

## PRE-PANDEMIC HISTORY OF A HEALTH CONTROVERSY

### Ten years of vaccine hesitancy on the Italian Twitter

di Ilir Rama\*

#### Abstract

The discursive politicization of vaccine-sceptic positions on Twitter following related legislative interventions. The Covid-19 pandemic underlined the complex ways in which social media and public health intertwine. This led to a newfound focus on the role of digital platforms in structuring public discourse around health and public health policies. In this context, one of the most addressed topics is vaccination, as research focused on how vaccine hesitancy is structured and received on social media in relation to the broader climate of a pandemic. However, the pervasiveness of the pandemic made it difficult to unpack social and political factors, and to gauge the effects on the conversation of legislative interventions concerning the pandemic vis a vis acts concerning vaccines specifically. To this end, the effects of a comparable legislative act on social media conversations have been measured. Specifically, the focus is on the discourse surrounding vaccines on Twitter in the 10 years leading to, and including, the aftermath of the Lorenzin Decree, a legislative intervention addressing immunization practices in Italy. The present research shows how the issuing of a decree involving vaccination practices led to a broader politicization of the issue, enhancing the visibility of vaccine sceptic positions, and radically altering the morphology of the conversation. This underlines how events and their subsequent discursive platformisation can affect the tone and frames of a conversation.

#### Keywords

Twitter, Coronavirus, platformization, events, discourse.

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DOI: [10.13131/unipi/xa61-0x70](https://doi.org/10.13131/unipi/xa61-0x70)

## 1. INTRODUCTION

The Coronavirus pandemic has been an extraordinary event, both in itself and due to the consequences it sparked. The latter included a variety of regulatory efforts made to contain the pandemic, concretised in a series of policies such as movement restrictions and immunization strategies. The pervasiveness of such policies proved to be a brooding ground for a hyper-politicization of the issue, meshing with doubts around vaccines and vaccination practices (Gesualdo et al., 2022). Despite the specificities of the Covid-19 pandemic, however, some degree of aversion to vaccines has been constant across time, leading, as a notable example, to the foundation of the Anti-Vaccination League in 1853 London. Since then, hesitancy towards vaccines has been constant, as historically have been its themes throughout history, encompassing both social and individual factors: trust in medicine, the economic interests of pharmaceutical companies, doubts about vaccines at large - and more (Wolfe, 2002). These features extended to the present day with the same topics deployed to discuss the Covid-19 vaccine (Garzonio & Nuvoli, 2022). Thus, vaccine hesitancy is not limited to health-related concerns, such as safety or efficacy, but includes the perception of political and mediatic systems. This intertwines with the legislative measures undertaken to address hesitancy or, in the case of the pandemic, to address a broader emergency; health-related motivations merge and are strengthened by worries about political impositions, personal liberty, and freedom of choice (Gesualdo et al., 2022; Larson et al., 2014). For these reasons, conversations around immunization practices are not confined to institutional spaces but spread over the public sphere. Specifically, the Internet has been one of the privileged channels to discuss vaccination, bringing about a massive spread of information and misinformation (Caliandro et al., 2020). The hesitancy conversation that had once been a characteristic of Web 2.0 (Betsch et al. 2012) thus expanded to social media, which contributed to fostering new anti-vaccination movements (Smith & Graham, 2019). In the Italian context, such hesitancy took place on a variety of social media, like Facebook (Comunello et al., 2017) and Twitter (Gori et al., 2021), restructuring the ecology and circulation of information around vaccines (Lovari et al., 2021; Righetti, 2021).

This entanglement between vaccinations, social media and political and public health policies becomes then difficult to extricate, especially in the context of hyper-politicization and pervasiveness that characterised the Covid-19 pandemic and related measures. How to disentangle the

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conversations about immunization practices from those revolving around broader restrictive measures? How to separate the political perception of the pandemic from that of vaccination at large? How to gauge the impact of public health policies on the conversation? To do so, we focus on a similar context, where the conversation about immunization practices and legislative acts was present, but not as pervasive: a decree-law, commonly referred to as the Lorenzin Decree, which in 2018 raised the number of mandatory vaccinations for children in Italy. The discourses unfolding in the decade before the decree will be considered as well, to get a better grasp of the context leading to the emanation of the decree.

To account for how legislative acts can impact conversation on social media, we will observe the ways in which the Lorenzin Decree impacted how vaccination is discussed on Twitter. Our expectations are to observe a higher salience of the issue following its politicization, resulting in a livelier debate around vaccines following the decree (Righetti 2021). We hypothesize the conversation to be affected by the decree not only in volume, but in how it frames vaccination as well: we expect an increase in content focusing on the political side of vaccinations, for example related to political parties and the imposition of compulsory vaccination, at the expenses of topics tangent to health, such as the benefits of immunization.

