

Under the surface:

Covid-19 vaccine narratives, misinformation and data deficits on social media

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Mapping competing vaccine narratives across English, Spanish and Francophone social media

This research demonstrates the complexity of the vaccine information ecosystem, where a cacophony of voices and narratives have coalesced to create an environment of extreme uncertainty. Two topics are driving a large proportion of the current global vaccine discourse, especially around a Covid-19 vaccine: the “political and economic motives” of actors and institutions involved in vaccine development and the “safety, efficacy and necessity” concerns around vaccines.

Narratives challenging the safety of vaccines have been perennial players in the online vaccine debate. Yet this research shows that narratives related to mistrust in the intentions of institutions and key figures surrounding vaccines are now driving as much of the online conversation and vaccine skepticism as safety concerns. This issue is compounded by the complexities and vulnerabilities of this information ecosystem. It is full of “data deficits” — situations where demand for information about a topic is high, but the supply of credible information is low — that are being exploited by bad actors. These data deficits complicate efforts to accurately make sense of the development of a Covid-19 vaccine and vaccines more generally. When people can’t easily access reliable information around vaccines and when mistrust in actors and institutions related to vaccines is high, misinformation narratives rush in to fill the vacuum. The findings should act as a wake-up call as the world waits for a Covid-19 vaccine and sees routine immunization rates drop.

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Executive summary

Executive summary

Overview

The outbreak of the novel coronavirus revealed both the sheer scale of misleading or false health claims online and the life-threatening impacts these can have.¹ While scientists are frantically working to manufacture a safe and effective vaccine for Covid-19, online misinformation has contributed to many people's reluctance across the globe to take a vaccine to protect them from the virus.² We have reached a pivotal and hypersensitive crossroads where increasing rates of vaccine skepticism may not only jeopardize the effectiveness of a potential Covid-19 vaccine, but that of vaccines more broadly, and even levels of trust in institutions connected to science and medicine.³

To understand and effectively tackle problematic vaccine discourse, it isn't enough to monitor and verify individual pieces of vaccine-related content.⁴ We have to understand that individual pieces of content create larger attitude-shaping narratives, and these narratives fall into even larger, overarching topics that steer conversations. Therefore, we need methodologies designed to map these key themes and identify the dominant narratives within them in a systematic and comprehensive manner.

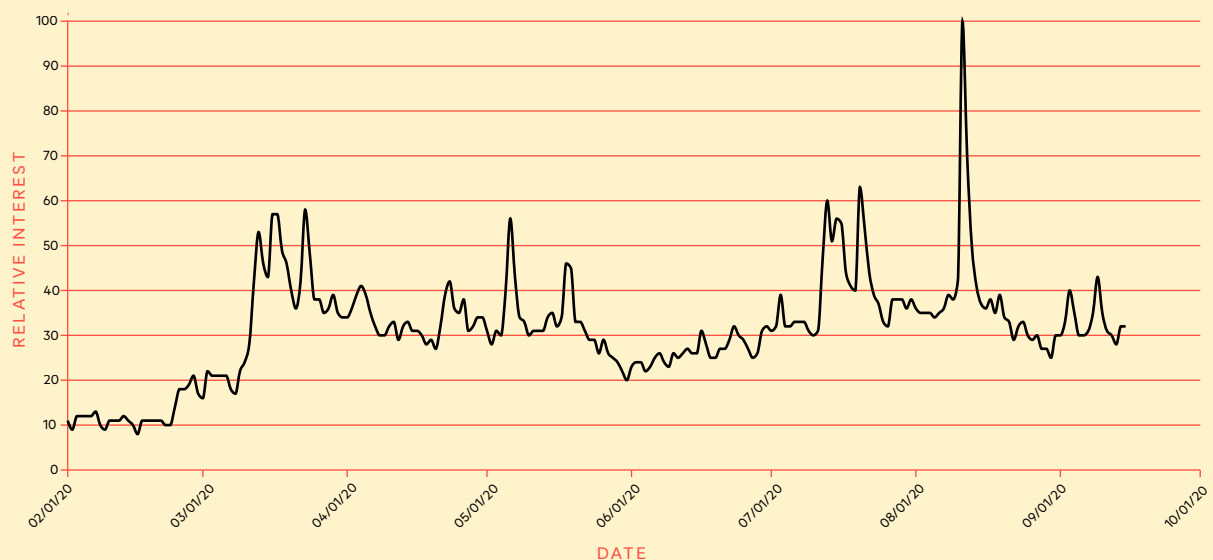
Uncovering these narratives, both positive and negative, is critical to assisting journalists, researchers and public communication experts wishing to report and act on potentially problematic vaccine discourse. However, online discourse is complex, even within one language or cultural context. But with the borderless social web, understanding which narratives are crossing borders and taking hold, and which are language- or culture-specific are critical elements to this question. For targeted and thus effective responses, we need to understand the global flows of online narratives.

Methodology overview

To examine online narratives about vaccines, First Draft collected social media posts from Twitter, Instagram, Facebook Pages and public Facebook Groups that included the words “vaccine” or “vaccination” in English, Spanish and French from June 15, 2020 to September 15, 2020. We focused on these three months because in June attention shifted to the race to develop a Covid-19 vaccine.

Vaccine interest over time

We chose June 15 as our starting point as this marked an inflection point when interest in vaccines, specifically the development of different Covid-19 vaccines, began to increase.



Over this period, we gathered a total of 14,394,320 posts on Twitter, Instagram, Facebook Pages and public Facebook Groups that included the words “vaccine” or “vaccination” in English, Spanish and French.

While this number is important to note, only a fraction of these posts received a serious level of engagement. We therefore pulled out this subsection of posts for deeper analysis. The dataset included the top 100 posts (as measured by engagement) on each platform and in each language, resulting in a sample of 1,200 of the most engaged-with posts related to vaccines. Between them, these 1,200 posts generated a total of 13,136,911 interactions.

Source: Google Trends.
 "Relative interest" is described by Google in the following way: "Numbers represent search interest relative to the highest point on the chart for the given region and time. A value of 100 is the peak popularity for the term. A value of 50 means that the term is half as popular. A score of 0 means there was not enough data for this term."

The most popular posts on Instagram and Facebook Pages tend to be dominated by established news sources. In order to capture organic social media conversations as opposed to media reports, we removed verified accounts from Facebook Pages and Instagram in our sample. (See Methodology section for more information).

Though these posts spanned only three languages, the Facebook Pages we analyzed were located in 41 countries.⁵

Dominant vaccine narratives

We categorized posts according to six topics, which were based on a new typology that First Draft designed to capture the different ways in which vaccines are framed in online conversations (see table 1). This gave us an overview of the dominant topics of conversation and showed us whether these differed across languages. A combination of quantitative and qualitative methods was then employed to uncover the key competing vaccine narratives within these frames.

In this report, we detail the narratives and trends unique to each language, as well as the overarching vaccine narratives that appeared across languages. In addition, we explore various features of information disorder related to vaccines, including tactics and key data deficits that are already being filled in with vaccine misinformation.

Table 1

Topic	Description	
	Development, provision and access	Posts related to the ongoing progress and challenges of vaccine development. This also includes posts concerned with the testing (clinical trials) and provision of vaccines as well as public access to them.
	Safety, efficacy and necessity	Posts concerning the safety and efficacy of vaccines, including how they may not be safe or effective. Content related to the perceived necessity of vaccines also falls under this topic.
	Political and economic motives	Posts related to the political and economic motives of actors (key figures, governments, institutions, corporations, etc.) involved with vaccines and their development.
	Conspiracy theory	Posts containing well-established or novel conspiracy theories involving vaccines. ⁶
	Liberty and freedom	Posts pertaining to concerns about how vaccines may affect civil liberties and personal freedom.
	Morality and religion	Posts containing moral and religious concerns around vaccines, such as their composition and the way they are tested.

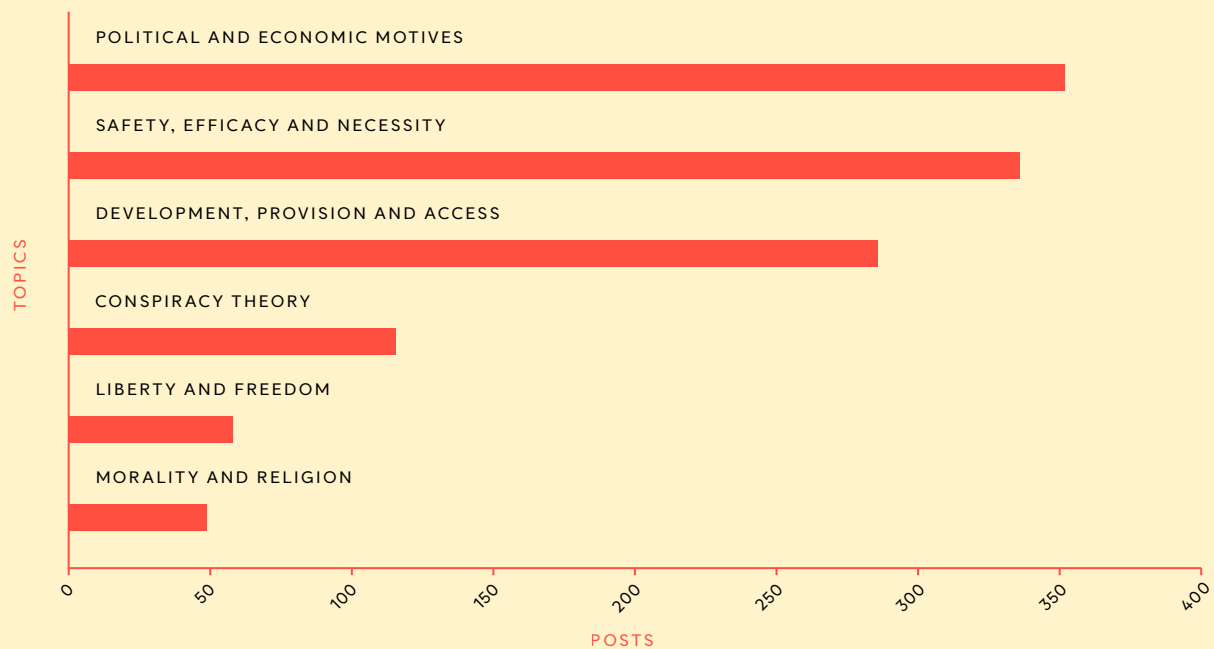
Key findings

1) REVIEW OF THE LANDSCAPE

- **Thematic breakdown:** Among the 1,200 posts we analyzed, two topics were dominant across all three language communities: 1) those that referred to the “political and economic motives” behind vaccines; 2) those that referred to the safety and necessity of vaccines.

The topics of conversations driving online vaccine discourse

Narratives related to mistrust of institutions and key figures around vaccines (which fall under the topic Political and Economic motives) are driving as much of the online conversation as safety concerns.



Source: First Draft Research

- **Language differences:** Though two themes were found in content posted in the three languages, some were unique to a specific language. For example, “liberty and freedom” was unique to English, and “morality and religion” was unique to Spanish. Furthermore, many of the most dominant narratives, even within the two dominant topics of conversations across languages, were often unique to each language community.

For a breakdown of the differences across English, French and Spanish, go to page 30.

- **Visuals play an important role:** Photos and videos accounted for 51 per cent of all content in the dataset. This figure underrepresents the true number of photos and videos. It is a conservative number as tweets with both a link and preview image were categorized as a link.
- **Platform differences:** Instagram and unverified Facebook Pages drove the debate. Together, the two platforms accounted for 71 per cent of the 13 million interactions (as measured by likes, shares, emoji reactions, retweets) generated by the 1,200 sampled posts. These two platforms also accounted for 84 percent of the 720,916 interactions generated by conspiracy theory-related content.
- **Conspiracy content:** Conspiracy theories about vaccines in general and the Covid-19 vaccine specifically play an outsized role on social media, particularly in Francophone spaces. More posts linked vaccines to conspiracy theories than moral issues and religious and civil liberties concerns combined. And these conspiracy theories were not limited to fringe groups. They resonated with the “Yellow Vest” movement, libertarians, New Age groups, highly popular anti-government groups and more conventional audiences, with key terms such as “microchipping” and “deep state” becoming increasingly popular.

2) TACTICS

- **Data deficits around vaccine ingredients and technologies:** There are significant data deficits concerning vaccine ingredients and novel vaccine technologies, such as mRNA vaccines. These deficits are being filled by unreliable individual accounts and alternative news outlets that are spreading disinformation to drive down confidence in vaccines.
- **“Zombie” content:** Previously debunked falsehoods and conspiracy theories about vaccines and long-standing anti-vaccination narratives are reappearing to fit the current health crisis and erode trust in a Covid-19 vaccine and vaccines more generally.

- **Bill Gates:** Bill Gates continues to play a central role in global vaccine conversations online. He appeared in 6 per cent of the total posts. However, unlike at the peak of the Covid-19 pandemic, where he was at the heart of many conspiracy theories, his political and economic interests as well as his overall credibility and trustworthiness as a public health expert are now at the heart of online conversations. Organizations' links to Gates are used to poison their legitimacy and undermine trust in the vaccines they are working to develop.
- **Laundering news headlines:** Anti-vaccination pages, groups and accounts are laundering vaccine-related headlines from legitimate news stories and repurposing them to fit their own anti-vaccination agenda.

3) NETWORKED COMMUNITIES

- **Ideologically incongruous communities** — Libertarians, traditional anti-vaxxers, New Age groups, QAnon adherents and others are uniting around safety and necessity concerns of a Covid-19 vaccine. The combination of these issues alongside mandatory vaccines is bringing very disparate communities together to oppose a future Covid-19 vaccine.

