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THE COMMUNICATION ON THE ISSUE OF COVID-19 VACCINATION ON THE SOCIAL MEDIA PLATFORMS

AN ANALYSIS OF THE 99 ITALIAN LOCAL HEALTH UNITS

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The communication on the issue of COVID-19 vaccination on the social media platforms: an analysis of the 99 Italian Local Health Units

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CONTENTS

Introduction

In the last millennium, humanity has repeatedly faced the pandemic problem. Plague, leprosy, smallpox, cholera, Spanish flu claimed hundreds of thousands and often millions of lives of various continents' inhabitants. For many centuries, people have found ways to defeat various pandemics, but not to eradicate them. The situation was changed a little more than forty years ago, when on December 9, 1979, the Global Commission for the Certification of Smallpox Eradication declared that "smallpox has been eradicated from the world" [1]. This has been achieved thanks to a total vaccination.

In the 21st century we have encountered a new fast-moving deadly virus COVID-19, and the World Health Organization (WHO) recalled us that the annihilation of smallpox is a reminder of the capacity of the international health cooperation to attain significant and lasting results. "Together in solidarity, we can beat Covid-19" [1], and a COVID-19 vaccine represents an extraordinary opportunity to do it.

In Italy, the first cases of virus COVID-19 (coronavirus) were registered in January 2020. Then, the virus rapidly spread across the country, and as result Italy turned out to be one of the most affected countries worldwide in terms of the number of cases from coronavirus: as of October 14, 2021, Italy recorded 4.7 million cases of coronavirus. Along with it, how authorities said, in autumn 2021 Italy reached one of the highest vaccination rates in Europe. In October 2021 fully vaccinated Italians were more than 82 percent of population aged over 12.

Such high results were reached by a large-scale vaccination campaign conducted throughout the country by all available means. One of the most important means for dissemination of information about the coronavirus and

COVID vaccination is Internet, especially social networks. For this reason, we have decided to conduct research on the communication of the COVID-19 vaccination on the official pages of Italian ASLs (Azienda Sanitaria Locale – Local Health Unit) represented in social media. A similar study was carried out in September-October 2018 by B. Sc. Jeffrey Fulgencio for his master's thesis at MaCSIS in the pre-COVIS-19 era.

The present research was performed in September-November 2021, and it includes two different studies:

- Study 1 is new research devoted to the quantitative analysis of the presence of 99 Italian ASLs on the social media platforms such as Facebook, Instagram, Twitter, LinkedIn, and YouTube,
- Study 2 is quantitative and qualitative analysis of latest 50 posts of ASL accounts in Instagram.

Both studies were conducted by M. Sc. Olga Panchenkova Cristiani, a student of *Master MaCSIS* at *University of Milano BICOCCA* during her stage at *The Mario Negri Institute for Pharmacological Research* (Istituto di Ricerche Farmacologiche Mario Negri) under supervision of PhD Eugenio Santoro, head of Laboratory of Medical Informatics, Department of Public Health.

"Communications in a public health crisis
are as crucial as medical intervention . . .
in fact, communications policies
ARE a medical intervention."
(Heidi Tworek. Twitter thread)

Chapter 1

1.1 Research and social media in the COVID-19 pandemic time

Since the coronavirus become our daily reality, a huge number of various scientists have been investigating the causes, course, and consequences of this disease. During 2020-2021, hundreds of thousands of studies were dedicated to research of coronavirus problem and related topics. Consequently, "research into COVID-19 and related conditions now represents 23% of all research output" [2]. This is evidenced of the incredible growth in the number of scientific publications. So, on November 20, 2021, in the section of Global literature on coronavirus disease of the WHO COVID-19 database there were 410.287 articles [3]. These figures indicate a phenomenal increase in the interest of the scientific community in the problems associated with one disease.

The other phenomenon we encountered during the corona crisis is an oversaturation of social networks with the coronavirus context. In general, "social media, online social networks and apps… are changing the way we communicate" [4]. During the COVID-19 pandemic, when millions of people around the world found themselves in conditions of widespread lockdowns, social networks have been an important source of information and communication. Therefore, people's use of social networks has increased significantly. Being at

home they spent much more time on social media to look for the news and the necessary information about coronavirus. However, along with a fact that the biggest COVID-19 communication unfolded in internet community, very often the most popular media platforms turned out to be the main source of rumors, fake news, and misinformation.

According to a study by the NGO Avaaz, the ten sites that propagated the most hoaxes in some months had four times as many views as the ten best official web pages, such as that of the WHO. For example, Facebook, the largest social network both in the world and in Italy, was named "a cradle of hoaxes", because last year it was seen spreading publications misinforming about health, including coronavirus 3,8 billion times [5].

However, the problem of social media in the COVID-19 pandemic time is not only in misinformation. The global social networks influence attitude and often have a big effect on the behavior of their users of whom there are about four billion today.

Misinformation Revue by scientists from Harvard Kennedy School (HSK) investigating the role of news and social media in the issue of COVID-19 misperceptions, shows "that preventative measures are more encouraged and covered on traditional news media, while misinformation appears more frequently on Twitter" [6]. Also, this research demonstrates that the news consumers from media are associated with more social distancing and fewer misperceptions about coronavirus, while social media, notably Twitter users, have more misperceptions and don't want to keep a social distance.

In 2020, as stated by the World Health Organization "the 2019-nCoV outbreak and response has been accompanied by a massive 'infodemic'– an over-abundance of information – some accurate and some not – that makes it hard for people to find trustworthy sources and reliable guidance" [7].

A real "war" of myths, propaganda, misinformation and outright lies unfolded in the Internet community after the invention of the first COVID-19

vaccines. In a heated debate about the usefulness and harmfulness of vaccination, not only ordinary users and influencers were involved, but also pharmaceutical vaccine manufacturers, some European media and even governments of such big powers as the United States, Russia, and China [8].

