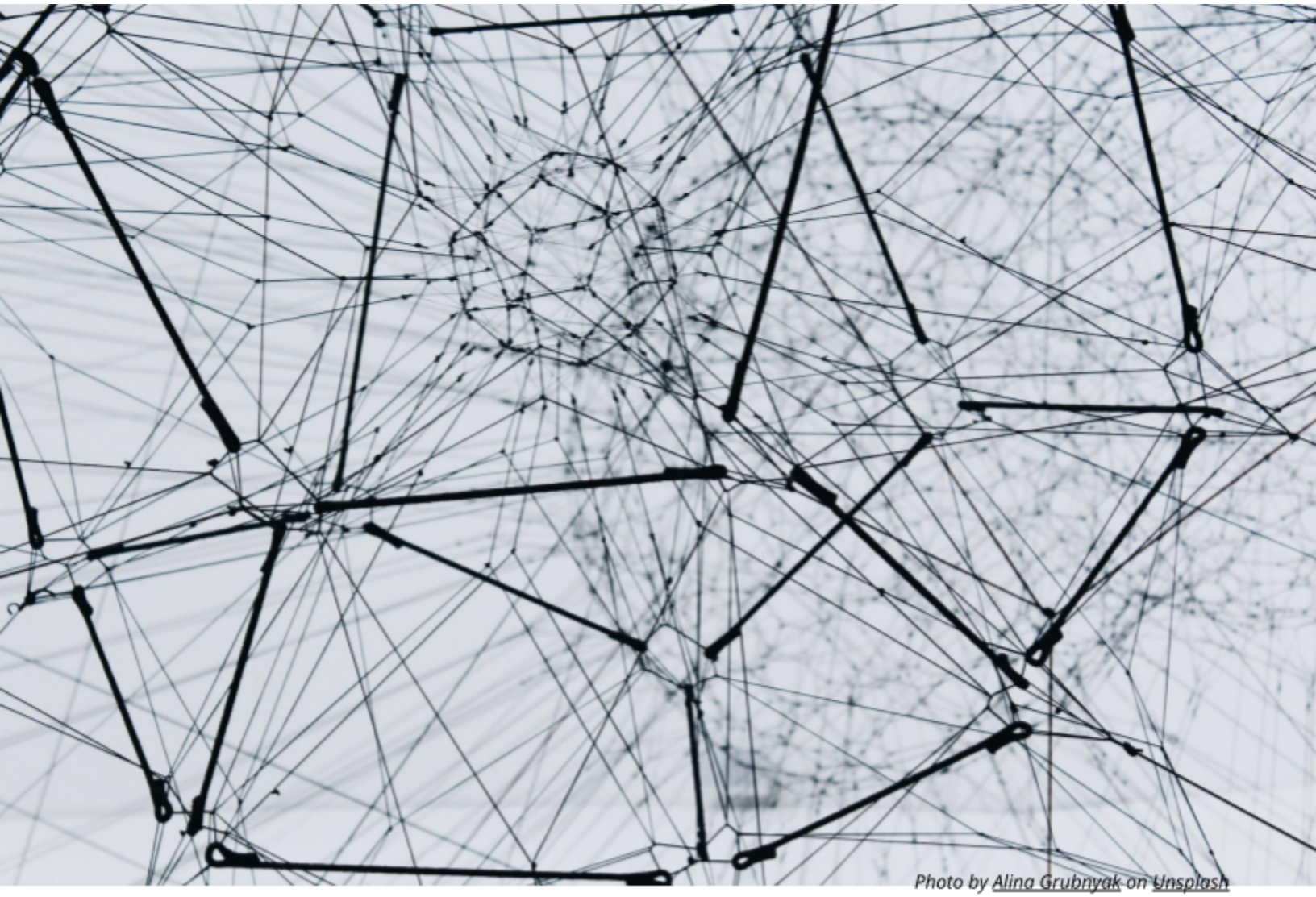

Photo by Alina Grubnyak on Unsplash

TRESCA

Trustworthy, Reliable and Engaging Scientific Communication Approaches

D1.3 Report with elaborated focus area description and trending topic analysis

This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No 872855.

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EXECUTIVE SUMMARY

The original aim of D1.3 was to offer an overview of the main topics around science and technology as discussed by the media and Europeans at the start of the TRESCA project, in order to provide context and be able to align inputs used in WP2, WP3, and the video to be developed in WP4, to people's needs and expectations. However, the abrupt outbreak of the COVID-19 pandemic drastically reoriented public opinion and policy discourses. The advantage of drafting this report during the evolution of the COVID-19 pandemic is that we are able to follow the evolution of science communication around SARS-Cov-2 between March and May 2020. The disadvantage, however, is the monitoring of people's interest in science during this period is obfuscated by the pandemic dominating over all other themes and topics.

Nonetheless, the three thematic areas originally envisioned in TRESCA, that is, information safety, environ-mental health, digitalisation and the future of work, all remain extremely relevant, if not became more relevant, as a result of the pandemic. Confinement measures adopted across Europe to limit contagion, produced an acceleration in the speed of digitalisation of everyday activities. From distance learning to smart working, all social activities moved online. Video and instant communication channels suddenly became the only way for people to interact and keep in touch with colleagues, friends, families, loved ones and the only way to have meaningful interactions. As well, questions arose around the psychological consequences of social distancing and massive adoption of smart devices by workers, kids and families. Misinformation around COVID-19 also became a serious issue, which required prompt actions by news agencies, fact checking platforms, and official public authorities.

1. Introduction

The aim of T1.3 is to map public interest in science communication in the first quarter of 2020 and to contribute to the development and elaboration of the three thematic areas related to digitalisation as identified in TRESCA: (a) digital security and public trust in data science; (b) environ-mental health; and (c) economics and the future of work. Aspects associated with these macro areas will serve as input in the experimental phase of WP3, the Citizen Science Communication meetings in WP2, and the production of a news focused scientific video in WP5.

At the beginning of 2020, the outbreak of the coronavirus (COVID-19) pandemic, caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), impacted Europe and forced the TRESCA consortium to reorient project activities and priorities to respond to this demand for effective science communication brought on by the crisis.

2. Science communication of COVID-19

At the beginning of March 2020, according to Observa Science in Society Monitor[1], more than one in five Italian citizens underplayed the risk of catching COVID-19. 17% of people interviewed declared that the danger of COVID-19 was exaggerated, while 13% considered it no more harmful than traditional influenza. One-third of Italian citizens were persuaded about the seriousness of the virus, but considered it sufficient to take basic sanitary precautions to avoid contagion. In Italy, while some people dream of things they wish to do after the end of the lock-down[2], other people with COVID-19 who have broken the quarantine are sanctioned[3].

Those more concerned about SARS-Cov-2 had mixed feelings about how best to react. Some people thought that the best solution was to stay home in order to reduce contagion (19,5%), while other more fatalistic people considered the pandemic was already out of control and believed that individual actions cannot stop the spread of the disease.

From this report, it is evident that there are quite relevant differences within the population. In the 60+ age group 60+, female respondents strongly believed that people should stay home. The tendency to minimise risk was more common in the age group 15-29 and 30-44. In the age group 30-44, one out of three respondents considers the level of alert exaggerated, while one youth out of five considers the virus slightly more

[1] Massimiano Bucchi and Barbara Saracino "Italian citizens and covid-19", Public Understanding of Science Blog, March 21, 2020.
[2] Barbara Visentin "Coronavirus, quale sarà la prima cosa che farete una volta usciti di casa? Raccontateci tutto", Il Corriere 31/03/2020 16:28 [Italy].
[3] Fiorenza Sarzanini "Coronavirus, denunciati 257 positivi che hanno violato la quarantena", Il Corriere, 31/03/2020 11:59 [Italy].

dangerous than a normal flu. With regard to regional differences, attitude towards voluntary confinement was more common in North-Western Italy and less common in the South and in the Islands. However, it is striking to notice that in the North-East, which had a number of cases, more than 18% considered COVID-19 only slightly more dangerous than normal flu. Perhaps not surprisingly, the highest percentage of people who underplayed the risk of getting COVID-19 also belong to the group of those who did not seek information on the pandemic at all or who seek information mostly via social media and relied on advice given by relatives and friends.

The perception of the coronavirus risk is also linked to media exposure. Those who consumed information mostly from TV news channels they trusted were more inclined to comply with confinement measures. Those who consumed information from newspapers (either the paper or the online version) and trusted social media were also more inclined to see the pandemic as out of control. As well, those receiving information mostly from institutional websites and relying on advice offered by medical doctors or pharmacists were also found to be more inclined to believe that appropriate precautions were needed to avoid contagion.

Based on an analysis of an online survey and of tweets published in Italy between February 25 and April 15 2020, Battiston, Kashyap and Rotondi (2020)[4] came to the conclusion that *trust in science emerges as a consistent predictor of both knowledge and containment outcomes*. Those who trust scientists less tend to not trust the information coming from them, while those who trust science are more receptive to information derived from experts.

Results from an online survey[5] conducted between 18 and 21 March 2020 in Sweden (n = 1,141) shows that television is the most common channel for information consumption about the coronavirus, in particular SVT (Swedish Television), the Swedish public service broadcaster, which 72 percent of the respondents reported that they had watched it in the preceding two days. Those aged 65 or older get more of their news from TV (both SVT and TV4), Sveriges Radio (the Swedish public broadcaster) and local morning newspapers, compared to other age groups. Two-thirds of the respondents (67 percent) perceive the tone of reporting on the coronavirus in the Swedish news media as fairly or very hyped/alarmist. More than nine out of ten (91 percent) Swedes say they have fairly or very high confidence in doctors and other healthcare professionals. Lastly, social media channels and Internet forums did not appear to be very common sources of information in Sweden.

[4] Battiston, P., Kashyap, R., & Rotondi, V. (2020, May 11). "Trust in science and experts during the COVID-19 outbreak in Italy".

[5] "CORONAVIRUS IN THE SWEDISH MEDIA STUDY – HIGH PUBLIC CONFIDENCE IN RESEARCHERS AND HEALTHCARE PROFESSIONALS", Vetenskap & Allmänhet.

2.1 Trending topics analysis in Google and Twitter

Google Trends Analysis: Between February and March 2020, the pandemic overshadowed all other topics and dominated public attention in all eight EU countries TRESCA uses as case studies in WP2 and WP3. As presented in the tables below, an analysis of interest for "coronavirus" in Italy, Spain, France, The Netherlands, Germany, Austria, Poland and Hungary had been performed. Interests in coronavirus related terms increased across all the channels. Between mid February and mid March 2020, a steady increase in interest in coronavirus became evident in news outlets, web searches, and YouTube searches. The different levels of interest on the topic between countries can be observed as corresponding to the spreading of the contagion. In Italy for instance, media interest in coronavirus was extremely high around 24 February 2020. Similar levels of attention were reached in Spain, France or Germany around 9 March 2020. The majority of Austrians and French people also looked for videos on YouTube around the 7 March 2020.

As displayed in the following charts, interest in web searches, news, and in YouTube searches reached a peak and then decreased over time. The shapes of the curves somewhat resembles the shape of the epidemiological curve of COVID-19 in each country, with the difference that all curves show initial interest in the coronavirus in February, which temporarily faded away at the end of the month, then a sudden and very fast incline (becoming viral) from March onwards. The final table shows the novelty of the coronavirus, as public interest in the disease enormously exceeds the interest people have for similar or related terms such as influenza during the same period.

Google Trends Analysis Of News, Web And YouTube Searches

News searches in Italy, Poland, Spain and The Netherlands (01/Jan-1/May 2020)

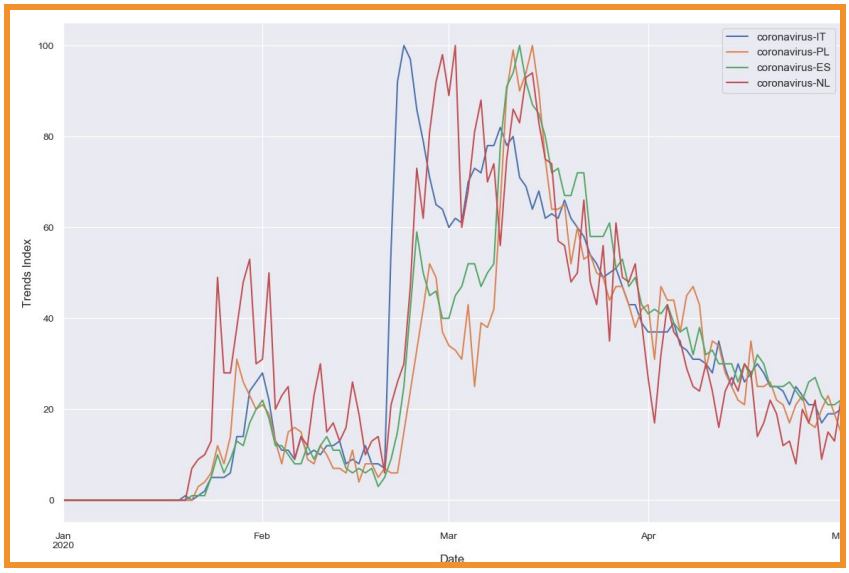
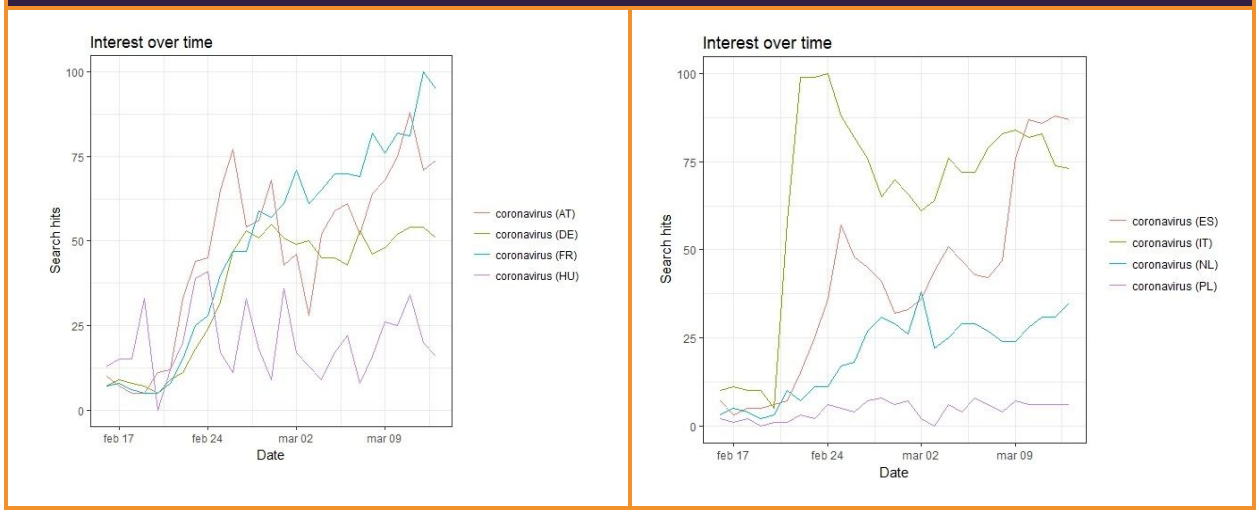


Fig. 1 Google Trends analysis for the term "coronavirus", which included all variations ("covid", "covid-19", etc.), for news searches in Italy, Poland, Spain and The Netherlands between 01/Jan and 1/May 2020.

News searches in Austria, Germany, France, and Hungary (01/Jan-1/May 2020)

Fig. 2 Google Trends analysis for the term “coronavirus”, which included all variations ("covid", "covid-19", etc.) for news searches in Austria, Germany, France, and Hungary between 01/Jan and 1/May 2020.

Tab. 1 NEWS searches of #coronavirus over the first month (15/02/20-16/03/20)



Google web searches in Italy, Poland, Spain and The Netherlands (01/Jan-1/May 2020)

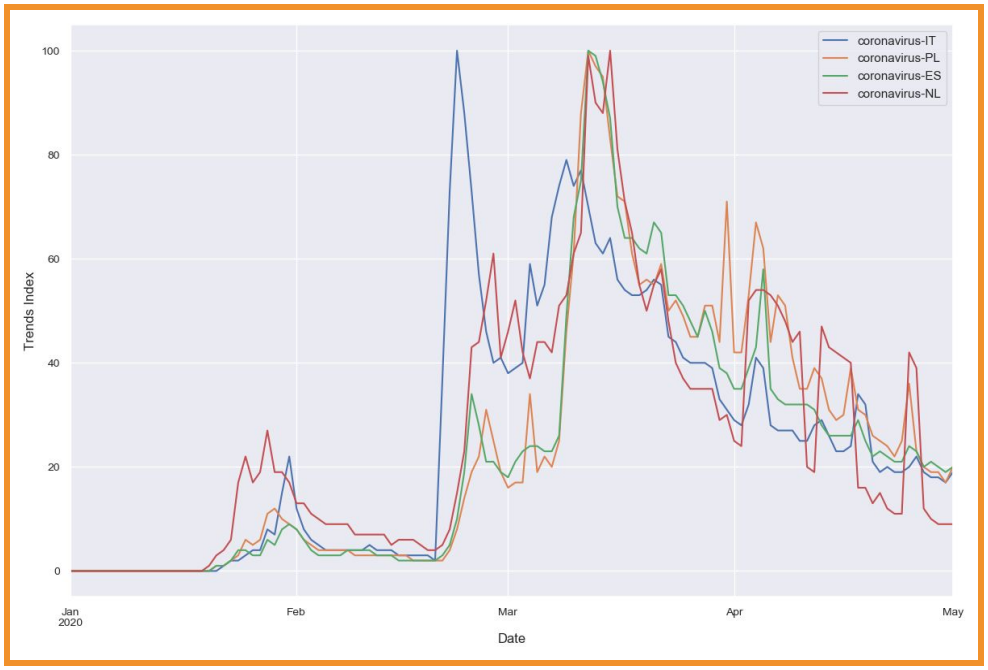


Fig. 3 Google Trends analysis for the term “coronavirus”, which included all variations ("covid", "covid-19", etc.), for Google web searches in Italy, Poland, Spain and The Netherlands between 01/Jan and 1/May 2020.

