstracts and conclusions of the selected articles. The theme of the "anti-vaccination

The term "anti-vaccination movement" seems to be gaining more visibility in scientific research with the advent of social networks and, mainly, "fake news," which since 2016 have contributed greatly to the reduction of vaccination coverage in the population. Fake news is considered false information disseminated irresponsibly and at high speed, mainly in digital media. For the elaboration of such news, there is a complete Such denial of science constitutes a major risk to Public Health, as demonstrated in the pandemic caused by Sars-CoV-2, in which empirical methods of prevention and treatment were passed on inconsequentially from individual to individual, evidencing the lack of respect and credibility to specialists and authorities in the Fake news circulates on the main social networks such as Facebook, Instagram, Twitter and Youtube, addressing a dangerous anti-vaccination discourse guided, by many, as the restriction of individual freedom being one of the consequences of vaccination. **??**8 Digital media, as well as mass media, are important tools for disseminating news and information. Shapers of beliefs and popular opinions, they should be used as means by health and government authorities, aiming at carrying out health education with awareness plans accessible to the population. It is necessary to note that in the midst of the "information society" there is so much disinformation shared and taken as truth. 49 V.
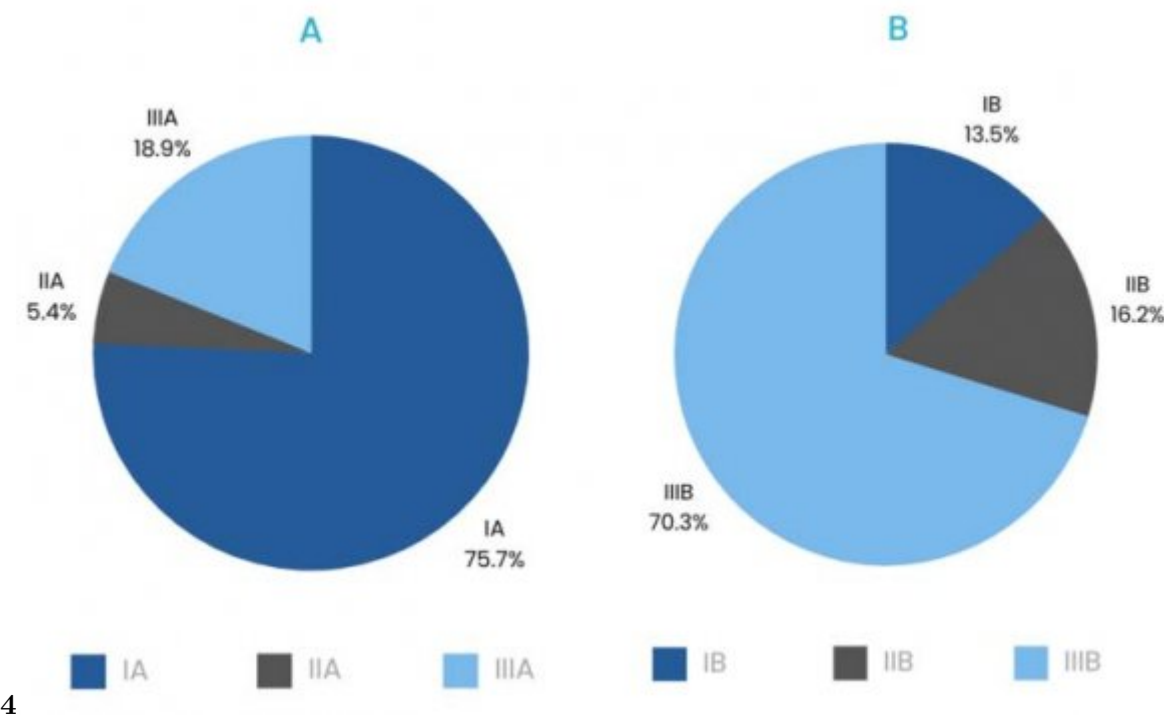
9 Limitations

VI.

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10   Conclusion

The number of scientific publications on the anti-vaccination movement and its implications for vaccination coverage of the Brazilian population, from March 2001 to March 2022, is scarce and figures peripherally compared to the publications selected as sources of evidence in the present scoping review.