Despite the virality of fake news and misinformation publication, social networks are one from important places for open communication of health care organizations with the population of their regions. In the case of health emergency, many people need trustful information and clear navigation of their actions both in case of disease and in case of vaccination. That's why the WHO, European Centre for Disease Prevention and Control (ESDPC), official medical institutions, and a lot of academic journals have been regularly posting pandemic guidance on their social media accounts. Moreover, posts and photos on the official pages of health care organizations on the Internet, demonstrating happy faces of newly vaccinated teenagers, pensioners, pregnant women, people of different ages and professions, celebrities, and neighbors, have been forming positive attitude and approval of vaccination among the broad masses of social networks users. "It is time for Europe and Italy to adopt appropriate guidelines for the use of the new media in health communication" [9], and we can already observe the first serious steps in this direction. This is evidenced by an October 2020 report, which states that "key components for successful national and EU-level Covid-19 vaccine deployment include monitoring of vaccine acceptability, behavioral research and communications plans" [10].

Understanding the significant role of social networks in the fight against coronavirus and taking into account the high COVID vaccination rates in Italy (at the end of 2021), we have decided to conduct our research analyzing the presence of the Italian ASLs on the leading social media platform and checking the availability of coronavirus and COVID-19 vaccination information on their Instagram pages.

1.2 Social media and Instagram in Italy

Before describing several details about the characteristics of an individual social network and their users, it is important to know some general data:

- about 58% of Italians use social networks (35 million),
- the average time spent on social media is 2 hours a day,
- 98% of users access social media from smartphones.

In 2020 Facebook was the social media platform with the largest number of users in Italy, totaling of 36.9 million. Instagram follows with 27.7 million users, and LinkedIn ranks third with 18.6 million users [11].

It is mainly young people who spend more time a day on social media, however, some of the networks are very popular even among the older generation (and yes, even among pensioners).

Currently, users spend an average of 53 minutes a day on Instagram. In addition, there are 500 million users who publish "Stories" every day. Instagram is still very popular among users aged 35 to 54. Users are inclined to follow their favorite business profiles. Among the total users of this social network, 50% follow at least one company profile. Many companies have discovered the potential of influencers and collaborate with them on Instagram, and as the results of our study show, ASL communication with the population on Instagram increased 5,7 times in last three years. It is the highest value among five studied social media platforms (Facebook, Instagram, Twitter, LinkedIn, and YouTube).

Chapter 2

Research

2.1 Objectives of research

The idea of our research was to create a panorama of presence of all Italian ASLs on the most popular media platforms in 2021. Then, we wanted to compare the data of the previous study of 2018 with the data collected in 2021. After that, we chose one of studied social media platforms (Instagram) for a qualitative and quantitative analysis of information about COVID-19 and COVID-19 vaccination in the latest 50 posts.

The objectives of this study were:

1. to collect information about accessibility and activity of the accounts of 99 Italian ASLs in Facebook, Instagram, Twitter, LinkedIn, and YouTube,
2. to compare the data obtained in 2021 with the results of the research conducted in 2018 in order to measure how Covid-19 has potentially affected the ASL's presence on the most relevant social media platforms,
3. to analyze the fifty latest posts of the active ASL public pages in Instagram to identify how many of them were related to the communication of coronavirus and COVID vaccination.

2.2 Method

2.2.1 Research method of Study 1

The Study 1 is a quantitative analysis about active official public pages of all Italian ASLs hosted on the following social media platforms: Facebook, Instagram, Twitter, LinkedIn, and YouTube. All data of this study were collected between 5 September and 5 October 2021.

To start with, we took a list of existing ASLs (Elenco Aziende Sanitarie Locali - ASL, anni 2010-2021) from the website of Italian Ministry of Health [12]. In September 2021, there were 99 ASLs on this list. From this we extracted the following data: Year (year of study), Code of region, Name of region, Code of ASL, Name of ASL, Address, Postcode, Town, Province, Telephone, FAX, E-mail, Website (official page of every ASL in Internet). This data has been used to create an Excel table (Tab.1 in appendix 1).

Other 39 columns have been added in the Excel table including the following parameters collected from the five social networks:

- FACEBOOK Active / URL /Followers / Registration / Last activity,
- INSTAGRAM / Active / URL / Followers / Post / Profiles followed / Registration / Last activity,
- LINKEDIN / URL / Active / Followers,
- TWITTER / Active / URL / Followers / Following / Lists / Moments / Tweets / Registration / Last activity,
- YOUTUBE / Active / URL / Subscribers / Playlist / Video / Views / Registration / Last activity.

As 'Active' accounts we considered the pages where activity has been observed at least during the last year, i.e., from September 2020 to September 2021. The 'Last activity' means the date of publication of the last post or video.

The presence or absence of a profile on the social media platform was verified by checking the "social media search bars", on the web page of each of the ASL examined. If the official ASL web site didn't have the "social buttons", we checked manually in the search engine of each social media the name of the ASLs to verify the existence of its profile/page. Each profile has been accessed for each ASL and for each social media platform when it was available, and its data used to update the Excel table.

2.2.2 Research method of Study 2

For the analyses of the posts related to the communication of coronavirus and Covid-19 vaccination, we decided to use those published on Instagram. This choice is based on the following reasons:

1. After reviewing the data of the data of the Study 1 we discovered that all Italian ASLs increased their presence on Instagram by 3,7 times.
2. Instagram is the second of the most used social media in Italy.
3. Instagram is a social media platform that has been studied less frequently than Facebook and Twitter in health communication research.

We have conducted the second study between 15 October and 15 November 2021.

For this study, we used some of the results of Study 1. As of 15 October 2021, we found 43 active official Instagram profiles of ASLs. Thirty-two of them have been identified for our study because they had more than 50 posts published. Each of the 50 posts coming from the 32 Instagram profiles (for a total of 1.600 posts) have been accessed, read, analyzed, and classified by topic. Three categories have been used: 'CoVax' (information about COVID-19 vaccination), 'COVID' (general or particular information about COVID-19 different from vaccination), and 'Other' (other topics not related to coronavirus). The posts have also been classifying for type of media used to create them as follow: 1 – Imagine, 2 – Video, 3 – Infographics, 4 – Text 9 (Tab.2 in appendix 1).

Data collected in this step has been stored in a second Excel table consisting of 9 columns and including Region code, Name region, Code company, Post code (a number from 1 to 50), URL, Date (date of publication), Design (type of 1, 2, 3 or 4), Topic of post (CoVax, COVID, Other), Followers (number of followers of each ASL page).