## 2. TWITTER, EVENTS, AND PUBLIC HEALTH

Social media then concurred to a platformisation of vaccine-hesitant discourse, in turn benefitting from the social nature of their affordances. Among other social media platforms, such discourse moved to Twitter (Cristadoro & Arcostanzo, 2017; Gesualdo et al., 2022; Lovari et al., 2021). Twitter has been vastly employed to consider public opinion around specific events and issues. Real-world occurrences are discussed on the platform, coalescing global, local, and personal points of view (Becker et al., 2011). As Twitter established itself as a platform for commenting, evaluating, and discussing events, it became a valuable tool to map opinions at different points in time, given its capacity to offer on-the-spot evaluation and discussion of newsworthy events. One of the ways to do so is by exploiting hashtags, a tag employed by users to mark the content they produce; hashtags can be used to categorize tweets across topics and themes, as well as to fragment the conversation around them, to underline keywords in a post, and to express emotions or reactions (Bruns & Burgess, 2015). Broadly speaking, hashtags allow to identify notable events and emerging topics of discussion (Becker, 2011), creating instant issue publics: ad-hoc publics ready to engage, actively or

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passively, in the conversation (Bruns & Burgess, 2015). Thus, Twitter allows for the discussion of instant events, and makes these discussions indexable through hashtags. It allows us to analyse and compare different points in time by “crystallising” public opinion around specific issues, in virtue of the almost instant reaction to real-life happenings. To this end, Twitter has been studied to compare public opinion around restrictive measures during the pandemic (Boccia Artieri et al., 2021), or to consider the spread of pandemic-related misinformation (Caliandro & Anselmi, 2020). For immunization practices at large, Twitter conversation on vaccines has been shown to directly correlate with vaccination rates at a geographical level (Salathé & Khandelwal, 2011). Focusing on the Italian context, Twitter has been mined to gauge the reception of Covid-19 vaccines (Tavoschi et al., 2020), or the effects of legislative acts fostering vaccinations on public opinion (Cristadoro & Arcostanzo, 2017; Lovari et al., 2020; Righetti, 2021).

The conversation on Twitter is receptive to public health policies around vaccinations. Thus, Twitter and has been aptly considered to gauge public opinion on immunization practices and related legislative interventions both before and during the Covid-19 pandemic. However, unpacking the complex relationship between vaccines, public opinion, and events becomes difficult given the pervasiveness and hyper-politicization of the debate about the pandemic. Furthermore, while of the utmost importance, sentiment around vaccination practices and events does not consider a fundamental part of the discourse: the impact of legislative events on how the topic is discussed. To this end, the conversation unfolding on Twitter around a decree raising mandatory vaccinations in Italy, the Lorenzin Decree, has been analysed considering both sentiment and framing of the issue by individuals.

### 3. LORENZIN DECREE AND THE ITALIAN CONTEXT

New-born immunization coverages in Italy for diphtheria, tetanus and poliomyelitis reached a peak, in 2004, of 96.8% - above the international threshold of 95%. Since 2008, however, vaccinal coverage begins slowing down; by 2013 this decline becomes a clear trend in every Italian region (Salmaso, 2017). The Minister of Health addressed the causes for the reduction of vaccinal coverage as little knowledge of the positive effects of vaccines; low perception of infectious diseases' risks due to the success of vaccination; diffusion of antiscientific theories and fake news; alleged links between some pathologies and vaccination (e.g.: autism); and the rise of movements opposing vaccines due to ideological reasons or other interests.

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(Ministero della Salute, 2017). With only 6 regions reaching the recommended 95% of coverage, in 2017 Emilia-Romagna, Friuli-Venezia Giulia, Tuscany and the province of Trieste introduced mandatory vaccination as a requirement to access nurseries (Rai News, 2017).

In this context, on the 19th of May 2017, the government enacted a decree-law, a legislative act usually reserved for emergencies and time-sensitive issues. On the 18th of July 2017 it became Law 3/2018, commonly known as the Lorenzin Decree, after the Health Minister who proposed it. It implements and changes several facets of immunization practices in Italy, increasing the number of mandatory vaccinations from 4 up to 10, and making them a prerequisite for children aged 0 to 6 to be enrolled in school. Vaccinations for the age 6 to 16 age bracket remain mandatory, and fines for non-compliance are raised. Additionally, it empowered pharmacovigilance and established a national vaccination registry (Ministero della Salute, 2017). Mediatic coverage and discussions around vaccines peaked in the months when the Decree-Law was being discussed and voted on. However, as mentioned, the Decree-Law is a consequence, and not a cause, of the spread of theories and movements opposing vaccination (Ministero della Salute, 2017). Vaccine hesitancy already had relevant coverage, with politicians such as Beppe Grillo promoting the link between autism and mandatory vaccinations (Pipitone, 2013), or public figures such as Gabriele Ansaloni (also known as Red Ronnie) mentioning vaccines as useless and linking 1.500 deaths in a year to vaccines, while defining mandatory vaccination an absurd imposition (Il Fatto Quotidiano, 2016). In 2017 Report, an independent investigative journalism tv show, airs a piece detailing several adverse reactions to the HPV vaccines, generally raising doubts about European pharmacovigilance (Borella, 2017).