TOPICS

POSTS (1,200)

EXAMPLES

NARRATIVES

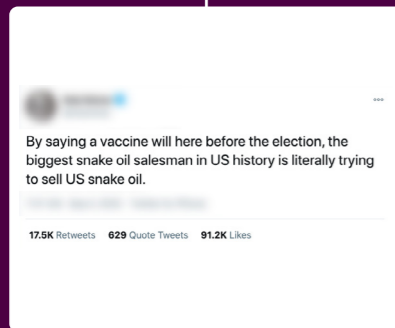


Political & economic motives

Trust in the political and economic motives of key figures, governments, institutions, corporations, etc., involved with vaccines

353

EN: 32.86%
ES: 39.66%
FR: 27.47%



- Concentrated financial interests drive vaccine development and undermine its safety
- Bill Gates, and institutions and vaccines associated with him, cannot be trusted
- Leaders are promoting vaccines for political gains
- Corrupt governments and media outlets serve as mouthpieces for Big Pharma
- Governments and media are manipulating coronavirus fears to advance a pro-vaccine agenda
- Politicians, institutions and governments are incompetent and cannot be trusted
- Free-market capitalism, not socialism, is facilitating the development of a Covid-19 vaccine



Safety, efficacy & necessity

Whether vaccines are perceived to be safe, effective, or needed.

337

EN: 41.83%
ES: 27.29%
FR: 30.86%



- The Covid-19 vaccine is the silver bullet solution and a ticket to a return to normality
- A healthy immune system is more powerful than a vaccine
- A Covid-19 vaccine is unnecessary
- A Covid-19 vaccine isn't necessary given the effectiveness of hydroxychloroquine
- mRNA vaccines and GMOs aren't safe
- You poison your body with drugs and alcohol, so you can take the vaccine
- Vaccines are often dangerous and may even be lethal



Development, provision & access

The progress and challenges of vaccine development, including trials as well as who gets them, when and how.

287

EN: 22.29%
ES: 43.2%
FR: 34.49%



- Russia has won the race to find a Covid-19 vaccine
- The Russian vaccine is safe and effective and a great hope in the fight against coronavirus
- The Oxford/AstraZeneca Covid-19 vaccine is safe and effective

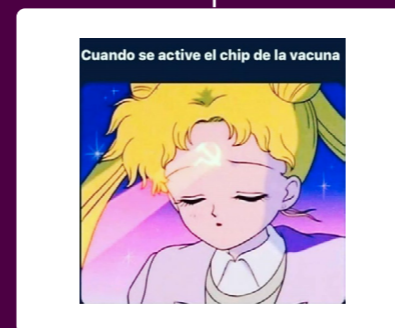


Conspiracy theory

Well-established or novel conspiracy theories involving vaccines.

116

EN: 29.31%
ES: 13.79%
FR: 56.89%



- Vaccines are tools to microchip and control entire populations
- Vaccines are means to control populations and reach a transhumanist dystopia
- Vaccines serve as tools for human engineering and depopulation programs



Liberty & freedom

How vaccines are perceived to affect civil liberties and personal freedom.

58

EN: 62.06%
ES: -
FR: 37.93%



- It starts with a mask, moves to vaccines and ends in total control
- Mandatory vaccines are "railroading our rights" and freedoms

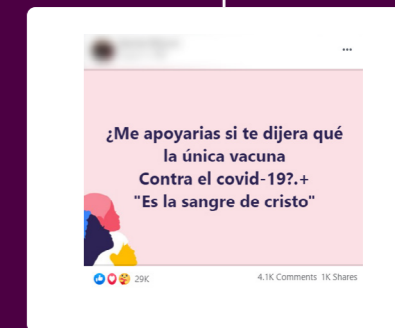


Morality & religion

Moral and religious concerns around vaccines, such as their composition and the way they are tested.

49

EN: 18.36%
ES: 57.14%
FR: 24.48%



- The 'blood of Christ' is the only vaccine against Covid-19
- God has the power to enlighten scientists to discover a coronavirus vaccine

Source: First Draft analysis of 1,200 social media posts (300 from Twitter, 300 from Instagram, 300 from Facebook Pages, 300 from Facebook public Groups), split equally across Spanish (400), English (400), and French (400), in three months between June 15 and September 15, mentioning variations of the keyword 'vaccines'

Recommendations

- **Recommendation No. 1:** We need to stop relying on fact-checking efforts and platforms' content moderation policies to address data deficits. Doing so is reactive, insufficient and potentially counterproductive. For example, greater levels of content moderation could fuel anti-vaccination narratives that claim platforms are attempting a cover-up. They also could encourage key vaccine communities to migrate to alternative platforms that are harder to monitor and research. Proactive messaging that is both compelling and tailored to different audiences is needed.
- **Recommendation No. 2:** Appreciate narratives (and even topic) differences across languages and regions and respond appropriately. And don't create an oversupply of information if there isn't a data deficit.
- **Recommendation No. 3:** Reliable news sources, social media monitoring and research organizations should collaborate to identify and address relevant data deficits, as well as to avoid the oversupply of information on a given topic.
- **Recommendation No. 4:** Narratives stemming from natural health and "New Age" online communities should be monitored more closely. Many of these directly oppose and discredit the concept of immunization and are being picked up by disparate communities on social media.
- **Recommendation No. 5:** Anti-vaccination misinformation narratives have adapted, and will continue to adapt, to the evolving Covid-19 health crisis context. The ability to track the development of problematic vaccine narratives over time will be key to informing proactive efforts at combating novel narratives and filling data deficits.
- **Recommendation No. 6:** Topic modeling and other machine learning technologies enable researchers to analyze large datasets, and the potential remains incredibly promising. But to understand the ways in which narratives are structured and created still requires human analysis and interpretation. While these technologies are relatively sophisticated when it comes to text, they are less useful when it comes to making sense of image and video content, which is a significant portion of what is happening online.
- **Recommendation No. 7:** We need to find a way to acknowledge people's uncertainties and fears, rather than dismiss them, and build bridges between health experts and the vaccine hesitant. Finding a way for health experts to connect with those who are questioning vaccine safety, without validating or amplifying concerns, will be a fundamental component to rebuilding trust in health authorities and institutions.

Full report

Background

Twelve months prior to the coronavirus outbreak, the World Health Organization cited vaccine hesitancy as one of the top ten threats to global health.¹ There is strong evidence that exposure to online anti-vaccine content leads to real-world rejection of vaccinations.⁷ It only takes a few minutes of exposure to online anti-vaccine content to reduce someone's intent to vaccinate.⁸ And the connection with real-world health choices is already being seen with Covid-19: Social media exposure is associated with more misperceptions, and in turn lower compliance with health measures such as social distancing.⁹

Social media platforms are now the central arena where anti-vaccine groups are organizing, community building, and spreading doubt about immunization. Anti-vaccine groups have proven particularly adept at exploiting the participatory features and networking opportunities that social media platforms offer, and they continue to connect with people who are still undecided about vaccination.¹⁰

Much of today's vaccine misinformation is driven by the process of "collective sensemaking," whereby people anxiously make sense of a crisis by collectively filling in gaps in understanding, either with accurate information or false rumors, which are often far more available. This process continues as people make sense of the evolving science on the novel coronavirus.

Research on how vaccine hesitancy manifests itself on social media is in short supply. Our understanding of the narratives that underpin vaccine hesitancy often relies on studies of websites from a decade ago,¹¹ and generally relates to how women make decisions about whether to vaccinate their children.¹² There is very little research on Covid-related narratives that may be driving increasing rates of vaccine hesitancy. And there is no research that does this across languages.

To do this, we developed a methodology for identifying topics and narratives within vaccine-related social media posts. The typology was constructed inductively based on the team's analysis of several test datasets and informed by its past medical misinformation monitoring projects. The typology was then refined by a supplementary literature review^{13 14 15} of existing vaccine discourse typologies as well as results from topic modeling performed by the University of Sheffield on a test dataset. Though there has been a recent trend toward using computational approaches for analyzing vaccine-related social media data,¹⁶ we found this method failed to interpret concerns that, especially in informal and unstructured posts on social media, are either implicit or ironic. Having explored natural language processing approaches to validate our methodological approach, we opted for manual analysis based on the qualitative judgements of subject experts, supplemented by computational analysis of key entities and content types.

We have divided the report into five sections:

- PART 1: Vaccine information disorder: data deficits and oversupply. In this section we explore the vulnerabilities in the contemporary vaccine-related information ecosystem, highlighting the topics that are being weaponized by those trying to drive down trust in vaccines.
- PART 2: Cross-language analysis. In this section we examine the key narratives that were spread across all three languages.
- PART 3: Language-specific analysis. In this section we provide a deeper dive into the three languages and analyze the dominant narratives that were unique to each of them.
- PART 4: Conclusions and recommendations. In this section we outline seven concrete recommendations for health authorities, researchers, policymakers and platforms.
- PART 5: APPENDIX: Full methodology

Methodology

Facebook Pages, Facebook Groups and Instagram data were collected by querying CrowdTangle’s API for posts published by unverified accounts between June 15 and and September 15, 2020, containing the keywords “vaccine” or “vaccination” (and their equivalents in Spanish and French).^{17,18} Using the Digital Methods Initiative’s Twitter Collection and Analysis Toolset installation,¹⁹ First Draft obtained posts provided by Twitter’s Streaming API that corresponded to the time frame and keyword criteria outlined above. For all three language-specific datasets obtained, the top 100 most interacted-with posts from each platform²⁰ were then manually coded according to our custom typology.

Data analysis was performed using Python and Pandas.²¹ First Draft researchers created a dictionary of keywords and key terms relevant to both this specific dataset as well as to vaccines more broadly to computationally identify relevant entities. Entities can be any keyword or key terms that consistently refer to the same referent, such as important figures, organizations, countries, conspiracy theories, alternative medicine, etc. An inductive approach to our qualitative analysis of posts was informed by systematic note-taking undertaken throughout the coding process, which helped assess the prevalence of individual narratives found within the dataset.

For more details on our data collection and analysis methodology, please refer to the [methodology appendix](#) (page 76).

Part 1:

Vaccine information disorder: data deficits and oversupply

- Data deficits and oversupply: an information market failure
 - mRNA technology and DNA alteration
 - GMOs and aluminium
 - Vaccine development and foreign propaganda narratives
 - Legal impunity for pharmaceutical companies
 - An oversupply of Covid-19 vaccine trial coverage
 - The illusion of the “silver bullet”
 - Alternative medicine and “New Age” spirituality
 - Poliomyelitis
- Tactics used to take advantage of the data deficits
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 - Highly adaptive disinformation: the chameleon effect
 - Graphic, emotive content and long-form videos

Part 1:

Vaccine information disorder: data deficits and oversupply

Data deficits and oversupply: an information market failure

Our analysis of the most influential online vaccine conversations revealed an environment cluttered with a confusing patchwork of harmful narratives and data deficits related to vaccines in general and the Covid-19 vaccine in particular. Not only is this environment fertile for the organic spread of misleading content around a Covid-19 vaccine, but it is also full of vulnerabilities that can be exploited by malicious actors.

Here we highlight a number of clear vaccine data deficits that are particularly susceptible to misinformation, as well as tactics that are being used to suppress confidence in vaccines.

There are two main types of market failure within the information industry: data deficits and data oversupply.

A data deficit is the negative difference between the level of supply of accurate and reliable information about a given topic and the level of demand for it. Low supply may occur because credible information is evolving, because it isn't reaching people effectively or because it doesn't exist.

Rather than a void or gap, high demand and low supply result in a data deficit — a lack of credible information, where results exist but they are misleading, confusing, false or even harmful. These deficits are not the result of deliberate actions from bad actors. In fact, they typically occur when quality information providers are unaware of the demand for information on a given topic or are unable to provide the information in an effective, compelling manner. However, bad actors can exploit these deficits, filling them with content meant to deceive or that fits their agenda.

Conversely, a data or informational oversupply is a situation where people are overloaded with information on a given topic. The sheer quantity of information, as well as its technically complex or seemingly contradictory nature, often leads to confusion and ultimately news avoidance.

Here are some of the key data deficits and surpluses identified within the most influential vaccine-related online conversations:

mRNA technology and DNA alteration

References to the novel messenger Ribonucleic acid vaccine technology and DNA appeared in a combined 4 per cent of posts in English and French. Most tellingly, only two of these posts centered around the development of vaccines, while more than 85 per cent were linked to safety, “political and economic motives” or “conspiracy theories.” The types of claims and narratives within these topics, as well as the complete absence of neutral, fact-based, informative posts, underlined the significance of this data deficit. Certain posts claimed Moderna’s new potential Covid-19 vaccine will change people’s DNA, and some posts presented the mRNA vaccine as the definitive future Covid-19 vaccine or discredited any future Covid-19 vaccine altogether. Others even linked Moderna’s vaccine and mRNA vaccines generally to targeted depopulation efforts or malign human engineering programs. While some of the highest-performing posts related to mRNA technology were labeled as false or misleading by fact-checking organizations, the time delays and limited reach associated with these actions mean quality proactive reporting and messaging around this topic are urgently needed.

GMOs and aluminium

Similar dynamics were observed for the topics of genetically modified organisms (GMOs) and aluminium in relation to vaccines: Among the 29 posts mentioning either GMOs or aluminium, only one post was identified as supplying important contextual information on either topic. By contrast, posts suggesting that vaccines were unsafe based on their links to GMOs and aluminium thrived in English, and to an even greater extent in Francophone language communities.

Vaccine development and foreign propaganda narratives

There is a lack of clear, reliable information detailing the steps involved in the vaccine development process, the scientific norms associated with it and what ultimately constitutes a “safe” vaccine. This deficit presents an opportunity for actors wishing to circumvent these established norms and procedures to bypass scrutiny. For example, numerous unverified accounts presenting themselves as news sources or health specialists reported the unveiling of the Russian vaccine “Sputnik V” in an uncritically positive and largely decontextualized manner. These reports failed to highlight the fact that the vaccine was approved before it had gone through large-scale Phase 3 trials, which provoked widespread concern and objections from the scientific community.²² These kinds of reports were especially noticeable in Francophone African Instagram and Latin American Facebook communities. At the same time, an attempt to undermine the credibility of Western vaccine development with fabricated information from sources dedicated to the amplification of foreign actors’ narratives was identified among the most influential French posts.²³ Coincidentally, this disinformation narrative had also gained traction across other language communities, and one of its versions exploited the mRNA vaccine technology data deficit detailed here.

Legal impunity for pharmaceutical companies

Transparent information, especially in the context of the United States, that unpacks 1) what indemnity is 2) why pharmaceutical companies receive it and 3) what this reverse incentive structure means for the production of vaccines is scarce. This data deficit was often filled by misleading narratives claiming this indemnity signified not only public organizations' prioritizing of vested interests over public health, but also the idea that vaccines are dangerous or even lethal.

