

## **ANÁLISIS DEL CONTENIDO PUBLICADO EN YOUTUBE, FACEBOOK E INTERNET SOBRE VACUNAS Y ANTI VACUNAS**

### ***Analysis of pro-vaccine and anti-vaccine content published on YouTube, Facebook and internet***

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### **Resumen**

En este artículo se investiga la información sobre vacunas y anti vacunas que es compartida en blogs, *Facebook* y *YouTube* mediante la monitorización de publicaciones desde el año 2015 hasta la actualidad. En el análisis se ha tenido en cuenta el origen de la fuente emisora de la información, el contenido publicado, y el impacto generado. Los resultados, obtenidos del estudio de 48 vídeos de *YouTube*, 207 post de 5 blogs distintos y de 7 grupos de Facebook, muestran que: a) la información anti vacuna o pro vacuna encontrada en la red no suele provenir de organismo oficiales; b) el contenido compartido gira en torno a ciertos temas recurrentes y suele estar ligado a hechos puntuales (por ejemplo, un brote de sarampión o una denuncia particular por efectos secundarios de una vacuna); c) el contenido compartido carece, mayoritariamente, de carácter científico y; d) las interacciones generadas por parte de los usuarios varían mucho dependiendo de si la información es transmitida por *YouTube*, un *blog*, o *Facebook*. Generalmente, tanto los

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blogs como *YouTube* generan más seguidores, interacciones, y comentarios que los grupos de *Facebook*.

**Palabras clave:** Vacunas, Comunicación de salud, *Facebook*, *YouTube*, Internet.

### **Abstract**

This article analyses the information about vaccines and anti-vaccines that is shared on blogs, Facebook, and YouTube by monitoring publications from 2015 to the present. The origin of the source of the information, the published content, and the generated engagement have been taken into account. The results, obtained from the study of 48 YouTube videos, 207 posts from 5 different blogs and 7 Facebook groups, confirm that: a) the anti-vaccine or pro-vaccine information does not usually come from official sources; b) the shared content orbits around certain recurring issues and it is usually linked to specific events (for example, a measles outbreak or a particular complaint for side effects of a vaccine); c) the shared content, generally, is not based on scientific evidence, and; d) the interactions generated by users vary greatly depending on whether the information is transmitted by YouTube, a blog, or Facebook. Generally, both blogs and YouTube generate more followers, interactions, and comments than Facebook groups.

**Keywords:** Vaccines, Health Communication, Facebook, YouTube, Internet.

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## **1. INTRODUCTION**

Several documents claim that vaccines are the most important public health achievement of the 20th century (e.g. World Health Organization, UNICEF, World Bank, 2009; Bean, 2011; Dube, Vivion and MacDonald, 2015, Deloitte, 2017). In terms of data, the World Health Organization (2009) has estimated that vaccines save around 3 million lives per year, equivalent to the population of Madrid or Rome. In terms of effectiveness, vaccination has managed to control a large part of existing diseases (Ehret, 2003; World Health Organization, 2008) and has even led to the eradication of smallpox, a pathology that "once killed 30% of its victims" (Bean, 2011, p. 1875) or, in America, polio (Dube et al., 2015).

The high vaccination coverage rate in most countries indicates that vaccination remains a widely accepted public health measure. Thus, "more children are being reached with immunisation today than at any other time in history" (World Health Organization, et al., 2009, p. XX) and the benefits of vaccines "are increasingly extending to adolescents and adults, protecting them against life-threatening diseases" (World Health Organization, et

al., 2009, p. XX). However, despite this evidence, there is still some mistrust in its application.

Traditionally, reducing the prevalence and incidence of vaccine-preventable diseases has depended on context, policy, science, public health and the media (Dube et al., 2015, p. 99). Practitioners have also played a major role in citizens' decisions about immunisation. In this regard, probably the most widely publicised example is that of Andrew Wakefield, a British doctor who in 1998 published in the prestigious journal *The Lancet* an investigation associating the MMR vaccine with autism. Although the study turned out to be a fraud, the level of hysteria caused by his claims led many parents to decide not to vaccinate their children for fear that they would develop autism. The result was a spike in measles cases.