While these are but some examples, they contextualize how spread the anti-vaccination rhetoric was in Italian media. They also concur to underline how vaccines are portrayed: based on health concerns, as well as in a politicized manner due to the legislative interventions taking place in the same period. Such politicization led to an increase in the spread of problematic information through alternative and mainstream media online (Lovari et al., 2020), as well as affecting the conversation on Twitter and Facebook (Righetti, 2021). Overall, research pointed at an increasing politicization of immunization following the Decree, resulting in a conversation polarized between those supporting and those opposing vaccination (Carugno & Radicioni, 2018). Following this line of research and taking the Lorenzin Decree as a case, it will be considered how legislative acts can affect the conversation around vaccines on Twitter, by

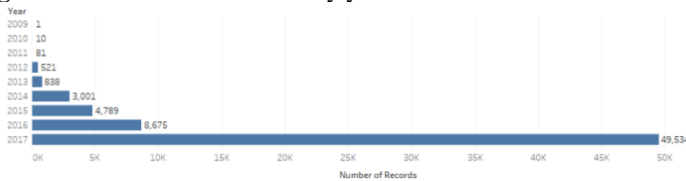
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comparing public opinion on the days immediately after the decree to a control period. The focus will be on both perception and framing, based on a combination of sentiment and content analysis.

#### 4. DATA AND METHODS

The analysis is composed of a quantitative overview of the conversation on Twitter around vaccines, and a manual content analysis of a sample of tweets surrounding the Lorenzin Decree. The starting point for both is a dataset of 67,451 tweets containing the keyword #vaccini in a period ranging from the 18th of November 2007 to the 1st of December 2017. The dataset, as well as any additional data collection, employed an ad-hoc Python script scraping the website for data and metadata. The analysis includes two different components. The first component is a descriptive quantitative overview of the conversation surrounding the hashtag #vaccini, including a co-hashtag analysis; both levels contribute to an overview of the conversation which considers its evolution over time, in quantity and in topics associated to the conversation - as quantified through their correlation with the hashtag #vaccini. The second component focuses on the content of the tweets. A sample from #vaccini is analysed through digital content analysis, focusing on frame, or how the topic is discussed, and sentiment. This approach is nested within the broader tradition of digital methods of controversy analysis (Marres, 2015; Marres & Moats, 2015), albeit with a stronger focus on qualitative analysis rather than computational methods.

**Figure 1.** Distribution of tweets by year for #vaccini



Starting from #vaccini, a co-hashtag analysis helps to get a better sense of the semantic associations deployed by users (Caliandro & Gandini, 2016). Correlated hashtags have been extracted from the complete dataset, yielding a total of 12,387 unique hashtags cumulatively appearing in the set 74,587 times. The vast time range from which the data has been drawn brings several limitations to this process, first by undermining the relevance of specific hashtags across specific time-frames – as is the case

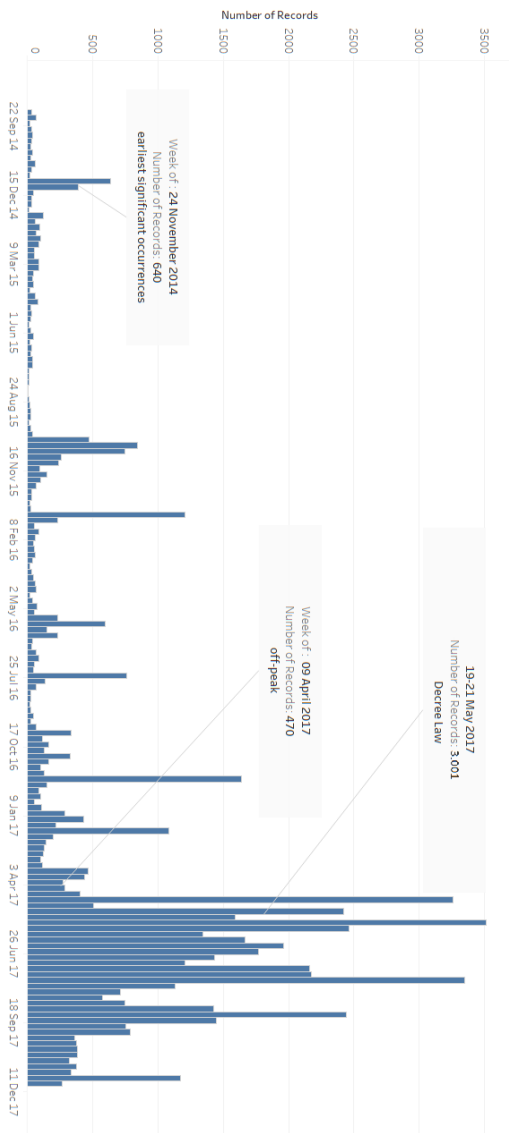
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especially for event-related hashtags #8LUGLIOPESARO, the “free-vax” demonstration which took place on the 8th of July 2017, or #REPORT, an Italian journalistic TV program stirring controversies after airing an episode about the HPV-vaccine. Usually such a vast time range represents a methodological limitation. However, given the focus on events and their effects on the conversation, such a timeframe provides a valuable eagle view of how #vaccini contributed to structure the broader conversation, while considering the broader ecology of hashtags (Airoldi, 2018; Caliandro, 2018).