An oversupply of Covid-19 vaccine trial coverage

There is an oversupply of reporting on vaccine development, including the myriad vaccines being produced, which phase of trials they are in, and the different countries and companies involved in their creation, but little in the way of reporting that contextualizes or makes sense of this “race” and the flurry of international vaccine development.²⁴ Furthermore, much of the reporting on vaccine development is based solely on press releases by pharmaceutical companies and is subject to “pharma spin.” This deluge of reporting — much of which may be biased toward the interests of pharmaceutical companies — leaves many more questions than answers, creating more spaces vulnerable to speculation and misinformation.

The illusion of the ‘silver bullet’

Too many people on social media take the discovery of a successful Covid-19 vaccine to mean an end to the current crisis. We know that a vaccine will not be a “silver bullet”²⁵ and we know that we may never return to “normalcy.” Yet there is little in the way of information highlighting this fact and explaining how vaccines will ultimately be part of a broader plan to control Covid-19 so that we can return to a relatively normal existence.

Alternative medicine and 'New Age' spirituality

The presence of New Age spirituality and natural medicine accounts peddling the idea that a healthy immune system — achieved through one of the many practices encouraged by these sources, such as yoga, meditation or vitamin D — can protect you from disease far outstrips authoritative information detailing how this is misleading. These accounts and posts could be a real cause for concern given their protean nature; they use arguments highlighting the importance of the individual and individual ownership of one's own immune system and health to attack the efficacy of vaccines, as well as the idea of mandatory vaccines, which falls under the topic of “liberty and freedom.”

Poliomyelitis

Poliomyelitis, often referred to as polio, was the second-most mentioned disease for which vaccines have been developed, with only six fewer mentions than the flu across all posts collected. Certain posts mentioned polio vaccination campaigns to highlight the benefits of vaccines, with some even suggesting that they should give us hope for the fight against Covid-19. However, many other highly interacted-with posts capitalized on the data deficit regarding the negative effects of an oral form of a polio vaccine. Several French- and English-language posts framed the World Health Organization as having been “forced to admit” the existence of adverse effects caused by the oral polio vaccine, thereby portraying the institution as untrustworthy. Bill Gates' financial links to the vaccine were also pointed out by some to suggest a Gates-sponsored Covid-19 vaccine will also be unsafe.

Clear, proactive and consistent messaging is needed to prevent the topic of poliomyelitis, and the vaccines to combat it, from developing into an even greater data deficit. Otherwise, the topic could be instrumentalized as part of wider anti-vaccination agendas aimed at undermining public health institutions and portraying all vaccines as dangerous.

Tactics used to take advantage of the data deficits

The data deficits mentioned here highlight how the online vaccine information ecosystem is pockmarked with vulnerabilities and weak spots. Where there is a data deficit, there will likely be actors spreading mis- and disinformation. Here we outline the different ways or tactics implemented among the posts we coded to facilitate the spread of misinformation.

Headline laundering

The laundering of news headlines related to vaccines by particular groups online to fit their own vaccine-skeptic agenda. News articles providing negative or ambiguous coverage of vaccines, especially where headlines might not be telling the whole story, are recycled within anti-vax communities and spun to fit their agenda.

The rehashing of old misinformation tropes

Old or “zombie” vaccine misinformation content continues to be shared by highly followed anti-vaccination sources. Examples include the purported link between the MMR vaccines and autism, the guinea pig or “lab rat” narrative to talk about Africans involved in vaccine development, and the role of vaccines as part of wider conspiracies, such as the imposition of totalitarian systems aided by mass population tracking capabilities, for example.

Highly adaptive disinformation: the chameleon effect

The highly adaptive nature of anti-vaccination networks proved particularly noticeable through the adaptation of old misinformation narratives to the current context of the Covid-19 pandemic. For example, the general notion that vaccines aren't safe was levied through false claims that the flu vaccine is associated with a higher likelihood of contracting Covid-19 and thus higher likelihood of death.²⁶ Similarly, one of the prominent anti-vaccination narratives based on individual liberty arguments in North American communities referenced the imposition of mask-wearing rules in public spaces to suggest the same will soon be applied to vaccine uptake. This trend was equally noticeable in regard to narratives linking vaccines to wider conspiracies, as certain “transhumanism” conspiracy theories included multiple references to the coronavirus pandemic in addition to vaccines.

Finally, the narrative that the most public proponents of vaccines are corrupt or don't vaccinate their own children was applied to current political actors such as Marine Le Pen, while an extract from a vaccine misinformation article was falsely framed as a Melania Trump quote.

Graphic, emotive content and long-form videos

The well-documented use of graphic, emotive visual content by anti-vaccination groups to portray vaccines as dangerous remains a defining feature of anti-vaccine discourse. Children are often used to add even more emotional bite to these messages. The emotions resulting from any kind of harm done to children, for example, make this strategy particularly effective, as evidenced by QAnon’s hijacking of the “saveourchildren” hashtag.²⁷

Moreover, the prevalence of superior video production quality and long-form vlog-style videos among the top most interacted-with Facebook and Instagram posts was noticeable. For example, more than 15 per cent of Francophone Facebook posts included a native video; many of these advanced misleading anti-vaccination and conspiratorial narratives. Inevitably, long-form videos present a difficult practical challenge for fact-checking organizations in the same way that has made YouTube something of a blind spot for misinformation monitoring.

Part 2:

Cross-language analysis

- Overview
- Key narratives
 - i) Political and economic motives
 - ii) Safety, efficacy and necessity
 - iii) Conspiracy theory

Part 2:

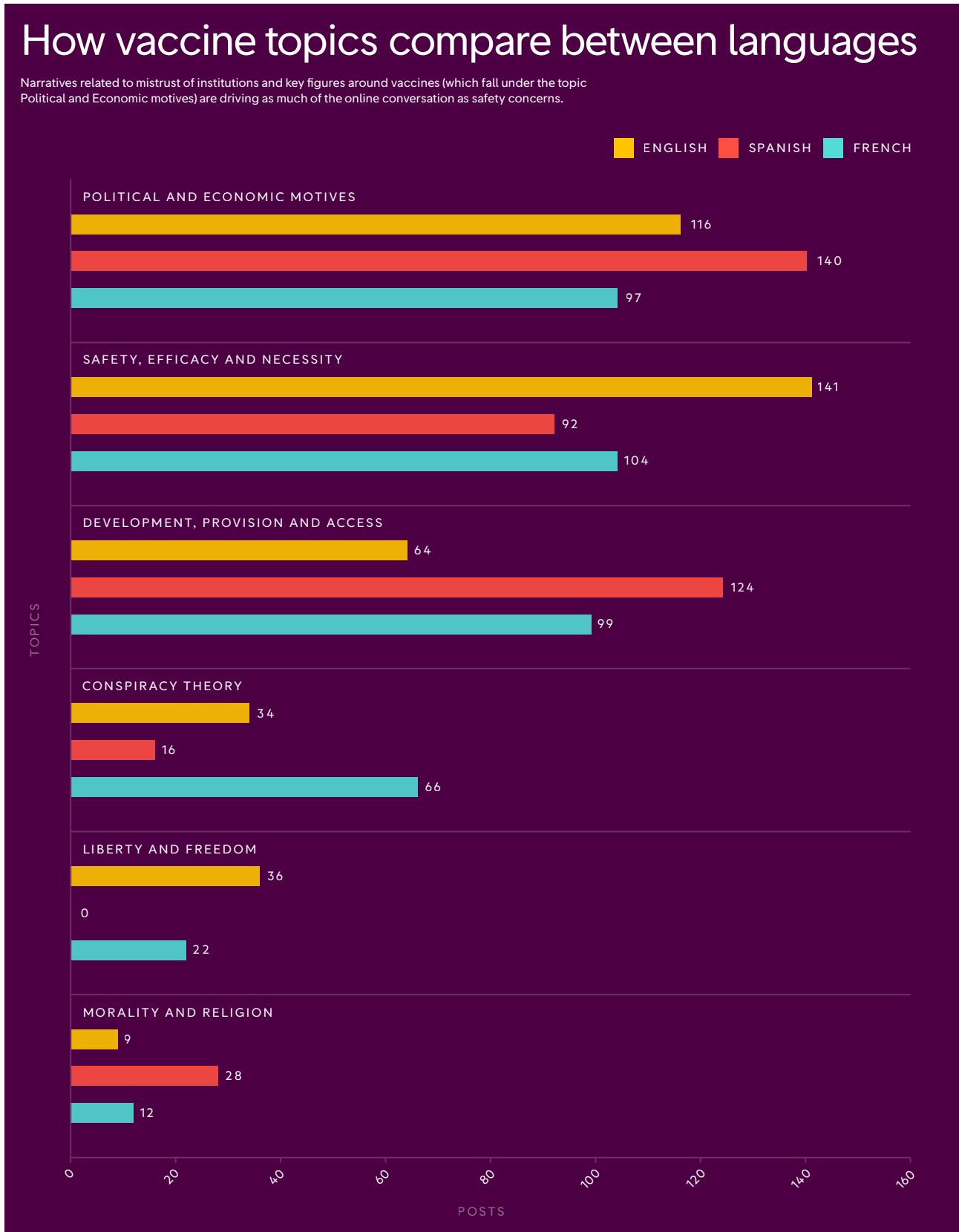
Cross-Language Analysis

Overview

Overall, two topics defined the majority of English, French and Spanish conversations in our dataset.

The topics were the “safety, efficacy and necessity” of vaccines as well as the “political and economic motives” behind them. Similarly, posts relating to the development, provision and access of vaccines, and particularly to the ongoing development of a Covid-19 vaccine, were an important part of vaccine discourse across all three languages. For example, posts about the unveiling of the “Sputnik V” vaccine in an uncritical and largely decontextualized manner were a noteworthy feature across all languages and present key issues for the information space.

This graph shows the breakdown of the different topics in all three languages:



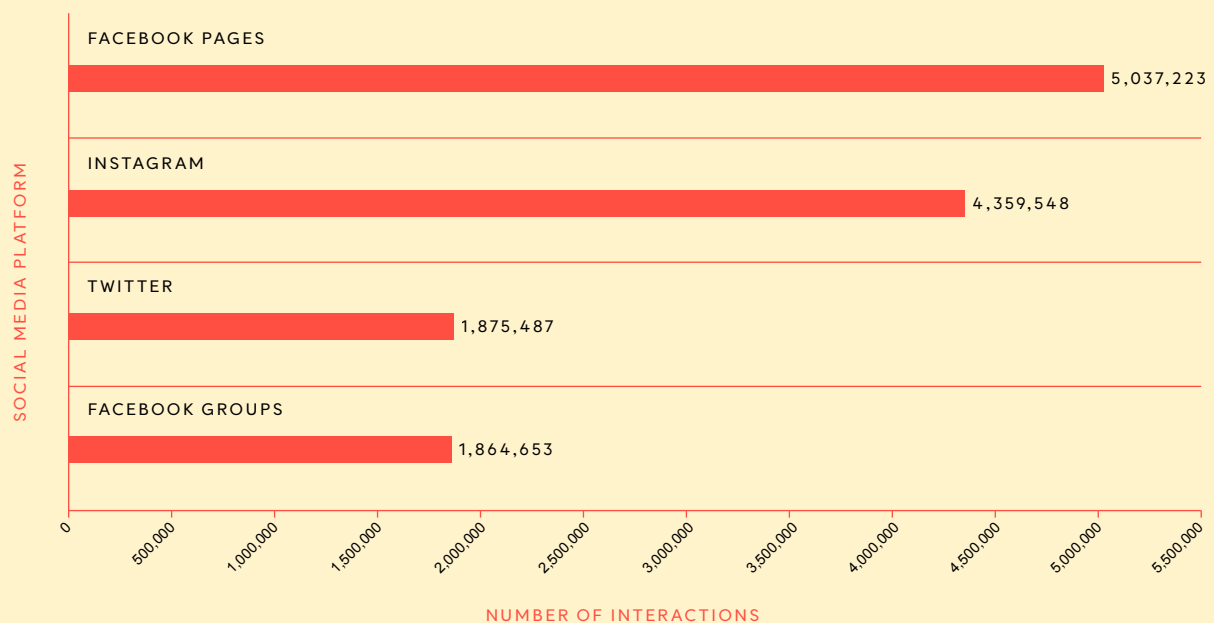
Source: First Draft Research

Instagram and Facebook pages drive vaccine discourse on social media

Unverified Facebook Pages and Instagram proved to be the biggest drivers of interactions from vaccine-related posts. They accounted for 71.5 per cent of the 13,136,911 interactions across the entire dataset (as measured by likes, shares, emoji reactions and retweets). These numbers highlight the importance of these two platforms in influencing vaccine discourse on social media. This is striking, given that Instagram is often overlooked when it comes to vaccine research.

Total engagement by platform

Facebook Pages and Instagram received the most interactions from vaccine-related social media posts in the dataset.



Source: First Draft Research

Vaccine-related conspiracy content is widespread

Vaccine-related conspiracy content accounted for 10 per cent of posts in the dataset. There were more conspiracy posts (116) than “liberty and freedom” and “morality and religion” combined (107). Of all the interactions resulting from conspiracy posts, 84 per cent came from two platforms — Facebook Pages (44 per cent) and Instagram (40 per cent).

Microchipping, Bill Gates, Donald Trump, the World Health Organization and Vladimir Putin among the top entities in posts

Unsurprisingly, posts related to Covid-19 and a Covid-19 vaccine dominated the dataset, making up 50 per cent of the posts and demonstrating the influence of this particular vaccine on the overall online vaccine discourse. Outside of that, some of the most frequent entities appearing in posts included US President Donald Trump (84 posts), Bill Gates (76), the World Health Organization (61), microchipping (55) and Russian President Vladimir Putin (55).