Recently, the referral sources of information have changed and, therefore, other variables have appeared in citizens' decision algorithms about whether or not to vaccinate: "although health care providers are the primary source of medical advice, including advice about vaccination, the public is increasingly turning to the Internet" (Bean, 2011, p. 1875). In this regard, some research highlights the importance of the internet in opinion flows generated about vaccines (Dannetun, Tegnell, Hermansson, Giesecke, 2005; Cuesta and Gaspar, 2014; Cambra, Díaz, Herrero, 2016).

Several authors argue that the Internet has provided anti-vaccinationists with great opportunities for exposure and that it plays a decisive role in fuelling anti-vaccination sentiment (Davies, Chapman and Leask, 2002; Cambra, Díaz, Herrero, 2016). Following this logic, the emergence of social networks and the Internet has multiplied the possibility of finding erroneous content and, consequently, has led to public health decisions being made on the basis of inaccurate or misleading information.

Based on this belief that traditional models of information transmission and health message persuasion are changing, this article analyses the anti-vaccine and pro-vaccine content that is transmitted through blogs, Facebook and YouTube. It aims to identify the sources of information and the type of content shared among the user community.

## **2. OBJECTIVES**

The overall objective of this research is to analyse the type of vaccination-related information that is distributed on blogs, YouTube, and Facebook groups.

The specific objectives are as follows:

- Identify sources of pro- and anti-vaccine information;
- Know the content they publish and the topics they debate on networks;
- Quantify the interactions that both anti-vaccine and pro-vaccine people are able to create.

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- Find patterns of behaviour in the generators of anti-vaccine and pro-vaccine content according to the channel through which the content is distributed (blogs, Facebook, YouTube).

To achieve these objectives, the following research questions (RQ) and their associated hypotheses (H) are posed (Table 1):

**Table 1. Objectives, Research Questions (RQ) and Hypotheses (H)**

Objective and approach	Research Questions	Associated hypothesis
<u>Identify the sources of pro- and anti-vaccine information:</u> on the internet, the content generated does not usually pass through veracity filters and its control is not exhaustive, so it is essential to know the sources of the information published.	<b>RQ1:</b> Who are the sources of pro- and anti-vaccine content on blogs, Facebook and YouTube?	<b>H1:</b> <i>The sources of information transmitted on the internet are not official bodies.</i>
<u>Knowing the content, they publish and the topics they debate on networks:</u> the information that is spread on the internet is easily accessible to the majority of the population, which means that anyone is susceptible to being influenced by the content shared on YouTube, blogs or Facebook. Because of this capacity for influence, in this research it is essential to know and understand the content generated on the channels under study.	<b>RQ2:</b> What is the content transmitted?	<b>H2:</b> <i>The contents respond to current issues.</i>
<u>Quantifying the interactions that both anti-vaccine and pro-vaccine advocates are able to create:</u> emphasising the influence that social media and the internet have, this research questions how much engagement the opposing positions on vaccination generate.	<b>RQ3:</b> Who gets more interactions: anti-vaccine content or pro-vaccine content?	<b>H3:</b> Pro-vaccination content generates more influence than anti-vaccination content.
<u>To find patterns of behaviour in the generators of anti-vaccine and pro-vaccine content according to the channel through which the content is distributed:</u> given that the three channels analysed offer different possibilities to both authors and users, we asked ourselves whether there are some media that are more favourable than others when it comes to creating pro- or anti-vaccine content.	<b>RQ4:</b> In which media are pro- and anti-vaccine content able to generate the most interactions?	<b>H4:</b> <i>Facebook and YouTube will attract more anti-vaccine content, while blogs will tend to share pro-vaccine information.</i>

**Source:** *Own elaboration*

### 3. METHODOLOGY

This article details the data collected on vaccines and anti-vaccines recorded in various blogs, YouTube channels, and Facebook groups. The data in this paper was collected between 23 December 2019 and 23 January 2020.

The methodology has been developed in two steps: a) on the one hand, a comprehensive data recording procedure was stipulated and; b) on the other hand, the specificities of each search field were defined.

The general data collection scheme is the same for all channels analysed (source origin, content and interactions). However, the information recorded varies according to

the research possibilities of each medium (YouTube, Facebook, and blogs). Consequently, it has been taken into account that on YouTube interactions can be counted in positive and negative likes, but that on blogs it is not possible to make this record. In the same way, the possibility offered by some blogs of sharing content directly on other social networks, such as Twitter and LinkedIn, has been taken into account, despite the fact that this option is not possible on the other channels studied.

The construction of the method is detailed below and, ultimately, the sample used is described.