Following hashtags’ co-occurrences, the analysis will move onto the tweets themselves. To explore the impact of the decree on the reception and framing of vaccines, the analysis will rely on the manual content analysis of a sample of tweets; it will focus on two different time periods: the 3 days following the approval of the policy (19th – 21st of May 2017, accounting for 3001 tweets), and a control period around a month before it (9th – 16th of April 2017, 470 total. See figure 2). The control subset has been chosen focusing on a period with a comparable number of occurrences, as close as possible to the decree, and with no relevant event discussed in the same timeframe. This was necessary to allow for comparisons and to avoid the influence of exogenous factors. However, such a comparative approach led to a numerical mismatch between the two subsets; to mitigate this, instead of comparing the absolute number of tweets, the analyses will consider the cumulative number of retweets, following the sociotechnical architecture of the platform (Rogers, 2015). Retweets are mostly used as “an affirmation of the contents of a particular tweet, and a way of spreading a conversation more widely” (Halavais, 2014) or, more generally, as behaviour supporting the content of the tweet (boyd et al., 2010) and driven by a specific topic (Shi, 2017). This allowed to select a smaller sample of tweets to manually analyze: the 50 most retweeted tweets, or all the tweets with more than 10 retweets – whichever is the highest.

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Figure 2. Distribution of #vaccini over time





The analysis of tweets includes two dimensions: frame and sentiment. Frame refers to how users discuss vaccination and immunization practices, and it provides an entry point into how these issues are perceived (Entman, 1993). The categories are two and draw from the results of preliminary exploratory analysis: health and political. Health includes tweets which mainly focus on the medical and public health dimensions, including vaccination and the effects of immunization; the second category, political, includes all tweets focusing on the legislative act and vaccines from a political angle or, more broadly, prominently featuring political actors in the text (figure 3).

The second dimension of analysis refers to sentiment (Caliandro & Gandini, 2016). Sentiment will be considered as positive, negative, or neutral, and gauged in relation to the perception of vaccines, immunization practices, and related legislative acts. Both framing and content have a residual category, other, referring to unrelated content.

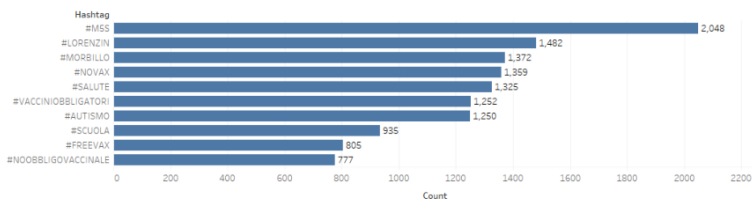
**Figure 3.** Example of a tweet framing the issue based on health (above) or politics (below)



## 5. TWITTER, VACCINES, AND EVENTS

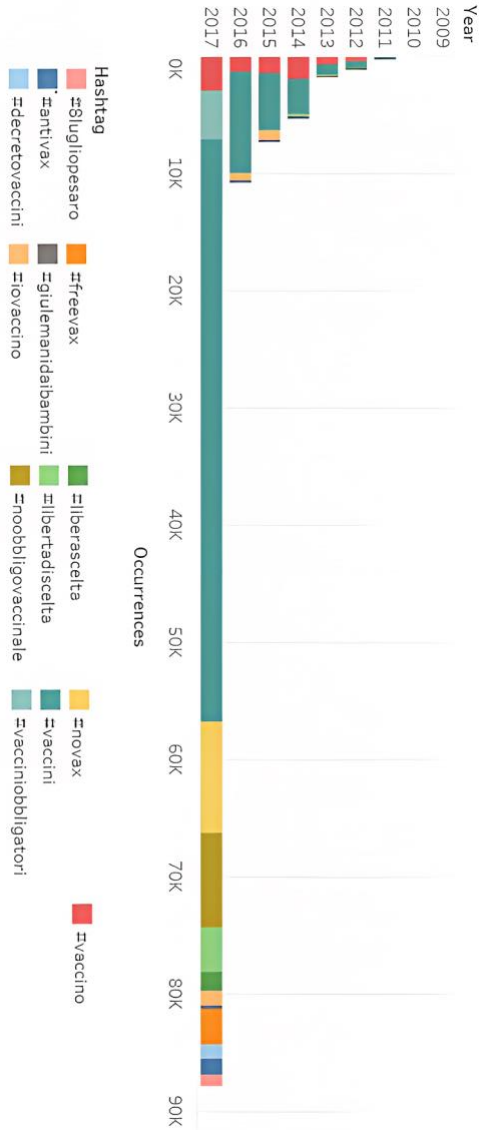
The number of tweets in the dataset sees a substantial increase over the years, passing from no records in 2007 and 2008 to the 49.534 of 2017 (see figure 1, 2007 and 2008 not shown for clarity). Within the dataset, the two correlated hashtags showing the highest occurrences count are both related to the political sphere: #M5S – short for Five Star Movement – and #LORENZIN - after Beatrice Lorenzin (figure 4). Notably, the Five Star Movement has been deeply involved in the debate surrounding immunization practices, often holding different and contrasting positions across the spectrum; Beatrice Lorenzin has been the political figure most associated with the Decree Law, being the Health Minister signing the reform and effectively representing its political face.