Other noteworthy entities representing data deficits and conspiracy theories appeared in many posts

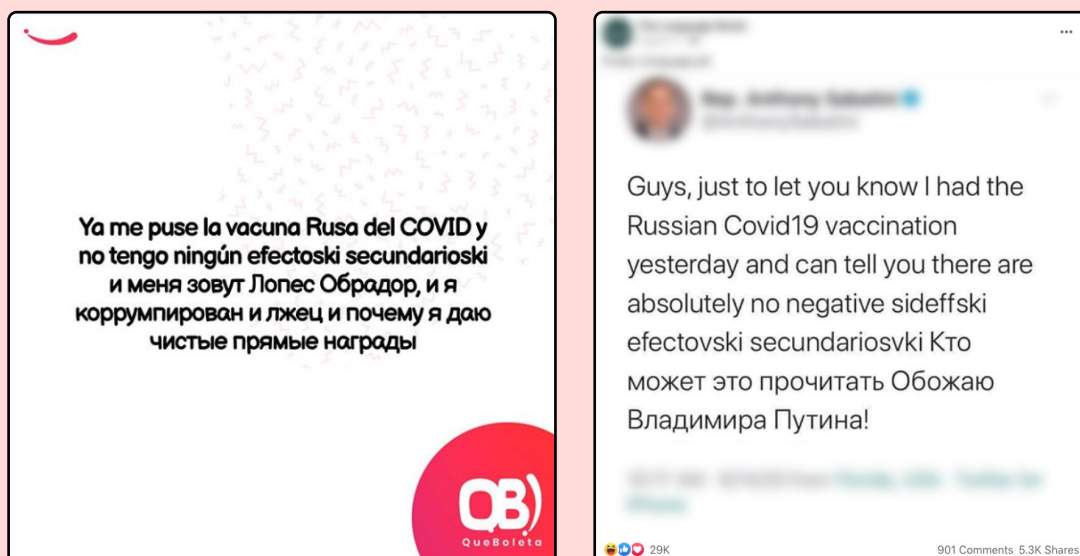
The entities polio and mRNA, two major data deficits identified in this report (see Part 1: Vaccine-related Data Deficits), peppered the dataset, appearing in 45 and 32 posts respectively. The presence of 5G (22 posts) and QAnon (19 posts)²⁸ in this dataset highlights the stickiness of these debunked conspiracy theories as well as how they are applied to vaccines.

Key narratives

i) Political and economic motives

“Political and economic motives” was the biggest aggregate topic across English, French and Spanish. Narratives framing vaccines as driven by cynical financial motives or short-sighted re-election objectives defined much of the conversation under “political and economic motives” across the three languages. Crucially, these narratives often served to undermine the safety of vaccines generally, as “political and economic motives” were frequently portrayed as not only surpassing public health objectives, but as working directly against them.

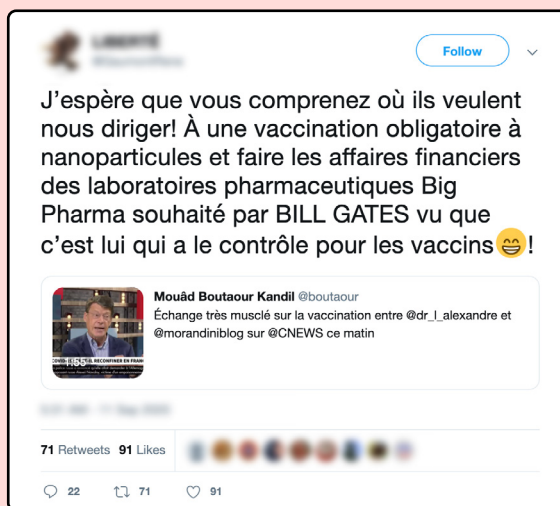
For example, many posts across the three languages discussed the political and economic motives behind the newly unveiled “Sputnik V” vaccine. The prevailing narrative across French and English — and to a lesser degree in Spanish — framed Russia and Vladimir Putin, and by extension the Sputnik V vaccine, as untrustworthy. Certain identical memes adapted and translated across languages reflected this narrative.



Example posts

Concentrated financial interests drive vaccine development and undermine its safety

The idea that the development of vaccines is primarily driven by economic motives is widespread both within and across global language communities. This belief is pervasive — “Big Pharma”-related keywords were among the top entities in both English and French posts. Crucially, this narrative was often advanced in order to undermine the safety of a future Covid-19 vaccine as well as vaccines generally.

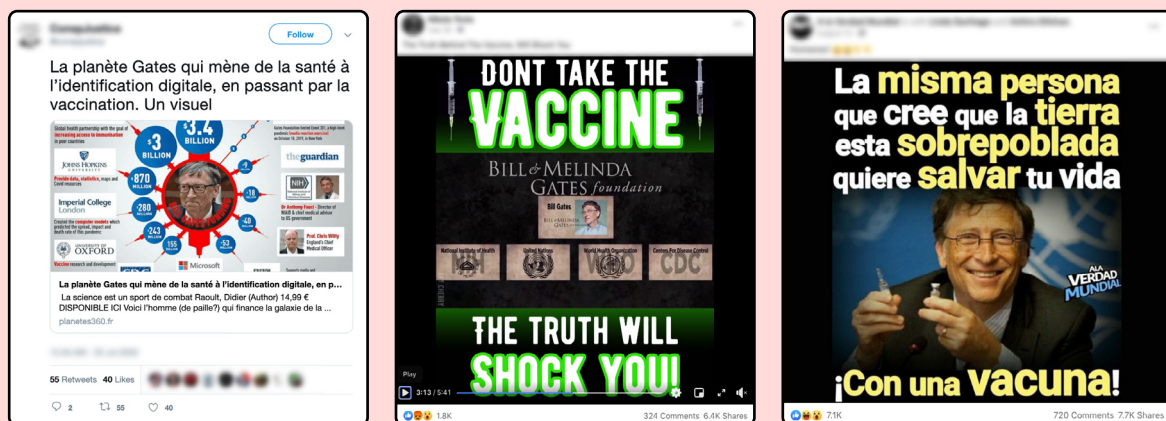


Example post

Another important strand of this overarching narrative is the perceived complicity or capitulation of governments and international policy organizations at the hands of the pharmaceutical industry’s vested interests. Several posts attacked “Big Pharma” and claimed these large pharmaceutical companies are colluding with governments, media outlets and social media platforms to encourage higher uptake of a future Covid-19 vaccine or to exploit financially rewarding mandatory vaccination policies. Similar narratives were found in conversations around pharmaceutical companies’ legal impunity over Covid-19 vaccines. Many posts framed the legal immunity offered to pharmaceutical companies as proof that they should not be trusted and that the vaccines they produce are unsafe and untrustworthy.

Bill Gates, and institutions and vaccines associated with him, cannot be trusted

Bill Gates's centrality to health- or coronavirus-related online conversations is a well- documented phenomenon in the disinformation field. So it is unsurprising that Gates was the second-most mentioned individual across the entirety of the social media posts. Only Donald Trump surpassed him. Though Gates is often linked to conspiracies, he featured in more posts that related to his "political and economic motives" and to his trustworthiness than posts related to conspiratorial content. Among other things, posts charged that Gates and his foundation are only interested in profiting from vaccines, that the vaccines he finances are unsafe, and that he is targeting black populations to test his vaccines. These narratives are particularly problematic because of their potential to erode trust in the institutions he is claimed to be or is actually working with. For example, certain posts referenced Gates' links to various organizations to undermine their credibility.



Example posts

ii) Safety, efficacy and necessity

Conversations about the “safety, efficacy and necessity” of vaccines dominated both across and within each language. Spanish proved to be the only language where “safety, efficacy and necessity” was not the biggest topic. This trend’s dominance reflects people’s mistrust of not just a future Covid-19 vaccine, but also the safety of vaccines generally. In fact, references to Covid-19 appeared in less than half of all “safety, efficacy and necessity” posts. While narratives about Covid-19 overshadowed many of the posts across all languages, vaccine technologies and diseases — such as mRNA vaccines, polio and the flu — each featured in several dozen high- performing posts. Moreover, competing narratives over the necessity of a future Covid-19 vaccine defined many of the conversations related to the “safety, efficacy and necessity” of vaccines.

The Covid-19 vaccine is the ‘silver bullet’ solution and the key to a return to normalcy

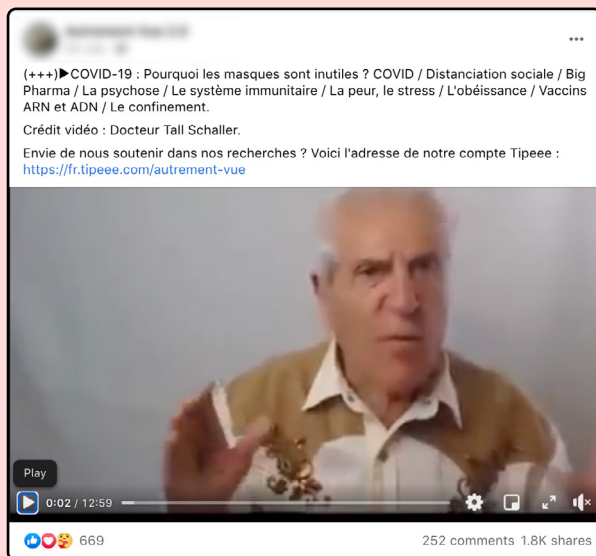
At the other end of the spectrum, posts framing a Covid-19 vaccine as the only solution to end the current pandemic, or at least pivotal to ending it, were prevalent in English, French and Spanish. While these posts reflect positive attitudes toward vaccines, they also underline how vulnerable many people are to the possibility that there may never be an effective vaccine against Covid-19, and, even if there is, that it will likely not be a “silver bullet,” as the WHO has warned.²⁹ These conflicting realities represent a serious data deficit that could end up being filled by confusion and rumors, which may further erode trust in governments and health institutions.



Example post

A healthy immune system is more powerful than a vaccine

This narrative was present in English, Spanish and to a lesser extent French social media. It was used primarily to argue that leading a healthy lifestyle — including increasing your intake of Vitamin D, spending time in the sunshine, and limiting carbohydrates — means you won't have to take a Covid-19 vaccine. Other posts state that nature — in this case our body and immune system — is “a truly perfect healing machine.” Many of these posts hail from New Age, alternative medicine, and spirituality based accounts. Such accounts and groups are often hubs of health misinformation. Worryingly, these communities are now intersecting with more radical conspiracy theory groups, as evidenced in Brazil and the US, where New Age and “wellness” communities are now spreading QAnon conspiracy theories.^{30 31}



Example posts

Vaccines are often dangerous and may even be lethal

This age-old but always-present narrative was found to resonate across all three language communities, but most notably in English and French. Posts including claims of warnings from scientists of the dangers of vaccines, or quotes from vaccines' product inserts, were common under this narrative. Children are often used as the unwitting victims of "dangerous" vaccines, often in emotive imagery of them supposedly suffering from adverse reactions. Because this narrative is generalized across all vaccines, it is particularly potent. It erodes trust in the overall notion of vaccines, not just one in particular.



Example posts



iii) Conspiracy theory

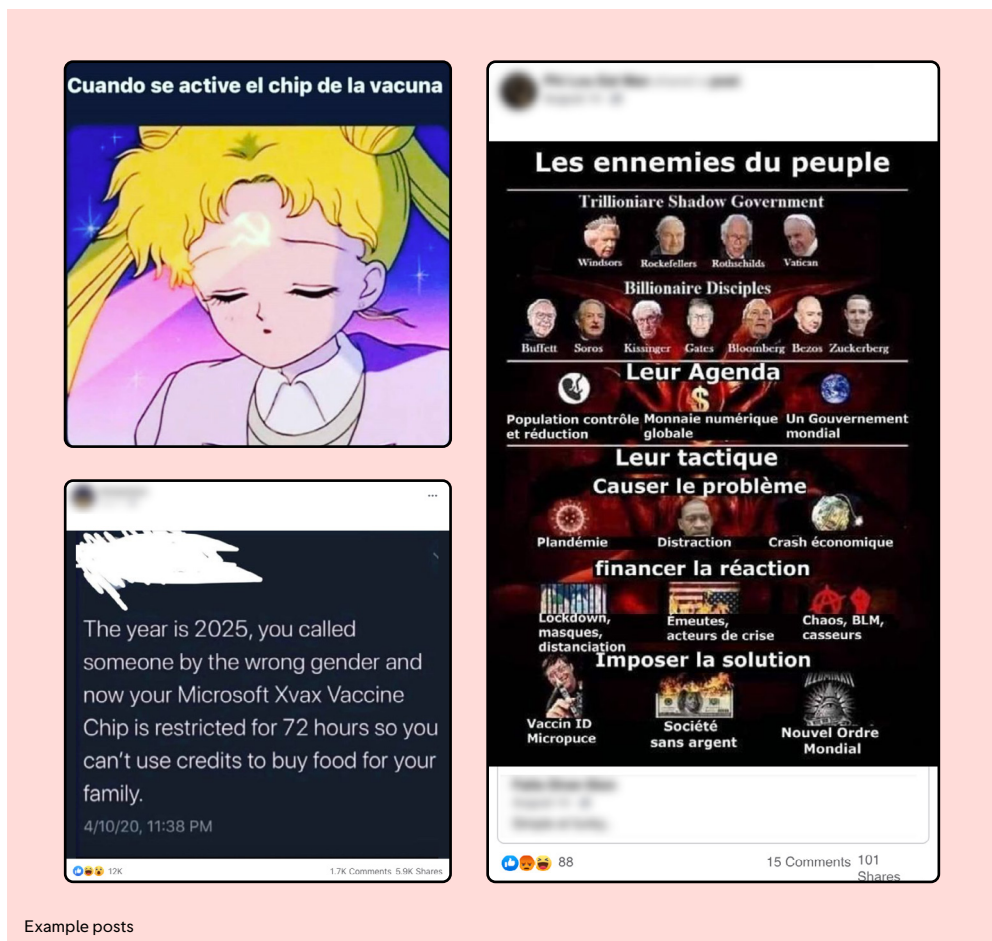
Conspiratorial content is usually associated with fringe, small-scale online communities. However, our analysis suggests this rule may not apply to online vaccine information dynamics.

In fact, posts linking vaccines or vaccination programs to wider conspiracies were more prevalent overall than morality and religion and liberty-themed posts combined.³² Many conspiratorial posts featured multiple conspiracy theories.

However, one vaccine-related conspiratorial narrative in particular stood out across all three language conversations:

Vaccines are tools to microchip and control populations

The idea that a future Covid-19 vaccine and other future vaccines will serve as tools to microchip individuals and develop mass population-tracking systems was the most dominant conspiratorial narrative across all languages. In fact, microchip-related keywords featured in just under 40 per cent of all posts tagged as referencing conspiracy theories. This conspiracy theory, as well as most other vaccine-related conspiracy theories, feeds off a deep mistrust of the intentions of political actors and institutions. It thus may be a symptom whose scale reflects the growth of a wider phenomenon.



