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The vaccine on the agenda: the production of meanings in *Folha de São Paulo's* coverage

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Abstract

Media is one of the main sources of information regarding vaccines. With the increasing misinformation and vaccine hesitancy, understanding how journalism produces meanings about this public health resource is essential. In this article, we analyzed *Folha de São Paulo*'s coverage during one year to investigate how the newspaper addresses the vaccine issue. We observed aspects such as framing, sources, explanation of concepts, and the benefits and risks of vaccines. The results show that the stories analyzed play an essential role in bringing vaccination closer to everyday life and in promoting its benefits. However, risks, controversies and citizen participation are less addressed, indicating that there is room to expand the relationship between journalism, science, and society.

Keywords

Vaccine; Media and science; Science journalism; Health communication.

Introduction

Themes related to health and science traditionally occupy an important space in the media (Ramalho et al., 2012). Stories, features, magazine covers, specialized programs, columns and special sections, and the work of professional commentators and columnists are all evidence of the existence of a public demand for health information (Catalán-Matamoros & Peñafiel-Saiz, 2019c; Lerner, 2015). In a scenario in which the media present themselves as one of the main sources of information on health, science and technology, their contents influence daily decisions related to these themes. Thus, alongside specialists and institutions in the field of science, the media represents one of the main agents to produce contemporary imagery of health (CGEE, 2019; Oliveira, 2014).

In this context, a common topic in recent debates has been vaccines (Catalán-Matamoros & Peñafiel-Saiz, 2019c). Of central relevance in news coverage and conversations on social networks, this topic gained even more prominence given the crisis caused by the COVID-19 pandemic in 2020 where vaccines are considered symbols of hope to control the disease and recover some kind of normality after social distancing. However, discussions on vaccines in the media are not only due to their potential to eradicate, prevent and control diseases. On the contrary, they are mostly due to the proliferation of false or distorted information about its safety, reliability and need (Catalán-Matamoros & Peñafiel-Saiz, 2019c). In several countries, this misinformation (Wardle & Derakshan, 2017) has been associated with an increase in vaccine hesitancy, or the reluctance or refusal to vaccinate despite its availability (WHO, 2014).

In Brazil, infant vaccination rates had been exceeding 95% since the 1990s, but from 2016 onwards that percentage has declined 10 to 20 points. The risks and harm of vaccine hesitancy in the country has resulted in outbreaks of previously controlled diseases, such as measles in 2018. Nevertheless, several factors may have contributed to the decline in vaccination. From the impact of misinformation to the difficulty of obtaining the vaccine (e.g.: time restrictions and problems in getting to vaccination posts), in addition to the very success of health policies for mass vaccination, giving the false feeling that it is no longer necessary to vaccinate and that the diseases are not so serious (Sato, 2018).

Although the causes of vaccine hesitancy are multifactorial, there is a consensus that the media plays a key role in promoting health and engaging the public with vaccines (Cancian, 2020; Catalán-Matamoros & Peñafiel-Saiz, 2019b; Sato, 2018). A study by Avaaz in partnership with the Brazilian Society of Immunizations (SBIIm) found that “traditional media”, such as television, radio and news portals, are the main sources of information on vaccines (68%), ahead of social media (48%) (AVAAZ, 2019). Among these, journalism takes on a central role since the journalistic coverage of vaccination campaigns impacts on public perception (Cancian, 2020; Sato, 2018).

Given this scenario, in this article we analyzed the news coverage on vaccines in the *Folha de São Paulo* over the period of one year. Based on the analytical protocol proposed by the Ibero-American Network for Monitoring and Training in Science Journalism (Massarani & Ramalho, 2012), the general objective was to understand the ways in which one of the most widely read newspapers in Brazil produces meanings for vaccines. We investigated the main framings operated, which sources were used to legitimize the stories, and in what ways risks, controversies and benefits of vaccines, as well as science communication of research and concepts related to immunization, were (or not) addressed in this coverage.

The research is justified due to the social relevance of the theme today, where vaccine hesitancy is threatening public health and has been associated with information consumption from the media. Given how central journalism has become to constructing an imagery of health, analyzing the coverage on vaccination can help to understand how this theme is addressed in the news and how it can contribute to the intersection of the areas of Media Studies, Science Communication and Health.