Google web searches in Austria, Germany, France, and Hungary (01/Jan-1/May 2020)

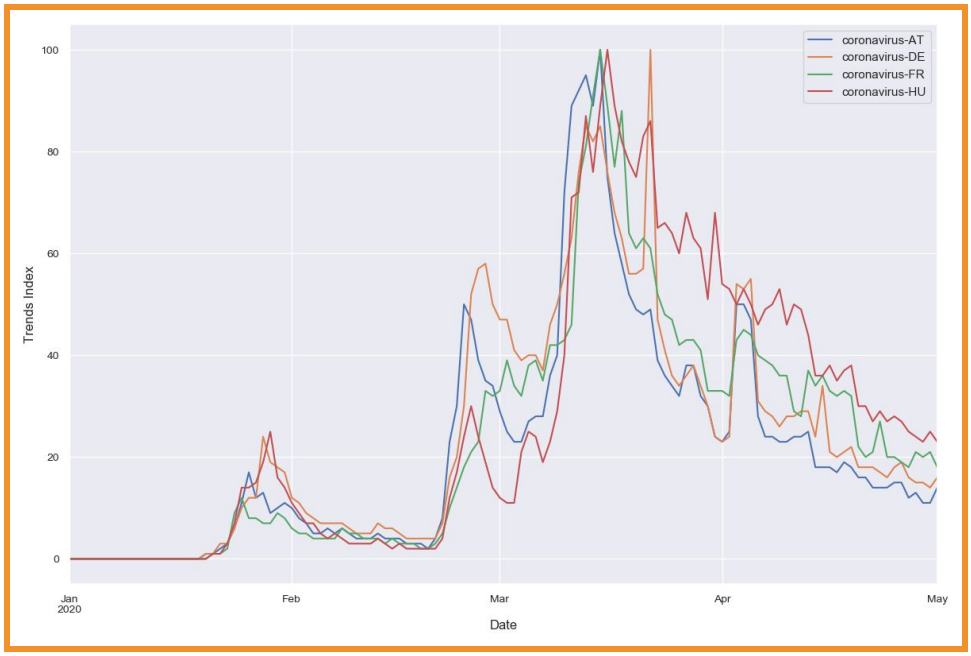
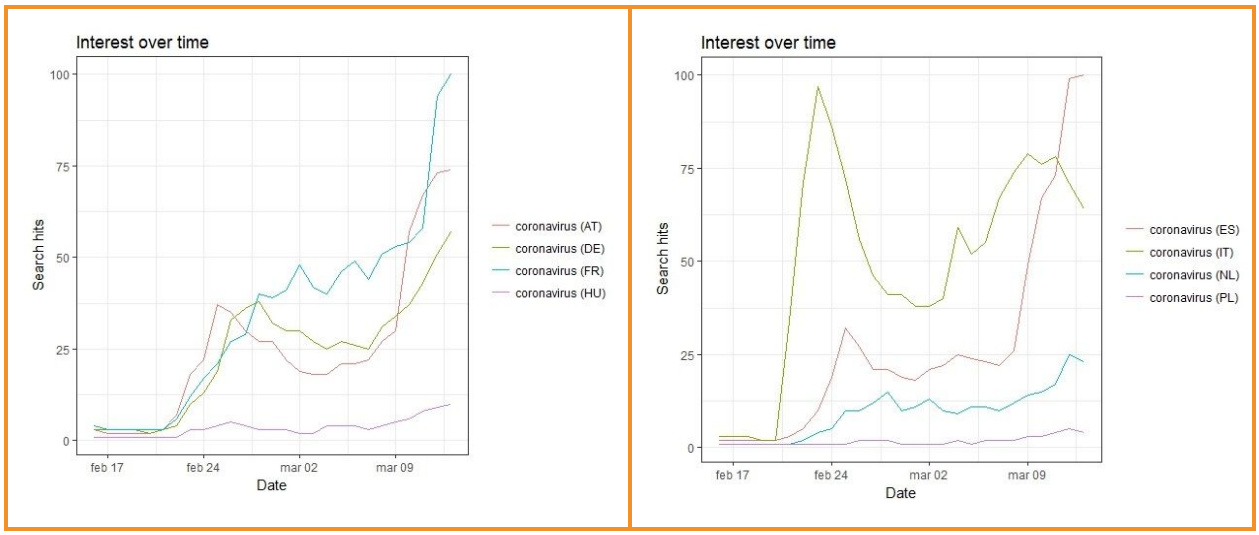


Fig. 4 Google Trends analysis for the term “coronavirus”, which included all variations ("covid", "covid-19", etc.) for Google web searches in Austria, Germany, France, and Hungary between 01/Jan and 1/May 2020.

Tab. 2 WEB searches for #coronavirus over the first month (15/02/20-16/03/20)



Google YouTube searches in Italy, Poland, Spain and The Netherlands (01/Jan-1/May 2020)

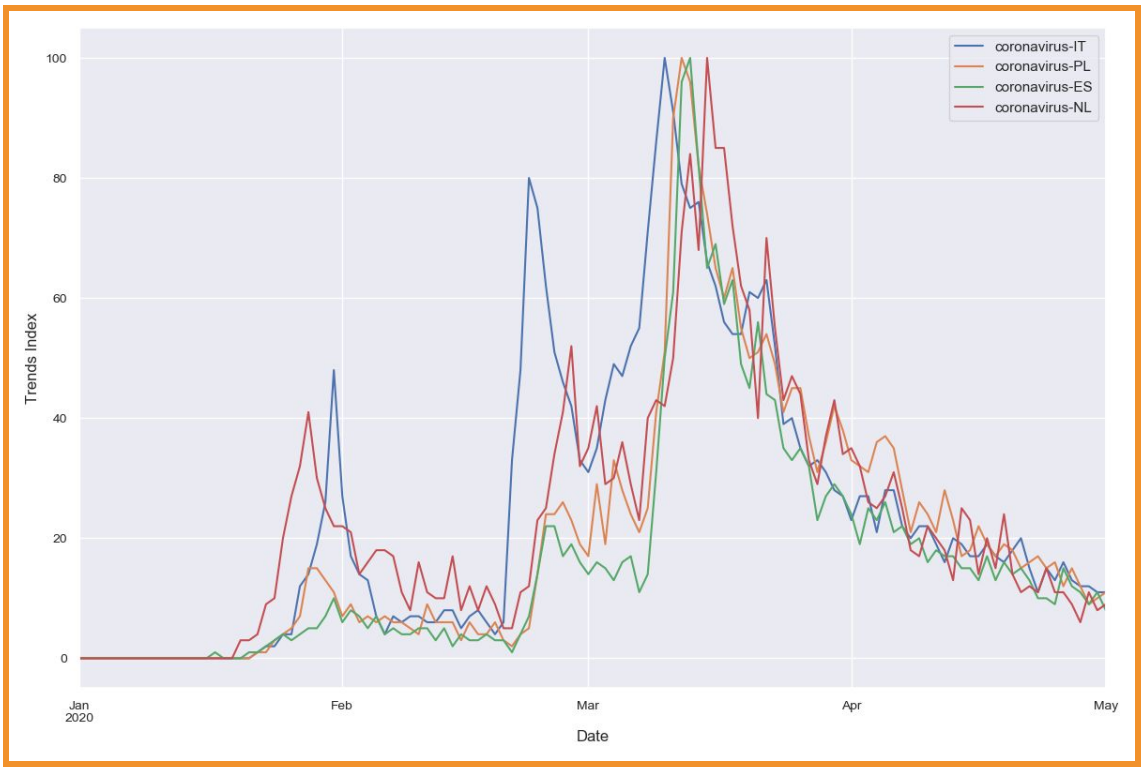


Fig. 5 Google Trends analysis for the term “coronavirus”, which included all variations ("covid", "covid-19", etc.), for Youtube searches in Italy, Poland, Spain and The Netherlands between 01/Jan and 1/May 2020.

Google YouTube searches in Austria, Germany, France, and Hungary (01/Jan-1/May 2020)

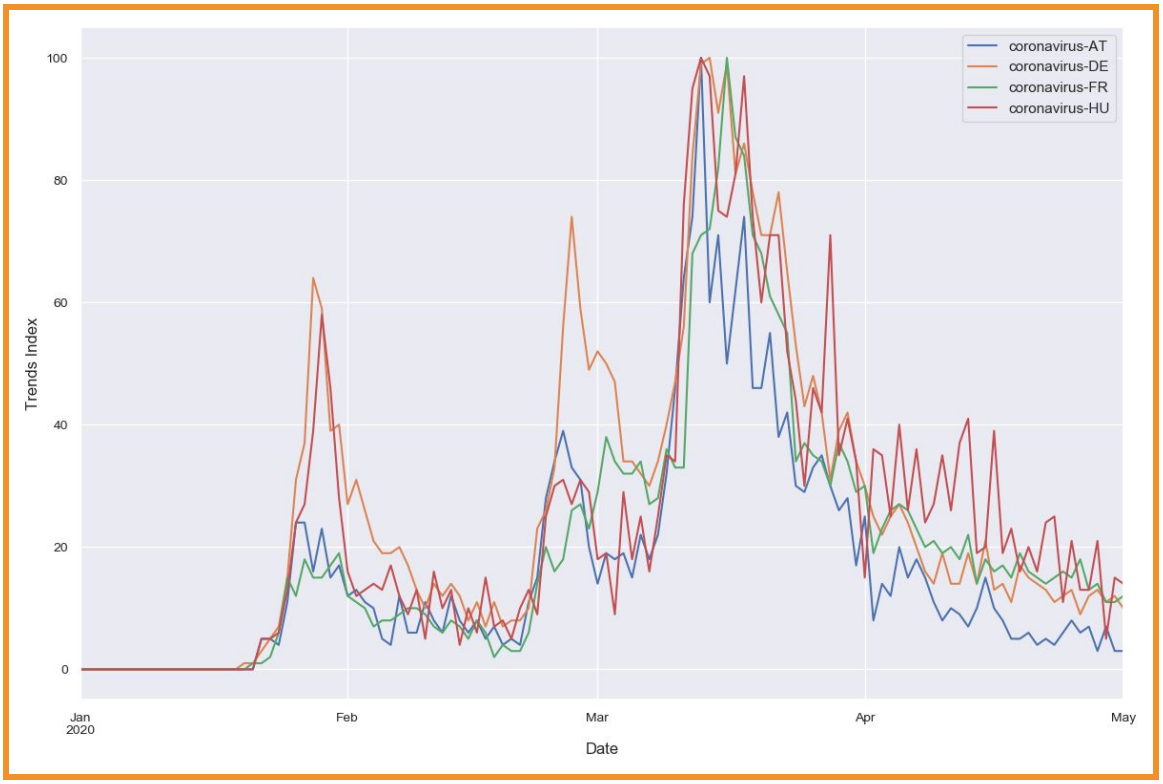
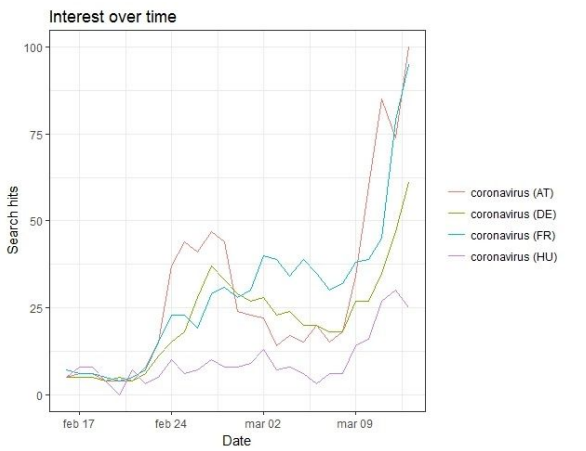
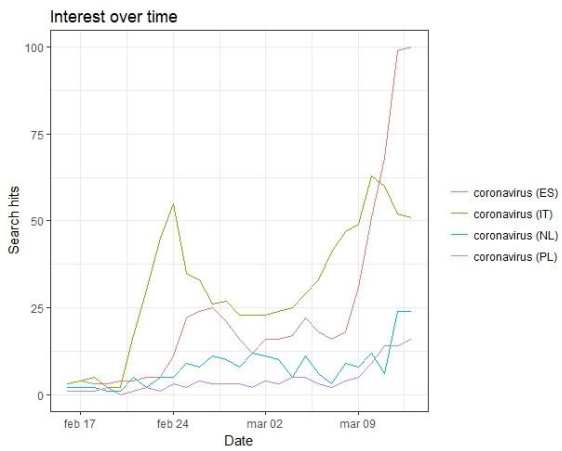


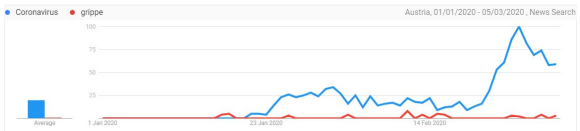
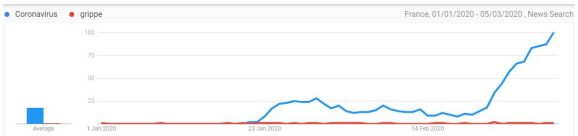
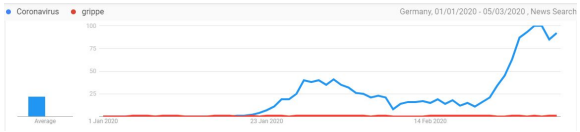
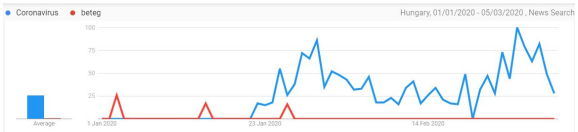
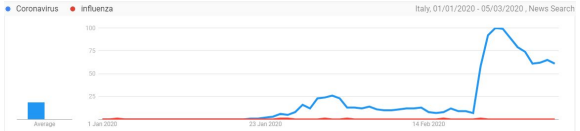
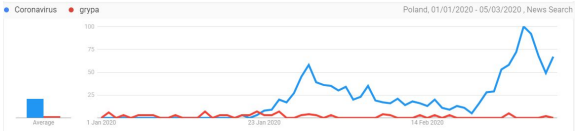
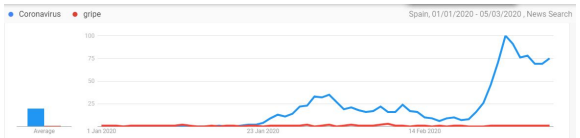
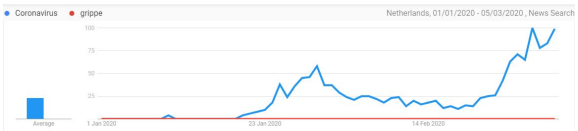
Fig. 6 Google Trends analysis for the term “coronavirus”, which included all variations ("covid", "covid-19", etc.) for Youtube searches of Austria, Germany, France, Hungary between 01/Jan and 1/May 2020.

Tab. 3 YouTube searches for #coronavirus over the first month (15/02/20-16/03/20)





Tab. 4 News searches in the eight EU countries studied (1/Jan-5/Mar 2020)[6]

Austria 'coronavirus' (blue) vs. 'grippe' (red)	France 'coronavirus' (blue) vs. 'grippe' (red)
	
Germany **'coronavirus' (blue) vs. 'grippe' (red)**	**Hungary** **'coronavirus' (blue) vs. 'beteg' (red)**
	
Italy **'coronavirus' (blue) vs. 'influenza' (red)**	**Poland** **'coronavirus' (blue) vs. 'grypa' (red)**
	
Spain **'coronavirus' (blue) vs. 'gripe' (red)**	**The Netherlands** **'coronavirus' (blue) vs. 'griep' (red)**
	

<u>Twitter analysis.</u> An analysis of trending topics on Twitter between March and May 2020 offers an opportunity to better understand public debates around the pandemic. As already shown in the Google Trends analyses above, terms such as 'coronavirus', 'covid_19', 'COVID', 'Corona', started receiving attention in February 2020 and then became hot topics from March on until May 2020, when the pandemic is considered to be mostly under control in the European countries TRESCA analysed. The hashtag #CoronaUpdate has a considerable volume of tweets (180,698) on Saturday 28 March and occupied position

[6] In the case of Poland, Hungary and The Netherlands, the comparison contains both Search terms and Topics, which are measured differently. Search term in English: 'coronavirus' (blue) Vs. 'influenza' (red).

24/50 in the hottest worldwide trending topics list (calculated with R Studio get_trends). On the same date, the no. 1 trending topic in The Netherland was #StayAtHomeAndStaySafe (91,289 tweets), in France was #Confinementjour12 (28,860 tweets), while in Austria it was #covid2019 (404,380 tweets). #StayAtHomeAndStaySafe occupied the 3rd position in Germany with 88,866 tweets, while #coronaupdate is in position 29th with 186,707 tweets. In Italy #CoronaLockdown was listed at position 22nd with 439,070 tweets and #StayAtHomeAndStaySafe followed in position 33rd with 90,018 tweets. The expression "chinese virus" coined and used by @realDonaldTrump (see this tweet as example) on 18 March 2020 captured the attention of German Twitter users on the 19 March (891245 tweets at 10:31am), likely in connection with this video directed by Robert Weide.

In order to monitor Twitter users' interest over time in the countries analysed (minus Hungary, for which the WOEID was not available and which shows a limited Twitter volume), the CSIC team collected the 10 most relevant trending topics every hour by using the free Developer Twitter API associated to the Twitter account @davidalqabri from 18 March until 19 May 2020. As a result, 70,000 data points were collected in Italy, Spain, France, The Netherlands, Germany, Austria and Poland. for each country. In the charts reported in the next section we used a **word cloud** to visualise the frequency of occurrence of the most frequent hashtags during this period. The bigger the size of the word(s) indicates the more frequent appearance of the hashtag between mid March and mid May 2020.