Chapter 3

Results

3.1 Obtained data of Study 1

The processing of the received data was carried out using R software.

3.1.1 Presented and active ASL pages on social networks

In October 2021, the representation of 99 Italian ASLs on the leading social media platforms was as follows: 83% of all ASLs had open official accounts on Facebook, 72% – on YouTube, 51% – on Instagram, 48% – on Twitter, and 38% – on LinkedIn (Fig. 1).

Active network accounts (pages, where communication has taken place over the past year) accounted for a smaller percentage of open ones: 80% – on Facebook, 56% – on YouTube, 43% – on Instagram, 35% – on Twitter, and 11% – on LinkedIn (Fig. 2).

Fig.1

Official ASLs pages presented in social media

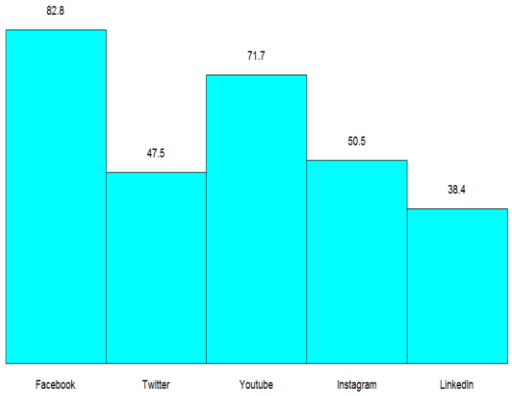
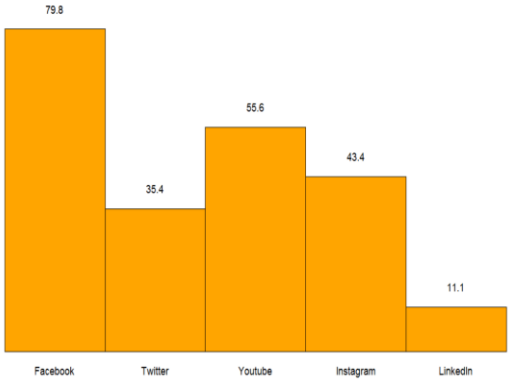


Fig.2

Official ASLs pages active in social media



If we look at the social media activity of Italian ASLs depending on their geographical location, we can see a difference in the usage of social networks among the Northern, Central, Southern, and insular parts of Italy. The greatest communication activity is made by central ASLs, followed by northern, and by southern and islands (Fig. 3,4,5).

Focusing on active profiles, it is noteworthy that Facebook is the number one media platform for mass communication throughout Italy with 79% of northern ASLs, 88% of central ASLs, and 77% of southern and islands ASLs activating Facebook pages. YouTube ranks second in terms of usage in northern and central Italy (69%). Instagram has the same intensity of usage with YouTube in central Italy (69%), it ranks second in the South and on the islands (40%), and fourth in the North of Italy (38%). About half of the central and northern ASLs use Twitter (56% on Central and 42% on North of Italy). However, in the South and on islands of Italy, ASLs use this media platform to a much lesser extent (17%). LinkedIn is considered the least popular social network for ASLs in all Italian. It is used 19% by northern ASLs, 6% by central ASLs and only 3% by south and island ASLs.