### 3.1. Data recording procedure

The following specificities of each channel were taken into account when recording the data:

- *YouTube*
  - Language: videos in English.
  - Keywords: the title of the video contains the word "vaccine(s)" or "anti-vaccine(s)".
  - Filters: using the application's search engine, we filtered by entering both the keywords described in the previous point and the dates indicated in the following point.
  - Period: the date of publication of the video is equal to or after 1 January 2015.
- *Blogs*
  - Language: content in English.
  - Keywords: the word "vaccine(s)" or "anti-vaccine(s)" is contained in the text.
  - Filters: The search process was done through the tags of the blogs themselves or by filtering through their search fields.
  - Period: the date of publication of the post is equal to or after 1 January 2015.
  - Restrictions: for a post to be taken into account, the number of posts that the author of the blog had made about the content to be analysed was counted. Thus, any blog with less than five texts referring to vaccines was discarded.
- *Facebook*
  - Language: content in English.
  - Keywords: the title of the group contains the word "vaccine(s)" or "anti-vaccine(s)".
  - Filters: the option "groups" was selected in the search, discarding other research possibilities such as "publications", "pages" or "videos".
  - Time period: the groups have a minimum activity of 10 publications per year since 1 January 2015.
  - Restrictions: analysis of publicly accessible groups. Private groups were discarded due to the impossibility of viewing shared content.

### 3.2. Explanation of the fields recorded in each channel

Generally speaking, the analysis of the content of the chosen channels is structured in three main blocks:

- 1) The origin of the source to collect data on the authorship of the video.
- 2) The description of the video to detail the content and its quality.
- 3) The level of engagement generated to account for the impact the content has had on users.

Specifically, the record fields within each block are described below:

#### 3.2.1. YouTube

- Origin of the source.
  - Author's name: name of the person who is the author of the video.
  - Name of the channel: name of the channel where the video is inserted.
  - Country - continent: country of origin of the video or continent (in case the exact country is not known).
- Description of the content.
  - Title: title of the video.
  - Date: date on which the video was uploaded to YouTube.
  - Duration: time in seconds.
  - Summary: synopsis of the content of the video.
  - Genre: mode of transmission of the information. There are five options:
    - Monologue (the author of the video intersperses images with voice-over statements and his or her own presence);
    - News (the video is about a news item from a news or TV programme);
    - Report (the video is a report);
    - Interview (a journalistic interview is broadcast);
    - Debate (a debate on vaccines is shown).
  - Primary source: the person who generates the video. There are five possible options:
    - Private person (this is a blogger who includes the video on his or her channel);
    - Journalist (the video is an excerpt from a news report or TV programme where the host of the talk or content is a journalist);
    - Journalist collective (the source creating the video is a collective rather than a single journalist);
    - Health professional (a video created and disseminated by a doctor).
  - Secondary source: the secondary source only appears when the video reflects an interview or a report. It then records who is being interviewed or who is participating in the report. There are six possible options:

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- Doctor (the person the journalist asks - the main source - in the interview or report is a doctor);
- Citizen (statements from citizens are included in the story we are watching in the video);
- Doctor and citizens (the people who appear in the story - where the main source is a journalist - are doctors who provide a scientific view and citizens who contribute their opinion);
- Official government statements (statements from a member of the government are inserted during the development of the story);
- Expert (the interview is conducted with an expert in the field but not a doctor).
- Stance: opinion on vaccines. There are four possible options:
  - Pro-vaccine (in favour of vaccination);
  - Anti-vaccine (against vaccination);
  - Neutral (no opinion either for or against);
  - Ambivalent (the two positions are confronted, thus establishing a debate between those interveners who are in favour and those who are against vaccination).
- Quality: this reflects whether the content is supported by scientific sources (quality content) or whether there are no clear references to the sources of the information (non-quality content).
- Level of interactions generated.
  - Views: number of views of the video at the time of the registration date.
  - Likes: number of likes of the video at the time of the registration date. Both positive and negative likes and dislikes are recorded.
  - Subscriptions: number of subscriptions to the channel.
  - Comments: positive, negative and neutral comments made to the video by users. For videos with less than 50 comments, the percentage of positive, negative and neutral comments was counted. For videos with more than 50 comments, a sample was selected (the first 20 comments) and the results were extrapolated to the total. To do this, the number of positive, negative and neutral comments in the sample was multiplied by 100 and divided by the total number of comments selected.

$$\left( \text{percentage of comments} = \frac{\text{neutral, positive or negative comments} \times 100}{\text{number of comments selected as a sample}} \right).$$

### 3.2.2. Blogs

- Origin of the source.
  - Author's name: name of the person who is the author of the post.
  - Name of the blog: name of the blog where the post is inserted.
  - Type of source: whether the source is official (an official body) or unofficial (an individual or group of professionals).
- Description of content.
  - Title of the post.