As we discussed in Section 2.2, the previous analysis shows that the **COVID hashtags is the most relevant in the considered time window**. In order to study public perception around the COVID theme in the context of misinformation, the EUR team performed an alternative analysis of Twitter data by selecting tweets based on language rather than geolocation. Tweets were scraped using GetOldTweet3, a Python scraper that accesses the search.twitter.com web site. Scraping in this manner acquires only a sample of all tweets (unlike the API), but permits scraping beyond the 2-week window of the API. Unfortunately, these tweets do not contain any geo-location metadata. The search queries collected tweets with terms or hashtags that fully or partly matched this list of terms: "(covid OR (corona virus)) (misinformation OR disinformation OR fake OR hoax OR scam OR <language specific translations for the preceding terms>)". Topic modeling (specifically, LDA or latent Dirichlet allocation) was employed on the textual content of the tweets, per language, to detect patterns and structures. As a first approximation, the number of detected topics was fixed at K = 15.

In the **topic model tables** inserted within each country section, the '#' column indicates the topic's rank of prominence in descending order i.e. Weight in descending order). The Weight score refers to how prominent the topic is within the corpus. The '%' column indicates the proportion of tweets that exhibit the topic > 0.50 or 50%. The 'Top Words'

shows the top 20 English-translated terms affiliated with the topic[7]. Each topic is also represented by different sets of tweets. For our interpretation of some of these topics, we rely on the top tweets affiliated with the topics as well as the changing prominence of topics across time; their tables and figures are omitted here due to limited space and their potential inclusion in future academic articles. Given the limited number of Hungarian tweets, we omitted their topic analysis.

In examining some of the more notable topics and their associated top tweets across the countries analysed, we observe some commonalities and differences. One was signals of disbelief in the seriousness of pandemic, which we observed to be more prominent in the Netherlands and in Poland. Poland in particular showed increasing attention to conservative and far-right perspectives. Criticism towards the government, politicians, and the media was also more common in France, Spain, Germany, and Italy. In the four countries, these critical messages exhibited a steady increase from January through May. Furthermore, while warnings of the presence of fake news was present, it is concerning that these messages have become muted in recent weeks, especially in the Netherlands and Italy. However, this may be due to the virus' waning in those countries resulting in diminished coverage (both truthful and fake).

In the next section we offer an overview of confinement measurements adopted in the eight countries where the data collection will take place in WP2 and WP3, and also present the result of the analyses performed by the CSIC and EUR team on Twitter data.

3. National responses to COVID19

Member States adopted strict measures in order to slow the spread of the COVID-19 virus. These measures included the prohibition of public gatherings; the total or partial closure of schools; and the introduction of border/travel restrictions. More than half of the EU's Member States have proclaimed a state of emergency. In the "Joint statement of the Members of the European Council", the following priorities were identified: (a) limiting the spread of the virus; (b) providing medical equipment; (c) promoting research; (d) tackling socio-economic consequences; (e) repatriation of citizens stranded in third countries.

Furthermore, the document "Joint European Roadmap towards lifting COVID-19 containment measures" offered guidance to EU member States on how to lift the restrictive measures. The document was based on advice given by the European Centre for Disease Prevention and Control (ECDC), the Commission's Advisory Panel on COVID-19, and the World Health Organization (WHO).

[7] Due to Google Translate's expanding non-English phrases, some topics are represented by more than 20 English words.

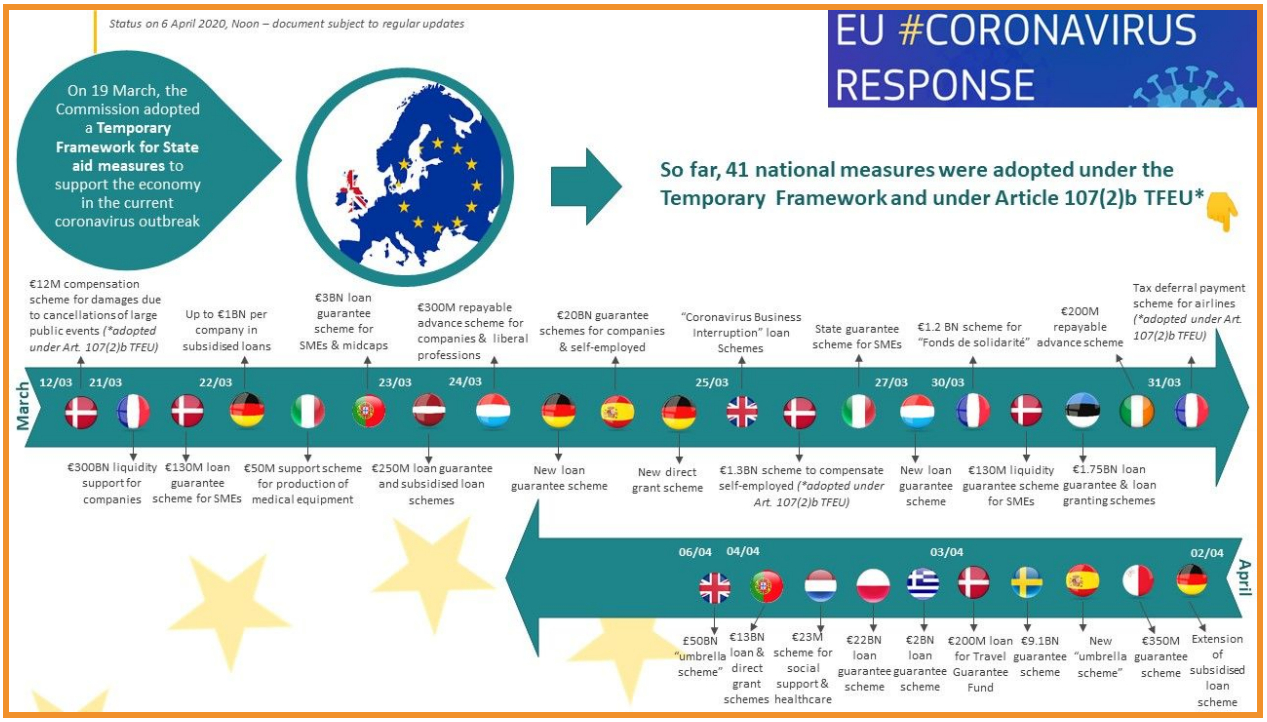


Fig. 7 Summary by @tsoni_maria of the 105 National measures adopted in April 2020 by EU member States

Tomas Pueyo in this serie of articles published on Medium describes measures taken by governments in response to the pandemic as the Hammer (strict confinement measures) and the Dance (a mix of contagion tracing post-confinement measurements).

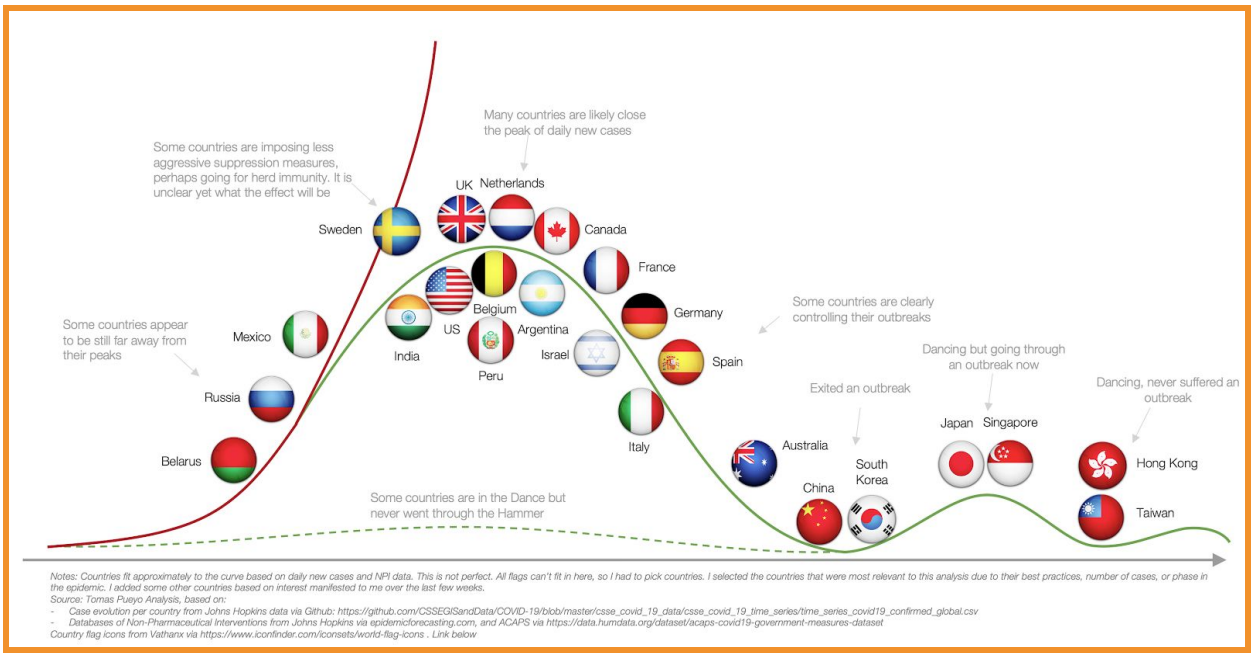
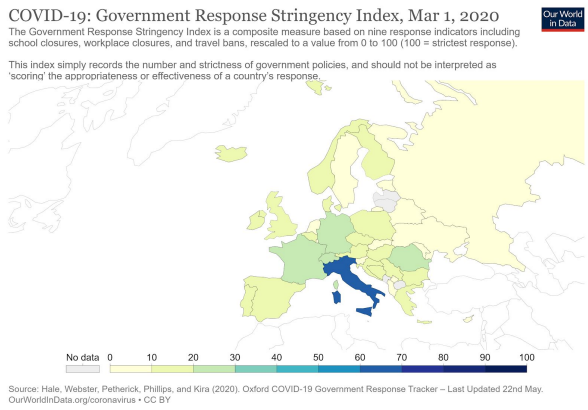


Fig. 8 Tomas Pueyo's approximation of countries along the *hammer* and *dance* phases

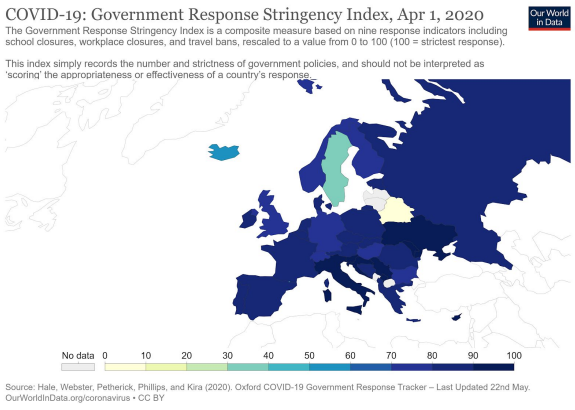
The following charts offer an overview of government responses to the pandemic in terms of school and workplace closure, travel bans, public events suspended, and land borders closure. The Government Response Stringency Index is a composite measure based on nine response indicators including school closures, workplace closures, and travel bans, rescaled to a value from 0 to 100, where 100 indicates the strictest response. The evolution of the Government Response Stringency Index is reported below, showing data from 1 March 2020, 1 April 2020 and 1 May 2020. As the data shows, Italy was the first country to establish stringent measures, later adopted by the majority of EU countries. The final chart shows policy responses reported by the Oxford COVID-19 Government Response Tracker.

Tab. 5 Evolution between March and April of the confinement measures

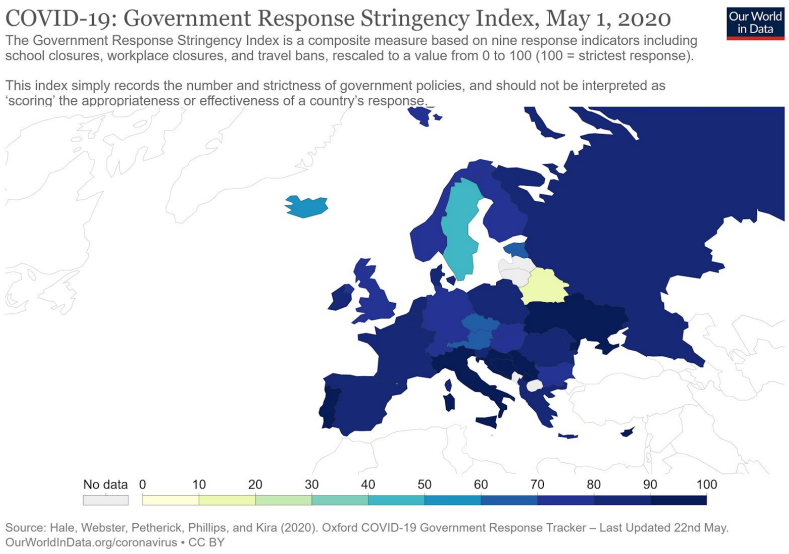
March 1, 2020



April 1, 2020



May 1, 2020



Source: Government Response Stringency Index

	Events suspended	All schools closed	Non-essential shops closed	Non-essential movement banned	Land borders closed	Non-essential production stopped	Date of third confirmed death
Italy	9 days	9 days	14 days	14 days		30 days	Feb 25
France	0*	13 days	11 days	14 days			Mar 3
Spain	4 days	9 days	9 days	10 days	10 days	23 days	Mar 6
U.K.	8 days	14 days	12 days	15 days			Mar 9
Belgium	2 days	3 days	5 days	5 days	8 days		Mar 12
Germany	8 days	3 days		9 days	4 days		Mar 12
Greece	0*	0*	1 day	8 days	0*		Mar 15
Poland	0*	1 day	0*	10 days	0*		Mar 15
Sweden	0*						Mar 16
Austria	0*	0*	0*	0*			Mar 17
Portugal	0*	0*	0*	0*	0*		Mar 20
Hungary	0*	0*	0*	7 days	0*		Mar 21
Czech R.	0*	0*	0*	0*	0*		Mar 25

Fig. 9 Timeline of confinement measures in some EU member States in March 2020

SOURCE: POLITICO research, Frontex, Oxford COVID-19 Government Response Tracker[8]

In the rest of this section we will focus on the eight EU countries where data will be collected either in WP2 (Italy; The Netherlands; Austria) or in WP3 (Spain; Germany; The Netherlands; Poland; Hungary; Italy; France). We have decided to focus on these countries to better understand public views and reactions to the pandemic and the overall degree of understanding of scientific findings related to the pandemic.

[8] A value of zero days is displayed when the measure was implemented before the third death caused by COVID-19 was registered in the country. Regional differences in Germany.

2.2.1 Italy

Fig. 10 COVID-19 in Italy (28/05/2020) by CoronaTracker

Italy declared a national State of Emergency relating to health risk on 31 January 2020. On 23 February 2020, the Italian Council of Ministers passed a law outlining access and removal measures in the municipalities where there are major outbreaks (first red areas). The Council also suspended demonstrations and events. Italy issued a nationwide lockdown on March 9 2020.

Since then, several more decree laws were issued, including: imposed school closure within red areas (Dpcm 25 February 2020), gave instructions on smart working and ordered the suspension of public events in Northern Italy until 15 March 2020. Other decree laws outlined the extension of restrictive measures such as avoid gatherings, keep social distance, and limited shop opening hours across Italy until 3 April 2020 (Dpcm 9 March 2020). Non-essential commercial activities (restaurants, hairdressers, etc.) were also ordered to close immediately .

The measures adopted in Italy further included the ordinance of 22 March 2020, which prohibits all natural persons from moving to/from a municipality the person is not located or resides in, with the exception for proven essential work needs, of absolute urgency and/or for health reasons. Italian Government issued, with the Presidential Decree of on 22 March 2020, new and additional measures for the closure of non-essential (or strategic) production activities in the nation. Food, pharmacies, basic necessities shops and essential services remained open only if they can secure the safety distance (1 meter) between people (both employees and clients). The provisions are effective until 3 April 2020.

The cumulative measures put in place to limit the spread of COVID-19, including the Prime Ministerial Decree of 11 March 2020 and the ordinance of the Minister of Health issued on 20 March 2020, were all extended to 3 April 2020. All measures to combat the spread of the coronavirus infection were further extended to 13 April 2020 by the Prime Ministerial Decree of 1 April 2020, which came into effect on 4 April 2020.

As presented in the word cloud, the most frequent hashtags in Italy are popular television programs of debate or talk shows (live propaganda and carte blanche), popular

entertainment games and challenges show programs (ciaodarwin, Beijing express), sentimental and love affairs programs and, finally, the most famous missing persons investigation program in Italy ("Chi l'ha visto?": who has seen it). Scientific information is noted, although this is extraordinary and a result of the exceptional nature of the pandemic, as it spread wildly in the generalist and entertainment programs.

Fig. 11 WORD CLOUD for Twitter trending topics in Italy (18-Mar to 19-May 2020).

Italian tweets about COVID-19 and misinformation exhibit more fluctuation than those of the other countries. The most prominent topic is (1) bemoans various instances of fake news/misinformation from political parties and journalists. However, this topic's popularity has slightly declined since the onset of the virus, pointing to a shift in public attention. Similarly, the popularity of topic 2 has declined. This topic includes generic warnings of fake news with some tweets pointing to the dual-edged nature of social media, highlighting its role in proliferating both fake news and valuable information.