It is of great importance that new studies be carried out directly addressing this issue, clearly explaining the implications for the vaccination coverage of this population. absence of scientific information with respectable levels of evidence, being based on denialism that becomes more evident every moment. 47 Systematic scoping reviews have some limitations, such as the possibility of bias in the selection of studies, since not all studies can be included. In addition, the quality and availability of studies can affect the results. It is also important to consider that scoping reviews may not provide a complete summary of the results, since they do not carry out statistical analysis of the data. Additionally, a limitation of great relevance related to our work is the fact that for the study of this theme we are more in the field of ideas and associated with social networks. [1]

Figure 1:

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[1] Year 2023

Figure 2:

Figure 3: Figure 4 :

Figure 4: Table 1

Publication Title	Authors Name	Journal Title	Country of the Journal	Original Language of Publication	Year of Publication
Understanding those who do not understand: a brief review of the anti-vaccine movement	Poland GA, Jacobson RM	Vaccine	USA	English	2001
Anti-vaccinationists past and present	Wolfe RM, Sharp LK	The BMJ	USA	English	2002
Anti-vaccine activists, Web 2.0, and the postmodern paradigm–an overview of tactics and tropes used online by the anti-vaccination movement	Kata A	Vaccine	Canada	English	2012
Parents' Refusal to Vaccinate Their Children: An Increasing Social Phenomenon Which Threatens Public Health	Barbacariu CL	Procedia - Social and Behavioral Sciences	Romania	English	2014
Vaccine hesitancy, vaccine refusal and the anti-vaccine movement: influence, impact and implications	Dubé E, Vivion M, MacDonald NE	Expert review of vaccines	Canada	English	2015
Vaccine hesitancy: understanding better to address better	Kumar D, Chandra R, Mathur M, Samdariya S, Kapoor N	Israel Journal of Health Policy Research	India	English	2016
Mapping the anti-vaccination movement on Facebook	Smith N, Graham T	Information, Communication and Society	Australia	English	2017
What do popular YouTubeTM videos say about vaccines?	Basch CH, Zybert P, Reeves R, Basch CE	Child: Care, Health and Development	USA	English	2017
The psychological roots of anti-vaccination attitudes: A 24-nation investigation	Hornsey MJ, Harris EA, Fielding KS	American Psychological Association (APA)	Australia	English	2018
The Anti-vaccination Movement: A Regression in Modern Medicine	Hussain A, Ali S, Ahmed M, Hussain S	Cureus	Aruba	English	2018

10   CONCLUSION

173 [Lebart and Statistique Textuelle ()] , L Lebart , Salem A Statistique Textuelle . `http://lexicometrica.`
174   `univ-paris3.fr/livre/st94/st94-tdm.html` 1994. 2023 jan 17. Paris: Dunod.

175 [Salviati ()] , M E Salviati . `http://iramuteq.org/documentation/fichiers/`
176   `manual-do-aplicativo-iramuteq-par-maria-elisabeth-salviati` 2017. 2023 jan 17. (Manual
177   do Aplicativo Iramuteq -versão 0.7 Alpha 2 e R Versão 3.2.3 [internet)

178 [()] , 10.25248/reas. `https://doi.org/10.25248/reas` 2020. 12 p. 30.

179 [Kim et al. ()] '#Antivaccination on Instagram: A Computational Analysis of Hashtag Activism through Photos
180   and Public Responses'. Y Kim , D Song , Y J Lee . 10.3390/ijerph17207550. *International Journal of*
181   *Environmental Research and Public Health* 2020. 17 p. 17.

182 [Wawrzuta et al. (2021)] '1Characteristics of Antivaccine Messages on Social Media: Systematic Review'. D
183   Wawrzuta , M Jaworski , J Gotlib , M Panczyk . 10.2196/24564. *Journal of Medical Internet Research* 4
184   jun. 2021. 23 (6) p. e24564.

185 [Saraiva and Faria ()] 'ACiência e a Mídia: A propagação de Fake News e sua relação com o movi-
186   mento anti-vacina no Brasil. Intercom -Sociedade Brasileira de Estudos Interdisciplinares da Comu-
187   nicação. 42º Congresso Brasileiro de Ciências da Comunicação -Belém -PA'. Ljc Saraiva , De Faria
188   , JF . 10.1590/0102-311X00037620. `https://www.portalintercom.org.br/anais/nacional2019/`
189   `resumos/R14-1653-1.pdf` *Cad* 2019. (48. Camargo Jr KR. Lá vamos nós outra vez: a reemergência do
190   ativismo antivacina na Internet. Saúde Pública; 36 Sup 2:e00037620, 2020)

191 [Cuesta-Cambra et al. (2019)] *An analysis of pro-vaccine and antivaccine information on social networks and the*
192   *internet: Visual and emotional patterns. El Profesional de la Información,* U Cuesta-Cambra , L Martínez-
193   Martínez , Niño - González , JI . 10.3145/epi.2019.mar.17. `https://doi.org/10.3145/epi.2019.mar.`
194   `17` 25 mar. 2019. 28.