**Figure 4.** Top ten hashtags co-occurring with #vaccini



To get a more complete picture of the hashtags users have deployed when discussing vaccines, the hashtag analysis has been expanded following a snowball sampling of tweets. A series of hashtags has been selected based on exploratory analyses and previous research (Cristadoro & Arcostanzo, 2017, Di Giovanni, 2021), both directly related to the topic (#vaccini; #vaccino; #novax; #iovaccino) and specific to the decree (#decretovaccini; #giulemanidaibambini; #libertadiscelta). Data has been collected for each of those hashtags, which in turn underwent a co-hashtag analysis aimed at identifying the most used hashtags within each subset; results have then been aggregated. The result when considering all previous keywords combined is a list of 13 hashtags with over 1000 occurrences (around 1% of the total): #8lugliopesaro, #antivax, #decretovaccini, #freevax, #giulemanidaibambini, #iovaccino, #liberascelta, #libertadiscelta, #noobligovaccinale, #novax, #vaccini, #vacciniobbligatori, #vaccino. These hashtags cumulatively occur a total of 114.596 times and are distributed as in figure 5.

**Figure 5.** Distribution of hashtags per year following a snowball sampling



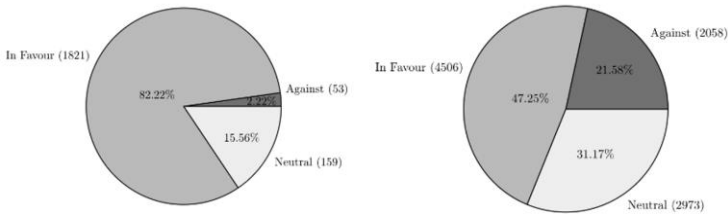
A brief analysis of how content is indexed by users points to a relevant role of events in driving the conversation. Additionally, it is shown how vaccines are discussed by leaning on both the health-related dimension as well as the political one. The political dimension is declined both through means of direct mentions to political actors (*#lorenzini*, *#m5s*), as well as specific mentions to the law (*#decretovaccini*) or broadly to mandatory vaccination (*#libertadiscelta*, “freedom of choice”). Conversely, while indexing the topic based on health, users deployed hashtags related to safety and coverage (*#morbillo*, or measles), perceived adverse effects (*#autismo*, autism), and topics related to public health (*#scuola*, school). Analysing the morphology of the conversation and its hashtags then allowed us to extract the two main analytical dimensions comprising the conversation, which will serve as the basis for further analysis: health-based and political.

## 6. VACCINATION, SENTIMENT, AND FRAMING

The results of the sentiment analysis, assessing the stances on vaccination and related law, are shown in figure 6. The differences in absolute numbers between the two periods are reflected in the distribution of retweets across datasets, hinting at different levels of mediatization of the issue. Aside from general differences in distribution, the stance changes significantly as well. The control period shows overwhelming support for vaccines and vaccination practices, with 82.22% of retweets (1.821) supporting immunization practices and relative acts. Conversely, around 2% of total retweets portrayed such practices negatively, with 53 retweets. Both figures are in contrast with the conversation following the legislative intervention: while the overall sentiment remains positive, with 47.25% of positive content (4.506 retweets), both neutral and negative stances increase significantly. Comments against immunization and the decree increase almost tenfold, from 2.22% to 21.58% (2.058 retweets); similarly, neutral comments double from 15.56% in the control period to 31.17% (2.973).

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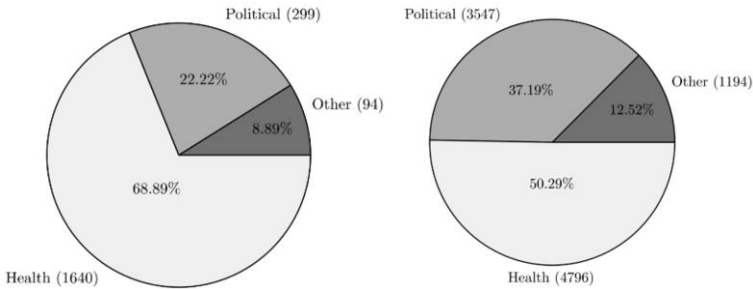
**Figure 6.** Sentiment on vaccination and related policies. Left is the control period, right is after the policy's enactment



Results underline not only an increase in negative and neutral stances, but one that is at the expense of positive comments. While it is impossible to trace the direction of the changes, that is to which category the positive tweets flowed into, such changes in sentiment are still particularly relevant as they encompass all three categories. Such a change is not limited to the slant of opinions; rather, it is also reflected in how vaccinations, the decree, and immunization practices are discussed.