Tab. 6 Topic model results for Italian (IT)

#	Weight	%	Top Words
1	0.1364	11	coronavirus fake covid news disinformation fakenews virus false crown panic italy news fear information diffusion spread video true italians lap
2	0.0805	8	fake news coronavirus fakenews covid news hoaxes health social ministry officers fake sources information coronavirusitalia ministry health attention disinformation avoid network
3	0.0759	7	covid coronavirus dead scam virus hoax italy flu false vaccine corona lie germany fakenews data pandemic cases disinformation test death
4	0.0621	6	fake news coronavirus false news schools hoaxes cases region alarm closed closing march april positive report italy mayor police naples
5	0.0588	5	coronavirus covid fakenews salvini fake conte italia coviditalia melons mes coron- avirusitalia liar hoax march april news league italian emergency money

2.2.2 Spain

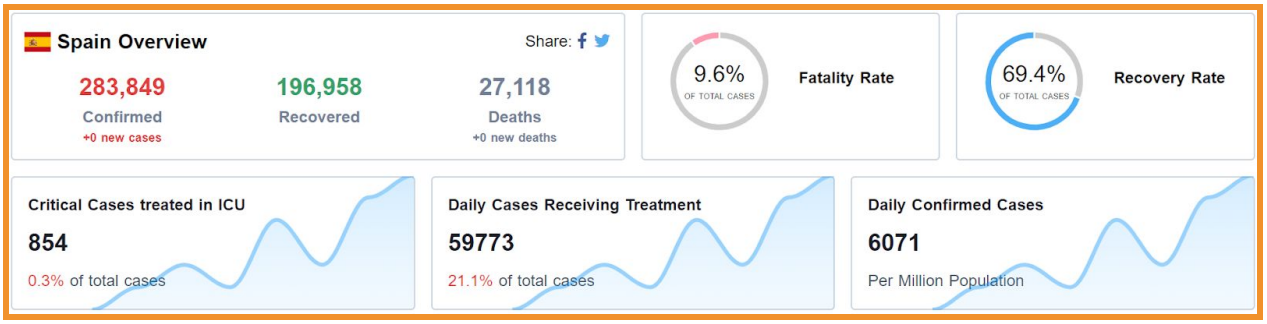


Fig. 12 COVID-19 in Spain (28/05/2020) by CoronaTracker

The coronavirus disease 2019 (COVID-19) caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) reached Spain by 31 January 2020. In April 2020, the Comunidad de Madrid suffered one of the world's highest crude mortality rate ratios. According to Ramón Pérez-Tanoira and coauthors (2020)[9], Madrid experienced a crude mortality ratio of 19.2% and a mortality ratio of 34.7% in admitted patients, which is

[9] "Prevalence and risk factors for mortality related to COVID-19 in a severely affected area of Madrid, Spain". medRxiv preprint doi: https://doi.org/10.1101/2020.05.25.20112912. Version posted May 26, 2020.

considerably above most of the ratios described in the Chinese series. The Spanish Government initially adopted partial lockdowns as the main response to the first evidence of the pandemic. National measures were preceded by a series of decisions at regional level. On 9 March 2020, the Madrid Regional Government (BOMC no. 59 338/2020) and the Basque Government closed schools in their Autonomous Regions. On 10 March 2020, the Spanish Government canceled all direct flights from Italy to Spain until 25 March 2020. The Government of La Rioja also cancelled flights coming from the Madrid region. On 12 March 2020, the Government of Cataluña quarantined four municipalities. The next day, the Regional Government of Madrid ordered the shutdown of bars, restaurants and other stores with the exception of groceries, supermarkets and pharmacies.

On Thursday 12 March 2020, Pedro Sanchéz, the Spanish President, dismissed suggestions that the Spanish authorities had been underestimating the health threat of COVID-19. However, on 13 March 2020, a State of Emergency was declared by the Spanish Government in accordance with the terms established in article 116.2 of the Spanish Constitution (Royal Decree 463/2020 of 14/03/2020). The following measures were enforced in Spain:

1. *Obligation of confinement*. People could not leave their homes except for specific reasons: to go to the grocery, to work, to the pharmacy, to the hospital, to the bank or to the insurance company (for urgent and reasonable reasons).
2. *Restrictions of freedom of gathering and obligation of social distancing*. Children could not go out for walks and visiting of friends/families was prohibited. The only exception was for people who had to care for people who needed help. The assistance was to be carried out while respecting hygiene and physical distance measures. Weddings could not have guests. Funerals could only have a few close relatives.
3. *Closure of non-essential services*. All bars and restaurants were closed. Only take-away meals and drinks were acceptable. All form of entertainment were suspended (sports, movies, museums, municipal celebrations)
4. *Restrictions on freedom of movement*. Mass public transit remained open, but the frequency of bus/trains were drastically reduced. On Monday 16th March, land borders were shut.

Children in Spain were not allowed to go outside for 42 days, from Sunday 15 March until Sunday 26 April 2020. Concerns for the mental health of children and teenagers started to rise amongst parents and associations such as ANAR, who started receiving requests from children and adolescents suffering from mistreatment or from psychological problems leading to suicidal thoughts (RTVE May 2020). In Spain, where Save the Children[10]

[10] Save the Children Child Protection staff conducted phone-based and online surveys to determine the effects of the social restrictions on children in March and April 2020. See ReliefWeb "'Children at risk of lasting psychological distress from coronavirus lockdown': Save the Children".

interviewed nearly 2,000 lower-income families, over a quarter of them reported higher levels of distress than normal, and many households reported their children were struggling with fear, anguish and concern for their family's situation.

Political polarization also rose during the confinement period, which resulted in protests and confrontation at the beginning of May between the National Government, led by Pedro Sanchez's left-wing progressive coalition, and the Regional Government of Madrid, led by Isabel Ayuso, representative of the Conservative party (Partido Popular). As shown in the Twitter post below, the word "virus", which used to refer to coronavirus, became a trending topic for the confrontation - "the virus is you" (#elvirussoisvoxsotros).

Fig. 13 Tweet from @sxndrichu (9:10am, May 24, 2020) saying "To create traffic jams on the roads and not allow ambulances to circulate, and to demonstrate in front of a hospital where the health workers have been working tirelessly for months to stop the pandemic should be illegal, this Spain does not represent me. #elvirussoisvoxsotros". The text in the image reads "Your flags don't cure".

@RosaGAlonso writes on twitter that "#rosavientos Perhaps journalism should accept its responsibility in magnifying what is the outcry of a minority and turning it into a perverse reality. We must insist that we are not the reflection of the mirror they put on us in the media. Great cartoon by Matt Wuerker"

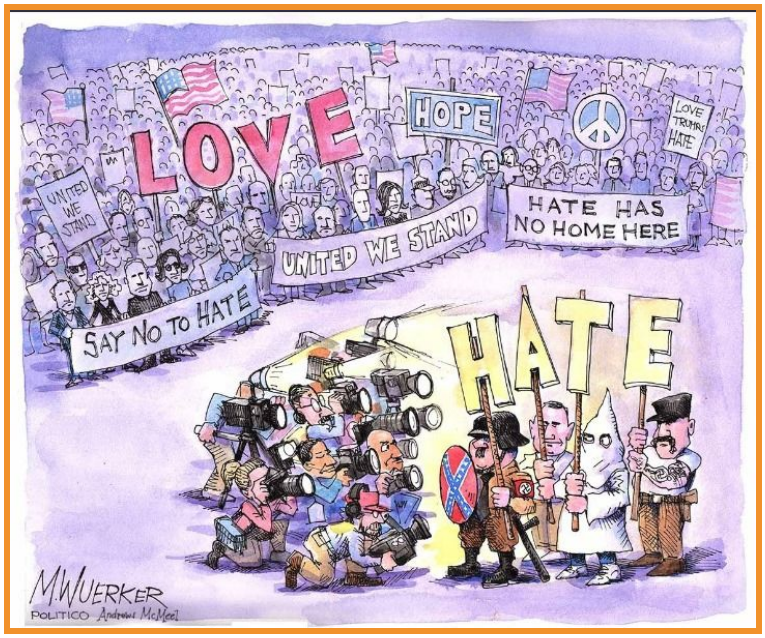


Fig. 14 Cartoon by Matt Wuerker

Furthermore, in Spain, the trending hashtags tend to be monopolised by marketing campaigns (e.g. #EnCasitaConChollometro or #EnCasaConAcerYPcComponentes) and of the use of the hashtag #Happy followed by the day of the week (e.g. #FelizSabado; 25,080 tweets on 28/03/2020). The following charts offer an overview of trending topics in Spain between mid March and mid May 2020. As mentioned and presented in the first chart, the hashtag happy(weekday) is widely used (e.g. #FelizLunes; #FelizMiercoles; #FelizDomingo). To foreground hot topics, in the second chart we have decided to exclude the happy(weekday) hashtag. Besides 'COVID' and 'Madrid', which was the city in Spain with the highest number of COVID-19 cases, entertainment shows such as '#MasterChef' along with shows talking about the pandemic received the most attention. Some examples are, '#MillenioLive' is a TV show on YouTube conducted by Iker Jiménez, who talks about topics related to science and technology from a counter-culture perspective keen on fostering controversies. As well, '#Rosavientos' is an entertainment radio show with podcasts produced by AtresMedia and presented by Bruno Cardeñosa y Silvia Casasola in which a lot of attention was paid to the science around COVID-19 and the management of the pandemic. Moreover, '#PabloMotos' refers to Pablo Motos Burgos, who is the presenter of satirical TV show El Hormiguero, who has been vocal and critical about the government's management of the pandemic. Lastly, "Abascal" refers to Santiago Abascal Conde, the leader of the right-wing party Vox.

Fig. 15 WORD CLOUD for Twitter trending topics in Spain (18-Mar to 19-May 2020) - original version.

Fig. 16 WORD CLOUD for Twitter trending topics in Spain (18-Mar to 19-May 2020) - revised version after removing the hashtag happy weekday.

As for topics surrounding Spanish tweets on COVID-19 and misinformation, we acknowledge that Spanish-speaking Twitter users largely reside in Mexico (10.2M) and Spain (8.4M)[11]; thus, it is difficult to disambiguate to which topics came from which country. The top tweets of the most prominent topic include personal accounts (e.g., of having or relatives' having the virus) and disbelief, that the virus is a lie.

Tab. 7 Topic model results for Spanish (ES)

#	Weight	%	Top Words
1	0.2033	14	lie coronavirus covid people virus corona fake home saying government people quarantine believe false conspiracy someone believe to leave world shit
2	0.1258	7	disinformation covid coronavirus media pandemic manipulation false information health measures crisis fakenews fear communication virus panic times theme mex- ico population
3	0.0953	6	covid lie coronavirus government false manipulation pandemic virus crisis people scam economy venezuela president world crown political liar want cuba
4	0.0875	5	covid coronavirus lie dead cases deaths manipulation government figures data peo- ple false spain deceased virus china flu countries tests number
5	0.0743	5	false information coronavirus covid official social networks fakenews misinforma- tion whatsapp sources circulates pandemic panic avoid spreading remaining home news health fake

[11] https://www.statista.com/statistics/242606/number-of-active-twitter-users-in-selected-countries/, STATISTA, 29-05-2020, 12:25.

2.2.3 France

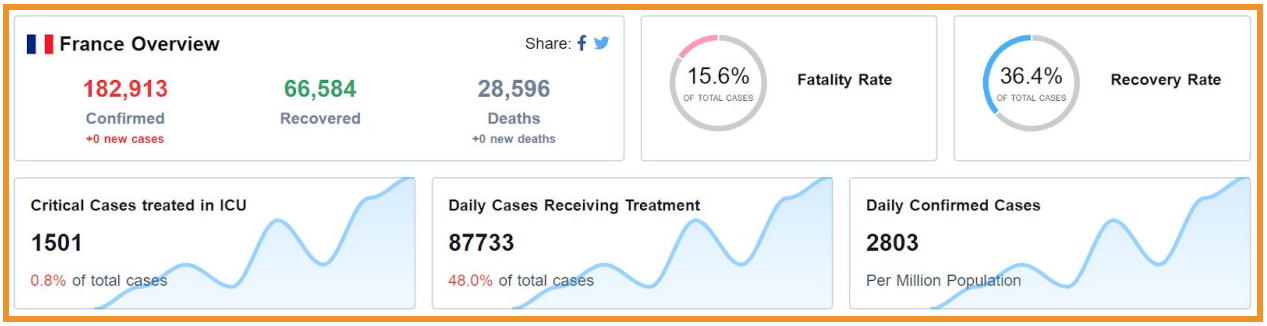


Fig. 17 COVID-19 in France (28/05/2020) by CoronaTracker

The French government announced a strict nationwide lockdown on March 17 2020. The banning of all public gatherings came with the closing of all non-essential shops. Families were allowed to take walks within 1 kilometer of their homes. Walking the dog was also allowed, as well as outdoor exercise for one hour once a day. Those breaching lockdown rules could face fines between €135 to €3,700, as well as up to six months in prison for multiple violations. The lockdown was extended from April 1 to May 11 2020, when gradual containment exit started. The level of deconfinement depended on green and red areas.

The government urged companies to ensure employees can continue to work from home when possible and, if it is not possible, to introduce shift working in order to avoid transport congestion and ensure physical distancing. Face masks became compulsory on public transport for everyone aged 11 and above. To enforce social distancing measures, public transport providers operated at around 50% capacity from 11 May 2020. Children began returning to nursery and primary schools from Monday 11 May 2020 on a voluntary basis. These classes are restricted to 15 pupils in primary schools and 10 in nursery schools.

According to an Odoxa-Dentsu Consulting survey published on 6 May 2020, 58 percent of the French people surveyed did not trust the government to implement a successful lockdown exit plan. 74 per cent say public transport will not be safe and more than two thirds believe schools will not be able to ensure the safety of pupils and teachers.

The analysis of trending topics in the French Twitter sphere reveals a vast ongoing debate about #confinement and #deconfinement measures, besides coronavirus (#covid). Entertainment, documentaries, newsmagazines (#ZoneInterdite), and TV shows also are part of people's daily conversations (#4mariagespour1lunedemiel; #TopChef; #PekinExpress; #septahuit; #KohLanta and celebrities such as #Moussa, Claude, or Greg). People also talked about relevant public figures such as #EduoardPhilippe, whos is the

Prime Minister of France, the journalist #PatrickCohen, and the President of the US #Trump, who is mentioned in many of the countries analysed.

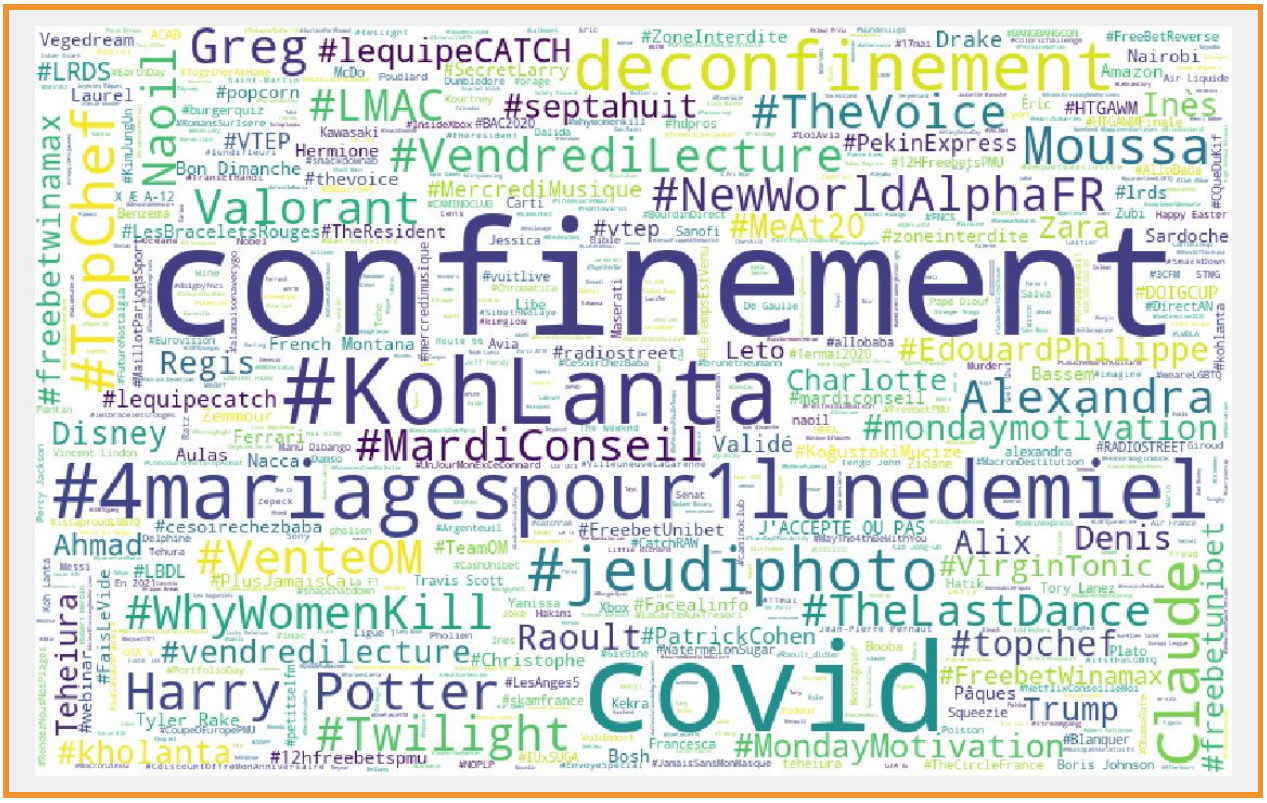


Fig. 18 WORD CLOUD for Twitter trending topics in France (18-Mar to 19-May 2020)

For the topics surrounding both COVID-19 and misinformation, France's top topic (1) is characterized by messages that have criticisms levied against others, including accusations of stupidity. The French tweets also harbor messages that drop noticeably in prominence since January, including those that serve to warn the public of misinformation.

Tab. 8 Topic model results for French (FR)

#	Weight	%	Top Words
1	0.2077	18	is covid the fake coronaviruses but in with news they did us well same virus lie do like this
2	0.0852	8	the coronaviruses covid fake news fakenews misinformation against false social network information with information fight pandemic media in

3	0.0799	7	lie covid coronavirus les des is macron masks state liar government france in us fakenews political crisis french lrem emmanuelmacron
4	0.0734	6	covid is the lie of the dead deaths in number coronavirus cases france country mortality but with false figures
5	0.0635	5	binds the coronaviruses confinement in us crisis context in the sanitary is our our measures risk epidemic make pandemic

2.2.4 The Netherlands

Fig. 19 COVID-19 in The Netherlands (28/05/2020) by CoronaTracker

The Duch government pursued herd immunity through an "intelligent" or "targeted" lockdown, in order to cushion the social, economic and psychological costs of social isolation and make the eventual return to normality more manageable[12]. Only those businesses that require touching, like hairdressers, beauticians and red light district operations, have been forced to cease trading. Schools, nurseries and universities are closed until at least 28 April 2020. Dutch Prime Minister, Mark Rutte, described the Netherlands as a "grown-up country": people seem to maintain 1.5m social distance.

The first lockdown measures were announced on 12 March 2020 and included the following rules:

- avoid contact with others, especially with vulnerable groups
- events with more than 100 people are cancelled
- for health professionals and individuals who work in vital professions: stay home only if you have symptoms and fever, and do not travel abroad
- universities are asked to provide online education

[12] Anna Holligan "Coronavirus: Why Dutch lockdown may be a high-risk strategy", BBC News, 5 April 2020.