195 [Ortiz-Sánchez et al. (2020)] 'Analysis of the Anti-Vaccine Movement in Social Networks: A Systematic Review'.
196   E Ortiz-Sánchez , A Velando-Soriano , L Pradas-Hernández , K Vargas-Román , J L Gómez-Urquiza ,
197   Cañadas-De La Fuente , GA . 10.3390/ijerph17155394. *International Journal of Environmental Research and*
198   *Public Health* 27 jul. 2020. 17 p. 5394.

199 [Wolfe ()] 'Anti-vaccinationists past and present'. R M Wolfe . 10.1136/bmj.325.7361.430. *BMJ* 2002. 325 p. .
200   (24 ago)

201 [KataA ()] 'Anti-vaccine activists, Web 2.0, and the postmodern paradigm -An overview of tactics and tropes
202   used online by the anti-vaccination movement'. KataA . 10.1016/j.vaccine.2011.11.112. *Vaccine* 2012. maio.
203   30 p. .

204 [Ko???taj et al. ()] 'Anti-vaccine movements -a form of social activity for health care, ignorance or diversion
205   aimed at destabilizing the health situation? Part 1. Epidemiological safety. Vaccinations -pros and cons'. W
206   P Ko???taj , B Ko?? ?taj , L Panasiuk , J Sobieszcza?ski , I D Karwat . 10.26444/aaem/126013. *Annals of*
207   *Agricultural and Environmental Medicine* 2020. p. 31.

208 [Ko???taj et al. ()] 'Anti-vaccine movements -health care, ignorance or a diversion aimed at destabilizing
209   the health situation? Part 2. Contemporary conditions for the functioning and development of anti-
210   vaccination movements'. B M Ko???taj , Ko?? ?taj Wp , I D Karwat , J Sobieszcza?ski , L Panasiuk .
211   10.26444/aaem/126014. *Annals of Agricultural and Environmental Medicine* 2020. p. 26.

212 [Basch et al. (2017)] C H Basch , P Zybert , R Reeves , C E Basch . 10.1111/cch.12442. *What do popular*
213   *YouTubeTM videos say about vaccines? Child: Care, Health and Development,* 19 jan. 2017. 43 p. .

214 [Wermuth et al. ()] 'Brazil is still an huge hospital": Hygienist and Anti-vaccine Movements in Brazil -from the
215   incipient Republic to the contemporary'. Mad Wermuth , J G Nielsson , G C Tertuliano . *Revista Academica*
216   *Da Faculdade De Direito Do Recife* 2021. p. .

217 [Elkin et al.] *comparing the displayed stances of vaccine information retrieved from Google, Facebook and*
218   *YouTube,* L E Elkin , Srh Pullon , M H Stubbe . 10.1016/j.vaccine.2020.02.041. `https://doi.org/10.`
219   `1016/j.vaccine.2020.02.041` 38 p. . (Should I vaccinate my child?)

220 [Bivar et al. (2021)] 'Covid-19, the anti-vaccine movement and immunization challenges in Brazil: a review'. Gcc
221   Bivar , Mesc Aguiar , Rvc Santos , Prg Cardoso . 10.15448/1980-6108.2021. `https://doi.org/10.15448/`
222   `1980-6108.2021` *Scientia Medica Porto Alegre* jan.-dez. 2021. 31 p. .

223 [Knuppel and Stang (2010)] 'DAG program: identifying minimal sufficient adjustment sets'. S Knuppel ,
224   A Stang . 10.1097/EDE.0b013e3181c307ce. `https://journals.lww.com/epidem/Fulltext/2010/`
225   `01000/DAG_Program___Identifying_Minimal_Sufficient.29` *Epidemiology* jan. 2010. 2023 jan 17.
226   21 p. 159.

227 [Vignoli et al. (2021)] 'Desinformação e movimentos antivacina: materialidade de enunciados em regimes de
228   informação'. R G Vignoli , R Rabello , C C De Almeida , Informação , Misinformação . 10.5007/1518-
229   2924.2021.e75576. `https://doi.org/10.5007/1518-2924.2021.e75576` *Encontros Bibli: revista*
230   *eletrônica de biblioteconomia e ciência da informação,* 4 jan. 2021. 26 p. .

9

[Braverman ()] 'Ecological model of health behavior as a methodology for reducing antivaccination trends'. Ariel Braverman . 10.1007/s00508-021-01817-y. *Wiener klinische Wochenschrift* 2021. 133 p. .

[Ben-Gal et al. ()] *Encyclopedia of statistics in quality & reliability*, I Ben-Gal , F Bayesian Networks ; Ruggeri , F Faltin , R Kenett . 2007. New Jersey: Wiley & Sons.