Journalism and vaccination: producing meanings

Journalism is an important ally in the areas of health and science and technology (S&T) by popularizing information about science research, health care and prevention, and public policies (Oliveira, 2014). Journalism also fosters citizen participation by bringing S&T closer to everyday life and highlighting its intersections with socioeconomic activities (Oliveira, 2007). With regard to vaccines, journalism assumes relevant social roles by providing services, when reporting on vaccination campaigns; in science communication, when explaining concepts and research; and by promoting health, when reaffirming the importance of immunization in preventing and controlling diseases. In addition, it examines and evaluates government agents working in the health area on behalf of the public interest. In the current context of growing misinformation about vaccines, journalism also plays an essential role in cross-checking information and mapping topics found in digital networks (Cancian, 2020; Oliveira, 2014).

In order to understand the news coverage of vaccination, a number of issues must be taken into account. The meanings of health and science that appear in newspapers are not given, but rather they are discursively constructed by various elements of the journalistic narrative and its modes of production. The editorial division itself and the system of section naming are important elements for the production of meanings. Although science and health have specific editorials in several vehicles, these themes are transversal, and investigating how they are addressed in the different sections can provide clues on how the subject is treated or not in these spaces (Lerner, 2015). In the case of vaccines, the transversality of the theme (which can refer to, for example: different diseases, scientific research, economic and political issues, local and international events), the analysis of the main topics covered, as well as their placing in these editorials, contribute to the understanding of the meanings produced by the coverage.

In addition, in a multimedia context, the discursive construction of journalism also includes imagery and audiovisual resources that are part of the construction of meaning (Oliveira, 2014). A five-year analysis of Spanish news coverage on vaccines found that photographs of vaccines being given, especially in babies, are the predominant images. Next came images of vaccine doses, followed by elements associated with vaccination, such as viruses and bacteria, and photos of scientists. The authors highlight the underrepresentation of infographics and data visuals (Catalán-Matamoros & Peñafiel-Saiz, 2019a). These elements provide clues about the imagery of vaccines in that country; therefore, it would be timely to perform an analysis of the multimedia resources of the Brazilian news coverage to understand the production of meanings in our context.

Still on journalistic narratives, by analyzing the framings and operations such as selection, emphasis or silencing of certain ideas, we are able to observe the process of meaning production in the texts (Entman, 1993). This understanding is based on the concept of "frames", acting as "interpretative marks" that allow social actors to identify, organize and make sense of the interactions experienced in certain normative contexts (França, 2012; Porto, 2004). Thus, investigating framings enables us to understand the relationship between socially shared values and the process of journalistic selection and construction of events (Silva & França, 2017).

In relation to health guidelines, framings in the news can influence public opinion, individual attitudes and health policies, since they define not only the focus of the theme, but also possible solutions, which crosses the course of the public debate. As Rothberg (2010) points out, it is not possible to affirm that the media determines perceptions and behaviors of individuals, but when introducing and emphasizing certain ideas, their effects cannot be totally disregarded. Thus, in the field of health, solutions discussed in public debates can serve as the basis for future public policies, whereas those that could have resulted from unused framings are neglected (Lima & Siegel, 1999; Menache, 1998).

The choice of sources is also relevant, since newspapers arrange speeches in special ways and validate certain players (at the expense of others) as authorized voices to discuss certain topics (Lerner,

2015). Analyzing the coverage of the Portuguese press on vaccination, Gomes and Lopes (2019) found that there was a predominance of official sources and stories from single sources, which indicates less plurality of perspectives and an under-representation of patients and civil society organizations. The role of scientists as sources in these types of stories is also an important aspect to consider from the point of view of journalism as a space for science communication and mediation between specialists and society.

Another important aspect in the production of meanings in S&T news is the explanation of science concepts, benefits, risks and controversies. Journalism is considered one of the main arms of science communication, playing an important role in the diffusion of knowledge that is often not accessible to the population through formal education only (Amorim & Massarani, 2008). However, more than transmitting information in a deficit model, in which experts who have the knowledge transfer it to those who supposedly do not, science communication should contribute to public engagement of S&T, promoting dialogue with the public, fostering their role as protagonists and encouraging appropriation of these issues in their everyday lives (Massarani, 2012). Journalism has the potential for promoting this dialogic model because the information it publishes can bring the population closer to public debates and contribute to elucidating causes and consequences based on science terms for issues that people face in their daily lives, such as health problems (Amorim & Massarani, 2008; Oliveira, 2007).

In the case of vaccines, science communication can contribute to promoting public health. Although its effectiveness is widely proven within the science community, the growth of vaccine hesitancy demonstrates that people have doubts about vaccines or distrust the agents responsible for their production or distribution. Sato (2020) reinforces that these concerns cannot be overlooked and need to be welcomed and addressed by professionals and specialists. Health communication strategies that focus only on the benefits of vaccines, without seeking to respond to concerns, may fail to promote their acceptance by the public (Dixon & Clarke, 2012).