As shown in Figure 7, while most of the conversation remains focused on themes related to health-related subjects - such as the public health system, the effectiveness of vaccines and immunization practices at large, or potential health risks - its size decreases significantly. In the control period almost 69% of retweets (1.640) framed the conversation according to health and related topics, compared to around 50% after the law decree was promulgated. This shift is reflected in the growth of its complementary frame. The political category grew from 22.22% (229 retweets) of the control period to around 37% (or 3.547). The residual category changes, but not as markedly as when considering sentiment, going from 8.89% to 12.52%. Here, as when considering sentiment, the changes encompass all categories. It seems to point to a shift in the conversation from health-related topics to more political ones.

**Figure 7.** Discussion frames on vaccination and related policies. Left is the control period, right is after the policy's enactment



The sampling method chosen, and the fact that it gives more weight to retweets rather than absolute numbers, have implications. Retweets might concur to underline the circulation of content and therefore overrepresent power users of social media, reflecting broader platform dynamics rather than public opinion. However, such a form of sampling allowed for a stricter and more precise categorisation; additionally, considering the spread of content rather than its absolute numbers, allows for a categorisation that sidesteps other methodological limits allowing for more meaningful comparisons across timeframes. In the future, research could benefit from a stronger focus on qualitative analysis, extending the sample in absolute numbers and considering more subsets. Another limit is given by how data has been collected. Choosing a single hashtag, such as #vaccini, means capturing a restricted portion of the conversation around a topic. The choice of using hashtags has been a necessity to index the conversation while maintaining a manageable dataset; however, in turn, the selection of a single hashtag might be limiting. To consider the broader ecology of hashtags through which the conversation is structured, empirical efforts included a broader descriptive analysis involving hashtags' co-occurrences.

## 7. CONCLUSIONS

This article considered how public opinion on social media shifts in response to events. To do so, the conversation on Twitter has been analysed, considering changes in how vaccination is discussed following

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the Lorenzin Decree, a legislative act impacting immunization practices. Sentiment and frames employed by users following the law have been analyzed and compared to a control period a few weeks before.

In line with current literature, results point to real-life events having a strong impact on the morphology and content of a conversation on Twitter (Boccia Artieri, et al. 2021). This applies in the case of public health policies as well, with sentiment around vaccines strongly changing in the days following the promulgation of the law (Cristadoro & Arcostanzo, 2017). In this case, the legislative act enhanced the visibility and reach of negative opinions on vaccines and related practices (Di Giovanni et al., 2021; Righetti, 2021); this is especially relevant given that this increase did not happen over more connotated hashtags, such as #freevax, #vaccinated, or #vaccineskill, but on the more general #vaccini (#vaccines). While semantic shifts in hashtag use do happen (La Rocca & Boccia Artieri, 2023), in this case the volume and the changes in the conversation point at the politicization (and mediatization) of the issue, rather than broader changes in meaning. Previous research focused on the ways in which the Decree structurally altered the structure of the debate, based on changes in hashtags employed (Carugno & Radicioni, 2018), in the sources shared by users (Lovari et al., 2021; Righetti 2021), and in the sentiment surrounding vaccination (Cristadoro e Arcostanzo, 2017; Di Giovanni et al., 2021).

This research contributes to the debate around vaccines, political events, and public opinion in Italy, in two ways. Firstly, by providing a longitudinal look at how the conversation around vaccines on Twitter has been structured across different hashtags (or fields, Airoldi, 2018; Caliendo, 2018). Ten years of data point at an increase in the conversation around vaccines on Twitter, significantly peaking in the buildup to the legislative act. It confirms the reactivity of the conversation to events not only based on popularity, but on the morphology of the field(s) as well. Different hashtags gain or lose prominence following the decree, and not only their individual rise and fall in usage, but their variations in relation to other hashtags are indicative of broader changes of opinion (Di Giovanni et al., 2021). The second contribution pertains the content of the conversation unfolding within single hashtags. This has been the case for #vaccini, affected by the decree; this led to the hashtag being increasingly deployed by users following a political frame at the expense of a health one; similarly, following the decree, the general sentiment about vaccination within the hashtag changes as well.

Overall, the decree concurred to affect sentiment on vaccination, exacerbating hesitant and sceptical positions and leading to the politicization of

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the issue on social media. This happened not only when considering opinions and their spread, but also regarding how hashtags are used, pointing at a complex mesh of social and technical factors.

Changes in the hashtags used, their distribution over time, the frames employed, and the sentiment, hint at the complex and layered ways in which events affect conversation and public opinion on social media. While an event, such as the decree, impacts the conversation within a single platform, it is tied to even broader structural changes in the field(s), concerning the ecology of mainstream media, alternative media, and sources employed in the conversation (Lovari et al., 2021; Righetti 2021). Platform dynamics might, as in this case, entrench hesitant positions that would not have risen without the politicization of the issue (Carugno & Radicioni, 2018), meshing with the more horizontal structure linked to the spread vaccine-hesitant information. This underlines the complexity of politicizing health-related issues. The decree led to a restructuring of the digital fields in which the conversation around vaccines took place, amplifying the reach of vaccine-hesitant positions, sources, and media. Overall, the impact of events on the conversation and public opinion is complex; the possibilities of unpredicted effects should be considered in depth, especially when considering sensitive topics such as health policies.