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- Summary: synopsis of the content.
- Type of content: whether it is based on information, on the author's opinion or on scientific data and statistics. Formulas may be combined.
- Position: Opinion regarding vaccines. There are three possible options:
  - Pro-vaccine (in favour of vaccination);
  - Anti-vaccine (against vaccination);
  - Neutral (no opinion either pro or con in this post);No results were recorded for the ambivalent stance, although this search criterion was taken into account.
- Date: the day the post was published.
- Quality: similar to the "type of content" column, but in this case, the aim is to distinguish whether or not the content shared is based on quality and notable sources.
- Level of engagement generated.
  - Likes: number of likes of the post at the time of the registration date.
  - Reads: number of reads of the post up to the date of registration.
  - Subscriptions: number of subscriptions to the blog.
  - Comments: comments made by users. There are 3 possibilities:
    - Positive;
    - Negative;
    - Neutral.
  - Shared content: This records how many times the content has been shared directly from the blog on other social networks such as Facebook, LinkedIn and Twitter.

### 3.2.3. Facebook

- Origin of the source.
  - Source type: the name of the Facebook group and the type of profile (whether it is an official source or not) is recorded.
- Description of content.
  - Posture: It is recorded whether the group has content:
    - Pro-vaccine (pro-vaccination) or;
    - Anti-vaccine (against vaccination).
  - Content type: whether the content is scientific, informational or anecdotal. The options can be combined.
  - Start of publications: start of the group's activity.
  - Quality of the content: it is recorded whether it is:
    - Appropriate (if it reproduces content about vaccines) or;
    - Inappropriate (if the content shared is jokes, images, etc.)
- Level of engagement generated.
  - Members: number of persons belonging to the group.



### 3.3. Sample

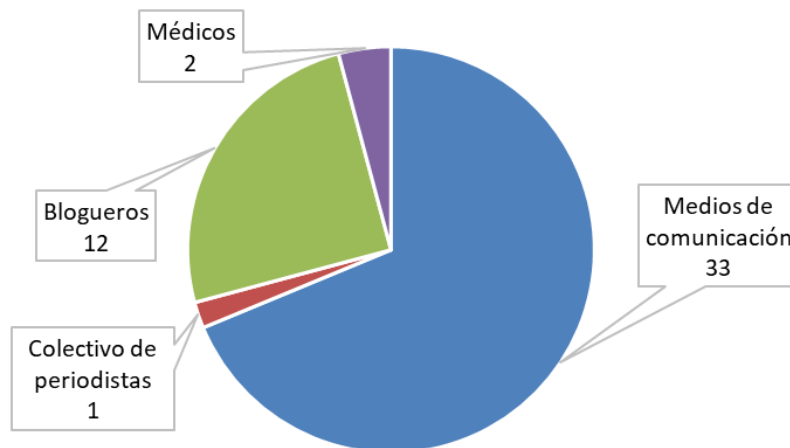
The sample of this research is composed of 48 YouTube videos, 207 posts from 5 different blogs with disparate trends and 7 public Facebook groups. The information is specified in Annex 1.

## 4. RESULTS AND DISCUSSION

This section describes the results of the research in terms of the research questions posed.

Research question 1 (RQ1): The information shared in the studied media is mostly issued by non-official sources. In this research, official sources are understood to be government bodies, local or regional administrations, hospitals and medical professionals.

Specifically, two YouTube videos belonging to medical specialists have been detected. In the remaining 46 videos, the authorship is divided between (Figure 1): bloggers (12 videos, 25%); the media (33 videos, 69%) and a group of journalists (1 video, 2%).



**Graph 1.** *Authorship of the videos analysed.*  
**Source:** *Own elaboration*

Of the groups shown in Graph 1, it can be seen that videos from the media have a special characteristic: in 63.3% of the cases (21 videos) the media outlet uses official sources to provide quality content. Thus: a) in the 6 videos in which a news item is broadcast, official statements on the fact narrated are recorded; b) in 5 of the 10 videos in which interviews are recorded, the journalist asks experts; c) in 5 of the 10 reports analysed, statements by doctors are included; d) in the 6 videos showing debates on vaccination, there is only one in which doctors do not participate and; e) in the only video broadcast by a comedy programme, the journalist made a monologue without resorting to sources.