This does not mean that journalism must strike a *false balance* between pro and anti-vaccine arguments. Analyses of US news coverage show that the correlation between autism and vaccination, which has already been ruled out by several studies, often appears as one between two (or among multiple) sides of the issue. This generates a false equivalence between the scientific evidence that proves the efficacy and safety of vaccination and an assertion that science has already proven to be unfounded. However, the solution is not to ignore these controversies, but to contextualize them, providing a science background of research and evidence (Dixon & Clarke, 2012).

Furthermore, scientific concepts related to vaccination, as well as possible risks and harm involved in its use, need to be explained. Research carried out in Brazil shows that the way vaccine coverage is handled is one of the factors that affects the public's attitude towards vaccination campaigns. For example, the coverage of the yellow fever outbreak of 2007-2008 as an uncontrolled epidemic whose only salvation would be the vaccine, without explaining its incidence in the wild, is one of the factors that could have caused the unbridled search for immunization by people for whom it would not be recommended (Sato, 2018). On the other hand, in the 2017-2018 outbreak, coverage was careful in detailing the recommendations and non-recommendations of the yellow fever vaccine and explaining that monkeys would not be transmitters of the disease, but "sentinel species", who warn against its spread (Cancian, 2020). This journalistic work stood out in a context marked by the proliferation of fake news about the disease on social media (Sacramento & Paiva, 2020).

Therefore, news coverage that is able to explain concepts about vaccination, reinforcing its benefits and discussing its risks from a science and social point of view, can dissipate the Manichean view of science and contribute to building a participatory science culture (Oliveira, 2007) in which vaccination can be seen as a right by which citizens can ensure their well-being and public health. Thus, even though the relationship between journalism and society involves different processes, including the dynamics of how news is perceived, the analysis of all these aspects of a journalistic coverage can contribute to the

understanding of the production of meanings about vaccination in everyday life.

Methodology

In this study, we chose to analyze the *Folha de São Paulo*, as it has the highest circulation (printed plus digital versions) among newspapers in the country, according to the Instituto Verificador de Comunicação (or IVC, a non-profit entity in Brazil, responsible for multiplatform media auditing).¹ The newspaper's prominent position in the Brazilian media places it as an important public opinion maker, regarded as the collective stances, judgments and assumptions specific to the public (Gomes, 2011). Public opinion is constructed from representations and images shared by different interest groups and social actors (Lippman, 2008), among which the media has significant power for setting an agenda (Mccombs & Ghanem, 2008; Rothberg, 2010).

The collection stage was carried out through the *Folha's* digital collection. We searched for the keywords 'vaccine', 'immunization' and related ones, such as vaccination, vaccinated and anti-vaccine. We established a period between August 1, 2018 and July 31, 2019, so that the sample spanned a full year, making it possible to observe seasonal circumstances in the coverage. We chose to investigate a period prior to the COVID-19 pandemic, a context whose particularities demand specific analysis, which is underway.

These parameters generated an initial corpus of 603 stories. Duplicates, stories published in subsites of the *Folha de São Paulo* (e.g.: *Livraria da Folha*) and texts written by readers, were eliminated. Publications that used the word immunization as a metaphor, such as in the context of reality shows, and stories in which vaccines were briefly mentioned but were not central to the discussion were also excluded. After applying these elimination criteria, we reached a corpus of 132 stories.