Example posts

Part 3:

Language-specific analysis

- Overview of English-language content
- How did the key narratives play out in English?
 - i) Safety, efficacy and necessity
 - ii) Political and economic motives
 - iii) Liberty and freedom
- Overview of French-language content
- How did the key narratives play out in French?
 - i) Safety, efficacy and necessity
 - ii) Political and economic motives
 - iii) Conspiracy theory
- Overview of Spanish-language content
- How did the key narratives play out in Spanish?
 - i) Political and economic motives
 - ii) Safety, efficacy and necessity
 - iii) Morality and religion

Part 3:

Language-specific analysis

Our analysis of the most engaged-with social media posts related to vaccines revealed that while two themes were found in content shared across English, French and Spanish social media, there were also powerful narratives unique to each of the languages. For example, liberty and freedom was unique to English. These posts focused on how governments will use mandatory vaccines to “railroad their rights” and employed vaccine safety concerns to further their arguments. Another important example is the topic of morality and religion: this topic of conversation was only significant in Spanish language. 93 per cent of these posts were found on Facebook Groups.

This part of the report is divided into three sections, by language: English, French and Spanish. For each section, we provide an overview of key trends and insights, then demonstrate the different ways the key narratives played out in each language, with examples.

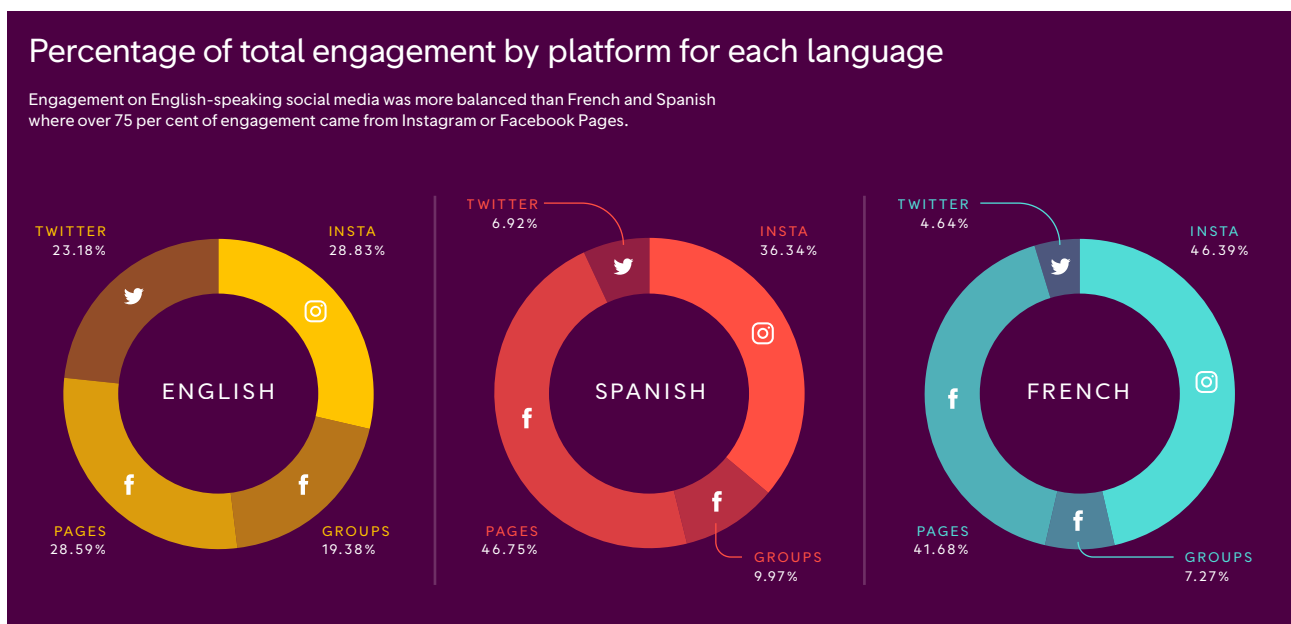
Overview of English-language content

English-language social media was dominated by US-related content.

76 per cent of administrators for Facebook Pages were located in the US. Trump appeared in 18 per cent of English posts, followed by Gates, who appeared in 10 per cent of posts. References to QAnon appeared in 3 per cent of posts.

There was a relatively equal distribution of interactions across Facebook Pages, Facebook Groups, Instagram and Twitter

Unlike French and Spanish, where over 75 per cent of interactions from vaccine posts occurred on either Instagram or Facebook Pages, the distribution of interactions on English social media was more balanced. This distribution emphasizes the importance of monitoring vaccine narratives and misinformation across all of the major platforms. The fact that Instagram received the most interactions from vaccine-related posts is a reminder that this platform continues to be an important but often overlooked space to study vaccine discourse.



Source: First Draft Research

Instagram and Facebook Pages were the key drivers of conspiracy-related content in English

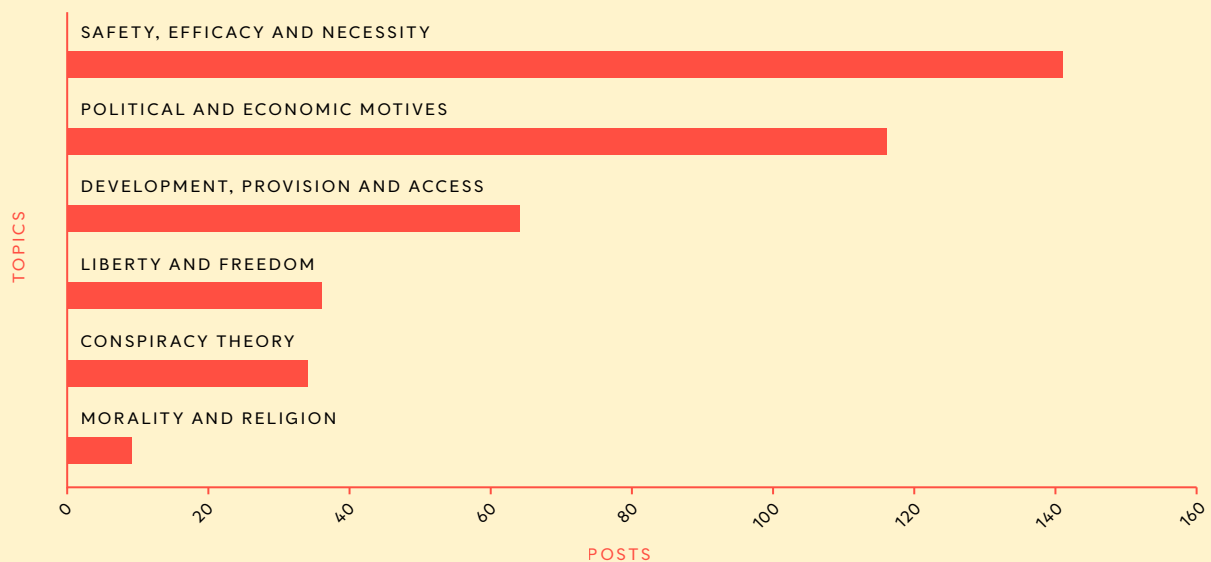
Facebook Groups have received their fair share of attention for their role in the proliferation of conspiracy theories online, such as the continued growth of QAnon.³³ Yet for conspiracy-related vaccine posts, Instagram and Facebook Pages³⁴ were the locus of this content, not Facebook Groups.³⁵ Together, these two platforms drove 89 per cent of the 405,326 interactions resulting from conspiracy-related vaccine posts.

Content related to the topic “safety, efficacy and necessity” prevailed on English social media

This content accounted for 35.25 per cent of posts, while posts relating to the “political and economic motives” behind vaccines and their development made up another 29 per cent of posts.

Topics in English

Narratives related to the safety, efficacy and necessity of vaccines as well as the political and economic motives behind vaccines were key conversation drivers on English-speaking social media.



Source: First Draft Research

Posts related to the development, provision and access to vaccines accounted for 16 per cent of posts. However, much of this content simply parroted news stories about vaccine developments. Despite the dearth of problematic narratives under this topic in English, the oversupply of reporting on vaccine developments — often merely rewrites of press releases from pharmaceutical companies — is a danger in its own right (see information disorder section for more information).

Content relating to conspiracy theories and morality, religion and ethics made up 8.5 per cent and 2.25 per cent of English posts respectively. They were notable for their use of previously debunked “zombie” narratives, including the idea that Gates is orchestrating a global depopulation plan through a Covid-19 vaccine. Associations between “the mark of the beast” and the Covid-19 vaccine were also present among religious posts, highlighting the ideological proximity of religious and conspiracy theory-related content on social media. These numbers may seem anodyne, but together they account for over 10 per cent of the most popular social media posts related to vaccines in English.

How did the key narratives play out in English?

i) Safety, efficacy and necessity:

Concerns related to the “safety, efficacy and necessity” of vaccines, primarily the Covid-19 vaccine, made up the bulk of content in English. Furthermore, many posts that were coded as under the topics “political and economic motives” or “liberty and freedom” borrowed safety concerns to attack either mandatory vaccinations or Trump’s handling of operation “Warp Speed.” Many other posts downplayed the severity of Covid-19 and the effectiveness of vaccines to support the idea that a Covid-19 vaccine is unnecessary (see the “Safety, Efficacy and Necessity” section under Cross Language Narratives and Trends for more information). And reporting on the adverse reactions to different Covid-19 vaccines are being picked up by known anti-vax communities to fit their agendas (see [Headline Laundering section in Information Disorder Section](#)).

A Covid-19 vaccine is unnecessary

Various arguments were deployed to support the idea that a Covid-19 vaccine is unnecessary. These posts generally came in two forms:

- 1) Posts that misleadingly downplayed the effectiveness of the flu vaccine and claimed that the seeming inability to eradicate the disease is evidence that a Covid-19 vaccine will be ineffective. Other flu-related arguments falsely compared the death rates of Covid-19 to the flu, suggesting that the death rate for Covid-19 doesn't justify having to take a vaccine.

These kinds of posts are likely to spike in the wake of Trump's recent social media posts³⁶ comparing the flu to Covid-19. This is likely to bolster the "the Covid vaccine is unnecessary" narrative.

- 2) Posts using misleading survival rate statistics to make a Covid-19 vaccine appear superfluous.



ii) Political and economic motives

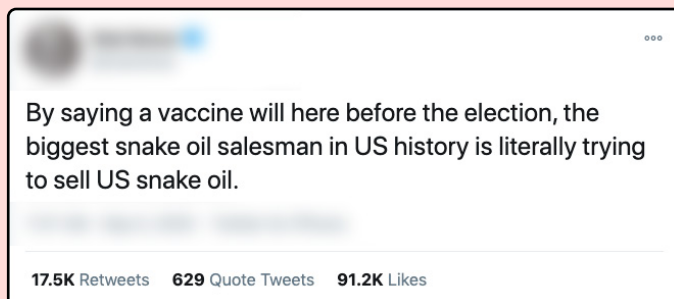
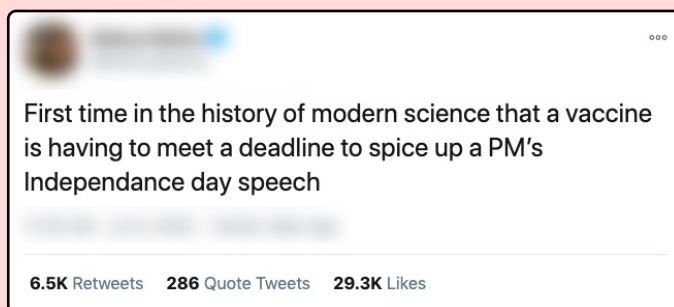
Posts relating to the “political and economic motives” of key players behind the production and distribution of vaccines were dominated by two figures in English: Trump and Gates (see Bill Gates section in Cross Language section). Together, these individuals were referenced in 41 per cent of all posts relating to “political and economic motives.”

Many of these posts attacked Trump’s expedited attempt to roll out a vaccine as pure political opportunism. Other posts condemned presidential and vice presidential candidates Joe Biden and Kamala Harris for “rooting against” vaccines. Collectively, these posts point to the political sensitivity of the Covid-19 vaccine in the US.

Leaders are promoting vaccines for political gains

Posts describing how national leaders, and Trump in particular, are putting politics above the public good in the development of a vaccine were found in English posts across Facebook Pages, Facebook Groups and Twitter. Trump’s operation “Warp Speed” was often framed as purely political, while his dealings with friends inside the pharmaceutical industry were used as evidence of corruption. Other posts question the safety of a rushed Trump vaccine and his motivation.

The mistrust resulting from Trump’s politicization of the Covid-19 vaccine — he has now effectively turned it into a wedge issue — has the real potential to suppress vaccine uptake. These posts underline a general distrust in politicians and any vaccine they produce, which is best exemplified by a series of the same posts found across all three languages that reads: The vaccine should be tested on politicians first. If they survive, the vaccine is safe. If they don’t, then the country is safe.



Example posts

iii) Liberty and freedom

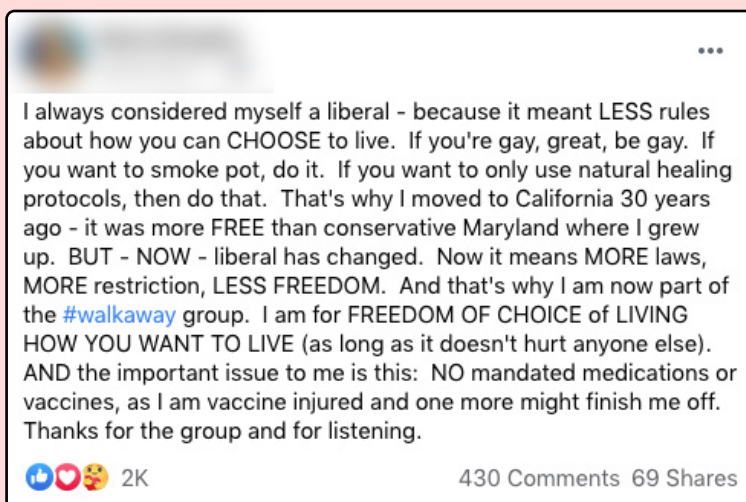
There were more posts relating to “liberty and freedom” in the English dataset than both French and Spanish combined. Given that these posts were almost exclusively American, it’s unsurprising that they have such a hold in the US. Libertarian notions of individual freedom and rights are core tenets of modern-day America³⁷, and any attempts to infringe upon these rights, through mandatory lockdown or vaccinations³⁸ can lead to strong backlash on social media and protests in the streets, as was exemplified by the anti-lockdown movement.³⁹ Interestingly, while opposition to mandatory vaccinations has generally been driven by ideology, our analysis found that many arguments opposing mandatory vaccinations are now powered by safety concerns. We detail two key narratives in English here.