Fig.3

Northern ASLs active in social media

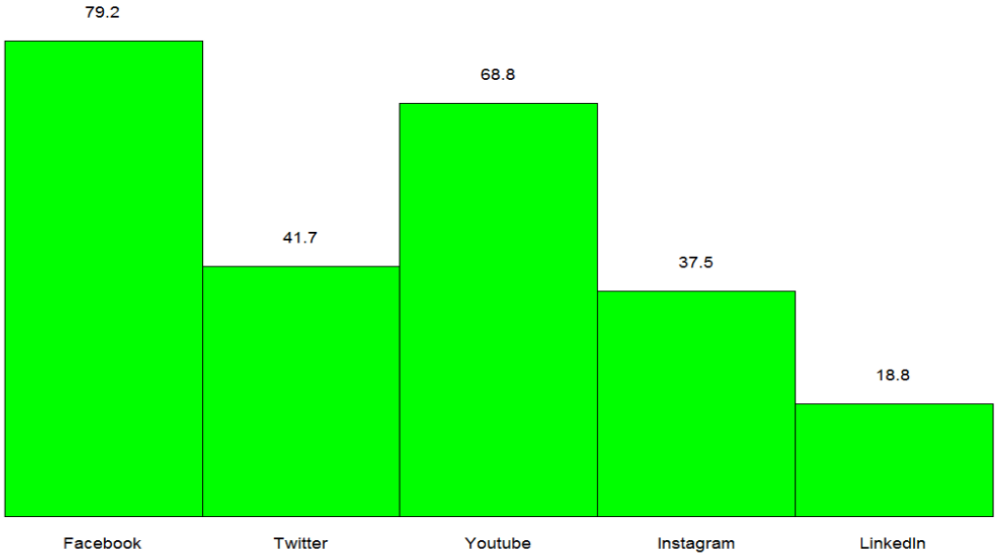


Fig.4

Central ASLs active in social media

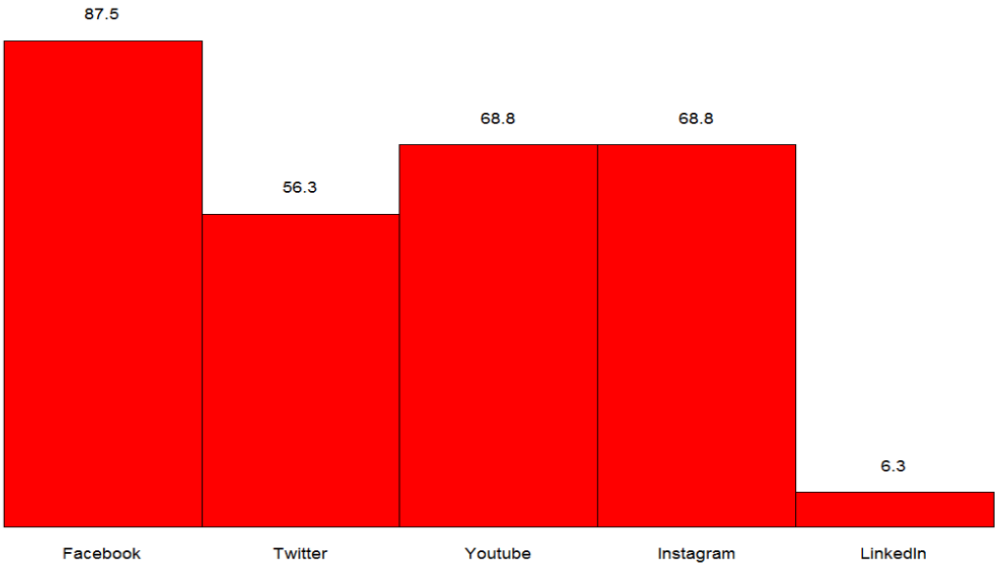
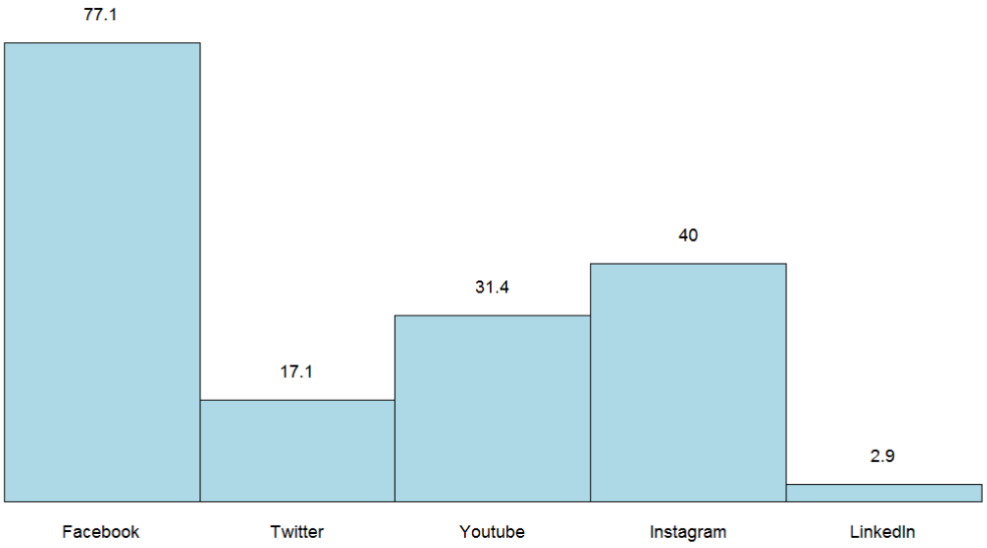


Fig.5

South and island ASLs active in social media

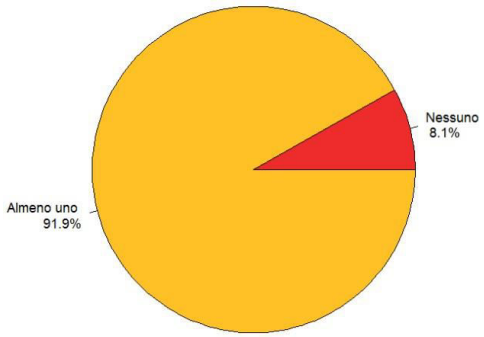


3.1.2 Number of social media platforms used by Italian ASLs

At the end of 2021, 92% of ASLs have at least one active social media platform, while other 8% of them have no activity on the leading social media (Fig. 6).

Fig.6

Usage of at least one active social network

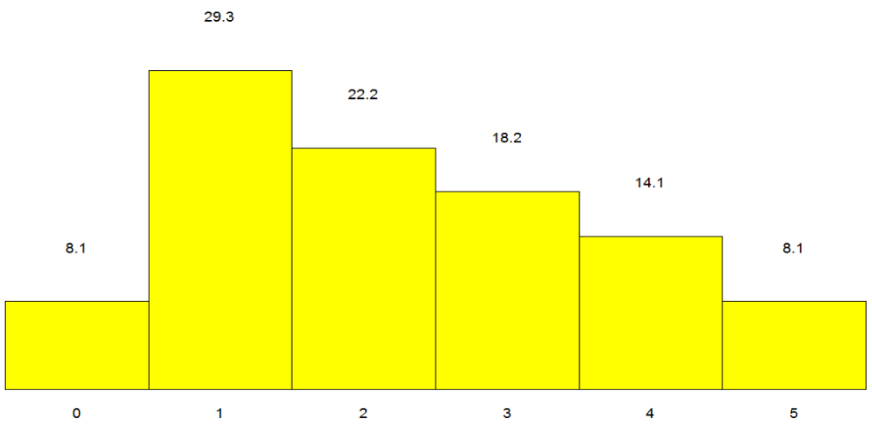


The total number of active profiles is 223, with an average number of profiles by ASL of 2,45.

In addition, 30% of all Italian ASLs communicate on one active social media platform, 22% – on two, 18% – on three, 14% – on four, and 8% – on five of them (Fig. 7).

Fig.7

Number of social media profiles x ASLs



There are some differences among the use of active social media platforms by geographic aria. These differences are illustrated in the following figures (Fig. 8 – 10):