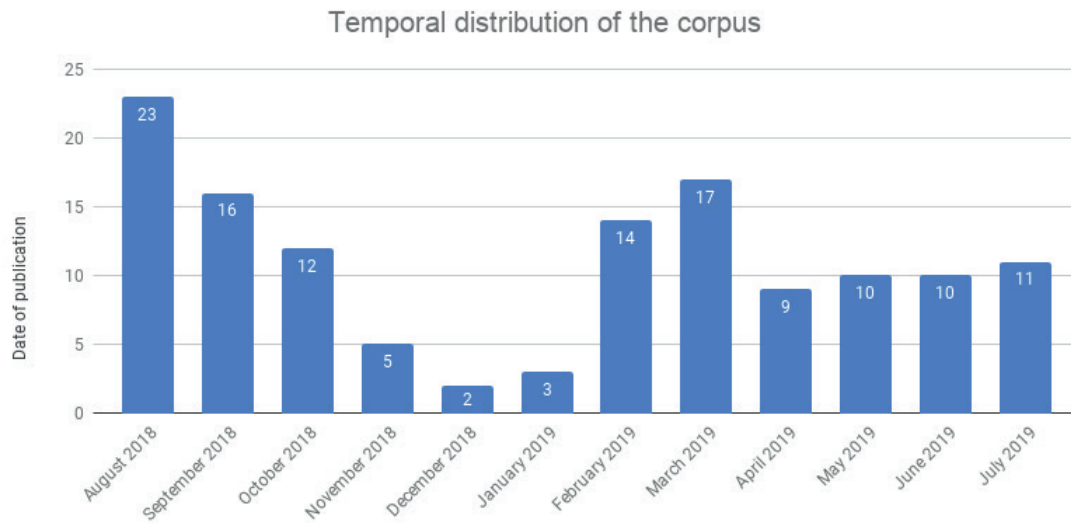
In the coding stage, the stories were submitted to the analytical protocol developed by the Ibero-American Network for Training and Monitoring in Scientific Journalism (Massarani & Ramalho, 2012). We chose this methodological tool because it allows the mapping of several aspects of journalistic coverages, such as framing, sources, editorials and multimedia resources; including issues relevant to S&T topics, such as explaining concepts, addressing controversies, benefits, promises, harm and risks; and the presence of scientists in the stories. These analytical categories were adapted to the topic of vaccination. Finally, the coding of the stories based on the protocol allowed quantitative and qualitative analyses of the coverage on vaccination in the *Folha de São Paulo*.

Media, health and everyday life: vaccines in the *Folha*

Vaccines were covered in the *Folha de São Paulo* every month during the period under analyses, more so between August and October, the period of the campaigns against polio and measles, and in February and March, months of vaccination against influenza, and the increase in yellow fever cases in 2019 (Graph 1).

¹ Retrieved on November 17, 2020 from: <<https://www1.folha.uol.com.br/poder/2020/01/folha-cresce-e-lidera-circulacao-entre-jornais-do-pais-em-2019.shtml>>.

Graph 1 – Monthly stories on vaccines in the period being analyzed



Source: Produced by the authors

Although the campaigns were important hooks, coverage of vaccines throughout the year confirms their relevance to the newspaper. Of the 132 stories, there were 115 news reports (87.2%), 13 stories (9.8%) contributed by columnists and invited guests, three editorials (2.2%) and an interview (0.8%) with the researcher Akira Homma, senior scientific advisor at Oswaldo Cruz Foundation (Fiocruz).

Of the total, 69 stories (52.3%) were included in the editorial ‘Cotidiano’ [Everyday life], which focuses on “covering the main facts in the areas of education, urbanism, violence, public health, environment, public administration and behavior”.² Another 29 stories (21.9%) were classified in the “Balance and Health” section, which, in the definition provided by the newspaper, is aimed at “physical and mental well-being, informing and inspiring the reader who seeks a more harmonious and healthy life”.³ On the other hand, no article was published in the “Science” section, whose stated objective is “to make the work of specialized sectors intelligible to lay people”.⁴ We observed that mentions of vaccines were predominantly in the “Everyday life” section, which demonstrates that vaccination is understood as a resource incorporated into people’s lives, and highlights the role of the newspaper in providing services on government campaigns and actions. This is explained by the broadened concept of health, which is no longer seen only as medical intervention on diseases, but as a resource that promotes well-being in everyday life (Batistella, 2008).

We also analyzed the vaccine framings most used by the *Folha* and the ways in which the vehicle (re) produces ideas and perspectives on this important public health resource. We were able to identify ten framings in the corpus, and each article may have presented one or more of them. In Table 1, we systematize the description of each framing, the total number of stories in which they appear and the number of stories where vaccines are identified as the main framing.

² Retrieved on October 15, 2020 from: <<http://www.publicidade.folha.com.br/folhadigital/editorias/>>.

³ Idem.

⁴ Idem.

Table 1 – Descriptions and framings on vaccines identified in the *Folha*

Framing	Description	Total number of stories where it is present	Number of stories where it is the main framing
Public policies	Government actions, programs and strategies on vaccine development, production and distribution; campaigns, vaccination coverage and services available in Brazilian Unified Health System (SUS)	93	64
Impact of S&T	Impact that scientific and technological development can have on society and on the quality of life of individuals and the community	85	24
Sociocultural	Cultural and social aspects related to vaccination	43	15
Economic	Economic and marketing scope of the biotechnology sector, including investment, patents and marketing efforts	20	9
Bioethical and/ or legal	Legal, ethical and moral principles involving the production, distribution and delivery of vaccines	14	9
New technological development	Announcement of discoveries, experimental results, clinical trials and new vaccines	10	6
Science background	General science background on vaccines, such as previous research, review of results and already known conclusions	6	1
Scientific uncertainties	Health risks, adverse effects and the limits of science in the production of knowledge and in the management of present and future risks	4	1
New research	Science and medical bases of new vaccine research and discoveries	3	2
Scientific controversies	Scientific controversies related to vaccines	1	1