- schools and kindergartens remain open

Initially, these first measures were meant to remain in place until 31 March 2020. However, they were extended and sharpened, just one weekend after their first announcement. The Dutch prime minister justified the quick tightening of the initial measures by referring to the public's lack of adherence to social distancing. That weekend, bars, cafes and terraces were flooded with customers flocking together in close proximity. As a result, on 15 March 2020 the cabinet announced the following measures which were to remain in place till 6 April 2020[13]:

- schools and kindergartens are closed
- teachers prepare homeschooling activities, specifically for highschool students who are expected to graduate this year
- children of parents who work in vital professions (e.g., health, police, public transport, and fire fighters) can be sent to child care facilities so their parents are able to continue working
- all eating and drinking facilities are closed
- all previous measures are extended till April 6 2020

On March 16th 2020, the following revisions were added:

- sports and fitness clubs, saunas, and sexclubs are closed
- coffeeshops (i.e., legal sale of cannabis) remain open, but only for take-away
- food delivery and take-away remain possible
- everyone is asked to keep a 1.5 meter distance in public

On March 23 2020, the government announced an additional set of measures[14]:

For individuals:

- everyone stays at home as much as possible
- people with cold symptoms, like cough, have to stay home. If they have a fever, every person belonging to the same household stays home.
- people are allowed to go outside for vital activities, such as doing groceries, visiting the doctor, outdoor walks and sports
- people can go outside in groups of up to 3 people. If they go outside with groups larger than 3, and they do not keep a distance of 1,5 meters, they can get a fine of a maximum of 400 Euros. These rules do not apply to family members.

[13] Rijksoverheid [Dutch National Government]. News report, 15-03-2020 | 17:35
[14] Rijksoverheid [Dutch National Government]. News report, 24-03-2020, 21:15

- a maximum of 3 individuals are allowed to come visit but if they do, they are expected to keep a distance of 1,5 meters

For children:

- children up until 12 years old are allowed to be in contact with each other and to play outside
- caretakers of children have to keep 1,5 meters distance from each other and are allowed outside only if they do not have health complaints

For companies and institutions:

- all public events are cancelled till June 1 2020, the lower limit of 100 people does no longer count, but there are exceptions for funerals and church weddings
- all gatherings, such as museum, concert venues, theaters and sports competitions are forbidden till April 28 2020
- hairdressers, beauty specialists, and individuals in professions that involve contact cannot perform their work until April 28 2020, because in these professions it is not possible to keep 1,5 meter distance
- municipalities get more power to impose the stricter measures, they are allowed to close locations where people tend to gather, such as parks and beaches
- shops and public transport are obliged to take measures to facilitate social distancing, for example by means of door policies
- shops will be fined and closed if they do not adhere to these measures
- all previous measures, like closing of food, drink and sports facilities, remain in place until April 28 2020

On 31 March 2020, the Dutch cabinet decided that all measures stay in place until 28 April 2020[15]. This means that schools, kindergartens and universities remain closed. In the week before 28 April, the cabinet decided what type of measures are necessary for the period after. For the Easter weekend, the strong recommendation was to stay at home.

The cloud of words below show trending topics on Twitter in the Netherlands between mid March and mid May 2020. Entertainment mostly captured people's attention, especially TV shows about football (#veronicainside) or dating TV shows (#boerzoektvrouw and #firstdates). Another popular TV show (#beaublijftbinnen) covered issues that people struggle with during the pandemic. Several hashtags of medium or small size (size indicates frequency of repetition) related to COVID-19 and specifically to the corona debate (#coronadebat), to the use of sanitary masks (#mondkapjes), to "stay home" recommendations (#blijthuis), and to social distancing in the new "1.5 meter-society" (#anderhalvemetersamenleving). Official communications also received wide attention. The

[15] Rijksoverheid [Dutch National Government]. News report, 31-03-2020, 19:00

hashtag #persconferentie (press conference) refers to the prime minister's conference when he spoke of the lockdown and other corona measures (#coronamaatregelen).

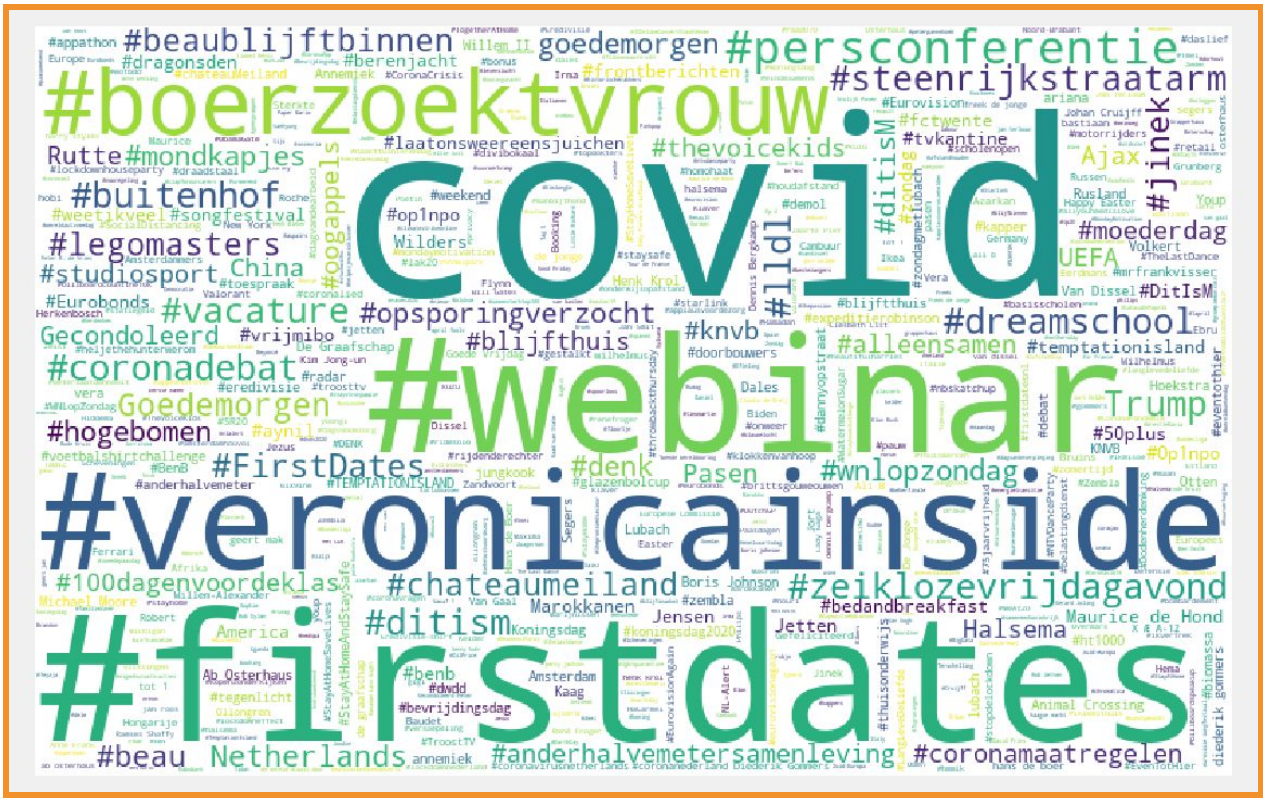


Fig. 20 WORD CLOUD for Twitter trending topics in The Netherlands (18-Mar to 19-May 2020)

The most prominent Dutch topic on COVID-19 and misinformation (topic 1) comprised a mixture of tweets that espoused belief that the virus or the elevated dangers is a hoax. However, some warned of the opposite, that deaths are underreported, and others warned of the spreading of misinformation. Topic 2 focuses more on the spread of fake news, particularly on social media, with generic warnings and also specific incidences of fake news reporting. However, this topic was most prominent earlier in the pandemic and appears to have become muted over time.

Tab. 9 Topic model results for Dutch (NL)

#	Weight	%	Top Words
1	0.3696	20	coronavirus corona covid virus people fake hoax news go conspiracy lie real fakenews news go flu kill all fake good
2	0.1335	10	coronavirus fake news media news messages twitter disinformation message nos fake warns reliable fakenews goes nunl fake dutch news rise social
3	0.1050	6	hoax virus trump corona coronavirus democrats fake youtube news president called wolferen karel says guilt control come left msm
4	0.0753	3	covid coronavirus fakenews covidnl rivm hoax coronavirus netherlands fake news corona netherlands corona crisis jensen lockdown coronavirus en pandemic virus corona minpres bioweapon control nos
5	0.0679	3	conspiracy coronavirus covid virus wuhan lab corona theory world man chinese theories china come made see power developed sars laboratory

2.2.5 Germany

Fig. 21 COVID-19 in Germany (28/05/2020) by CoronaTracker

Germany opted for strict social distancing measures which were issued on 22 March 2020. A banning of public gathering was enforced, except for families and those who live together. Non-essential shops were told to shut down and restaurants could only offer food deliveries and pick-up. Many Germans seemed to accept the confinement rules for the first three weeks after the lockdown, which started on 23 March. However, more than 100 people were arrested by German police on Saturday 25 April 2020 for flouting the coronavirus lockdown measures they were protesting against. The protest organisers'

website called for "an end to the state of emergency" and played down the threat posed by the virus. By 11 May 2020 most shops and playgrounds reopened, children are gradually returning to classrooms and the states are at varying degrees of reopening restaurants, gyms and places of worship. Germany has not imposed total confinement across the country, but the government is keenly aware of the risk of lifting restrictions too early only to have to impose a full lockdown later.

Similarly to The Netherlands, Germans talked mostly about entertainment on Twitter. TV shows, especially reality TV or talk shows (#dasperfektedinner, #hartaberfair, #firstdates, #letsdance, #promisunterpalmen, #tatort, #annewill, #lanz, #themaskedsinger, #shoppingqueen) captured the attention of most users. Besides conversations directly related to coronavirus (#covid), hashtags associated with the pandemic refer to the easing of lockdown measures (#Lockerungen), the stay home recommendation (#wirbleibenzuhause), and the mandatory use of sanitary masks (#maskenpflicht) are also visible.

Fig. 22 WORD CLOUD for Twitter trending topics in Germany (18-Mar to 19-May 2020)

Like Spanish, as German is spoken/written prominently not just in Germany, but also in Austria and Switzerland; therefore, disambiguation in this case is a

limitation. For German tweets on COVID-19 and misinformation, the top two topics are relatively more distinct and prominent than other topics, compared to those of other countries. These two topics compete for opposing narratives with topic (1) comprising warnings for misinformation proliferation by non-official agents and topic (2) showing claims of fake news and lies from the media and public officials. Topic (5) also has risen in recent weeks. However, this topic is dominated by tweets by a private user, with a modest following, whose tweets point to a Google document discussing various (political) perspectives of the pandemic.

Tab. 10 Topic model results for German (DE)

#	Weight	%	Top Words
1	0.3214	23	coronavirus fake news fakenews spread covid about corona for virus ibuprofen media whatsapp conspiracy theories spread false positives please information in- formation warns
2	0.2648	15	coronavirus covid corona virus fake lie for fakenews news germany about flu num- bers government dead people goods truth simply rki
3	0.0661	3	trump coronavirus hoax usa covid fakenews democrats for designated president luge donald virus lugner vaccine media world china curevac uber
4	0.0643	3	disinformation coronavirus about covid pandemic fakenews russia corona peep- ing drought warn russian doctors propaganda news online misinformation report outbreak gates
5	0.0620	4	covid hoax corona corona crisis youtube covidde corona Germany pandemic crisis fakenews kaufman returns coronavirusde horror mask requirement flattenthecurve new coronavirusdeutsche wirbleibehause luge

2.2.6 Austria

Fig. 23 COVID-19 in Austria (28/05/2020) by CoronaTracker

Austria was hit by the pandemic at the end of February 2020. Initially it became one of the major COVID-19 hotspots in Central Europe with much European media coverage during this period. Highlighted as breaking news in major Austrian media on 25 February 2020, Austrian authorities confirmed the first two cases of COVID-19, a man and a woman from Lombardy, Italy were tested positive and treated at a hospital in Innsbruck, Tyrol. On 10 March 2020, the government announced that all universities would be closed by 16 March 2020. At this point, all outdoor events with more than 500 people and all indoor events with more than 100 people were cancelled and further guidelines for exit restrictions were announced. Travel restrictions for people arriving from Italy were established. The government also asked the general public to avoid social contact and announced that further restrictions would be made soon. Suspected COVID-19 infected people were requested to go to a doctor or to an outpatient clinic, in order to reduce the risk of infection. They were also asked to call the Healthcare number '1450' instead. On 15 March 2020, a ban was announced for public gatherings of more than five people.

By 16 March 2020, nationwide, homes may only be left for one of the following reasons: (a) necessary professional activities, (b) necessary purchases (groceries or medication), (c) assisting other people, (d) activities outside, alone or in the company of people living in the same household.

On 30 March 2020, the Austrian government announced that everyone entering a store has to wear a face mask, this came into effect on 6 April 2020. From 1 April to 6 April 2020, random tests were conducted by the SORA Institute who contacted 2000 randomly selected candidates in regions affected by the virus; 1544 of the candidates were tested. Based on this study, the prevalence of the infection in the non-hospitalized population was recalculated, resulting in an estimate around 0.33%. The results were announced on 10 April. On 14 April, wearing face masks became mandatory on public transportation. At the same time, stores such as retail shops and home improvement stores that are under 400

square metres reopened, followed by bigger stores and shopping malls reopened on 2 May.

On 28 April 2020, it was announced that from 1 May 2020, gatherings of up to 10 were permitted and bigger shops and hairdressers were allowed to open, from 15 May 2020, restaurants were allowed to reopen under certain conditions, and from 29 May 2020, hotels and swimming pools were allowed to reopen.

Cross-border crisis communication and the case of Ischgl. At the beginning of March, authorities in Germany and Nordic countries voiced their concerns about the spreading of COVID-19 in the Tyrolean ski resort village of Ischgl. Apart from Iceland and Norway, many other European countries reported cases of COVID-19 infection from returning Ischgl vacationers, including Denmark and Germany. In parallel with the massive failures in the crisis communication, Austria's international image is also damaged. To give an example, Manfred Lucha, Minister of Social Affairs of Baden-Württemberg, Germany, responded with the following statement about the case of mismanagement: "Our problem is not Iran, but Ischgl."

A number of infections were eventually traced back to this village, where transmissions were identified from late February onwards. After initially questioning the risks, authorities in Tyrol placed the entire village in quarantine on 13 March 2020. On 18 March 2020, provincial governor Günther Platter declared a lockdown throughout the province of Tyrol.

On the evening of 16 March 2020, the state government of Tyrol had a chance to explain the COVID-19 situation during a TV show on the Austrian Broadcasting Corporation (ORF). Bernhard Tilg, State Councillor for Health, called in via video link to this Austrian major news programme as a guest. During this TV show, he stressed that the authorities had done everything right. Shortly after, the accusations against the provincial government grew louder, and opposition parties were demanding the resignation of the State Health Councilor.

The Federal Ministry of Labour, Social Affairs, Health and Consumer Protection (the german title in short: BMSGPK) took the leading role in the nation-wide communication plan and provided regularly updated service information, which can be accessed online. Austrian Federal Ministries implemented a crisis management system in order to provide stakeholders with regularly updated information within its remit on the latest developments in the COVID-19 outbreak. All COVID-19 related laws and decrees are listed and accessible via the ministry's website. The epidemiological curve below shows the dynamics of the COVID-19 epidemic over time. This data comes from the Epidemiological Reporting System (EMS).

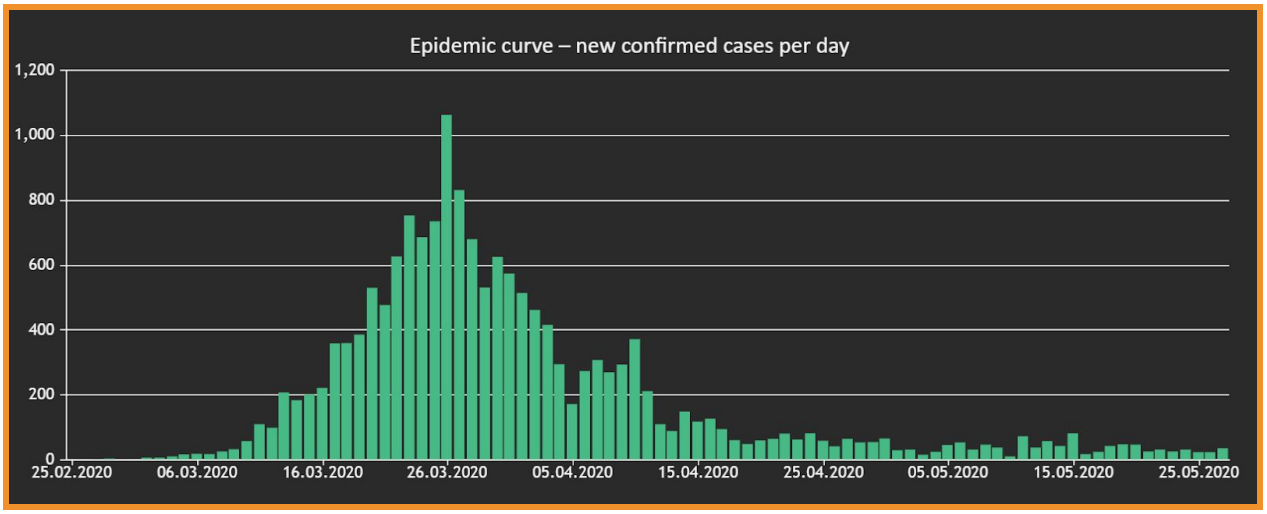


Fig. 24 Epidemiological curve in Austria provided by BMSGPK (retrieved 28.05.2020)

The Austrian Federal Ministry for Digital and Economic Affairs (BMDW) provided a general online portal to COVID-19 related issues in a national, European and transnational context. In mid March 2020, the Austrian government also launched a digital crisis team to counteract fake news in collaboration with a task force sponsored by the Federal Ministry for Internal Affairs. On 27 March 2020, the Federal Ministry for European and International Affairs started a communication campaign in 16 languages to prevent fake news with foreign origins or a inmigration background from targeting the Austrian population. The Austria Press Agency (APA) regularly published fact checks and updated reports about Coronavirus and the pandemic, and made available the APA-Faktenchecks tool, which complemented the work done by other platforms such as Mikama.