In the exploration of Facebook groups, no official group was found.

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Among the blogs, the Real e Ilustre Colegio de Farmacéuticos de Sevilla (RICFS) was considered an official source, as well as the Pills Blog and the Live Med Iberia Blog. In the case of the latter two, although they do not represent any official body, their posts are written by members of the healthcare community (especially doctors and pharmacists).

Based on these data, Hypothesis 1 is validated:

*H1: The sources of information transmitted on the internet are not official bodies.*

Research Question 2 (RQ2): The content analysed responds to recurrent and topical themes, but the form of transmission and the focus of the information varies depending on the medium explored. In this respect, there are clear differences between a YouTube video, a blog or a Facebook post.

On YouTube, the publication of videos is directly linked to topical content. In this respect, it is clear that the media as well as bloggers and journalists publish their information when the vaccination is in the news. In contrast, in the two cases of videos published by doctors, the reason for broadcasting is not current affairs, but the transmission of their own opinions on the benefits of vaccination.

The content of the blogs is very disparate and it is difficult to find common patterns among them. However, in order to facilitate the presentation of the results, three categories have been established: 1) Recurrent information: an index of topics covered can be clearly established. This category includes Miguel Jara's blog, in which information on the Human Papilloma Virus (HPV) vaccine, criticism of the pharmaceutical industry and the supposed ineffectiveness of the measles vaccine occupy a large part of the posts; 2) Consulting: the authors' posts answer users' questions. This pattern of behaviour is detected in the RICFS, isalud and Live Med Iberia blogs; 3) Miscellaneous: The wide variety of topics makes it impossible to categorise them. The Pills blog is characterised by publishing pro-vaccine content with information supported by data and statistics, but its posts are not connected.

With regard to Facebook, 8 public groups with vaccine-related content were identified, but only 7 of them were considered in the final study (Table 2). This is due to the fact that one of the groups does not offer content in line with the study topic.

**Table 2.** *Information on pro- and anti-vaccine groups on Facebook.*

Group name	Trend	Type of content	Frequency of publication	Members
STOP VACCINATIONS	Anti	Informative	40 publications per day	530
No forced vaccinations - No SB277	Anti	Informative	8 publications per month	270
Affected by mercury	Anti	Informative	7 publications per week	178
Pro-vaccine scientists	Pro	Informative	12 publications per year	256
The Importance of Vaccines!	Pro	Informative	2 publications per week	441

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Anti Antivaccine	Pro	Informative-anecdotal	6 publications per week	106
The Danger of Mercury in Vaccines	Anti	Informative-anecdotal	12 publications per year	332

**Source:** *Own elaboration*

The content of these groups is very generic, but is associated with current affairs. In fact, media content is shared in all the groups. In this way, a user publishes a news item from a media outlet and the interested Facebook community comments on it and interacts with it.

The information provided validates the second hypothesis:

*H2: The contents respond to current issues.*

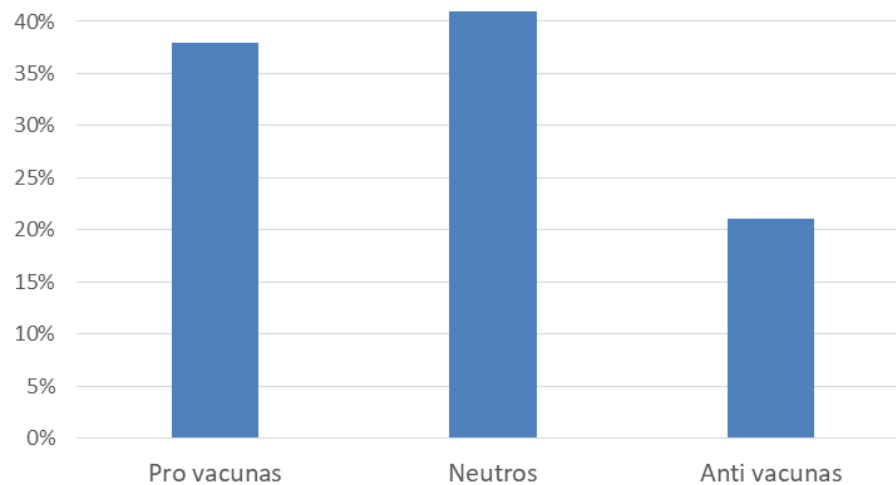
Research question 3 (PI3): This research question could not be answered, because the way of counting interactions or influence capacity is not comparable between YouTube, Facebook, and blogs.