## REFERENCES

- AIROLDI, M. (2018). Ethnography and the digital fields of social media. *International Journal of Social Research Methodology*, 21(6), 661–673. <https://doi.org/10.1080/13645579.2018.1465622>
- BETSCH, C., BREWER, N. T., BROCARD, P., DAVIES, P., GAISSMAIER, W., HAASE, N., LEASK, J., RENKEWITZ, F., RENNER, B., REYNA, V. F., ROSSMANN, C., SACHSE, K., SCHACHINGER, A., SIEGRIST, M., & STRYK, M. (2012). Opportunities and challenges of Web 2.0 for vaccination decisions. *Vaccine*, 30(25), 3727–3733. <https://doi.org/10.1016/j.vaccine.2012.02.025>
- BOCCIA ARTIERI, G., & GRECO, F. (2021a). Lockdown and breakdown in Italians' reactions on Twitter during the first phase of Covid-19. *Partecipazione e conflitto*, 14(1), 261–282.
- BOCCIA ARTIERI, G., GRECO, F., & LA ROCCA, G. (2021b). The construction of the meanings of #coronavirus on Twitter: An analysis of the initial reactions of the Italian people. *International Review of Sociology*, 31(2), 287–309. <https://doi.org/10.1080/03906701.2021.1947950>
-



- BORELLA. (2017). *Reazioni Avverse*. Reazioni Avverse.  
<http://www.report.rai.it/dl/Report/puntata/ContentItem-3130cc7a-9973-49e5->
- BOYD, D., GOLDER, S., & LOTAN, G. (2010). Tweet, Tweet, Retweet: Conversational Aspects of Retweeting on Twitter. *2010 43rd Hawaii International Conference on System Sciences*, 1–10.  
<https://doi.org/10.1109/HICSS.2010.412>
- BUTTER, M., & KNIGHT, P. (2023). *Covid Conspiracy Theories in Global Perspective*. Taylor & Francis.  
<https://doi.org/10.4324/9781003330769>
- CALIANDRO, A. (2018). Digital Methods for Ethnography: Analytical Concepts for Ethnographers Exploring Social Media Environments. *Journal of Contemporary Ethnography*, 47(5), 551–578. <https://doi.org/10.1177/0891241617702960>
- CALIANDRO, A., ANSELMINI, G., & STURIALE, V. (2020). Fake news, Covid-19 e Infodemia: Un esempio di ricerca sociale in real-time su Twitter. *Mediascapes journal*, 15(15).
- CALIANDRO, A., & GANDINI, A. (2016). *Qualitative Research in Digital Environments: A Research Toolkit* (0 ed.). Routledge.  
<https://doi.org/10.4324/9781315642161>
- CARUGNO, C. & RADICIONI, T. (2018). Echo Chambers e Polarizzazione. Uno sguardo critico sulla diffusione dell'informazione nei social network. *The Lab's Quarterly* 20 (4), 2018.
- COMUNELLO, F., MULARGIA, S., & PARISI, L. (2017). «Non guardarmi, non ti sento». Processi di sense giving nella controversia sui vaccini infantili tra gli utenti di Facebook. *Problemi dell'informazione*, 3, 431–458. <https://doi.org/10.1445/88099>
- CRISTADORO, A., & ARCOSTANZO, F. (2017). Obbligo vaccinale: Sentiment e opinioni degli italiani su Twitter. *Problemi dell'informazione*, 3, 555–557. <https://doi.org/10.1445/88108>
- DI GIOVANNI, M., CORTI, L., PAVANETTO, S., PIERRI, F., TOCCHETTI, A., & BRAMBILLA, M. G. (2021). A content-based approach for the analysis and classification of vaccine-related stances on Twitter: the Italian scenario. In *Workshop Proceedings of the 15th International AAAI Conference on Web and Social Media* (pp. 1–6).
- GARZONIO, E., & NUVOLI, K. (2022). Covid-19, la «dittatura sanitaria». Uno studio comparativo della narrazione antivaccinista in Italia e Francia. *Problemi dell'informazione*, 3, 383–405.  
<https://doi.org/10.1445/105775>
-