The Austrian government held daily press conferences and members of the government were active on social media constantly informing the public on the COVID-19 crisis in Austria. In March 2020, Federal ministers and their teams published nearly 2000 postings and generated about 1,7 mio user interactions – about 75 % of the published postings had a focus on COVID-19. One of the most used platforms for communicating about the pandemic was Facebook. According to a survey conducted by the Gallup Institut on a representative sample of the Austrian population, 77 percent of respondents was satisfied with the information they received from traditional media such as TV and newspapers, but also online news portals - media such as ORF ON, derstandard.at and die Kleine Zeitung were identified as high quality media outlets.

By the end of April 2020, a lively debate on policy and legal measures adopted by the Austrian government and its use of crisis communication, and the fear it generated, took place. On 27 April 2020, Ö1 Morgenjournal, a radio format of the Austrian Broadcasting Corporation, published the details of a meeting of the Austrian Federal Chancellor with experts, which took place at the beginning of March 2020. It was shown that at this

meeting, forcing the Austrian public to take precautions with strong narratives on potential consequences of the COVID-19 pandemic was considered. In succession, the Austrian political opposition reacted with heavy critics. In parallel, some Austrian media and communication experts started to put out claims to stop "message control" by the government and argue for the lack of transparency in data presentation.

As shown in the word cloud, Austrians watched a lot of TV programs and discussed them on Twitter between february and march 2020. For example, Zeit im Bild (#zib2) but also #imZentrum are popular news programs broadcasted by ORF that discuss emerging topics. #puls24 is another show discussing current events, and it is run by a private TV group (ProSieben). The discussion around COVID-19 (#covid) has been lively in Austria, especially the controversy around the spreading of the disease in the town of Ischgl (#Ischgl), which is a ski resort village in western Austria's Paznaun Valley. Austrians were also interested in discussing how their life was affected by the lockdown. Keywords such as #homework show the interest of Twitter in smart working, while #Matura refers to the debate on final year exams for 12th level students.

Fig. 25 WORD CLOUD for Twitter trending topics in Austria (18-Mar to 19-May 2020)

2.2.7 Poland

Fig. 26 COVID-19 in Poland (28/05/2020) by CoronaTracker

On 4 March 2020, Poland confirmed its first diagnosed case of COVID-19, the same day as the first confirmed cases in Hungary and Slovenia were identified. From 9 March 2020, the government started introducing restrictions on freedom of movement and gatherings, and implemented health checks at its borders. Restrictive measures included a lockdown confining people to their homes except for essential activities, which would included food shopping, dog-walking, going to work and taking care of elderly relatives and a ban on gatherings of more than two people, excluding families. Since 15 March 2020, people returning to Poland were subject to a mandatory 14-day quarantine. On March 28 2020, the Polish Parliament adopted a COVID-19 economic support plan worth nearly EUR 50 billion, equaling 10 percent of the Polish GDP. The closure of schools and airports lasted until 26 April 2020 and of borders until 3 May 2020. Easing of confinement measures in Poland started on 20 April 2020. The 2020 Polish presidential elections were due to be held on 10 May 2020, but it was postponed due to the pandemic. The Polish government announced that hotels, malls, and some open-air sport facilities can be reopened on 4 May 2020. Nurseries and kindergartens also resumed on 6 May 2020.

Fig. 27 “Not every hero wears a cape” mural

Similar to Germany and the Netherlands, entertainment attracted the most attention on Twitter. Sport TV shows (#hejtpark), dating TV shows (#hejtpark), and talk shows about politics and current affairs (#wtylewizji, #woronicza, #minela8) are widely discussed by Polish Twitter users. Politics is a pretty visible topic in the Polish Twittersphere. It is common to find references to political agreements (Porozumienia) and political institutions such as the lower house of the Polish bicameral parliament (#Sejm) and the Court of Justice of the European Union, or CJEU (#TSUE). Mentionings of political figures are also common. Twitter users talked of Jacek Sasin (#Sasin), who became Deputy Prime Minister in June 2019 and the Minister for State Assets in November 2019, and of Jarosław Adam Gowin (#Gowin), who is a Polish conservative politician and an editor. Gowin served as Minister of Justice in the cabinet of Prime Minister Donald Tusk between 2011 and 2013, and as Minister of Science and Higher Education in the cabinet of Mateusz Morawiecki between 2015 and 2020. Even former Polish Pope John Paul II (Jana Pawła II) was frequently mentioned.

Besides coronavirus (#covid), more than about the lockdown, people talk of activities affected by confinement such as the celebration of secondary school exams (#matura2020).

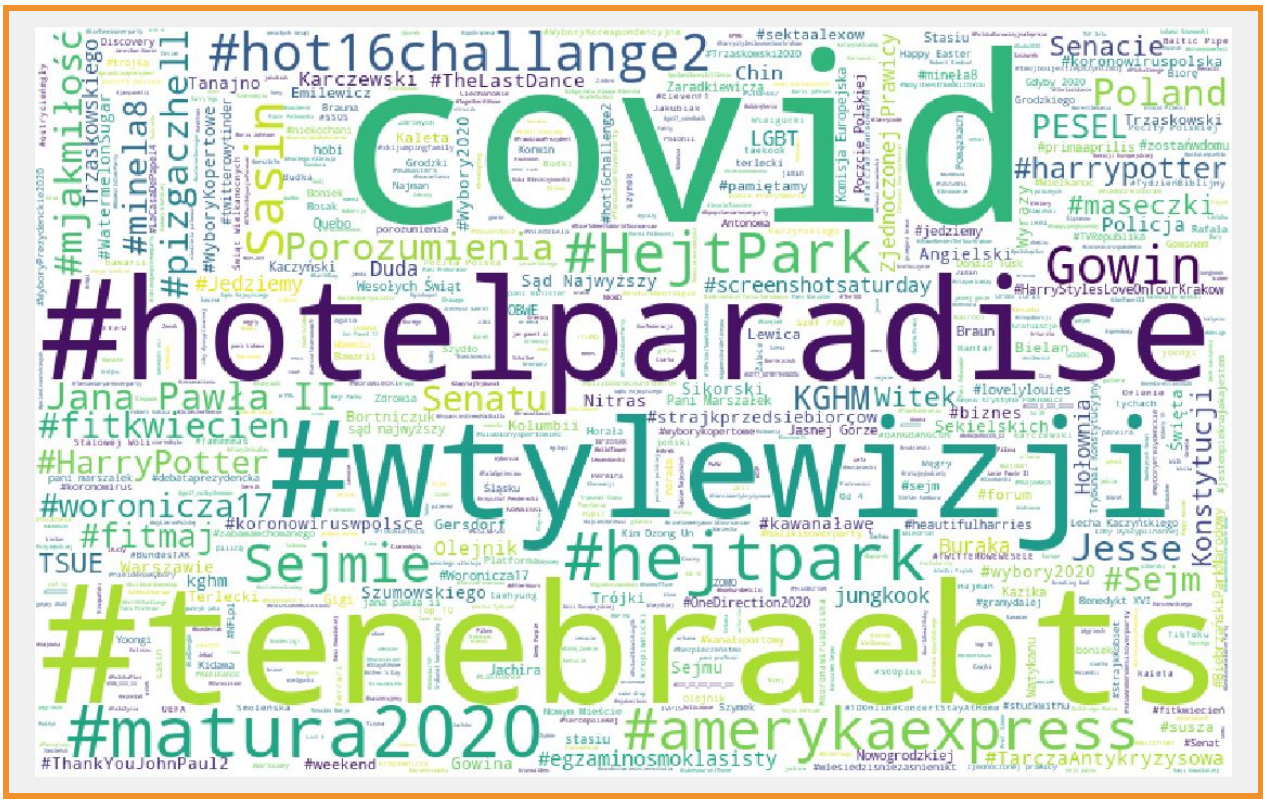


Fig. 28 WORD CLOUD for Twitter trending topics in Poland (18-Mar to 19-May 2020)

Tweets in Polish, that are about COVID-19 and misinformation, appear to not exhibit dominant topics, unlike those from the other languages. While many of the top topics show a decline in popularity over the months, the most stable topic (2) contains a mixture of subtopics with mentions of the virus' effect on animals and the veracity of news and other information reports. The top tweets for Topic 4 are recent retweets pointing to a Washington Times publication decrying the pandemic as overblown by the media.

Tab. 11 Topic model results for Polish (PL)

#	Weight	%	Top Words
1	0.0619	11	covid fakenews coronavirus coronavirus coronaviruspolska network will become a fake coronavirus in Poland Moravian Poland Poland disinformation coronovirus unfortunately ncov gov coronavir suspolska skimskish Poland
2	0.0524	7	covid fake news more Polish testing maybe more than people sick news walks the truth of the dead etc. data please
3	0.0399	6	fake covid news news russia news fight the coronavirus compound disinformation sbu bots news was maybe the country the topic of recommendation
4	0.0358	9	cheat pandemic covid big media times information life page law right wing jour- nalism church internet rypla washington flu case virus
5	0.0351	6	covid coronavirus already misinformation pandemic coronavirus china liar will be the government epidemic time fraud Poles make Morawiec Poles to seriously

2.2.8 Hungary

Fig. 29 COVID-19 in Hungary (28/05/2020) by CoronaTracker

The Hungarian government declared a state of emergency on 11 March 2020. Based on Section 58 (2) of the Hungarian Constitution the government may adopt such decrees that suspend certain legal acts and deviate from legal measures, as well as may take other extraordinary measures for the purposes of protecting human health or ensuring legal security and economic stability. The validity of such decrees are originally limited to 15 days however - with the adoption of Act XII of 2020 on 31 March - all these current and future measures were declared valid for an indefinite period, i.e. until the end of the state of emergency declared by the government. This legal move was met with widespread critics both within the country and in the international community.

Fig. 30 Text: "Enemy at the gates" (kórház=hospital) - hvg.hu

The first measures against the spread of COVID-19 included the re-introduction of border controls and the closing of all borders (first towards Austria and Slovenia and to all neighbouring countries). Both higher education institutes and lower-level (primary and secondary) schools were closed as of 16 March and children had to engage in distance education. According to the latest plans, secondary school leaving exams will be organised in May, but only on a voluntary basis and in written format.

With regard to social distancing, on 16 March 2020 the first restrictions were introduced with the closing of all cultural institutes, museums, cinemas and theatres and cafés and restaurants being only open till max. 3 PM. These rules were made stricter on 27 March 2020 when a curfew was ordered between 28 March and 11 April 2020, and the closing of all cafés and restaurants. As well, people are only allowed to leave their home with a substantial reason. Only pharmacies and food stores were allowed to be open after 3 p.m.

Since elderly people (65+) are among the most vulnerable segments with regard to the pandemic, their shopping hours were restricted to a time period between 9 a.m. to 12 a.m. The curfew was subsequently prolonged and local mayors may introduce stricter regulations in their municipalities than the national measures.

As for the future of work, the crisis brought about an extensive flexibilisation of the labour market by Section 6 of Government Decree 47/2020, which effectively suspended the Labour Code on 18 March 2020, by allowing any deviations from stipulations within collective agreements in case the employers and employees can agree upon them. On the other hand, following the example of German "Kurzarbeit", more security was offered to employees at risk of losing their job through the introduction of a state-support system for people temporarily employed in a shortened working time on 10 April 2020.

4. TRESCA THEMATIC AREAS AND COVID-19

The communication of medical, biological and epidemiological research. With the insurgence of the COVID-19 outbreak, most science communication articles tried to explain how the virus works and what makes this new coronavirus so unique and dangerous[16]. The pandemic made evident to everyone that effective science communication can increase public health preparedness in the event of an emergency.

Wearing a sanitary mask soon became one of the symbols of the pandemic throughout Europe. Some German cities made the wearing of these protective masks mandatory[17] and the acquisition and production of sanitary masks and other protective gear and items became a national priority in France[18], Spain[19] and Italy[20]. When people cough, sneeze, talk, or simply breathe a plume of air and droplets are emitted. With the smallest of these droplets, sometimes called aerosols, hovering or drifting through the air for hours as a possible way of infection, masks are widely seen as the way to reduce the spread of the infectious by catching microbes expelled by the wearer and protecting the wearer from microbes in their environment[21]. However, inconsistent results in randomized controlled trials have failed to find definitive support for mask wearing, which lead to some health policy organisations deciding against recommending mask wearing to the general public. The result has been a controversy around the effectiveness and usefulness of sanitary masks, as expressed in the Tweet below by Dr Angela Rasmussen.

[16] von Köksal Baltaci, "Was das Coronavirus so einzigartig und gefährlich macht", Die Presse, 30.03.2020 um 09:53 [40 Kommentieren] [Austria].
[17] "Erste deutsche Großstadt führt Maskenpflicht ein", Die Welt > Panorama, 31/03/2020, 8:08 [Germany] [5553 comments].
[18] Par Stanislas Poyet, "EN DIRECT - Coronavirus: forte hausse des décès en France, Macron se rend dans une usine de masques", Le Figaró > Sciences, 31/03/2020, 6:57.
[19] EFE, "Llegan a España 1,2 millones de mascarillas para sanitarios y empleados de transporte", La Vanguardia, 28/03/2020 11:45.
[20] Silvia Turin "Coronavirus, mascherine: quali sono quelle che ci proteggono e che scadenza hanno", Corriere della Sera, 16/03/2020.
[21] Ferris Jabr "It's Time to Face Facts, America: Masks Work", WIRED, 03.30.2020 12:59 PM.

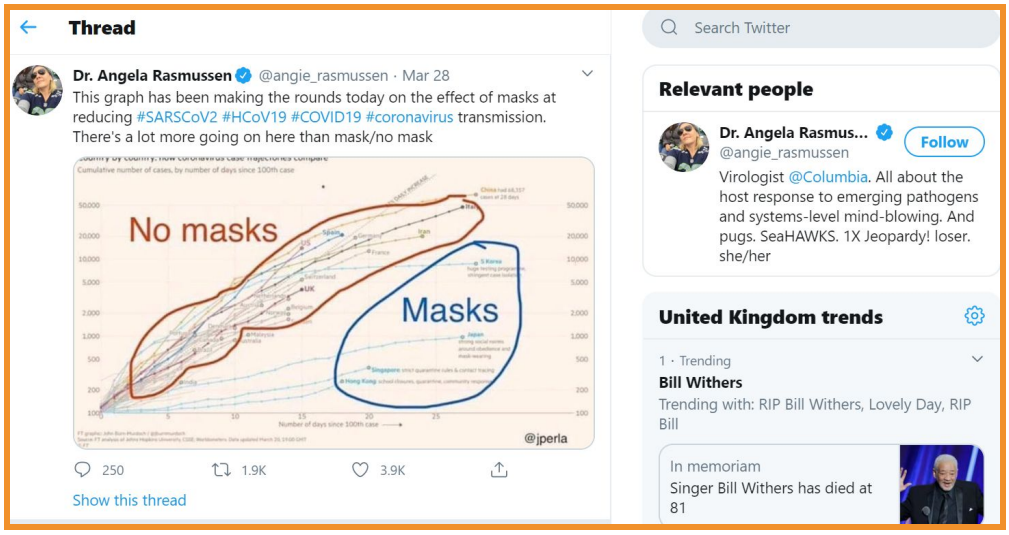


Fig. 31 @angie_rasmussen's tweet about the effect of mask at reducing #SARSCoV2 transmission (Mar 28, 2020)

Along with protective masks, the use of sanitizers and gloves was interpreted as another element that became a basic safety barrier against COVID-19. For example, the sale in Italy of Amuchina, which is a disinfectant solution that is used for hands, surfaces, commonly used objects, and even food, increased dramatically during the pandemic. The ironic cartoon below represents the psychological role that Amuchina has played in lowering Italian people's anxiety about catching the virus. Experts suggestion actually prefers soap above hydroalcoholic gel, and if possible enzymatic cleaners.

Fig. 32 From a Franco Battiato's song: "Amuchina: I will protect you from the fear of hypochondria".

The use of gloves has been mainly recommended for healthcare workers, and health officers recall that there is no reason to wear gloves out in public. The problem with the

use of gloves is that it may create a false sense of safety, which can make people forget about basic hygiene protections against COVID-19, such as avoiding touching our face or hand washing after touching possible contaminated surfaces (as the screen of our mobile phone). In addition, masks and gloves disposal should be properly carried out to avoid health hazards and any additional environmental impact, like on Hong Kong's beaches where discarded face masks were piling up. Environmental groups have warned that this type of waste is a threat to marine life and wildlife habitats.

Caregivers and health workers denounce the lack of protective gear and of the basic equipment (alcohol, glycerin, masks, thermometers, gloves)[22] they need to carry out their work. To respond to the demand for sanitary protections, bottom-up initiatives started to emerge in various countries. In Spain, 15,000 volunteers formed part of the 'Makers' community adopt a Do-It-Yourself (DIY) approach and start producing all sort of objects with 3D printers[23], from protection masks[24] to ventilators[25]. Despite the goodwill and spirit of the initiative, Makers has been celebrated[26], these items are sometimes accepted by hospitals and police forces and other times rejected by them, as happened in Madrid on March 30th[27]. The industrial sector also responded with acts of kindness, such as the production of textile sanitary masks[28].

The reluctance of certain governments, such as Hungary, to provide the population with affordable protective masks – citing the initial WHO recommendations that advised against healthy people wearing masks – resulted in various bottom-up social initiatives that started to provide people, and in particular healthcare workers, with 3D-printed masks and other medical equipment. Most of these actions were crowdfunded through various social media channels. A Hackaton was also organised to find co-creative solutions for social and medical problems caused by the pandemic. The necessity of such voluntary non-profit actions aimed at hospitals is underlined by the fact that 12.5% of the infected people are healthcare workers. In addition to the lack of protective masks, the questionable quality of certain masks, tests and medical equipment ordered by the Hungarian government from China, was another area of concern. The 3D-printed solutions can provide a potential alternative. Similar quality problems with Chinese medical products were also seen in other countries, such as the Netherlands, Spain or Czech Republic.