Source: Produced by the authors

As identified above, ‘public policies’ was the predominant framing, present in 93 stories (70.5%) and the main framing in 64 (48.5%) due to the newspaper’s strong focus on government actions to immunize target populations. This data is in line with findings from previous debates on vaccines on social networks in the country (Massarani et al., 2020). In Brazil, the National Immunization Program (PNI) created in 1973 was responsible for unifying the vaccination calendar and expanding demographic, age and vaccine coverage, consisting of an internationally recognized public health program, which is responsible for 90% of the vaccinations in the country (Silva Junior, 2013; Gadelha et al., 2020). The amount of coverage on

state actions regarding vaccines reflects and reinforces the importance of the Brazilian State in establishing a 'culture of immunization' by introducing new vaccines and implementing its mass vaccination actions (Hochman, 2011).

Government work in Health can be demonstrated, for example, in stories that highlight the performance of public entities at federal, state and municipal levels, such as the *Ministry of Health warns of the risk of an outbreak of yellow fever in the summer*;⁵ *States use shopping malls, vaccinate at night and go to homes to achieve goal*;⁶ and *City Hall will visit 13,000 homes to vaccinate against yellow fever in SP [São Paulo]*.⁷ These stories gave voice to representatives of the medical field and health agencies, albeit with little or no space for citizens to speak.

Besides 'public policies', the framing on 'impact of S&T' was also high, showing up in 85 stories (64.4%) and was the main framing in 24 (18.2%). The importance of vaccines for our health and quality of life is mentioned mostly in stories that address the drop in the rates of vaccine coverage and the reemergence of already controlled diseases. Examples of these are: *Outbreak in the North of the country, the total number of measles cases is already the largest since 1999*;⁸ *Yellow fever cases put cities on the coast of São Paulo on alert this holiday*;⁹ *Measles spreads among the Yanomami in Venezuela and kills 72*;¹⁰ and *the Democratic Republic of Congo is experiencing the second largest outbreak of Ebola*.¹¹ The importance of immunization is also reinforced in stories on anti-vaccine movements, emphasizing the risks of vaccine hesitancy.

The coverage highlights some themes related to vaccines. Vaccination campaigns and outbreaks in Brazil and abroad have made measles the most prevalent disease in the *Folha*, where it is the focus of 40 stories (30.3%). In addition, polio and influenza (including H1N1) were present in 16 stories (12.1%) and yellow fever in 13 (9.8%). These mentions were part of an agenda on vaccination campaigns and the risk of reemergence due to the decrease of vaccination coverage rates.

There have also been recurring social debates around vaccines. The question of their being mandatory was discussed in 11 texts (8.3%), including three editorials and opinion columns. The debate focused on the vaccination requirement for enrolling children in schools, the possibility of a fine for parents who fail to vaccinate their children and arguments on religious freedom. Disinformation and anti-vaccine movements were mentioned in nine and six stories (9.8% and 4.5%), respectively, with an emphasis on the risks brought about by these phenomena. In the story *Government maps on average 14 fake news per day related to health*, the *Folha* provides a 'guide' on how to prevent the spread of fake news, including tips such as 'Search the internet'; 'Check the date'; 'Read the entire news' and 'If the news has no source, do not pass it on'.¹²

⁵ Retrieved on October 10, 2020 from: <<https://www1.folha.uol.com.br/cotidiano/2018/08/ministerio-da-saude-alerta-para-risco-de-novo-surto-da-febre-amarela-no-verao.shtml>>.

⁶ Retrieved on October 10, 2020 from: <<https://www1.folha.uol.com.br/cotidiano/2018/09/estados-usa-shopping-vacina-a-noite-e-busca-em-casa-para-atingir-meta.shtml>>.

⁷ Retrieved on October 10, 2020 from: <<https://www1.folha.uol.com.br/cotidiano/2019/02/prefeitura-vai-visitar-13-mil-casas-para-vacinar-contr-a-febre-amarela-em-sp.shtml>>.

⁸ Retrieved on October 10, 2020 from: <<https://www1.folha.uol.com.br/cotidiano/2018/08/com-surto-no-norte-do-pais-total-de-casos-de-sarampo-ja-e-o-maior-desde-1999.shtml>>.

⁹ Retrieved on October 10, 2020 from: <<https://www1.folha.uol.com.br/cotidiano/2018/09/casos-de-febre-amarela-poem-cidades-do-litoral-paulista-em-alerta-no-feriado.shtml>>.