It starts with a mask, moves to vaccines and ends in total control

Popular among these posts was the idea that vaccines are just another step in the government’s march toward controlling the US population, and in some instances turning it into a socialist state. This argument is particularly potent as, in the eyes of the accounts posting this content, it casually daisy-chains different events — lockdown, masks and vaccines — to support the idea. For those already suspicious or distrustful of the government, vaccines — in this case a Covid-19 vaccine — represent a looming threat.

Mandatory vaccines are “railroading our rights” and freedoms

The more classic narrative, that mandatory vaccines “railroad our rights” and freedoms, was also central among “liberty and freedom” posts. While in the past this narrative attacked governments and politicians attempting to infringe on people’s rights, in the current data, the narrative employs arguments that both downplay the severity of Covid-19 as well as the danger of a rushed and unsafe vaccine to justify why vaccines should not be mandated. Given the safety concerns around the Covid-19 vaccine, this narrative has the potential to become increasingly attractive to people outside this movement.



Example post

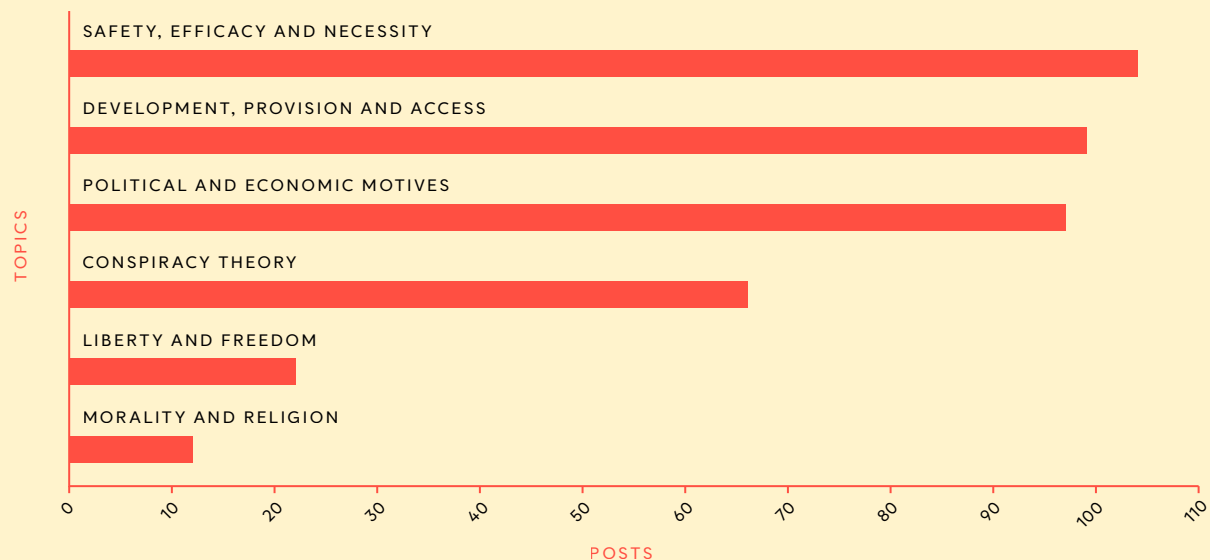
Overview of French-language content

Posts centering around the ‘safety, efficacy and necessity’ of vaccines were the most prevalent among French conversations overall.

The conversations accounted for 26 per cent of all entries across platforms. Unsurprisingly, posts relating to the development, provision or access to vaccines also featured heavily (24.75 per cent). Most notably, posts linking vaccines to “political and economic motives” or wider conspiracies represented more than 40 per cent of total entries, while more conspiracy theory content was present in French-language conversations than in both Spanish- and English-language conversations combined. Posts framing vaccines along “moral, religious or individual liberty” lines accounted for a significantly smaller proportion of the dataset (3 per cent and 5.5 per cent respectively) with the vast majority of liberty and freedom-based considerations around vaccines and mandatory vaccination policies coming from Canadian (Quebec) Facebook communities.

Topics in French

Narratives related to the safety, efficacy and necessity of vaccines as well as the political and economic motives behind vaccines drove much of the vaccine debate on French social media. There were also more conspiracy theory-related posts in French than there were in English and Spanish combined.



Source: First Draft Research

Facebook is the home of conspiratorial narratives for Francophone communities

Facebook proved to be the hub of vaccine conspiracy theories, as the platform hosted 64 per cent of the total Francophone conspiratorial content observed. Community-friendly public Facebook Groups, whose crowdsourcing nature has lent itself to collective “sense-making,” have served as key online spaces for the development of various conspiracy theories.⁴⁰ Data from online Francophone conversations suggest they are fulfilling a similar role with vaccines. They attracted more conspiracy theory content than Twitter and Instagram combined.

Visual content is key

Francophone data revealed media content to be a vital characteristic of top-performing vaccine-related social media posts. Beyond Instagram, which is designed to host media content, Facebook and Twitter posts were overwhelmingly media driven. Only 11.5 per cent of all Facebook posts did not contain some form of media, be it a photo, video link or link with a preview image. Just 26 per cent of tweets were media- or link-free. These findings reinforce the notion that short, visually-led publications often prove the most compelling within online communities. Counter-messaging in the form of long, text-led social media posts may struggle to compete within these spaces.

How did the key narratives play out in French?

i) Safety, efficacy and necessity

As was the case with most types of French-language conversations, safety, efficacy and necessity-centered posts were predominantly related to the coronavirus vaccine. In fact, references to the coronavirus appeared in at least a third of all posts within each of the top three topics of conversations in French across each platform. Within these, two key narratives emerged:

A Covid-19 vaccine isn't necessary given the effectiveness of hydroxychloroquine

This narrative began gaining traction in France at the start of the pandemic before spreading to other Francophone communities, appearing in Belgium and multiple African countries' online spheres within the dataset. Hydroxychloroquine's main proponent, the now-famous infectious disease specialist Didier Raoult, has been the subject of dozens of Facebook support Groups, some of which have reached close to half a million members. In fact, more than a fifth of all French-language Facebook Group posts originated from Raoult support Groups. Hydroxychloroquine and Raoult each featured in 15 unique French-language posts, with hydroxychloroquine constituting the most-represented treatment in the dataset. Raoult was the third-most referenced individual actor, behind only Putin and Gates.

The significance of this narrative is underscored by its pervasiveness in conversations framing vaccines as driven by "political and economic motives." Posts referenced the drug's low cost to suggest that governments' refusal to promote the drug and their willingness to invest in vaccine development are

driven by vested financial interests. Data deficits surrounding hydroxychloroquine may persist for the foreseeable future, as knowledge of its efficacy evolves.

mRNA vaccines and GMOs aren't safe

Beyond coronavirus-related conversations, a significant proportion of the dataset was formed by concerns about the safety of novel vaccine technology, as well as composite ingredients of pre-existent vaccines. For example, mRNA vaccines and genetically modified organisms both featured among the 15 most frequently mentioned entities in all French-language posts. The safety implications of mRNA technology and various composite ingredients such as GMOs and aluminium constitute a significant information deficit currently being filled by largely inaccurate information that is fueling anti-vaccination misinformation narratives.



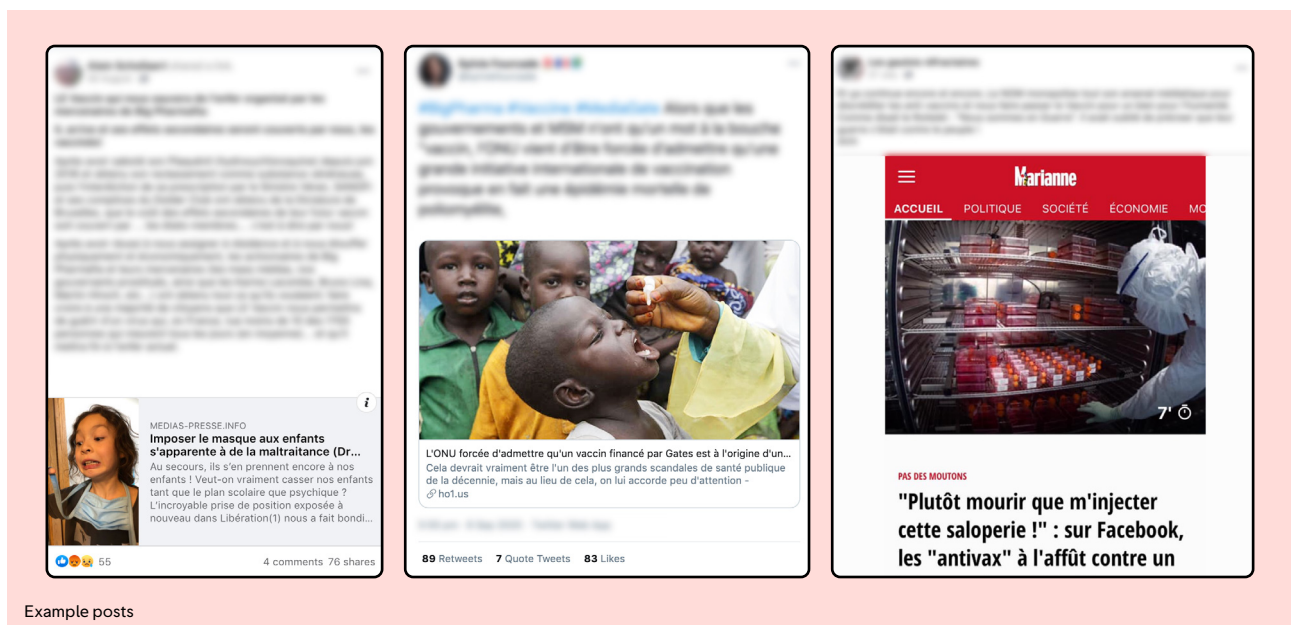
Example posts

ii) Political and economic motives

With almost a quarter of all French-language posts linking vaccines to shallow “political and economic motives” or assessing the trustworthiness of individual actors and organizations in relation to vaccines, the centrality of trust in institutions within Francophone vaccine discourse is clear. The negative reaction to the Russian vaccine unveiling and subsequent characterization of Putin and Russia as untrustworthy accounted for a noticeable portion of the dataset, especially on Instagram. However, the most pervasive narratives within these conversations were underpinned by the deep-rooted conviction that governments and established media outlets’ perceived pro-vaccine agenda is driven by vested pharmaceutical interests.

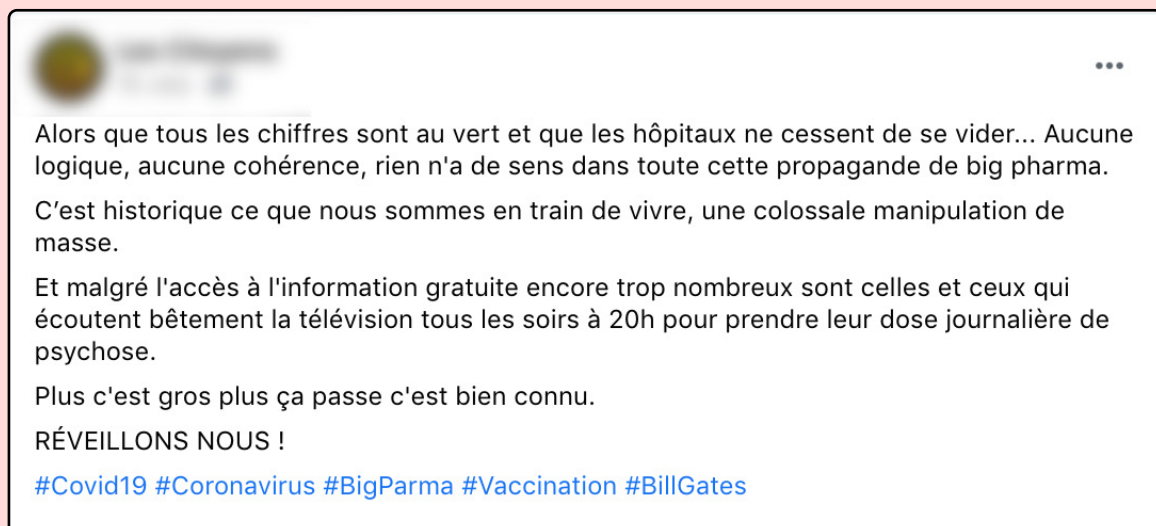
Corrupt governments and media outlets 'serve as mouthpieces for Big Pharma'

The idea that Francophone countries' governments and established media outlets were disseminating pro-vaccine propaganda on behalf of large pharmaceutical companies proved highly pervasive within French-language online communities. In fact, 20 per cent of all posts coded under this category contained a reference to the "media" or established media outlets. This belief was particularly noticeable in Facebook Pages and Facebook Groups, where "political and economic motives" was the most dominant topic of conversation. Conversely, a perceived "media campaign" against hydroxychloroquine was often argued to have been orchestrated to prevent this inexpensive drug from undercutting the profits that pharmaceutical companies could earn thanks to future vaccines. These narratives portray vaccine provision as driven purely by economic motives and, as such, undermine the safety and efficacy of vaccines generally. They also delegitimize expert proponents of vaccines, such as scientific research institutions and health policy organizations.



Governments and media are manipulating coronavirus fears to advance a pro-vaccine agenda

Multiple posts claimed governments and mainstream media were deliberately overstating the severity of the coronavirus crisis or even manipulating coronavirus statistics to artificially enhance the case for a Covid-19 vaccine and to attempt to increase vaccine uptake. These claims typically referenced government links to “Big Pharma” or figures perceived to be promoting vaccines purely for financial or political reasons, such as Gates, who featured in more than 10 per cent of all posts revolving around “political and economic motives,” making him the most mentioned individual within this topic of conversation.