Fig. 8

North (n=48)
Number of social networks used

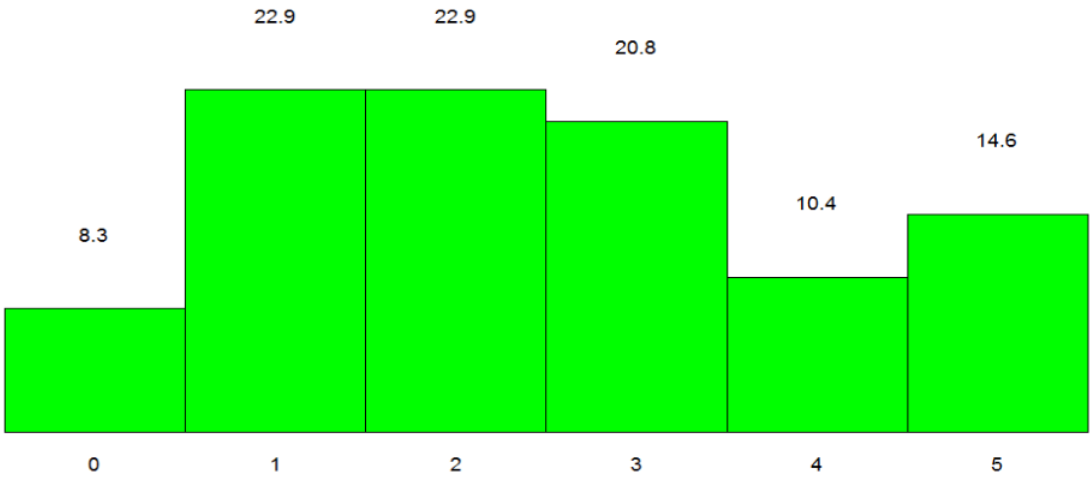


Fig. 9

Center (n=16)
Number of social networks used

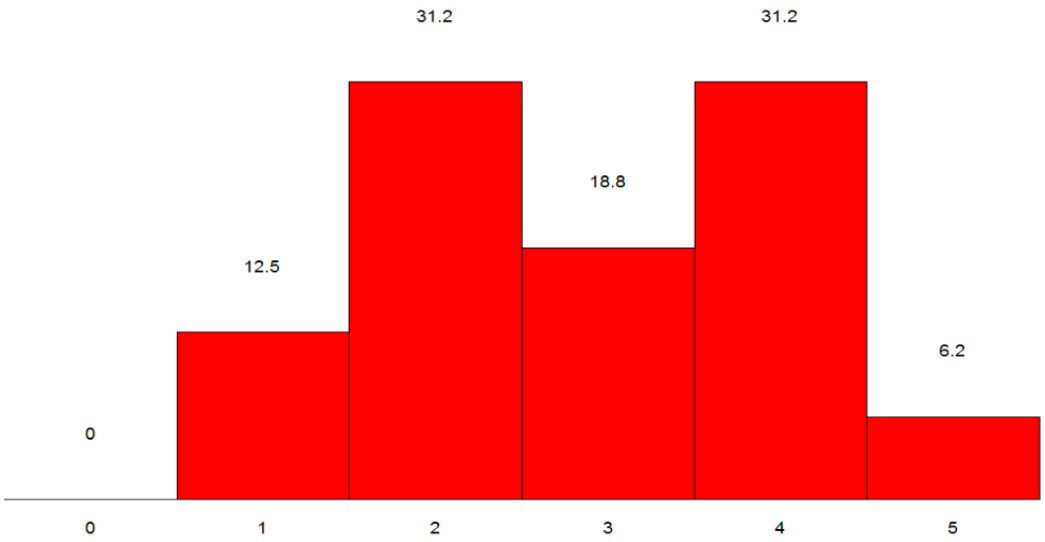
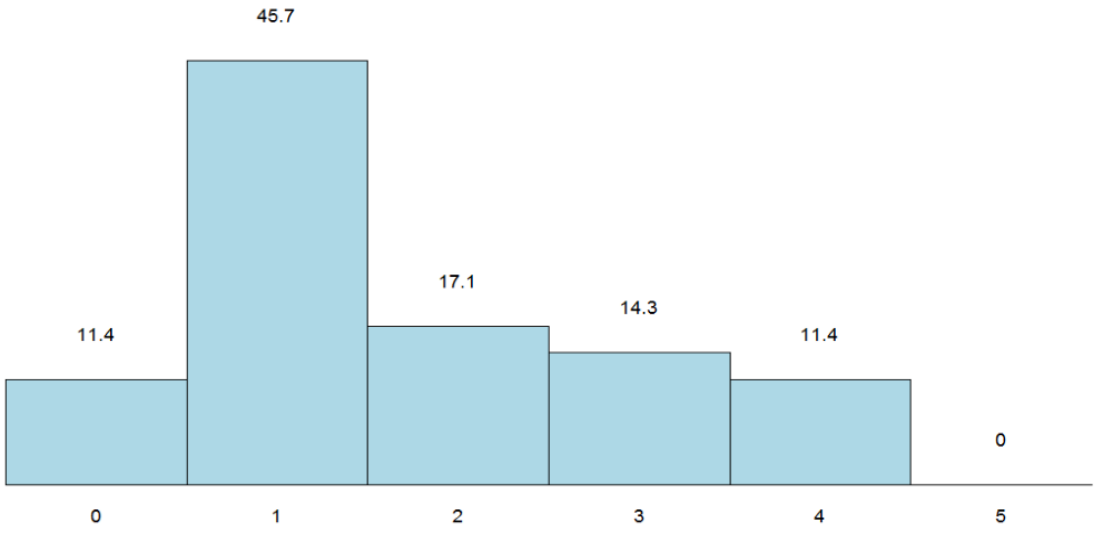


Fig. 10

South and Islands (n=35)
Number of social networks used



The largest number of ASLs communicating with the population on all five platforms (Facebook, Instagram, YouTube, Twitter, and LinkedIn) are located in the northern part of Italy (15%). Twenty-three percent of all ASLs in this area use one social network, 23% – two, 21% – three, and 11% – four of them.

Central ASLs of the country occupy a leading position in communication in social networks. All of them use actively at least one social media platform among Facebook, Instagram, YouTube, Twitter, and LinkedIn, while more than 30% of them use two or four social networks.

In the South and islands things are different. No ASL is actively present on all five media platforms, and 11% of them have no active pages on Facebook, Instagram, YouTube, Twitter, or LinkedIn. About half of the ASLs (46%) communicate only on one social media platform, 17% on two, 14% on three, and 11% on four.

3.1.3 Number of published tweets, YouTube videos and Instagram posts

Determining the total number of published posts on every account is allowed only on Twitter, YouTube, and Instagram. We used the collected data of Study 1 to count average values, median values, and the range of ASL publiched posts on these three platforms.

The average values of video/post published on these platforms are as follow:

- 2.806 tweets on Twitter,
- 124 videos on YouTube,
- 370 posts on Instagram.

Median values of video/post published are as follow:

- 841 tweets on Twitter,
- 92 videos on YouTube,
- 260 posts on Instagram.