¹⁰ Retrieved on October 10, 2020 from: <<https://www1.folha.uol.com.br/mundo/2018/10/sarampo-se-alastra-entre-os-ianomamis-na-venezuela-e-mata-72.shtml>>.

¹¹ Retrieved on October 10, 2020 from: <<https://www1.folha.uol.com.br/mundo/2018/12/ebola-chega-a-grandes-cidades-do-congo-que-vive-o-segundo-maior-surto-da-doenca.shtml>>.

¹² Retrieved on October 10, 2020 from: <<https://www1.folha.uol.com.br/cotidiano/2018/10/governo-mapeia-14-noticias-falsas-em-media-por-dia-so-relacionadas-a-saude.shtml>>

Another relevant theme was immunization coverage. The *Folha* dedicated 37 stories (28%) to the difficulty of campaigns reaching the immunization goals, especially against measles, polio and H1N1 flu. The stories were mainly centered on the 'public policies' framing (31 stories), focusing on the actions of the Ministry and Secretariats of Health, such as anticipating and extending campaigns, vaccinating in schools and homes and even the return of 'Zé Gotinha', a children's character created in the 1980's to raise awareness of the importance of vaccines. However, only one story addresses the possible reasons for the low adherence and proposes solutions to increase vaccination.

In *Fear of side effects, a false sense of security and structure derails vaccination*,¹³ *Folha* claims to have talked to 'fathers, mothers, health professionals, specialists and managers' for weeks. However, the explanations listed in the report - a false sense of security, misunderstanding the need for revaccination, limited opening hours, etc. - come mainly from public authorities. Only one person mentioned by name is not linked to a health agency: a mother from the west of São Paulo who expressed concerns about possible side effects. In other words, not even when the newspaper claims to have listened to family members and health care professionals are the voices of these people explicitly heard.

In general, vaccine coverage in *Folha* favors government sources, with the most recurring ones linked to the federal government (65 stories, 49.2%), followed by the state (41 stories, 31.1%) and the municipality (27 stories, 20.5%). As already demonstrated, the predominance of 'public policies' framing places government entities as main actors in this debate, ahead of science and health professionals. The choice of sources constitutes an important framing process in the journalistic production because it legitimizes information and creates social representations about vaccines. However, news is also the result of the interaction between journalists and other social actors, where institutional sources have greater agenda setting power, influencing the way health information is handled in the news (Gomes & Lopes, 2019).

The news sources were also medical doctors (30 stories, 22.7%), researchers (28 stories, 21.2%), international organizations, such as World Health Organization (WHO) (20 stories, 15.1%), science societies (17 stories, 12, 9%) and health professionals (five stories, 3.8%). As already mentioned, it is important to assess the way in which scientists are framed in the production of news. When covering science topics, these professionals seem to give special credibility to the information presented in the stories. In this sense, when considering the corpus of the analyses, priority has been given to researchers from areas such as immunology, infectious diseases, tropical medicine and epidemiology, as well as public health policies.

In addition, in the 28 stories with scientists as sources, 35 researchers were male and only 11 were female, which demonstrates a gender disparity: male scientists are mentioned three times more than female scientists, a trend already verified in previous studies on Brazilian news programs, where men appear twice as many times and have longer speaking times than women do. This asymmetry in the representations reinforces the imagery in the common knowledge that associates the image of scientists to the male gender, making women in science invisible (Carvalho & Massarani, 2017, Massarani et al., 2019; Ramalho et al., 2012).

The Unified Health Service (SUS, in Portuguese abbreviation) users, patients and their families were significantly less heard, covered in only ten stories (7.5%). These citizens, in general, are embodied into the news to personalize and humanize the science and health contents, in an effort to bring them closer to the readers' daily lives. However, this effort is limited to less than one tenth of the corpus. In view of the growing lack of information in the vaccine debate, the priority given to governmental, institutional and professional sources is understandable, on the one hand. However, on the other hand, the low presence of citizens in these spaces indicates that there are still opportunities to expand social

¹³ Retrieved on October 10, 2020 from: <<https://www1.folha.uol.com.br/cotidiano/2018/09/medo-de-reacao-falsa-sensacao-de-seguranca-e-estrutura-esvaziam-vacinacao.shtml>>

participation in public debates on vaccines.