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[22] ALICIA ALAMILLOS, CARLOS BARRAGÁN, ENRIQUE ANDRÉS PRETEL, "¿Por qué no quedan mascarillas? El miedo a la expropiación agrava la escasez en España", El Confidencial, 18/03/2020 05:00 [Spain].

[23] "Impresoras 3D y 'makers' en la crisis del coronavirus: quiénes son y cómo se organizan", Maldita.es, 27/03/2020.

[24] HÉCTOR ATIENZA, "Los 15.000 'makers' que fabrican viseras con impresoras 3D para sanitarios y policías", El Mundo, 27/03/2020 9:22 [Spain].

[25] "Ventiladores respiratorios: ¿Qué hacen y cómo trabajan?", Hacedores.com, 26/Mar/2020 [Spain].

[26] BELÉN GARCÍA, "'Makers': los superhéroes 3D contra el coronavirus", RTVE.es 26.03.2020 09:17 [Spain].

[27] FERNANDO PEINADO "Madrid dice no a la solidaridad de los impresores 3D", El País, 30/03/2020 00:30 CET. See also the local government's explanation and the Ministry of Health's explanation.

[28] @Compromiso_Empr "Manos de toda España se unen para coser mascarillas sanitarias", 25 marzo 2020 [Spain].

The communication of Social Science and Humanities (SSH) research. The science communicated during the pandemic did not come only from medical and epidemiological research. The contribution of SSH research to give effective responses to crises such as COVID19 became evident as the pandemic progressed. As pointed out by Van Bavel and Willer and coauthors[29],

> *"Social and behavioural sciences can support efforts to identify effective public health messages, encourage compliance with government directives, design institutional responses that are well-calibrated to human behavior, sustain prosocial motivations in large, disconnected societies, manage anxiety and loneliness, identify cultural factors that can minimize the spread of the virus and motivate compassion for, and costly actions that benefit, vulnerable groups."*

Confinement measures adopted across Europe have accelerated the pace of digitalisation and people's familiarity with science and technologies issues. According to the 2018 3M's State of Science Index, people were already very excited about science-related advancements such as vaccines for chronic diseases. However, they also were concerned of other health-related scientific advancements such as "gene editing", genetically-modified food, or human cloning. In 2018, people were also concerned about robots and self-driving cars, even when they said that these scientific achievements would likely become a reality during their lifetime (see tables below with data from Germany, Poland, Spain and the UK)

Tab. 12 People's reactions to science-related advancements

Do you feel excited or afraid when it comes to each of the following science-related advancements?	Germany	Poland	Spain	UK
Answered: Excited to "Vaccines for chronic diseases (e.g. cancer, diabetes, etc.)"	88%	90%	91%	89%
Answered: Afraid to "Gene editing"	87%	72%	65%	63%
Answered: Afraid to "Genetically modified foods"	85%	79%	73%	64%
Answered: Afraid to "Human cloning"	93%	84%	80%	83%

[29] Van Bavel, J. J., & Willer, R. (2020). Using Social and Behavioural Science to Support COVID-19 Pandemic Response. PsyArXiv. doi:10.31234/osf.io/y38m9

Answered: Afraid to "Driverless cars everywhere on the road"	61%	51%	61%	63%
Answered: Afraid to "Robots in every workplace"	68%	54%	60%	61%
	n = 1002	n = 1003	n = 1000	n = 1000

Tab. 13 Likely near-future scientific achievements

Which, if any, of the following do you think science will achieve in your lifetime?	Germany	Poland	Spain	UK
Answered: Yes to "Vaccines for chronic diseases (e.g. cancer, diabetes, etc.)"	61%	64%	76%	63%
Answered: Yes to "Driverless cars everywhere on the road"	67%	54%	55%	61%
Answered: Yes to "Robots in every workplace"	48%	45%	63%	55%
Answered: Yes to "Space travel/tourism"	45%	52%	59%	55%
Answered: Yes to "Human cloning"	23%	26%	34%	35%
Answered: Yes to "Flying cars"	14%	33%	32%	27%
	n = 1002	n = 1003	n = 1000	n = 1000

As discussed in the next section, the COVID-19 pandemic has somehow accelerated scientific discoveries and technological developments especially in areas related to digitalisation and smart technologies. From smart working to distance learning, going through digital communication tools, the COVID-19 pandemic has magnified the risks and opportunities brought on by living a digitalised life. Based on Kouzy's and coauthors' analysis[30] of 14 different trending hashtags and keywords related to COVID-19, around 70%

[30] Kouzy R, Abi Jaoude J, Kraitem A, et al. (March 13, 2020) "Coronavirus Goes Viral: Quantifying the COVID-19 Misinformation Epidemic on Twitter". Cureus 12(3): e7255. doi:10.7759/cureus.7255

of the 673 tweets identified tackled medical/public health information, while the rest referred to sociopolitical and financial considerations.

According to Talkwalker "Stay home: Consumer trends during COVID-19" study, conversations around technology mostly touched upon the following themes: the new technology needed to keep working; the technology needed to keep in touch; and cybersecurity. These three areas of interest reflect TRESCA's thematic areas: (1) information safety, which includes cybersecurity, hybrid threats and mis/disinformation; (2) environ-mental health, which focuses on the effects of smart devices and digital communications on psychological wellbeing and social relations; and (3) smart technologies, digitalisation and the future of skills and work. Social distancing and confinement measures adopted during the 2020 pandemic generated a huge demand for knowledge in these three areas. In the following section we will briefly present key aspects of the debate around the effects of digitalisation on people's safety and social and economic wellbeing. These reflections contribute to the overall discussion within TRESCA about SSH research relevant to people and which demands to be widely disseminated and communicated.

4.1 Thematic Area No. 1: Information Safety

Social distancing requirements and confinement measures adopted across Europe forced people to suddenly rely heavily on digital and smart devices to perform daily activities such as working, learning, and communicating. This change is visible in the rapid increase in the demand for conference call services, the use of instant messaging applications, the rise of internet traffic and download of contents (movies, electronic books, podcasts, etc.).

In the midst of the COVID-19 pandemic, science was crucial to inform public policy. At the same time, mistrust of scientists and misinformation about scientific facts were rampant. According to the first briefing of the ISD's Digital Research Unit on the disinformation ecosystem around COVID-19, both state-sponsored media and extremist movements, especially anti-migrant and far-right networks, have been exploiting the Covid-19 situation to spread harmful and hateful messaging on social media. Based on the analysis of the COVID19 Infodemics Observatory, only 70.5% of news travelling on Twitter are reliable, which leaves us with 29.5% of unreliable news, due also to the fact that 42% of all Twitter accounts are bots, which means that only 58% are humans. Out of Kouzy's and coauthors' (2020)[31] analysis of 14 different trending hashtags and keywords related to COVID-19, 24.8% of tweets (153) included misinformation, and 17.4% (107) included unverifiable information regarding the COVID-19 epidemic. The keyword "COVID-19" had the lowest rate of misinformation and unverifiable information, while the keywords "#2019_ncov" and

[31] Kouzy R, Abi Jaoude J, Kraitem A, et al. (March 13, 2020) Coronavirus Goes Viral: Quantifying the COVID-19 Misinformation Epidemic on Twitter. Cureus 12(3): e7255. doi:10.7759/cureus.7255

"Corona" were associated with the highest amount of misinformation and unverifiable content respectively.

Instances of misinformation around COVID-19 has been investigated by NewsGuard, which explains, for example, that the claim that a high-dose of vitamin C regimen is effective against the new strain of coronavirus originated from a 26 January, 2020 press release titled "Vitamin C Protects Against Coronavirus." This was published by the International Society for Orthomolecular Medicine, which promotes large doses of nutritional supplements. The article was then republished in full the next day on HealthImpactNews.com, a Red-rated network of health sites with 450,000 Facebook followers that has promoted false health claims such as the debunked link between vaccines and autism. The earliest mention NewsGuard could find of the COVID-19 virus being called a "bioweapon" was a video published on 23 January 2020 from U.S. conspiracy theorist David Zublick, who has 160,000 subscribers on YouTube. The video was titled "Breaking: Coronavirus Is Bioweapon For Population Control" and received 22,159 views.

As people became increasingly reliant on social media and messaging services to keep in touch and communicate. Services such as WhatsApp became an undeniable part of people's life and a major communication channel[32]. Unfortunately, misinformation spreads easily throughout encrypted communication channels such as WhatsApp with very limited oversight. Fake audios are forwarded and shared via WhatsApp groups with no way of ensuring the reliability of the original source. To fight infodemics in the case of COVID-19, WhatsApp (owned by Facebook) is partnering with WHO, UNICEF, UNDP, and IFCN and is working on including a button into the App to enable info verification through Google. AFP FactCheck, the fact-checking arm of Agence France Presse, has already identified and debunked more than one hundred different myths circulating on instant messaging platforms. Already in March, an audio recording of a message spread with lightning speed among German-language users of WhatsApp. The voice of the woman speaking German, introducing herself as "Elisabeth" and which sounded genuinely concerned, says that a friend of hers, who was a doctor at the university hospital of Vienna, had called her with a warning. The clinic had noticed that most patients with severe symptoms of COVID-19, the disease caused by the coronavirus pandemic, had taken the painkiller ibuprofen before they were hospitalized. Tests run by the university's laboratory, she added, had found "strong evidence that ibuprofen accelerates the multiplication of the virus."

Misinformation about treatments of diseases can generate immediate harm. ABC News reported that officials from the Maryland Emergency Management Agency sent out an alert one day after receiving more than 100 calls about ingesting disinfectants as a possible treatment for COVID-19 based on a suggestion made by Donald Trump who said that he would consider exploring the use of injecting disinfectants into the body to treat

[32] GIUSEPPE SMORTO "Le vite parallele su WhatsApp: Insostituibile, pericoloso: come sta cambiando le nostre giornate", La Repubblica 30/03/2020 [Italy].

coronavirus. , the medical community shuddered due to the dangerous and irresponsible implications of this suggestion.

Misinformation can also lead to riots and conflicts. After the release of a viral video on the connection between 5G and COVID-19, there have been fires at masts in Birmingham, Liverpool and Melling in Merseyside according to the BBC. As reported by CODA, the Stop 5G UK Facebook page has more than 30,000 members and generates around 1,600 posts a day. Its feed is filled with apocalyptic messages and videos, claiming that the virus is a result of 5G exposure, a mass depopulation project, a plot led by Bill Gates, or a ploy to vaccinate people with a tracking microchip.

According to Scott Brennen, Felix Simon and Philip Howard, most (59%) of the misinformation involves various forms of reconfiguration, where existing and often true information is spun, twisted, recontextualised, or reworked. Less misinformation (38%) was completely fabricated. As a result, the number of English-language fact-checks rose more than 900% from January to March. Top-down misinformation from politicians, celebrities, and other prominent public figures made up just 20% of the claims in our sample but accounted for 69% of total social media engagement. Misleading or false claims about the actions or policies of public authorities, including government and international bodies like the WHO or the UN, are frequent (39% in the sample analysed). In terms of responses to misinformation, the study finds that on Twitter, 59% of posts rated as false in the sample by fact-checkers remain up, on YouTube, 27% remain up, and on Facebook, 24% remain up without warning labels.

According to the World Economic Forum, better cyber hygiene standards[33] are needed as hackers are targeting people's increased dependence on digital tools, as it grows due to working-from-home policies' reliance on emails, video-conference and messaging services. Steve Durbin, managing director at the Information Security Forum (ISF) says[34] that "Trust, but verify now becomes the new normal in this remote working world that we've been forced to embrace." The pandemic is also accelerating specific trends in the cybersecurity sector. Organisations are trying to move to cloud-based applications (using two-factor authentication) and implementing secure remote working strategies. As third parties can become the entry point for hackers into larger, more data rich companies, access and identity management along the entire supply chain is also becoming a priority. Hiring skilled cybersecurity professionals to work remotely (or part-time) becomes an option these days to support the roll out of a comprehensive patch management strategy, password distribution and authentication along with rapid implementation of VPNs, review of BYOD policies for home working, social media compliance and zero trust networking. There is also a demand for better cooperation between the operation and security teams and more focus on efficiency; and to acquire third-party products for monitoring threats,

[33] Algirde Pipikaite and Nicholas Davis "Why cybersecurity matters more than ever during the coronavirus pandemic", World Economic Forum, 17 Mar 2020.
[34] Teri Robinson "Coronavirus turns up the heat on cybersecurity projects", SC Magazine April 7, 2020.

unauthorised access, and unusual behavior on networks. At home, people need to become more aware of IoT security and change their router password and revise the privacy and security settings of their devices.

Finally, wide attention has been devoted to new forms of digital health surveillance that can help detect, prevent and forecast the longer-term toll of the pandemic. One example is that of South Korean, which developed applications to track citizens' movements to respond to the Middle East respiratory syndrome (MERS) in 2015, is setting a new standard. Thanks to extensive tracing, testing and isolation measures and APPs such as coronamap.site (whose European homologue is PEPP-PT[35]), the number of new cases being reported each day in South Korea has dropped dramatically, from a peak of 909 cases announced on 29 February to 74 on 16 March 2020.[36] Preserving public health does not have to compromise personal rights. For example, the identification of those who either have the antibodies to defeat the virus (see debate on immunity certificates) or have tested negative for the virus within a defined time period, and thus can safely return to work and school, should be done using identity technology that places control of private data in the hands of the individual.

4.2 Thematic Area No. 2: Environ-Mental Health

As displayed in the table below, internet consumption has increased during the pandemic. The large majority of people worldwide say they watch more news coverage (67%). People in China watch more films on streaming (63%), while people in France watch more TV on broadcast channels (53%). People in Italy and Spain say they spend more time on messaging services (60%; 61%), on social media (52%; 49%), and on computers or video games (41%; 48%). Since 24 February 2020 worldwide Pornhub traffic has been above average, starting a more noticeable increase around 10 March 2020, with a rise in traffic in the UK (+15%) and in Australia (5%) on 24 March 2020. Of course, the risk of problematic internet use (PIU) has increased along with internet service consumption.

The FKK coronavirus poll run in March and April 2020 reveals that nearly half (45%) of adults in the United States reported that their mental health has been negatively impacted due to worry and stress over the virus. Large majorities of Republicans (70%), independents (72%), and Democrats (76%) say their lives have been disrupted. And most also report no end in sight with three-fourths saying "the worst is yet to come" when it comes to the coronavirus outbreak in the U.S., while only a few (13%) say "the worst is behind us."

[35] Pan-European Privacy-Preserving Proximity Tracing (PEPP-PT), is developing technology that can be used to build contact tracing apps that use Bluetooth.

[36] Mark Zastrow "South Korea is reporting intimate details of COVID-19 cases: has it helped?", Nature, 18 MARCH 2020.

Tab. 14 In-home media consumption due to the coronavirus outbreak among internet users worldwide as of March 2020, by country

	Italy	Spain	France	Germany	UK	China	US	Worldwide
Watching more news coverage	67%	63%	50%	60%	50%	77%	43%	67%
Watching more shows/films on streaming services (e.g. Netflix)	53%	58%	31%	21%	32%	63%	42%	51%
Watching more TV on broadcast channels	55%	43%	53%	35%	32%	46%	42%	45%
Spending longer on messaging services (e.g. WhatApp, Facebook Messenger, etc)	60%	61%	24%	22%	24%	59%	17%	45%
Spending longer on social media (e.g. Facebook, Instagram, Twitter etc)	52%	49%	27%	21%	21%	50%	32%	44%
Spending more time on computer/video games	41%	48%	39%	21%	20%	29%	29%	36%
Reading more books/listening to more audiobooks	36%	42%	24%	19%	19%	44%	25%	35%
Listening to more streaming services (e.g. Apple Music, Spotify etc)	25%	27%	14%	13%	14%	49%	18%	35%
Listening to more radio	29%	32%	23%	24%	17%	16%	16%	18%
Reading more magazines	23%	22%	14%	17%	15%	14%	12%	16%

Reading more newspapers	18%	14%	14%	10%	9%	17%	12%	14%
Creating/uploading videos (e.g. on Tik Tok, YouTube etc)	10%	15%	7%	5%	6%	17%	6%	14%
Listening to more podcasts	8%	10%	6%	6%	11%	13%	10%	12%

Source: Statista 2020

The social isolation and the suspension of routines during the COVID-19 crisis have been especially risky for the mentally ill and vulnerable people[37]. Responding to social isolation and loneliness is a widely discussed issue[38]. Even at the absence of underlying psychological conditions, the lack of structure, loss of routine and increased uncertainty regarding the future, are all considered threats to the mental health of the general population[39]. In several European countries, warnings of increased domestic violence and child abuse have been issued[40]. Due to quarantine measures, vulnerable groups are forced to spend longer hours at home with potential aggressors, which puts them at higher risk of abuse and makes it more difficult for them to report violent incidents to the police[41]. Reporters talk of the experience of confinement in a residential facility for the dependent elderly people as being in between sentiments of fear, and the sacrifice of caregivers[42].

As explained by Achraf Ammar and coauthors (2020), results of the ECLB-COVID19[43] survey, which was run from 6 April 2020, results show that the COVID-19 home confinement evoked a negative effect on mental wellbeing and emotional status ($P < 0.001$; $0.43 \leq d \leq 0.65$) with a greater proportion of individuals experiencing psychosocial and emotional disorders (10% to 16.5%). Increased vigilance for psychosis symptoms in patients

[37] Doris Griesser 26 März 2020, 06:00 "Coronavirus: Psychisch kranke Menschen sind übersehene Risikogruppe", Der Standard > Wissenschaft [154 Postings] [Austria].

[38] L'édito du Figaro, "«Combat solitaire» pour l'Amérique", 30/3/2020, Podcast 2 min [France].

[39] "Dit is de invloed van corona op onze mentale gezondheid", Trouw, 20/3/2020, 8:46 [Netherlands]

[40] "Häusliche Gewalt in der Corona-Krise: Gefangen auf engstem Raum", Süddeutsche Zeitung, 31/3/2020, 5:27 [Germany]

[41] "Geen toename van meldingen over huiselijk geweld, maar wel zorgen", NU.nl, 1/4/2020, 15:35

[42] Florence Aubenas, "A l'Ehpad des Quatre-Saisons, la vie et la mort au jour le jour", Le Monde, 31/03/2020, 05h46 [France].