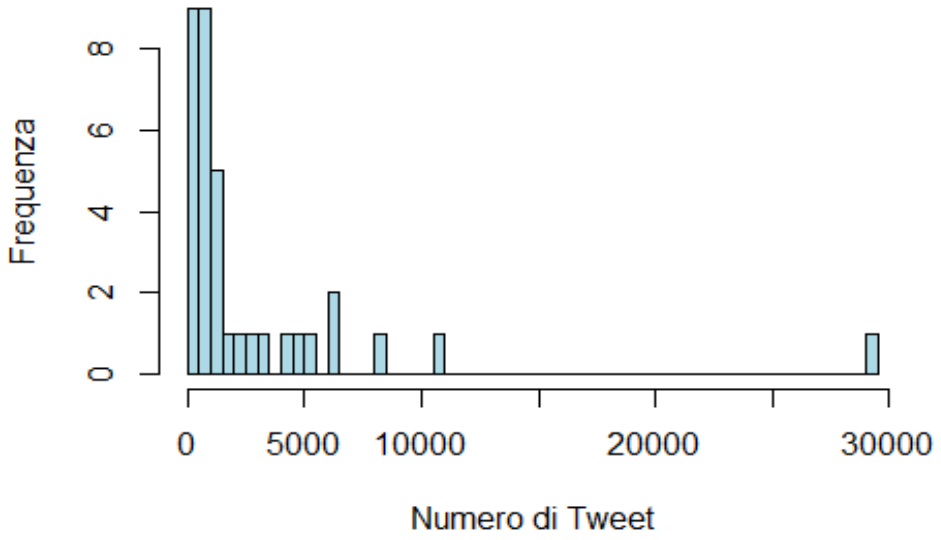
The range values of video/post published are as follow:

- from 1 to 29.500 tweets on Twitter,
- from 6 to 563 videos on YouTube,
- from 2 to 2082 posts on Instagram.

Frequency of distribution of ASL publications on Twitter presented in Figure 11 is very large (Fig. 11). It can be seen, that in general ASLs have published 2-6 thousand tweets. Along with that, there are 1-2 ASLs which have posted only 2-10 tweets and at the same time one ASL has posted about 30.000 tweets.

Fig.11

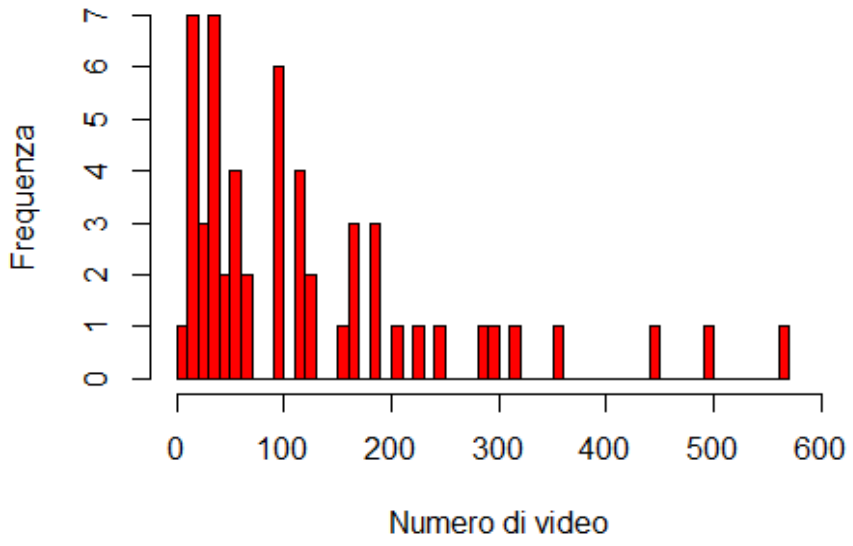
Frequency of distribution of tweets



The graph of the frequency of video publications in YouTube display that most of ASLs posted from 6 to 200 videos on their channels (Fig. 12). A much smaller number of them have published about 300 videos and a few ASLs communicate actively on their official YouTube channels, posting from 450 to 563 videos.

Fig.12

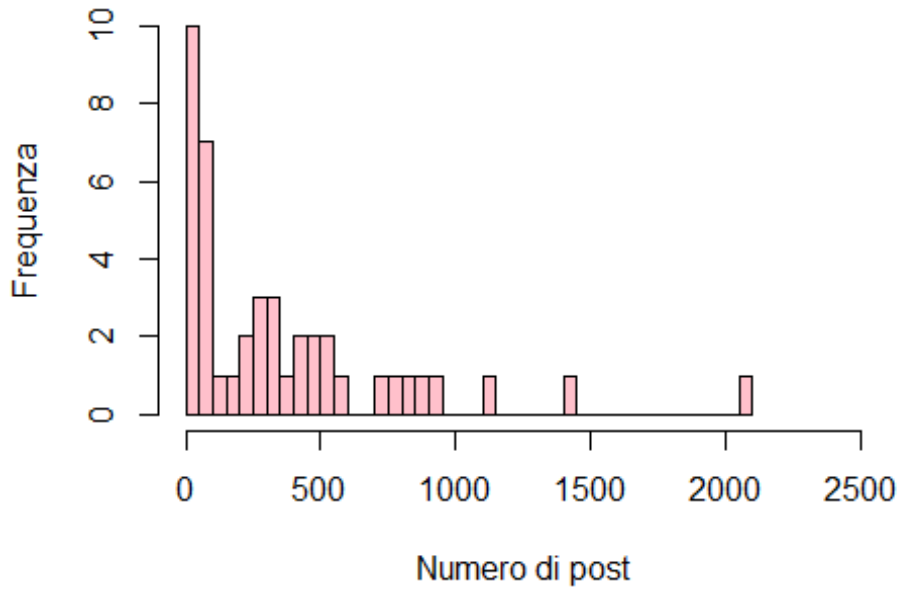
Frequency distribution of video in YouTube



Instagram data of 2021 shows the highest intensity of ASLs' posts. On most official ASLs pages we can find from 100 to 1000 posts (Fig. 13). Alongside this, ten ASL's pages have the minimum number of posts and only one of them has published more than 2000 posts.