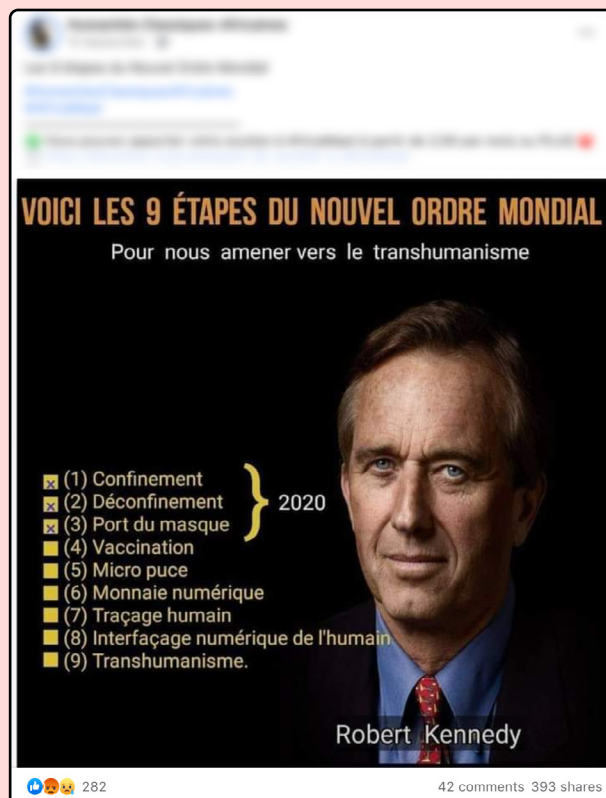
Example post

iii) Conspiracy theory

Posts framing vaccines as part of a wider conspiracy were particularly prevalent in online Francophone discourse, accounting for 32 per cent more posts than in English and Spanish conversations combined. As several Francophone countries' governments, such as those of France, Belgium and the province of Quebec in Canada, have imposed strict coronavirus measures, narratives claiming these to be the sign of an authoritarian drift have resonated with many anti-government online communities. These narratives have proved important to transnational Francophone movements such as that of anti-mask opposition.⁴¹ Unsurprisingly, they have equally reflected themselves in the most dominant narratives linking vaccines to wider conspiracies.

Vaccines are means to control populations and reach a transhumanist dystopia

The idea that vaccines serve as the means to install mass population-tracking programs represents one of the most dominant conspiratorial narratives within vaccine-related social media discussions. Microchipping and associated keywords such as “chip” or “RFID chip” were the sixth-most prominent entity in French-language conversations, featuring in more than 7 per cent of all French-language posts. Posts promoting this narrative tended to frame mass population tracking as part of a wider totalitarian framework, thereby reflecting the underlying belief that governments were using the coronavirus crisis to implement a dystopian, totalitarian style of governance. More specifically, unique to French-language posts was the notion that vaccine-induced microchipping represents one of a number of steps towards a transhumanist new world order. This also resonated with African and European Francophone communities.

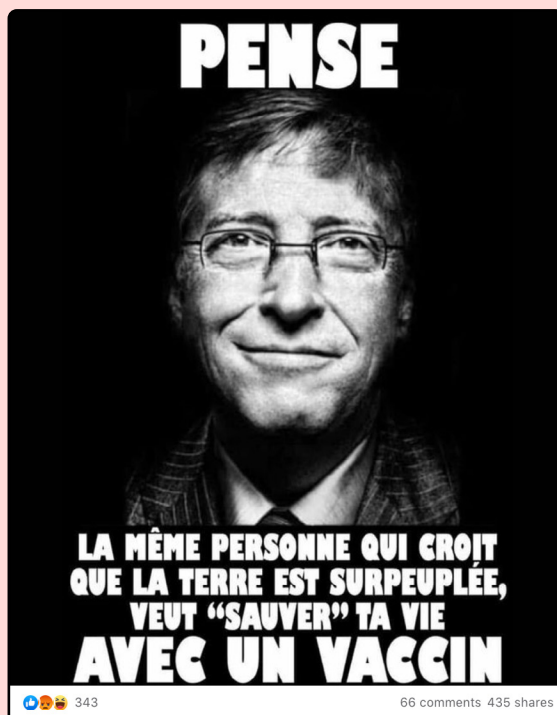


Example post

Vaccines serve as tools for human engineering and depopulation programs

Frames of vaccines as tools for malign human engineering programs or even depopulation efforts also featured frequently within prominent conspiracy theory content. Several posts suggested that the development of novel mRNA vaccines is motivated by a desire of political, scientific and economic elites to modify human DNA at a large scale. The tendency for conspiracy theories to coalesce⁴² was equally noticeable, with mass population tracking, human engineering program and depopulation narratives often combining and intersecting within posts, sometimes even referencing 5G and other known conspiracy theories.

Both of these narratives were often based on the idea that the novel coronavirus was a hoax and, as many conspiratorial narratives do, were explicitly linked to a deep-seated mistrust in the intentions of Western political actors and institutions.



Example post

Overview of Spanish-language content

Spanish social media posts were overwhelmingly related to Latin America.

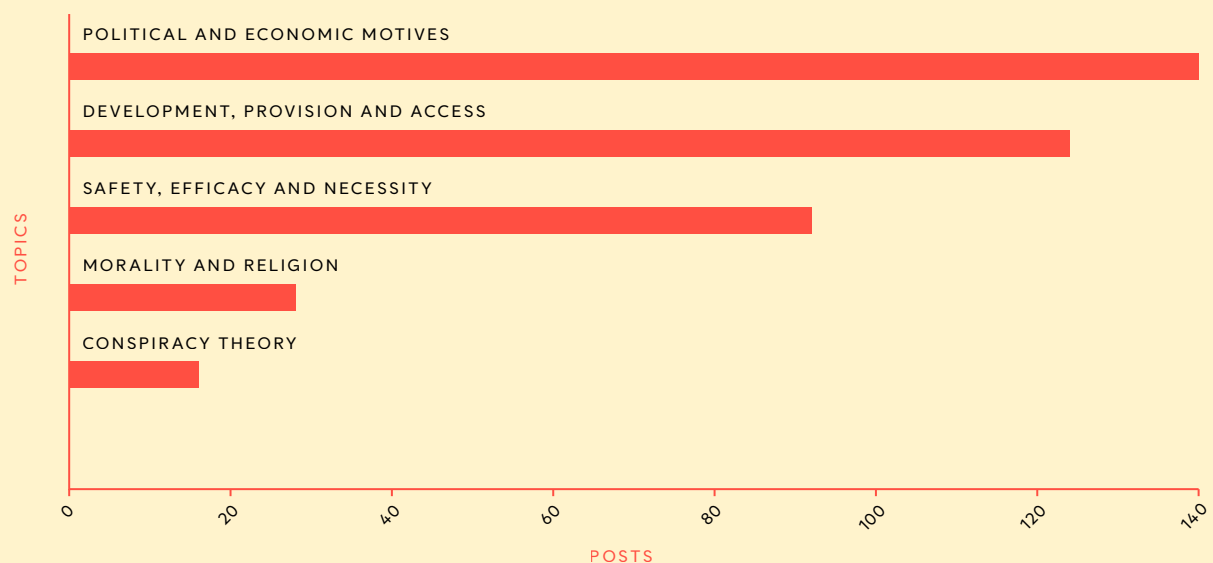
Of all the Facebook Pages, only 2 per cent were administered from Spain. All other Pages were shown to be managed from Latin America, with the exception of one page managed from Singapore and another from Russia.

Posts relating to the ‘political and economic motives’ of vaccines dominated Spanish social media

These posts accounted for 35 per cent of all posts in the language, outpacing both English (29 per cent) and French (24.5 per cent). Posts relating to the development and provision of vaccines — almost half of which focused on the Russian vaccine — made up another 31 per cent of posts in Spanish. Posts relating to the “safety, efficacy and necessity” of vaccines were far less frequent than in English and French, making up 23 per cent of all posts.

Topics in Spanish

Narratives related political and economic motives drove much of the vaccine debate on Spanish social media.



Source: First Draft Research

There were more posts relating to morality and religion in Spanish than in both English and French combined. Of these posts, 93 per cent were found in Facebook Groups. There were no posts relating to “liberty and freedom” in Spanish. Yet given the low levels of trust in government in the region — 75 per cent of Latin Americans have little to no confidence in their governments⁴³ — issues related to “liberty and freedom” could become potential flashpoints online if governments move to mandate Covid-19 vaccines.

Parody and satire a key messaging medium

Parody and satire featured heavily on Spanish social media by way of memes, videos or text-based jokes. Most of these posts were made up of different video or photo posts suggesting that a Russian vaccine would turn people into Russians or Communists. Other parody posts took aim at conspiracy theorists, parents who don’t vaccinate their children or people hesitant about vaccines. While these posts were meant to challenge some of these bogus ideas, it’s still unclear how effective humor is in creating attitudinal changes.⁴⁴

The message behind a joke or piece of satire is rarely universally agreed upon. A satirical post that is clearly criticizing a politician for one audience may be interpreted differently by that politician’s supporters.⁴⁵ And many of these humor-laden posts are only giving more oxygen to conspiracy theories and anti-vaccine narratives. More research is needed to understand the effects of satirical posts on vaccine attitudes, but it’s likely that these posts are creating more confusion than clarity and amplifying ideas that should be stamped out.

The outsized presence of Russian vaccine-related content

Posts both championing and satirizing the Russian vaccine played an outsized role on Spanish social media, making up 31 per cent of all posts in the dataset. There were more posts about the Russian vaccine in Spanish than in English and French combined. News articles and videos from RT were also sprinkled throughout Spanish social media, highlighting how Russia may be able to win influence in Latin America, where opinions about the country are divided.⁴⁶

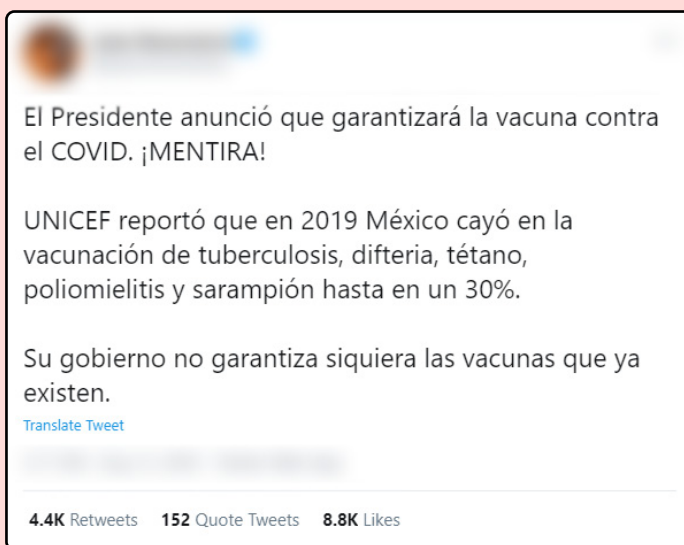
How did the key narratives play out in Spanish?

i) Political and economic motives

Posts related to the “political and economic motives” behind vaccines and their development — specifically a potential Covid-19 vaccine — were central to Spanish-language social media, making up 35 per cent of all posts. This was the highest percentage for any other topic across English, French and Spanish social media. Many of the “political and economic motives” posts related to the Russian vaccine “Sputnik V” both lampooned and questioned its safety. They also celebrated Putin and touted the vaccine as a success. Spanish social media differed significantly from English- and French-language conversations in their positive framing of Putin, Russia and the Russian vaccine. Other posts, both in Latin American and in Spain, attacked governments for their ineptitude in the vaccine’s development, procurement and future rollout.

Politicians, institutions and governments are incompetent and cannot be trusted

Spanish social media was ablaze with posts condemning political leaders, governments, and institutions for their incompetence. Confidence in national governments is generally quite low in Latin America,⁴⁷ and the quality of the region's democracy is also on the wane.⁴⁸ In this respect, the condemnatory nature of political and economic posts in Spanish is unsurprising. Interestingly, while corruption is a big concern in the region,⁴⁹ posts overwhelmingly focused on the incompetence of governments, not their misconduct, and highlighted how this incompetence is frustrating attempts at developing, acquiring and rolling out a vaccine.



Example post

Free-market capitalism, not socialism, is facilitating the development of a Covid-19 vaccine

Littered throughout Spanish social media were posts either championing capitalism's role in the development of a Covid-19 vaccine or deriding socialism. Anti-socialism posts were used to attack left-wing governments in the region, such as the current administrations in Mexico and Argentina.

Such polarizing posts — especially in a region divided by the legacy of the Cold War, where current governments are more sympathetic to Russia than the US or vice versa — have the potential of dividing Latin American opinion on a Covid-19 vaccine along East versus West lines. More research is needed, but it appears as if influence is being won not through traditional “hard power”⁵⁰ but through a Covid-19 vaccine.



Example post

ii) Safety, efficacy and necessity

Posts focusing on the “safety, efficacy or necessity” of vaccines accounted for 23 per cent of Spanish posts. These posts overwhelmingly portrayed a Covid-19 vaccine as essential to end the pandemic and return to a normal life. While far less prevalent, various posts stood in opposition to this narrative, challenging the need for a vaccine altogether. These posts cited various experts who claimed the disease would take care of itself or naturally result in herd immunity. Like many other posts on Spanish social media, memes and jokes were also used to emphasize the necessity of vaccines.

You poison your body with drugs and alcohol, so you can take the vaccine

Posts suggesting how hypocritical it is for people to consume drugs or alcohol while at the same time refusing to take a Covid-19 vaccine were scattered across Spanish social media. Interestingly, this hypocrisy narrative lent support to the Russian vaccine in two ways:

- 1) To attack people skeptical about the efficacy or safety of a Russian vaccine.
- 2) To suggest that while a Russian vaccine may be unsafe, it would be hypocritical not to try it.

By comparing the copious consumption of drugs and alcohol to the Covid-19 vaccine, the overall narrative still strongly hints at the fact that vaccines are not safe.