It is possible to state that the interactions on YouTube videos are significant (approximately half of the videos analysed, 20 out of 48, have more than 100 comments) and that the ratings on Facebook group content are very low (there are hardly any posts with more than 5 "likes"). However, as the measurement methods are different, we cannot establish direct relationships or conclude which medium has more followers.

Nevertheless, as part of the results, several comparisons are provided according to the media analysed:

On YouTube, the level of interactions generated is remarkable. By authors: a) videos from the media have more than 606,000 views and generate 19,223 positive likes and 1,047 negative likes; b) the total number of views reached by the videos analysed which are broadcast by bloggers is 2,212,313. Likewise, the total number of positive likes is 170,383, while the negative ones barely exceed 4,000. Furthermore, there are 21,005 comments registered on these publications, of which 38% are in favour of vaccines, 41% maintain a neutral position and 21% declare themselves to be anti-vaccine (Graph 2); c) finally, the two videos made by medical professionals have a total of 133,887 views and have the peculiarity of obtaining more negative likes (134,211) than positive ones (991).

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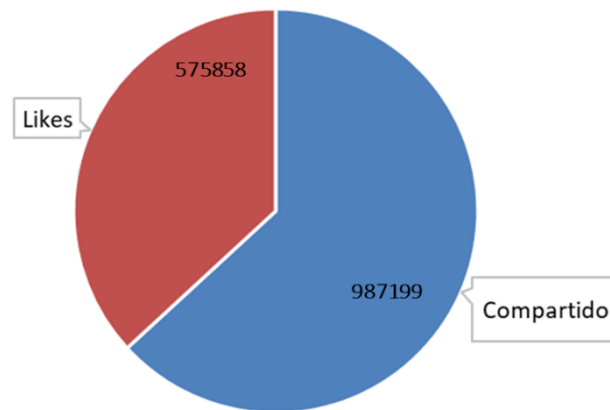
**Graph 2.** Trends in comments made on blogger videos.

**Source:** Own elaboration

In the case of blogs, it is difficult to make assessments. The data collected are very disparate because the measurement variables do not coincide in all publications. This means that for the Pills blog only the comments could be counted (29 in total) and for the Live Med Iberia blog only the reading rates of each entry could be recorded (an average of 1,060 per publication). On the other hand, the RICFS blog and the isalud blog do not specify any of the variables used to measure interactions. For this reason, only the data from Miguel Jara's blog are presented in detail below.

Although the number of subscribers is not public, it has been calculated that Jara accumulated 575,858 likes on the publications analysed (an average of 4,500 per publication) and his content is massively shared by his readers (Graph 3) on Facebook (972,066 times), Twitter (14,501) and LinkedIn (632). In addition, the total number of comments on its posts is 1,100, a figure far higher than the number of comments made, for example, on the Pills Blog (29).

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**Graph 3.** Miguel Jara's blog interactions counted in "likes" and content shared on other social networks.

**Source:** Own elaboration

Facebook interactions are the least representative of the entire sample. When compared with the other media analysed, we found that although the groups studied usually have more than a hundred followers, their activity and interactions are very low.

The frequency of content publication varies depending on the group studied, but, in general, content is shared weekly and monthly. On the other hand, the reactions to these shared contents are very scarce (an average publication has 3 "likes", practically no comments, and its impact index is, in almost all cases, less than 50 views).

Research question 4 (RQ4): The results of RQ4 on the ability of the media studied to generate pro- or anti-vaccine interactions are presented.

In the exploration of the data, it has been observed that both YouTube videos and blogs analysed tend to be pro-vaccination: 60.4% of the videos and 80% of the blogs are pro-immunisation. However, less than half of the Facebook groups (42.8%) are pro-immunisation.

A priori, it appeared that anti-vaccine content found Facebook to be a friendlier medium for sharing their information. However, this statement should be qualified by adding an important point regarding blogs: Miguel Jara's blog, the only blog detected with an anti-vaccination tendency, has twice the capacity to generate content and interactions than the other 4 blogs combined (Table 3). Thus, of the 207 entries analysed in the category, 128 belong to Jara.