Fig.13

Frequency of distribution of posts in Instagram

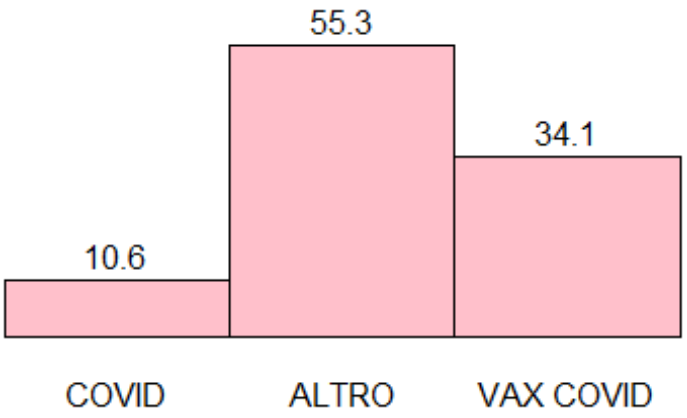


3.2 Obtained data of Study 2

The sample of Study 2 consisted of latest 50 posts which we analyzed on 32 official ASLs pages. Conducting a qualitative study of these publications we divided all the posts into three topic groups: COVID, Vax COVID, and Other. The figure 14 shows that the information about COVID and COVID-19 vaccination take almost half of all ASL's communication in Instagram. Moreover, 34% of all ASL's Instagram posts link with the argument of COVID-19 vaccination and 11% with the general information about COVID-19 (Fig. 14).

Fig.14

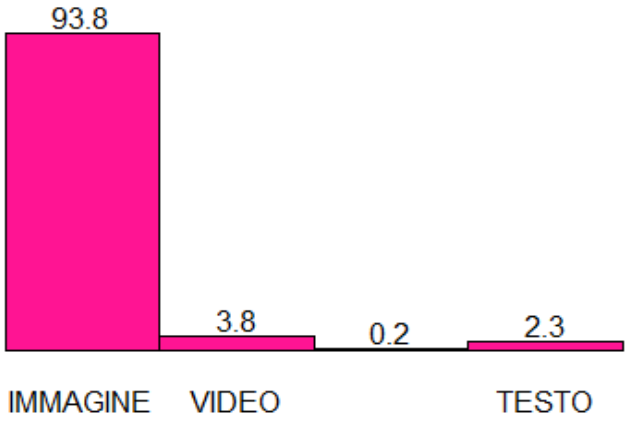
Topic of posts



Also, as part of Study 2 was to notice the types of Instagram posts such as imagine, video, infographics, and text (Fig. 15). It needs to be said, majority active ASLs understand the specifics of providing information on this platform and therefore 94% of their posts are imagines and 4% publish video. Though few ASLs choose for communication text messages (2%), that a priori is ineffective. Instagram is a visual platform, and the best way of communication is to post imagines and shorts video.

Fig.15

Types of posts



Discussion

One of the objectives of our research was the comparison of 2018 and 2021 research data.

According to the data of 2018, 62% of ASLs had an active account on at least on social media platform. In three years, this value has increased by 30% in absolute terms and at the end of 2021 amounted to 92%.

The social media preferences of ASLs, indicated in the following table (Fig. 16), show the percentage of the presence of active ASL pages on all five social media platforms:

Fig.16

Presence of active ASLs pages on social networks

	2018	%	2021	%
1	Facebook	47	Facebook	80
2	YouTube	38	YouTube	56
3	Twitter	33	Instagram	43
4	LinkedIn	11	Twitter	36
5	Instagram	9	LinkedIn	11

The comparison of data in this table demonstrates that the range of social networks has undergone some changes. From 2018 to 2021 Facebook and YouTube saved their first and second leader positions. Twitter and LinkedIn lost one point each and went down from the third place to the fourth (Twitter) and from the fourth place to the fifth (LinkedIn). Instagram, on the contrary, came

from the last place in terms of usage in the third place and entered the top three preference networks of ASLs.

Four in five social media platforms have increased their presence in communication strategies of Italian ASLs. The usage of Facebook grew up by 33%, YouTube – by 18%, Twitter – by 3%. LinkedIn is used on the same level as three years ego. The interesting fact is that ASLs increased the use of Instagram significantly, almost four times, in total from 9 to 34 percent.

The total number of active profiles in 2018 was 143, with an average number of profiles by ASLs of 2,3. In 2021 they were 223 and 2,45 respectively, indicating there was no increase on average number of profiles.

Other comparison of the results of 2018 and 2021 studies are related to the percentage of active ASL profiles on the different social media platforms by geographical area. The table below illustrates the data about the presence of active ASL accounts on the five studied social media platforms in North, Central, South and island parts of Italy (Fig. 17). Also, every fourth column indicates the absolute percentage increase related to the presence of active ASL accounts on a particular social platform.

Fig.17

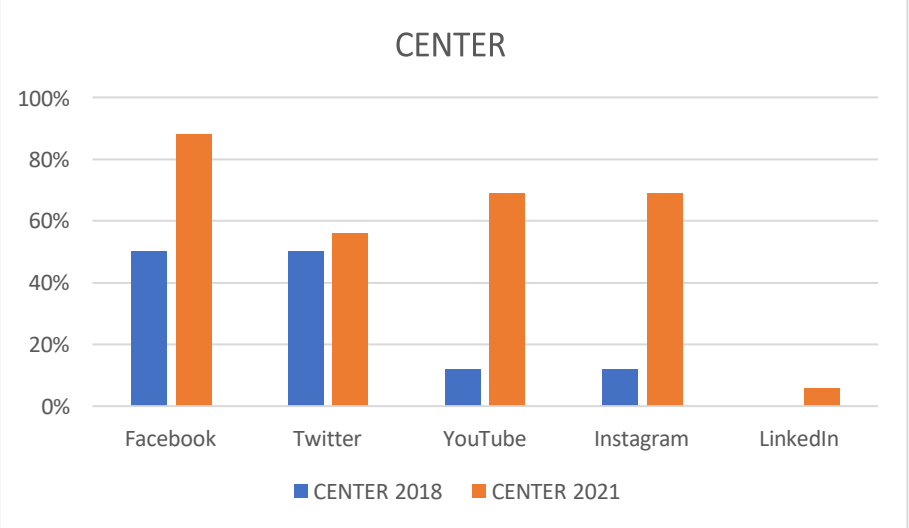
Presence of active ASLs pages on social networks by geographical area