[Stolle et al. ()] 'Fact vs Fallacy: The Anti-Vaccine Discussion Reloaded'. L B Stolle , R Nalamasu , Pergolizzi Jr , J V Varrassi , G Magnusson , P Lequang , J . 10.1007/s12325-020-01502-y. *Advances in Therapy* 2020. 37 p. 23.

[Kalichman et al. ()] 'Faster than warp speed: early attention to COVD-19 by anti-vaccine groups on Facebook'. S Kalichman , L A Eaton , V A Earnshaw , N Brousseau . 10.1093/pubmed/fdab093. *Journal of public health* 2022. Oxford, England. 44 p. .

[Peters et al. ()] *Guidance for conducting systematic scoping reviews*, Mdj Peters , Godfreycm , Khalilh , Mcinerneyp , Parkerd , C B Soares . 10.1097/XEB.0000000000000050. https://journals.lww.com/ijebh/fulltext/2015/09000/guidance_for_conducting_systematic_scoping_reviews.5 2015. 13 p. . (International journal of evidence-based healthcare)

[Ruiz et al.] *Identifying Vaccine Hesitant Communities on Twitter and their Geolocations: A Network Approach*, J Ruiz , J D Featherstone , G A Barnett . (s.l: s.n.)

[Aromataris ()] 'JBI Manual for Evidence Synthesis'. 10.46658/JBIMES-20-01. https://doi.org/10.46658/JBIMES-20-01 *JBI* Emz Aromataris (ed.) 2020. 2023 jan 17.

[Smith and Graham ()] 'Mapping the anti-vaccination movement on Facebook'. N Smith , T Graham . 10.1080/1369118X.2017.1418406. *Information, Communication & Society* 27 dez. 2017. 22 (9) p. .

[Ferreira et al. ()] 'Movimento antivacinação no Facebook®:uma análise crítica da disseminação de notícias falsas'. M V Ferreira , A Quadros , Apf Dellanhese , Mtc Fernandes . 10.34117/bjdv6n9-197. *Braz. J. of Develop* 2020. Curitiba. 6 (9) p. .

[Alamoodi et al. ()] 'Multi-perspectives systematic review on the applications of sentiment analysis for vaccine hesitancy'. A H Alamoodi , B B Zaidan , M Al-Masawa , S M Taresh , S Noman , Iyy Ahmaro . 10.1016/j.compbiomed.2021.104957. *Computers in Biology and Medicine* 1 dez. 2021. 139 p. 104957.

[Borges et al. ()] 'Parental autonomy in health and anti-vaccine movement conformation in the post-truth scenario'. G S Borges , T D Cervi , T C Piaia . 10.26668/revistajur.2316-753X.v2i59.4100. http://dx.doi.org/10.26668/revistajur.2316-753X.v2i59.4100 *Revista Juridica* 12 abr. 2020. 2 p. .

[Barbacariu ()] 'Parents' Refusal to Vaccinate their Children: An Increasing Social Phenomenon Which Threatens Public Health'. C L Barbacariu . 10.1016/j.sbspro.2014.08.165. *Procedia -Social and Behavioral Sciences* 2014. 149 p. . (set)

[Beltrão et al.] 'Perigo do movimento antivacina: análise epidemio-literária do movimento antivacinação no Brasil'. Rpl Beltrão , Aan Mouta , N S Silva , Jen Oliveira , I T Beltrão , Cmf Beltrão . *REAS* (Internet)

[Beltrão et al. ()] *Perigo do movimento antivacina: análise epidemio-literária do movimento antivacinação no Brasil. REAS [Internet]. 30abr*, Rpl Beltrão , Aan Mouta , N S Silva , Jen Oliveira , I T Beltrão , Cmf Beltrão . 10.25248/reas.e3088. https://doi.org/10.25248/reas.e3088 2020. 2023 jan 17. 2020. 12. (e3088. Disponível em)

[Schmidt et al. (2018)] 'Polarization of the vaccination debate on Facebook'. A L Schmidt , F Zollo , A Scala , C Betsch , W Quattrociocchi . 10.1016/j.vaccine.2018.05.040. *Vaccine* jun. 2018. 36 p. .

[Bradshawas et al. ()] *Pro-Vaxxers Get Out: Anti-Vaccination Advocates Influence Undecided First-Time, Pregnant, and New Mothers on Facebook*, Shelton Bradshawas , Ss , E Wollney , D Treise , AugusteK . 10.1080/10410236.2020.1712037. 2021. 36 p. .