**Table 3. Comparison of blog interactions.**

Blog	Nº of post analiz.	Suscript.	Average of likes per public.	Shared content	Total Comments	Average readings
Miguel Jara	128	Unknown	4.500	Facebook: 972.066	1.100	Unknown
				Twitter: 14.501		
				Linkendln: 632		
El blog de Pills	9	Unknown	Unknown	Unknown	29	Unknown
Live Med Iberia	52	Unknown	Unknown	Unknown	Unknown	1.060
RICFS	12	Unknown	Unknown	Unknown	Unknown	Unknown
isalud	6	Unknown	Unknown	Unknown	Unknown	Unknown

**Source:** *Own elaboration*

The data presented in the analysis allows for the refutation of Hypothesis 4:

*H4: Facebook and YouTube will attract more anti-vaccine content, while blogs will tend to share pro-vaccine information.*

During the research, it was found that anti-vaccine content is shared more on Facebook and blogs. In contrast, pro-vaccination content is mostly found on YouTube.

## 5. CONCLUSIONS

Returning to the outline of the methodology, the conclusions detailed below are structured into: 1) origin of the source, 2) content of the information, and 3) interactions generated.

### 5.1. According to the origin of the source

- The anti-vaccine or pro-vaccine information found and analysed does not, in most cases, come from official sources.

No Facebook groups with governmental or administrative authorship have been detected. In the case of Facebook, only 2 of the 48 videos come from medical sources and, in the case of blogs, the only one that represents an institution of collegiate professionals is the Blog of the College of Pharmacists, in that it represents an institution of collegiate professionals.

- Information sources tend to be collective in the case of Blogs, but individual on Facebook and YouTube.

On Facebook and YouTube, it is most common to find individuals giving their opinion on vaccination. While it is true that most of them use a pseudonym to publish their content, each of the people who participate is easily identifiable insofar as their names are linked to a profile within the Social Network itself.

This is not the case for the Blogs: 4 of the 5 analysed are managed by a collective (RICFS) or by a compendium of professionals (El blog de Pills, Live Med Iberia, El blog de isalud). However, only in the cases of RICFS and Live Med Iberia do we know the name of the author of the information, while in the rest, the entry is signed by a collective (for example, "isalud team").

It should be noted that the case of Miguel Jara's blog is different. The author is perfectly identifiable and takes responsibility for the information he shares in his space.

## **5.2. According to content**

- The content varies according to the medium analysed.

It has been identified that the topics shared on YouTube respond to the current situation. This means that the pattern of publications followed in this medium is linked to current events.

With regard to blogs, different categories have been registered to structure the content: a) Recurrent information; b) Consultancy, and c) Miscellaneous). However, no clear similarities were found in the information shared in each blog.

Finally, in the study of the Facebook groups, it can be concluded that information is posted according to current hot topics on vaccination.

- Published content tends to be either pro-vaccination or anti-vaccination, depending on the medium through which the information is conveyed.

There is a certain tendency to support vaccination on YouTube and, in a certain sense, there is also a palpable rejection of anti-vaccination content. However, in the videos shared by the media it is common to see how space is given to people who declare themselves to be anti-vaccine, giving them a prominence comparable to that of pro-vaccine people.

Anti-vaccine content is more common in blogs (128 posts are anti-vaccine content compared to 79 pro-vaccine posts) and on Facebook (4 of the 7 groups share anti-vaccine content).

- The way in which information is transmitted varies according to the channel studied.

While on YouTube the focus is on debates and interviews, on Facebook and blogs it is common for a subject to convey information or opinion in a one-way manner.

### **5.3. According to the interactions generated**

- Interactions on Facebook are much lower than those generated on YouTube and blogs.

The level of comments and "likes" achieved on YouTube is much higher than on other channels, perhaps because users are able to interact with the content more easily.

However, it is also possible to generate interactions through a blog. The paradigm is Miguel Jara: he accumulates a large number of comments and has the capacity to have his content reproduced by users on other social networks such as LinkedIn or Twitter. However, this is not the case with the other 4 blogs analysed, whose level of interactions is negligible.

On Facebook, on the other hand, interactions are very limited.

- It cannot be determined that the interactions on the blogs are real.

While on Facebook and YouTube the authors of comments can be identified, this is not the case with blogs. In this medium, the names of the people who share content are not public and access to them through comments is not possible. This makes it difficult to identify DOLs (Digital Opinion Leaders) and casts doubt on whether the author has as many followers as the interactions suggest.