NORTH				CENTER				SOUTH and Islands			
	2018	2021	*INCREASE for 3 years*		2018	2021	*INCREASE for 3 years*		2018	2021	*INCREASE for 3 years*
FB	52%	80%	28%	FB	50%	88%	38%	FB	34%	77%	43%
Twitter	40%	42%	2%	Twitter	50%	56%	6%	Twitter	14%	17%	3%
YT	58%	69%	11%	YT	12%	69%	57%	YT	20%	31%	11%
Insta	10%	38%	28%	Insta	12%	69%	57%	Insta	6%	40%	34%
LinkedIn	12%	19%	7%	LinkedIn	0%	6%	6%	LinkedIn	0%	3%	3%

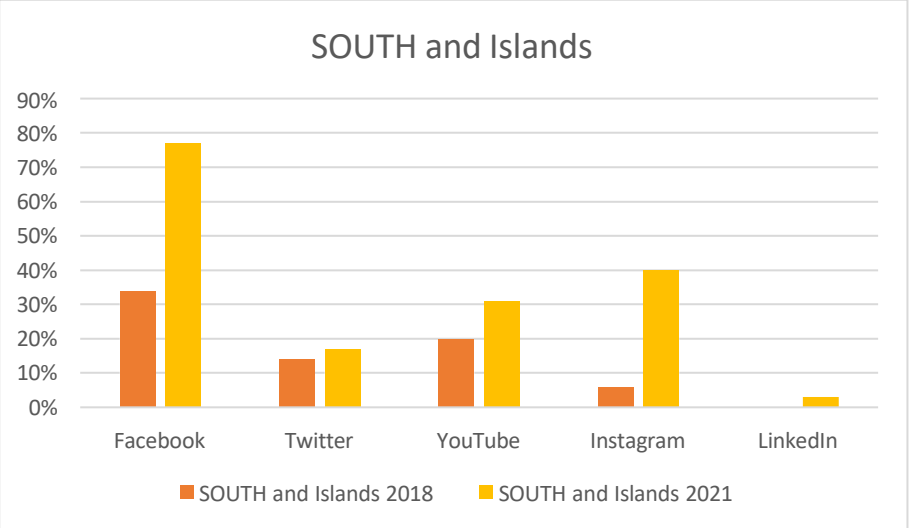
**FB (Facebook), YT (YouTube), Insta (Instagram)*

The most noticeable values are highlighted in red and relate to three social networks: Facebook, Instagram, and YouTube. The biggest breakthrough in the

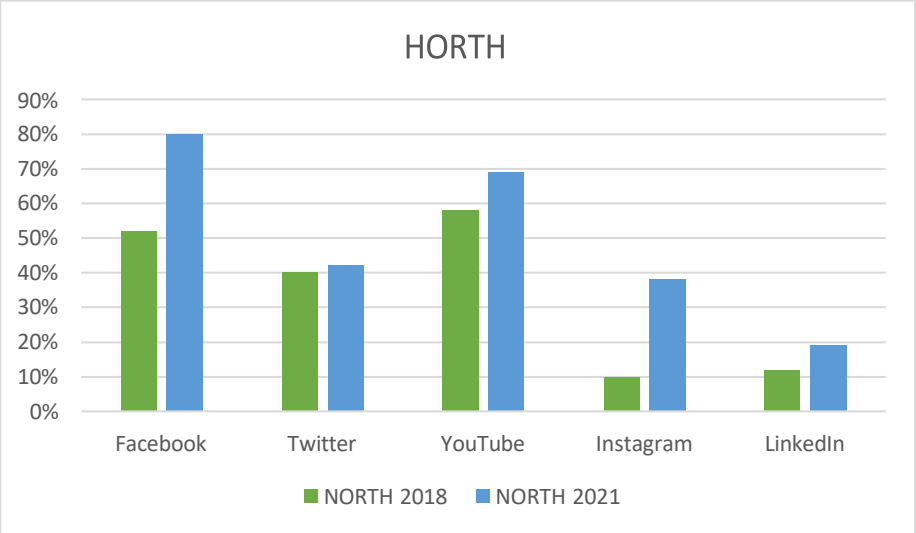
development of communication through social networks was made by organizations in the central part of Italy. Here the increase of communication was low on Twitter and LinkedIn (by 6% on each platform), noticeably grew up on Facebook (by 38%) and soared on Instagram and YouTube (by 57%), which means that an increase of ASLs presence on the last two social media platforms more than five times.



ASLs of South and islands have experienced a significant increase in communication on Facebook (43% on absolute value, corresponding to an increase of two times), and on Instagram (34% on absolute value, corresponding to an increase more than six times).



Northern ASLs also show good growth of activity on these platforms, by 28% on Facebook and YouTube.



Another kind of comparative analysis that we did is the comparison of the number of social networks where ASLs have their open active pages. In 2018, according to the data of previous research 20% of ASLs opened one, 18% two, 13% three, 7% four, 4% five official pages among Facebook, Twitter, YouTube, LinkedIn, Instagram, and Google+. In 2021, 30% of all Italian ASLs had one, 22% two, 18% three, 14% four, 8% five official accounts on Facebook, Twitter, YouTube, LinkedIn, and Instagram. This data shows a general increase in each category even if Google+ was no longer available in the 2021 research.

Conclusion

In recent years significance and influence of social media on human life have become of great importance. Since the beginning of the COVID-19 pandemic, major part of people has been drawing information about coronavirus on the Internet, preferably on popular social networks. Facebook, Instagram, YouTube, Twitter, LinkedIn like others huge web community can inform, misinform, and influence to opinion and behavior of million people.

In Italy, where the COVID-19 problem has become a serious challenge since the first days of its discovery, ASLs (national Local Health Unit) have activated a large information campaign to educate the population about problem of COVID-19 and then about COVID-19 vaccination.

Comparing the results of our study against the results of similar study conducted by our team in 2018, we found an increase of social media use in number of profiles and in post published. The increase was almost heterogenous among Italian geographic area. Such increase is probably due to the COVID-19 pandemic. About half of Instagram posts were related to COVID-19 and COVID-19 vaccination demonstrating how these tools could spread the institutional health communication. More detailed research should be conducted in order to evaluate the communication engagement. This could be the objective of future studies.

Gratitude

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