[Ouzzani et al. ()] 'Rayyan-a web andmobile app for systematic reviews'. M Ouzzani , H Hammady , Z Fedorowicz , A Elmagarmid . 10.1186/s13643-016-0384-4. https://doi.org/10.1186/s13643-016-0384-4 *Syst Rev* 2016. 5 (1) p. 210.

[Gunaratne et al. ()] 'Temporal trends in anti-vaccine discourse on Twitter'. K Gunaratne , E A Coomes , H Haghbayan . 10.1016/j.vaccine.2019.06.086. *Vaccine* 2019. 37 p. .

[Guttinger ()] 'The anti-vaccination debate and the microbiome: How paradigm shifts in the life sciences create new challenges for the vaccination debate'. S Guttinger . 10.15252/embr.201947709. *EMBO reports* 2019. 20 p. 47709.

[Hussain et al. (2018)] 'The antivaccination movement: A regression in modern medicine'. A Hussain , S Ali , M Ahmed , S Hussain . 10.7759/cureus.2919. *Cureus* 3 jul. 2018. 10 (7) .

[Calderón et al. ()] 'The Influence of Antivaccination Movements on the Re-emergence of Measles'. Rnp Calderón , Jerez Pacheco , YZ , Ruvalcaba Ledezma , J C Chavarría , MA , Jiménez Sánchez , RC , Reynoso Vázquez , J . 10.22207/JPAM.13.1.13. *J Pure Appl Microbiol* 2019. 13 (1) p. .

[Turillazzi et al.] *The Model of "Informed Refusal" for Vaccination: How to Fight against Anti-Vaccinationist Misinformation without Disregarding the Principle of Self-Determination. Vaccines*, E Turillazzi , M Zanon , R V Viola , P Frati , V Fineschi . 10.3390/vaccines9020110. `https://doi.org/10.3390/vaccines9020110` 9 p. .

[Hornsey et al. ()] 'The psychological roots of anti-vaccination attitudes: A 24-nation investigation'. M J Hornsey , E A Harris , K S Fielding . 10.1037/hea0000586. *Health Psychology* 2018. 37 p. .

[Mitra et al. (2021)] *Understanding Anti-Vaccination Attitudes in Social Media. ICWSM [Internet]*, T Mitra , S Counts , J Pennebaker . 10.1609/icwsm.v10i1.14729. `https://doi.org/10.1609/icwsm.v10i1.14729` 2021Aug.4. 2023Jul.24. 10 p. .

[Poland and Jacobson ()] 'Understanding those who do not understand: a brief review of the anti-vaccine movement'. G A Poland , M Jacobson . 10.1016/s0264-410x(00)00469-2. *Vaccine* 17-19, p. 2440-2445, mar. 2001. 19.

[Frugoli et al. ()] 'Vaccine fake news: an analysis under the World Health Organization's 3Cs model'. A G Frugoli , R S Prado , Tmr Silva , F P Matozinhos , C A Trapé , Saf Lachtim . 10.1590/S1980-220X2020028303736. `https://doi.org/10.1590/S1980-220X2020028303736` *Rev Esc Enferm USP* 2021. 55 p. 3736.

[Pullan and Dey (2021)] 'Vaccine Hesitancy and Anti-Vaccination in the Time of COVID-19: a Google Trends Analysis'. S Pullan , M Dey . 10.1016/j.vaccine.2021.03.019. *Vaccine* v. 39, n. 14, mar. 2021.

[Dubé et al.] 'Vaccine Hesitancy, Acceptance, and Anti-Vaccination: Trends and Future Prospects for Public Health'. È Dubé , J K Ward , P Verger , N E Macdonald . 10.1146/annurev-publhealth-090419-102240. `https://doi.org/10.1146/annurev-publhealth-090419-102240` *Annual Review of Public Health* 42 p. .

[Dubé et al. ()] 'Vaccine hesitancy, vaccine refusal and the anti-vaccine movement: influence, impact and implications'. E Dubé , M Vivion , Macdonald , Ne . 10.1586/14760584.2015.964212. *Expert review of vaccines*, 2015. 14 p. .

[Kumar ()] 'Vaccine hesitancy: understanding better to address better'. D Kumar . 10.1186/s13584-016-0062-y. *Israel Journal of Health Policy Research* 1 fev. 2016. 5 (1) .

[Sato (2018)] *What is the importance of vaccine hesitancy in the drop of vaccination coverage in Brazil? Revista de Saúde Pública*, Aps Sato . 10.11606/S1518-8787. `https://doi.org/10.11606/S1518-8787` 22 nov. 2018. 2018052001199. 52 p. .