Example post

iii) Morality and religion

There were more posts relating to morality and religion on Spanish social media than there were in both English and French combined. 93 per cent of these posts were found on Facebook groups. The top-performing posts in Facebook groups proclaimed that the “blood of Christ” is the only cure against coronavirus. Given the continued strength of the Catholic Church and increasing rates of Protestant Evangelicalism⁵¹ combined with the fact that religious beliefs are already barriers to vaccine acceptance,⁵² these narratives are likely to have disproportionate influence in Latin America and could suppress rates of vaccine uptake.

Other posts centered around spirituality and natural health. Similar to the way traditionally religious posts saw “God” as their savior against the pandemic, these more “New-Agey” posts saw nature, chakras and the immune system as the ultimate protectors against Covid-19.

The 'blood of Christ' is the only vaccine against Covid-19

A strong narrative in the Spanish-language dataset was the notion that the “blood of Christ,” or a belief in God, is the only vaccine against coronavirus. These posts accounted for 67 per cent of the 309,409 total interactions resulting from morality and religion posts in Spanish. A related narrative suggested that any preoccupation with Covid-19 is only a “worldly” fear and that salvation from Jesus is more important.



Example post

God has the power to enlighten scientists to discover a coronavirus vaccine

Other posts blurred the lines between religion and vaccine science. These posts encouraged people to put their trust in faith and supplicated God or saints to “enlighten” or “guide” scientists to find a coronavirus vaccine. Similar posts supported the notion that supernatural intervention would be required to resolve the pandemic.

While these narratives implicitly supported a Covid-19 vaccine, they also suggest how belief in God still takes precedence over belief in science. And in a region where the separation between church and state continues to get thinner,⁵³ trust in vaccines, and ex officio, science, is still unsteady, vulnerable to the political and religious leanings of leaders in the region, as evidenced in Brazil.⁵⁴



Example post

Part 4:

Conclusions and recommendations



Part 4:

Conclusions and recommendations

The development and potential provision of a Covid-19 vaccine is poised to define attitudes toward vaccines and the institutions that govern them for generations. Regardless of the ultimate effect that this vaccine may have — assuming one is created — trust in a Covid-19 vaccine is already disintegrating in many parts of the world. This report has revealed the presence of myriad data deficits that are being filled with misinformation and resulting in the development of narratives detrimental to vaccine confidence.

Despite these dangers, there are proactive measures that could be taken to ensure that reliable information around vaccines fills these data deficits and counteracts the misinformation that is eroding trust in vaccines. We also understand that information around Covid-19 and a vaccine is not a static entity but will change going forward. As such, First Draft will continue tracking key narratives, trends and data deficits related to vaccines.

Here we offer a series of recommendations based on the current report for platforms, policymakers, communications professionals, journalists and researchers, all of whom play essential roles in ensuring that the public has easy access to reliable information related to vaccines.

Recommendations

- **Recommendation No. 1:** We need to stop relying on fact-checking efforts and platforms' content moderation policies to address data deficits. Doing so is reactive, insufficient and potentially counterproductive. For example, greater levels of content moderation could fuel anti-vaccination narratives that claim platforms are attempting a cover-up. They also could encourage key vaccine communities to migrate to alternative platforms that are harder to monitor and research. Proactive messaging that is both compelling and tailored to different audiences is needed.
- **Recommendation No. 2:** Appreciate narratives (and even topic) differences across languages and regions and respond appropriately. And don't create an oversupply of information if there isn't a data deficit.
- **Recommendation No. 3:** Reliable news sources, social media monitoring and research organizations should collaborate to identify and address relevant data deficits, as well as to avoid the oversupply of information on a given topic.
- **Recommendation No. 4:** Narratives stemming from natural health and "New Age" online communities should be monitored more closely. Many of these directly oppose and discredit the concept of immunization and are being picked up by disparate communities on social media.
- **Recommendations No. 5:** Anti-vaccination misinformation narratives have adapted, and will continue to adapt to the evolving Covid-19 health crisis context. The ability to track the development of problematic vaccine narratives over time will be key to informing proactive efforts at combating novel narratives and filling data gaps or data deficits.
- **Recommendation No. 6:** Topic modeling and other machine learning technologies enable researchers to analyze large datasets, and the potential remains incredibly promising. But to understand the ways in which narratives are structured and created still requires human analysis and interpretation. While these technologies are relatively sophisticated when it comes to text, they are less useful when it comes to making sense of image and video content, which is a significant portion of what is happening online.
- **Recommendation No. 7:** We need to find a way to acknowledge the uncertainties and fears people have, rather than dismiss them, and build bridges between health experts and the vaccine hesitant. Finding a way for health experts to connect with those who are questioning vaccine safety, without validating or amplifying concerns, will be a fundamental component to rebuilding trust in health authorities and institutions.

Part 5:

Appendix: Full methodology

- Construction of the typology
- Qualitative methods
- Data gathering
- Data analysis
- Case selection

Part 5:

Appendix: Full methodology

Construction of the typology

Our new custom typology was built inductively by the First Draft research team. A test dataset of 400 posts was provided to each member of the team, who then individually created his or her own typology with an aim to capture the different ways in which vaccines and vaccination are framed on social media. Elements from each individual's typology were then selected to combine into one preliminary typology. This typology was then refined by a literature review of existing vaccine-related typologies.

The typology was then further informed by a topic modeling test performed by the University of Sheffield on a larger test dataset. The university's topic modeling program, based on k-means clustering, produced 20 "cluster" topics that informed the typology's design. In the final stage of its construction, this preliminary typology was then repeatedly tested by the coders participating in the project on a number of 20 per cent sample test datasets (n=100). This allowed the team to modify the typology to ensure it could be applied with a high level of inter-rater reliability.

Cohen's kappa for the final iteration of the typology tested on a 20 per cent sample test dataset was 0.77 and the percentage agreement score was 82. While these scores may be considered "substantial," they fall slightly short of being considered "almost perfect." However, social media posts, as opposed to news headlines, for example, are particularly difficult to code in a reliable manner due to a number of their unique features. For example, certain posts can have long-form texts featuring

a number of different elements that may be coded under different categories within the typology. Others can use a variety of emojis, capitalized words and punctuation that may place emphasis on different parts of the posts. Many posts also feature a combination of text, images and preview text from embedded URL links embedded that may convey different messages simultaneously.

Therefore, additional methods were applied to ensure a higher level of inter-rater reliability for the full dataset: Our analysis of sources of disagreement between coders on test datasets revealed the “safety, efficacy and necessity,” “political and economic motives” and “excluded” categories to be the most common sources of disagreement. While coding the full dataset, any post considered an “edge case” between “safety, efficacy and necessity” and “political and economic motives” was coded with the help of a second coder by consensus agreement. Any post considered to meet the exclusion criteria by the coder was also double-coded by consensus agreement.

Each coder was provided a codebook containing detailed guidelines to be followed when coding social media posts. Some of the most significant guidelines included:

- The unit of analysis is the whole social media post, but only the post: links to external web pages such as news articles or blogs embedded in a post could not be accessed and their content could therefore not influence the coder’s decision.
- Videos featured in social media posts must only be viewed for five minutes. The content delivered in those five minutes, along with any text or any other feature within the rest of the post, are the basis for the coding decision.

When a social media post contains multiple elements that could lead it to be justifiably coded under a number of different topic categories within the typology, the coder’s decision should be made based on the following considerations:

- How the issue is being framed: the way in which the key claim or message is being presented. Emphasis could be placed on

certain keywords with the use of capital letters; emojis may convey crucial information relating to an element discussed in a post. These details should inform the judgment on how an issue is framed and therefore what its dominant aspect is.

- What the intent of the message is: What is the author of the post getting at? What is the view or the overarching belief the author is conveying? Is an element that may fall until x category actually being used to make an explicit argument that falls under y category?
- Which of the narratives presented in the post is the most ambitious: When there are multiple arguments or elements included in the post, think about which is the more ambitious.

The codebook also included example posts that may be considered “edge cases” and the appropriate coding decisions.

Certain social media posts were not relevant for the purposes of the research despite containing the words “vaccine,” “vaccines” or “vaccination.” Coders had to exclude posts if they fell under one or more of these criteria:

1. Content related exclusively to pet or animal vaccination;
2. Posts in which vaccine keywords appeared as part of a hashtag spam; Posts in which the words “vaccine” or “vaccination” are only included as part of a metaphor;
3. The subject of the post is not vaccines and references to vaccines within the posts have no relation to the subject of the post;
4. When the content that would enable one to categorize the post is contained in an external link that one would have to click through to access;
5. When the subject of a post is an increase or decrease in share prices related to vaccines or vaccine trials;
6. When the purpose of a post is to advertise a good or service (such as bitcoin, for example, but this could also include offering vaccination services);
7. Posts that include a different language from the one that is being coded, even if the language being coded makes up the majority of the post;
8. Any poll or question-based post that is either open-ended or unspecific to a single topic;

9. Any general post where the category would have to be extrapolated subjectively and could be justifiably contested;
10. If the subject of the post, a meme or a joke does not fit into a topic in a clear and obvious way according to the coder, i.e., if there is any internal debate from the coder or the joke does not make sense, it should be excluded.

Qualitative methods

In order to uncover key narratives, their defining characteristics and their pervasiveness within the dataset, a structured note-taking system was established for coders to follow. Next to each social media post, coders could fill two additional text columns after having made the coding decision as to which category the post fell under:

1. A “notes” column, where the coder could record a narrative or claim advanced in a post. By recording these using the following format: “narrative: the narrative identified ;” “claim: the claim identified,” the coder was then able to review all the entries made in the notes column, assess the prevalence of a narrative or claim and therefore choose to carry out further analysis of the most prevalent narratives and claims and then include this analysis in the Language-Specific Narratives or Information Disorder sections respectively.
2. A “tags” column, where the coder could denote any entity (such as a key figure or institution) central to the narrative or claim identified in the post. These notes could then serve as the basis for the coder to undertake further data analysis on the entities listed in that column so as to evaluate their relative significance. The column also served to highlight any term denoting a specific entity, but whose spelling differed from the official name of the entity. These key terms and entities formed a dictionary we used with Python to quantify the prevalence of entities in the dataset (Please see the Data analysis section for more details).

Data gathering

The terms “vaccine” and “vaccination” as well as their equivalents in French and Spanish were used as the basis for all our queries. We used the search endpoint of CrowdTangle’s API to gather data from Instagram, Facebook Pages and Facebook Groups. For Facebook Pages and Groups, we collected only posts from unverified accounts.

For Twitter, we used Twitter Capture and Analysis Toolset (TCAT), created by the Digital Methods Initiatives (DMI). The tool uses Twitter’s public streaming API in combination with other tools developed by DMI to retrieve and collect tweets and analyze them in various ways. We created separate streaming query bins for the three languages. For Twitter, posts were collected from both verified and unverified accounts. This was done to capture posts from verified accounts that were not established media outlets or elected public officials and which drove organic conversations. It was also done because Twitter’s account verification has been considered quite lenient at times — white nationalists’ accounts have been verified by the platform — and we didn’t want to miss any important anti-vax voices that may also have been verified by the platform. Moreover, unlike verified Facebook Pages and Instagram, whose most engaged-with posts typically come from news organizations or brands, tweets are much more individual-focused — they come from personal accounts and represent individual voices.

From this data, we selected the 100 most engaged-with and publicly available posts per platform and per language, which resulted in a final dataset of 1,200 posts.

Because of inconsistencies among platforms in how and whether they provide data for the number of views from videos embedded in a post, we excluded video views and focused only on engagement metrics related to the posts themselves.

Data analysis

The categorization of topics, tagging and note-taking was all done manually. However, all subsequent data analysis — segmenting the dataset by language and topics and compiling engagement metrics, for example — was done computationally using Python and Pandas.

We found that using pre-existing automated entity recognition packages missed a lot of the in-group language and organizations relevant to this niche subject. We thus used a mixed-methods approach where we:

Manually inputted vaccine-related entities and keywords in the “tags” column of our dataset, including their various spellings; Created a dictionary of keys (the entities) and values (a list of keywords associated with each keyword across all languages) in Python, which we then used to automate the extraction and count of entities relevant to vaccines.

Case selection

Our initial research question — “To what extent do the most dominant vaccine narratives online differ across languages?” — was informed by our months-long international monitoring projects. They had often provided indications that global vaccine discourse was being driven by certain narratives and topics of conversations that were unique to individual language communities. This provided us with the initial motivation to map narratives across different language communities and therefore assess the extent to which they differed based on language. English, French and Spanish were the three languages in which we had two or more native speakers who could analyze the information dynamics within these communities to an expert level based on their linguistic and region-specific contextual knowledge. These languages also cover a significant number of regions across the world, thereby enabling us to understand whether languages, as opposed to borders, contributed most to the spread of vaccine discourse and narratives on social media.

To obtain a sample of all social media conversations relating to vaccines, we opted to collect data from public Facebook communities (Pages and Groups), Twitter and Instagram because of these platforms' relative significance within these language communities. Other platforms, such as Reddit, were considered, but the engagement generated by the most interacted-with Reddit posts was not comparable to that generated by posts published on the platforms mentioned. The application of a manual coding methodology to long-form YouTube videos was deemed infeasible because of time constraints. Private online spaces, such as private Facebook Groups or social messaging apps, were not selected despite their significance within English-, French- and Spanish-language communities. We didn't manually collect data from private Facebook Groups because of 1) the many ethical dilemmas involved with researching these closed spaces and 2) the fact that there is no way to collect data from private Facebook groups at scale.

Limitations of the research design and data

In many of the countries that are part of the language communities we researched, social messaging apps such as WhatsApp and Telegram, private online environments such as private Facebook Groups as well as the video platform YouTube account for a large proportion of conversations taking place. Therefore, the validity of our results is limited by the failure to capture relevant vaccine content from these platforms in our data.

In order to provide a more comprehensive "map" of global vaccine narratives and discourse, a greater number of languages, particularly languages that account for a significant proportion of the world's population, such as Hindi or Mandarin, would need to be included within the scope of our research. Data from these language communities would also enable us to increase the validity of our measure of the extent to which languages determine the prevalence of vaccine narratives on the social web.

For data there were two minor limitations. CrowdTangle's Application Programming Interface (API) provides an extensive but not fully comprehensive sample of data for publicly available Facebook and Instagram posts. While collecting tweets from Twitter's Streaming API, we hit several rate limits, which means we may have missed tweets and retweets that were published during those downtimes.

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