Another important element in the production of meaning is the multimedia resources. Photographs were recurrent, used in 128 stories (97%). Illustrations were also used, such as infographics and diagrams (18 stories, 13.6%), maps (five stories, 3.8%) and videos (3 stories, 2.3%). Most of the photographs in the *Folha's* stories show children receiving vaccines, some of them crying, or the hands of health professionals handling syringes and vials. It is important to observe the way in which these images are used as they reinforce the social imagery of vaccines (Oliveira, 2014). For example, photographs of children crying appear repeatedly in different stories, including texts on vaccination of the elderly. There are also cases of scientists that appear in the photos and are not mentioned in the texts; they are only part of the image gallery that was reused from previous stories.

We also sought to observe how the newspaper's coverage contributed to the communication of scientific knowledge, through the presentation of concepts, controversies and unfolding of the current stage of science. Among the analyzed corpus, 45 texts (34.1%) explained some concept related to immunization, as in the following examples:

Chickenpox, also known as varicella, is a viral infection that causes rash, itching and fever. In severe cases, it can lead to complications such as brain inflammation, pneumonia and even death.¹⁴

The two initial doses use a compound created from a modified cold virus that does not cause the disease to "deliver" four *immunogens* – a substance that induces immune responses.¹⁵

Therefore, before the outbreak, the *triple viral vaccine*, which protects against measles, mumps and rubella, was already offered free of charge throughout the year by SUS.¹⁶

Observing if and how science concepts are introduced in a story is an important way to understand how the vehicle assumes that its public is familiar with vaccines and how it works to popularize science and qualify public debates. The excessive volume of science and health content available on the network nowadays makes it difficult to assess the quality of information and the reliability of sources, which can lead users to unfounded conclusions (Navas-Martín et al., 2012). In this scenario, journalism is critical for science communication. However, the explanation of concepts in this analysis was restricted to 45 stories (34.1%), which may indicate that in the rest of the corpus, the awareness of the population of the issues related to vaccines was taken for granted. On the other hand, a greater number of stories (58, or 43.9% of the total) offered some type of health recommendation to their readers. For example, keeping environments airy, washing hands, avoiding contact with infected people, being up to date with the vaccination schedule and reading about vaccinations before traveling.

We also sought to investigate whether the texts mention specific benefits or harm, as well as promises and potential risks of immunization. In the sample, 63 stories (47.7%) explicitly mention one or more benefits of vaccines and 55 (41.7%) mention one or more promises. On the other hand, risks are much less mentioned, only in 23 stories (17.4%), and only one mentions any harm (Table 2).

¹⁴ Retrieved on October 10, 2020 from: <<https://www1.folha.uol.com.br/equilibrioesaude/2018/11/comunidade-antivacina-esta-por-tras-do-maior-surto-de-catapora-emany-decadas-em-estado-americano.shtml>>

¹⁵ Retrieved on October 10, 2020 from: <<https://www1.folha.uol.com.br/equilibrioesaude/2019/07/brasil-participara-de-fase-avancada-de-teste-de-vacina-contra-hiv.shtml>>

¹⁶ Retrieved on October 10, 2020 from: <<https://www1.folha.uol.com.br/cotidiano/2019/07/baixa-imunizacao-contra-sarampo-faz-sao-paulo-levar-campanha-para-escolas.shtml>>

Table 2 - Description and presence of benefits, harm, promises and risks of the vaccines identified in the Folha de São Paulo

Category	Mentions	Number of stories found
Benefits	Vaccines prevent one or more diseases	33
	Vaccines block the transmission of diseases	19
	Vaccines eradicate diseases	18
	Vaccines prevent deaths	5
	Vaccines are effective	4
	Vaccines avoid suffering caused by diseases	3
	Vaccines cure	1
	Vaccines are an achievement	1
	Vaccines minimize the effects of diseases	1
Promises	Vaccines will prevent one or more diseases	40
	Vaccines will block transmission of a disease	7
	Vaccines will eradicate diseases	4
	New vaccines are on their way	2
	Vaccines will not cause diseases	1
	Vaccines will prevent deaths	1
	Vaccines will prevent suffering from diseases	1
	Vaccines will recover the livestock sector	1
	Vaccines will minimize diseases	1
Risks	Vaccines can cause harm	17
	Vaccines can cause diseases	3
	Vaccines may fail	2
	Vaccines can be used as a biological weapon	1
Harm	Vaccines worsen diseases	1

Source: Produced by the authors

As shown in the table above, only one story mentions real harm. The story *Dengue vaccine should not be taken by those who have never had the virus, says Anvisa*¹⁷ (National Agency for Sanitary Vigilance) addresses the agency's decision to advise against the vaccine for seronegative people who can develop more severe forms of the disease if they become infected by the *Aedes aegypti* mosquito. Despite the importance of emphasizing the benefits and promises of vaccines to reinforce their relevance to public health, clarification of possible doubts about risks and harm is necessary in view of the proliferation of misinformation. The low incidence of these aspects in news coverage shows that journalism can explore this area more emphatically.