- Interactions generated towards anti-vaccine content are more representative in blogs.

This conclusion can be verified by analysing the five blogs proposed in this research. Of these, only one is anti-vaccine and its level of followers, comments and interactions is significantly higher than the other four. It is also true that the content generated by Miguel Jara is much higher than that produced by the other blogs.

In the case of YouTube, the opposite trend is detected: the number of comments and "likes" increases if the content shared is pro-vaccine. Thus, the only two videos registered as anti-vaccination accumulate a total of 11 comments, 1197 views, 37 positive "likes" and 3 negative "likes". These are derisory numbers considering that between the two channels they have more than 340,000 subscribers.

In the analysis of the Facebook groups, no conclusions can be drawn about the interactions carried out, since, although the number of members is higher in the anti-vaccine groups (1,000 versus 352), the level of interaction is low in all of them.



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## 7. ANNEX

### 7.1. List of YouTube videos used in the analysis

CNN Chile. (2014, Febrero 4). Carmen Gloria Chaigneau: "No somos una agrupación antivacunas exigimos vacunas seguras" [Archivo de video]. Recuperado de <https://www.youtube.com/watch?v=rKh6QQpSL08>

NTN24. (2015, Junio 30). Movimiento antivacuna cree es imposible contagiarse de enfermedad circulante: médico [Archivo de video]. Recuperado de <https://www.youtube.com/watch?v=i6ng1LCvHJM>

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La Sexta. (2015, Octubre 30). Ortrud Lindemann, doctora: "No hay ninguna vacuna que sea segura al 100%" [Archivo de video]. Recuperado de [https://www.youtube.com/watch?v=tSx\\_LWaeTJs](https://www.youtube.com/watch?v=tSx_LWaeTJs)

La Sexta. (2015, Octubre 30). El perfil de los antivacunas [Archivo de video]. Recuperado de <https://www.youtube.com/watch?v=OwJZyAXIVaM>

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CNN. (2016, Septiembre 9). Andrea Schilling: "Estos grupos antivacunas son asesinos en potencia" [Archivo de video]. Recuperado de <https://www.youtube.com/watch?v=fDRHluRcTw0>

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- Telemiño Ourense. (2018, Agosto 22). Antivacunas y brote de sarampión [Archivo de video]. Recuperado de [https://www.youtube.com/watch?v=k569din7QbY&feature=emb\\_logo](https://www.youtube.com/watch?v=k569din7QbY&feature=emb_logo)
- Reporte Indigo. (2018, Septiembre 21). Los antivacunas, el movimiento que está matando | Reporte Indigo 1586 [Archivo de video]. Recuperado de <https://www.youtube.com/watch?v=mj3MYB72pl0>
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Telenoche. (2019, Marzo 18). Los antivacunas no vacunan a sus hijos y los exponen a todas las enfermedades [Archivo de video]. Recuperado de <https://www.youtube.com/watch?v=YVi9R6V8-o8>

Repretel Costa Rica. (2019, Marzo 25). Grupos antivacunas no afectan brotes de sarampión [Archivo de video]. Recuperado de [https://www.youtube.com/watch?v=I9t2\\_1fRj1Y](https://www.youtube.com/watch?v=I9t2_1fRj1Y)

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Jara, M. (2020). Miguel Jara [Blog]. Recuperado de <http://www.migueljara.com/>

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## 7.3. List of Facebook groups

¡La importancia de las Vacunas! [Nombre de usuario] Recuperado de <https://www.facebook.com/groups/541904929740761/>

Afectados por el mercurio [Nombre de usuario] Recuperado de <https://www.facebook.com/groups/604058640089804/>

Anti Antivacunas [Nombre de usuario] Recuperado de <https://www.facebook.com/groups/307166246860080/about/>

Científicos provacunas [Nombre de usuario] Recuperado de <https://www.facebook.com/groups/1232552076771162/about/>

El peligro del mercurio en las vacunas [Nombre de usuario] Recuperado de <https://www.facebook.com/groups/nomasmercurio/>

No vacunas forzadas - No SB277 [Nombre de usuario] Recuperado de <https://www.facebook.com/groups/novacunasforzadas/>

STOP VACUNAS [Nombre de usuario] Recuperado de <https://www.facebook.com/groups/STOPVACUNAS/>

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