- GESUALDO, F., PARISI, L., CROCI, I., COMUNELLO, F., PARENTE, A., RUSSO, L., CAMPAGNA, I., LANFRANCHI, B., ROTA, M. C., FILIA, A., TOZZI, A. E., & RIZZO, C. (2022). How the Italian Twitter Conversation on Vaccines Changed During the First Phase of the Pandemic: A Mixed-Method Analysis. *Frontiers in Public Health, 10*, 824465. <https://doi.org/10.3389/fpubh.2022.824465>
- GORI, D., DURAZZI, F., MONTALTI, M., DI VALERIO, Z., RENO, C., FANTINI, M. P., & REMONDINI, D. (2021). Mis-tweeting communication: A Vaccine Hesitancy analysis among twitter users in Italy. *Acta Bio Medica : Atenei Parmensis, 92*(Suppl 6), e2021416. <https://doi.org/10.23750/abm.v92iS6.12251>
- GRANT, L., HAUSMAN, B. L., CASHION, M., LUCCHESI, N., PATEL, K., & ROBERTS, J. (2015). Vaccination Persuasion Online: A Qualitative Study of Two Provacine and Two Vaccine-Skeptical Websites. *Journal of Medical Internet Research, 17*(5), e4153. <https://doi.org/10.2196/jmir.4153>
- HALAVAIS, A. (2014). Structure of Twitter: Social and technical. *Twitter and society, 29-42*.
- IL FATTO QUOTIDIANO. (2013, November 20). *Bimbo autistico dopo vaccino obbligatorio, ma ministero Salute rifiuta indennizzo*. Il Fatto Quotidiano. <http://www.ilfattoquotidiano.it/2013/11/20/bimbo-autistico-dopo-vaccini-obbligatori-ma-ministero-della-salute-rifiuta-indennizzo/779505/>
- IL FATTO QUOTIDIANO. (2016, May 16). *Virus, Red Ronnie: 'Demenziale vaccinare i bambini'. Il medico: 'Sproloquio intollerabile in tv pubblica'*. Il Fatto Quotidiano. <http://www.ilfattoquotidiano.it/2016/05/16/virus-red-ronnie-demenziale-vaccinare-i-bambini-il-medico-sproloquio-intollerabile-in-tv-pubblica/2735211/>
- KANG, G. J., EWING-NELSON, S. R., MACKEY, L., SCHLITT, J. T., MARATHE, A., ABBAS, K. M., & SWARUP, S. (2017). Semantic network analysis of vaccine sentiment in online social media. *Vaccine, 35*(29), 3621–3638. <https://doi.org/10.1016/j.vaccine.2017.05.052>
- LARSON, H. J., JARRETT, C., ECKERSBERGER, E., SMITH, D. M. D., & PATERSON, P. (2014). Understanding vaccine hesitancy around vaccines and vaccination from a global perspective: A systematic review of published literature, 2007–2012. *Vaccine, 32*(19), 2150–2159. <https://doi.org/10.1016/j.vaccine.2014.01.081>
-

- LOVARI, A., MARTINO, V., & RIGHETTI, N. (2021). Blurred shots: Investigating the information crisis around vaccination in Italy. *American Behavioral Scientist*, 65(2), 351-370;
- MA, J., & STAHL, L. (2017). A multimodal critical discourse analysis of anti-vaccination information on Facebook. *Library & Information Science Research*, 39, 303–310.  
<https://doi.org/10.1016/j.lisr.2017.11.005>
- MARRES, N. (2015). Why map issues? On controversy analysis as a digital method. *Science, Technology, & Human Values*, 40(5), 655-686.
- MARRES, N., & MOATS, D. (2015). Mapping controversies with social media: The case for symmetry. *Social Media+ Society*, 1(2), 2056305115604176
- MINISTERO DELLA SALUTE. (2017). *Il Ddl Lorenzin è legge. Via libera definitivo dal Senato.*  
[https://www.salute.gov.it/portale/news/p3\\_2\\_1\\_1\\_1.jsp?menu=notizie&id=3237](https://www.salute.gov.it/portale/news/p3_2_1_1_1.jsp?menu=notizie&id=3237)
- RAI NEWS. (2017, May 11). *Quando per andare a scuola bisognava vaccinarsi. Una storia legislativa travagliata.* Rai News.  
<https://www.rainews.it/dl/rainews/articoli/Legge-Quando-i-vaccini-erano-obbligatori-dal-1967-al-1999-f3816402-6b5e-4365-bce6-73b3674c11d1.html>
- RIGHETTI, N. (2021). The impact of the politicization of health on online misinformation and quality information on vaccines. *Italian Sociological Review*, 11(2), 443-466.
- ROGERS, R. (2015). *Digital methods* (First paperback edition). The MIT Press.
- SALATHÉ, M., & KHANDELWAL, S. (2011). Assessing Vaccination Sentiments with Online Social Media: Implications for Infectious Disease Dynamics and Control. *PLOS Computational Biology*, 7(10), e1002199. <https://doi.org/10.1371/journal.pcbi.1002199>
- SALMASO, S. (2017). *Copertura Vaccinale In Italia: Dati Epidemiologici E Politiche Vaccinali.*
- SMITH, N., & GRAHAM, T. (2019). Mapping the anti-vaccination movement on Facebook. *Information, Communication & Society*, 22(9), 1310–1327.  
<https://doi.org/10.1080/1369118X.2017.1418406>
- TAVOSCHI, L., QUATTRONE, F., D'ANDREA, E., DUCANGE, P., VABANESI, M., MARCELLONI, F., & LOPALCO, P. L. (2020). Twitter as a sentinel tool to monitor public opinion on vaccination: An opinion mining analysis from September 2016 to August 2017 in
-

Italy. *Human Vaccines & Immunotherapeutics*, 16(5), 1062–1069.  
<https://doi.org/10.1080/21645515.2020.1714311>

WOLFE, R. M. (2002). Anti-vaccinationists past and present. *BMJ*, 325(7361), 430–432. <https://doi.org/10.1136/bmj.325.7361.430>