Finally, there was a significant amount of mentions to possible vaccine controversies, found in 36 stories (27.3%). A controversy can be understood as the clash of ideas and theories or the lack of consensus around certain themes (Ramalho et al., 2017). Among the topics with greater impact are the anti-vaccine movement, vaccination hesitancy, mandatory vaccination versus individual freedom, adverse effects and fake news. Discussing these controversies openly can help to clarify possible questions from the public and broaden the public debate.

Controversy was the main framing in only one story: *Measles vaccine does not cause autism, reaffirms a new study with big data*. According to the report, "a new and important study published this

¹⁷ Retrieved on October 10, 2020 from: <<https://www1.folha.uol.com.br/cotidiano/2018/08/vacina-contra-dengue-nao-deve-ser-tomada-por-quem-nunca-teve-o-virus-diz-anvisa.shtml>>

week does not point to an association between the measles vaccine and autism - one of the reasons that parents invoke for not vaccinating their children"¹⁸ (Italics added). That is, even if previous research has already ruled out the risk, a new study is considered "important" in view of the still high rates of vaccine refusal. Thus, the controversy is addressed, but without promoting a false balance; i.e.: presenting a context given by scientific research. This practice, seen on a smaller scale in coverage, could help to clarify any doubts the public may have about vaccination.

Final remarks

The analysis of the *Folha de São Paulo's* coverage revealed important aspects towards understanding the production of meanings about vaccines in the newspaper. They are handled, primarily, as aspects of everyday life ('Cotidiano'). This is reflected in the prominence of this editorial compared to the others (52.3%), including that of "Balance and Health" (21.9%). This approach reinforces the understanding of health as a broad concept, seen not only as the absence of diseases, but also to ensure a healthy life; and vaccination as a matter of public health and policy. The analysis highlighted the role of journalism in promoting health and providing services, with an emphasis on addressing vaccination campaigns and health recommendations to readers.

The predominance of the *public policy* framing (main in 48.5% and present in 70.5%) and government sources reinforces the importance of vaccines as a public health resource and the role of the State in its distribution to the Brazilian population. The incidence of the *impact of S&T* framing (main in 18.2% and present in 64.4%) also demonstrates that the existence or not of vaccination significantly affects people's lives. The main hooks used to deal with impact were the moments when vaccination was threatened: increase in diseases, drop in vaccination coverage and anti-vaccine movement. This aspect demonstrates that the news coverage converses with contemporary challenges in the promotion of public health, such as misinformation and vaccine hesitancy. Journalism positions itself as an important actor, alongside science, to raise awareness about the importance of vaccines. However, the underrepresentation of ordinary people (7.5%) demonstrates that the newspaper's agenda can be more citizen oriented with regard to vaccination.

The *Folha's* journalism also promoted science communication by reinforcing the benefits of vaccines (47.4%), combating misinformation and explaining concepts (34.1%), although the latter aspect could be improved. Although scientists, doctors, and science societies were frequently the sources, there was a gender gap in the scientists interviewed, with men showing up more than three times as often as women did. In addition, multimedia resources focused on photographs of children receiving an injection. The fact that these images appeared even when the stories referred to the vaccination of adults limits the construction of the imagery of vaccines as being restricted to childhood.

In addition, risks (17.4%) and controversies (27.3%) could have been more frequently addressed by the coverage since the growing vaccination hesitancy demonstrates that the population has doubts about vaccines. These aspects have been widely explored through disinformation, therefore, the role of journalism in addressing them is reinforced, contextualizing and highlighting science research instead of ignoring them. Lastly, there are opportunities for communicating science research in the coverage, since none of the stories were in the "Science" section. Thus, on the one hand, the predominance of vaccine treatment appearing largely in the "Everyday life" section constructs meaning by depicting vaccines as part of everyday life. On the other hand, there is a risk in not framing vaccines as a resource that is developed and constantly improved by science, whose findings, if disclosed to the public, could help to clarify doubts. If the imagery of health constructed in the media calls people to take ownership of this field

¹⁸ Retrieved on October 10, 2020 from: <<https://www1.folha.uol.com.br/equilibriosaude/2019/03/vacina-contra-sarampo-nao-causa-autismo-reafirma-novo-estudo-com-big-data.shtml>>

as an aspect of life, the opportunity for journalism to expand and strengthen the relationship between Science & Technology and everyday life is still there to be exploited.

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