[43] 1047 responses from individuals (54% women) from Western-Asia (36%), North-Africa (40%), Europe (21%) and other countries (3%).

with COVID-19 is advisable according to experts[44] who have found that psychosis diagnosis is associated with viral exposure, treatments used to manage the infection, and psychosocial stress. Psychoactive substances and other reinforcing behaviors (e.g., gambling, video gaming, watching pornography) are often used to reduce stress and anxiety and/or to alleviate depressing mood. According to Neria, Nandi and Galea[45], large-scale disasters, whether it is traumatic (eg, the World Trade Center attacks or mass shootings), natural (eg, hurricanes) or environmental (eg, Deepwater Horizon oil spill), are almost always accompanied by an increase in depression, posttraumatic stress disorder (PTSD), substance use disorder, a broad range of other mental and behavioral disorders, domestic violence, and child abuse. An analysis[46] of stories appearing in seven major daily newspapers in South Korea, between 1990 and 2018, revealing that victims of disaster and accidents and their families are the group of people more often described as 'embittered', which is an emotional state that varies from the one expressed in a colloquial language to a pathological state.

Fig. 33 "Psyche Revived by Cupid's Kiss" by Antonio Canova. In Italian "Amore e Psiche" here transformed into "Love and Psychosis".

The ICT sector has been crucial in keeping parts of the economy going, allowing large groups of people to work and study from home, enhancing social connectedness, providing

[44] Ellie Brown, Richard Gray, Samantha Lo Monaco, Brian O'Donoghue, Barnaby Nelson, Andrew Thompson, Shona Francey, Pat McGorry, "The potential impact of COVID-19 on psychosis: A rapid review of contemporary epidemic and pandemic research", Schizophrenia Research, 2020, https://doi.org/10.1016/j.schres.2020.05.005.

[45] Neria Y, Nandi A, Galea S. Post-traumatic stress disorder following disasters: a systematic review. Psychol Med. 2008;38(4):467-480. doi:10.1017/S0033291707001353

[46] Ju, Y., & You, M. (2019). Exploring News Media Epidemiology of "Embitterment": A Content Analysis of Korean News Coverage between 1990 and 2018. Health communication, 1-10.

greatly needed entertainment, etc. Although for the vast majority of people, ICT use is adaptive and should not be pathologized, a subgroup of vulnerable individuals are at risk of developing problematic ICT usage patterns. It has not always been immediately recognised the need for prevention and social intervention to bolster people's mental health system in preparation for the inevitable challenges precipitated by the COVID-19 pandemic.

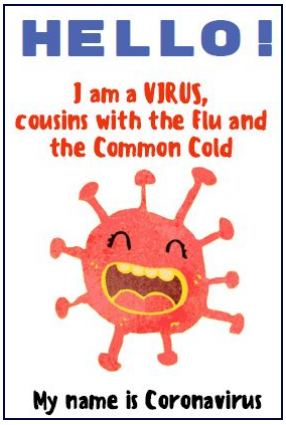


Fig. 34 COVIDBOOK

According to a Save The Children's survey of over 6000 children and parents in the US, Germany, Finland, Spain and the UK, up to 65 per cent of the children surveyed struggled with boredom and feelings of isolation during the confinement. To tackle these difficulties, 'Coronavirus: Caring for children' tips suggest parents to: (a) keep a normal schedule; (b) limit excessive news reporting and social media, but listen and respond to kids and reassure them by giving simple explanations; (c) take care of your physical and mental health and offer a model to kids to follow; (d) eat well and stay positive. A child-friendly activity COVIDBOOK was created @mindheart.kids to reassure children under the age of 7 about the novel coronavirus.

Experts have offered practical and intuitive recommendations that may help diminish the risks of increased use of ICT tools, devices and online activities. These recommendations are meant to help people cope with the disruptions caused by confinement measures and also to avoid the risk of developing a mindset that rationalizes new unhealthy habits (e.g., engaging in a poorly controlled use of the internet or excessive screen time) as necessary for coping, thus potentially posing a longer-lasting threat.

EXPERT RECOMMENDATIONS ON HOW TO SAFEGUARD MENTAL HEALTH DURING CONFINEMENT

1. Looking after oneself. Promoting a daily routine at home in self-isolation, quarantine, or lockdown. Of fundamental importance are approaches for ensuring structure, continuity of learning, and socialization in order to mitigate the effect of short- and long-term sheltering in place. Particularly relevant here is the development and implementation of routines, especially for children who are out of school, ensuring that they have access to regular programmed work.

a. Sleeping regularly and enough, eating regularly and healthily, drinking sufficient fluids, and attending to personal hygiene are essential for enhancing psychological well-being.
b. Engaging in physical activity regularly is not only necessary to keep a healthy body but also contributes to boosting mood by reducing levels of stress hormones, stimulating the production of endorphins (i.e., natural chemicals in the brain that relieve pain and enhance mood) and having a beneficial effect on immune function.

c. Learning and using relaxation and other stress-reduction techniques (e.g., reading, writing, listening to music, meditation, autogenic training, and mindfulness exercises) can be helpful in keeping bodies and minds healthy and to be aware of one's emotions. People living together should also find ways of being alone or having some self-time regularly.

2. Looking after one's social safety net. Family members should arrange to spend quality time with each other, and people living apart or together should try to enjoy social activities and maintain relationships at a distance. Even small signs that someone cares could often make a difference in the early stages of social isolation. ICT usage such as group calls, social media groups, and online video games can be useful in forming and maintaining meaningful relationships across physical distances. Outreach that involves voice and/or video seems superior to email and text messaging to reduce isolation.

3. Limit negative information exposure and information overload. Keep up-to-date on the status of the pandemic and public health advice from reliable news sources in a circumscribed way (e.g., watching a reputable news broadcast once or twice per day at a specified time) while limiting excessive exposure to such news can promote balanced and informed thinking about the pandemic. Constantly checking social media or watching the news about the pandemic may have a negative impact on mental wellbeing.

Being conscious of, self-monitoring and regulating one's screen time are essential. Having pre-scheduled technology-free periods or programs, and setting specific limits for oneself in order to minimize time online and financial expenditures. Using analogue technical tools (e.g., wristwatches, alarm clocks) when possible instead of ICT tools may help prevent overuse in certain situations. Using digital wellbeing apps (i.e., apps that provide feedback about the amount of time spent on different apps) can also be helpful in raising awareness and self-regulation. Parents are role models; thus, regulating their own ICT-related behaviors may help their children to establish controlled use as well. Monitoring and regulating children's behavior is also crucial and it may best be done by involving them in rule-making.

4. Relying on professional help and support services. If experiencing high levels of distress or significant difficulties controlling internet use or specific online activities (e.g., gambling, gaming, watching pornography), mental health professionals should be contacted. Social media can also be used to encourage groups to connect and direct individuals to trusted resources for mental health support. It is critical that we have in place mechanisms for surveillance, reporting, and intervention, particularly, when it comes to domestic violence and child abuse. Telemedicine mental health visits, group visits, and delivery of care via technology platforms will be important components of stepped care for both acute crisis management and more routine communication and support.

4.3 Thematic Area No. 3: Digitalisation and The Future Of Work

Fig. 35 Empty shelves in one of the largest Dutch supermarkets Albert Heijn. Especially pasta, toilet paper and canned vegetables were hoarded. In March 2020, images of empty shelves were widely shared on social media and Dutch newspapers accompanied with the call to stop hoarding.

The COVID-19 pandemic has been impacting the economy and the job market even more than the 2008 financial crisis, as we had a simultaneous destruction of the demand and supply chain. The transformation of countless businesses into digital commerce providers nearly overnight has set the base for a permanent transformation of the global economy. There is evidence that discretionary spending by consumers has collapsed, but the consequences of COVID-19 will not be equally distributed throughout the economy.

Some sectors have profited. Providers of essential services such as supermarkets and pharmacies have increased their revenues and margins. There has also been a visible expansion of delivery services, which have allowed users to shop and order from local grocery stores, retailers, and even local restaurants. In contrast, hospitality related sectors from casinos to hotels and the global travel industry from airlines to cruise companies have encountered a reduction in activity of more than 90%. Supply chain networks is another channel through which the COVID-19 negatively impacted the global economy. Car companies are shutting operations for lack of parts. Studies[47] in the US, UK and South Korea show that news media tend to be skewed toward negative news about the economy, and this negative bias influences public perceptions.

[47] Ju, Y. (2008). The asymmetry in economic news coverage and its impact on public perception in South Korea. International Journal of Public Opinion Research, 20(2), 237-249.

Chang Ma, John Rogers, and Sili Zhou[48] report that on average, GDP growth in affected countries is about 2.4% below that of unaffected countries. McKinsey says that IHS Markit PMIs for the United States show a moderate contraction in manufacturing (48.5) and a historic fall in services, to 39.1 (from 49.5 in February 2020). A similar pattern is observed in the eurozone, with the manufacturing PMI retreating from 49.2 in February 2020 to 44.5 in March 2020 and the services PMI falling disastrously, from 52.6 in February 2020 to a never-before-seen 28.4 in March 2020. According to Nuno Fernandes[49], overall countries with more service-oriented economies will be more affected, and have more jobs at risk, but there is no correlation between economic impact and mortality rates. On the contrary, as mortality rates are higher amongst elderly it seems that the pandemic could be reducing the number of pensions paid by the national insurance system.

According to the World Economic Forum, the COVID-19 pandemic has accelerated 10 key technology trends, including digital payments, telehealth and robotics as they can help make society more resilient in the face of pandemic and other threats and help businesses stay open. We have seen an increase in online shopping and digital payments, remote work (virtual meetings, cloud technology, work collaboration tools, virtual private networks (VPNs), voice over internet protocols (VoIPs)), and even robot delivery to support the logistics system. The popularity of video conference applications has increased dramatically, in spite of the privacy and security problems some services such as ZOOM have experienced.

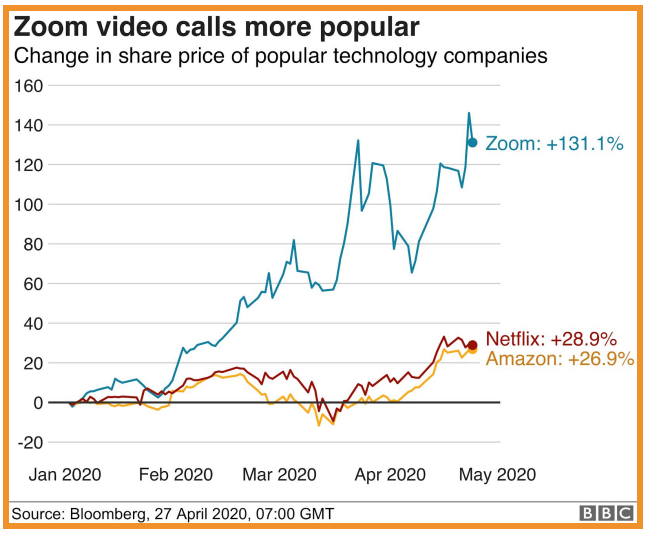


Fig. 36 Rise in the popularity of ZOOM reflect in the share price

Coronavirus has been a great catalyst for business transformation, and seems to materialise predictions made about the future of work. Heather McGowan & Chris Shipley argue that businesses need to shift from a production modality to a creation mentality,

[48] "Modern health crises: Recession and recovery", VOX 13 May 2020.
[49] Fernandes, Nuno, Economic Effects of Coronavirus Outbreak (COVID-19) on the World Economy (March 22, 2020). Available at SSRN: https://ssrn.com/abstract=3557504 or http://dx.doi.org/10.2139/ssrn.3557504

because in their view a company is only culture[50] plus capacity and culture is the only thing that can make people withstand seismic disruptions. An organisational cultural change has been required in all those countries and sectors where remote work was not well established.

Teleworking, vulnerability and the future of work. Cultural barriers to smart working adoption were foregrounded during confinement. Spaniard suddenly learned that there is no national law governing remote working in public administration. Based on the results of a multi-dimensional indicator of teleworking propensity, Juan César Palomino, Juan Gabriel Rodríguez and Raquel Sebastián argue that Spain, Romania, Bulgaria, Slovakia and Hungary are the European countries worst prepared for remote working. In contrast, the countries that are best adapted to telework are Luxembourg, Switzerland, Sweden and the UK. The likelihood of having the opportunity to telework increases with the level of education and with a highly paid job. Despite the benefits of teleworking in reducing traffic, and thus pollution, and increasing working-hours flexibility, preliminary evidence demonstrates that workers do not equally benefit from remote working. Single parents who had to look after their kids while teleworking, women in science and across professions who had to attend conflicting family and work demands, and also students in less privileged areas suffered the most from the stress produced by the increased workload generated by the lockdown.

As pointed out by Lizzie Wade[51], economically-disadvantaged and marginal groups suffer more during a pandemic because they have less resources to cope with it. For instance, in New York City, COVID-19 cases have been concentrated in poorer ZIP codes, where people live in crowded apartments and can't work from home or flee to vacation homes. As a result, Latino and black people have been twice as likely to die from COVID-19 as white people. Brazilian public health data analyzed by Reuters for the cities of Sao Paulo, Rio de Janeiro and Fortaleza show a shift in recent weeks from the wealthy boroughs that seeded the outbreak to the gritty urban outskirts. Recent demographic studies[52] have shown many groups on the lower end of the socioeconomic spectrum, not just Native Americans, suffered disproportionately in the 1918 Spanish flu pandemic caused by the H1N1 influenza.

According to a KFF coronavirus poll conducted in April 2020, nearly six in ten adults (57%) report being worried they will put themselves at risk of exposure to coronavirus because they can't afford to stay home and miss work (up from 35% earlier in March). Overall, 39% of adults say they have already either lost their job, lost income, or had their hours reduced

[50] A company's culture can be understood in the answers to three fundamental questions: 1) Why do you exist? (Mission) 2) How does the world look differently because you exist? (Vision) 3) What will and won't you do to achieve your mission and fulfill your vision? (Values).

[51] Lizzie Wade, "From Black Death to fatal flu, past pandemics show why people on the margins suffer most", Science, May. 14, 2020 .

[52] Mamelund, Svenn-Erik. "A socially neutral disease? Individual social class, household wealth and mortality from Spanish influenza in two socially contrasting parishes in Kristiania 1918–19." Social science & medicine 62.4 (2006): 923-940.

without pay because of the recent coronavirus outbreak. Research shows that job loss is associated with increased depression, anxiety, distress, and low self-esteem and may lead to higher rates of substance use, disorder and suicide. In the Netherlands, job uncertainty related to COVID-19 is of particular prevalent among freelancers. More than 10% of the country's total workforce is made up of freelancers, many of whom work in the creative industry. Lockdown measures demanding all public events to be cancelled for a minimum of 2 months, which left this group particularly vulnerable and without an income[53]. The Dutch government was quick to put together a financial support program which covers ongoing costs, like rent, and salary for this particular group.

5. Conclusions

The COVID-19 pandemic has profoundly influenced the life of Europeans during the first half of 2020. As we finalise the drafting of this report, we start appreciating the long term effects and deep economic, societal and psychological consequences of confinement measures. The crisis leaves open questions on how to better prepare for the future and build societal resilience. Societal resilience refers to the ability of a human community to cope with and adapt to stresses such as social, political, environmental, or economic change or crisis. The capacity of a community and a society to be resilient is pivotal in order to embrace change in a positive way and reduce collateral damages of the management of a crisis, such as psychological distress, resentment or embitterment. There is currently uncertainty about the near future. Parents in countries like Spain still do not know if their kids will go back to school in September and under what conditions. Workers are concerned about unemployment. National governments and corporations face several open questions on the future of work, how to protect people from future waves of contagion, and on how to ensure digital technologies are safe and our privacy and liberties are respected in the post-pandemic area.

Many of these highly relevant questions are addressed within social science and humanities (SSH) research. TRESCA has been conceived to deploy engaging science communication approaches to bring to the people SSH findings relevant to their everyday digital life. This report has made evident the important role that communications about COVID-19 have had during the first half of 2020. It has also given some insights into which other themes around digitalisation are becoming increasingly relevant. These considerations will inform the work that will be carried out in WP2 and WP3 in the second half of 2020.

Examples of relevant scientific questions SSH research could answer and that could be addressed in the input material used in WP2 and WP3, as well as in WP4, are:

How can we help people become more resilient in a time of social distancing and isolation? To what extent complex social networks can be leveraged to rebuild communities rather

[53] "Geen werk door corona, geen inkomen voor zzp'ers", NRC, 16/3/2020 [Netherlands]

than just fostering dangerous information cocoons or filter bubbles? How can we revert the effects of misinformation and lower the risk of opinion polarisation? What do people need to know to safeguard their psychological health in the face of excessive screen and information exposure? How are teleworking and distance learning reshaping working and teaching practices? Is it possible to build trust relationships only through digital interactions? What do we lose if we only live a digital life?

APPENDIX: WHAT WE KNOW ABOUT COVID-19

A new virus. 2020 begun with the outbreak of Coronavirus 2019-nCoV, a new virus with unknown morbidity and mortality rate[54]. Unlike seasonal flu, for which there is a vaccine to protect the population against infection, until May 2020 there is still no vaccine for 2019-nCoV. The known human coronaviruses cause respiratory infections similar to flu, usually with mild symptoms, but which can lead to pneumonia and become lethal. On 12 February 2020, the novel coronavirus was named *severe acute respiratory syndrome coronavirus 2* (SARS-CoV-2). The disease associated with it is now referred to as COVID-19[55].

Fig. A.1 ISO-FORM LLC'S RENDERING OF SARS-COV-2

Origin of the virus. SARS-CoV-2 likely originated in bats but might have been amplified in an intermediate host. Initial work showed that it can use angiotensin-converting enzyme 2 (ACE2) from bats, civet cats, swine, cats, ferrets, non-human primates (NHPs), and humans as a receptor[56]. The case fatality rate (CFR) seems to be age dependent, with a higher percentage in the elderly, especially men, and an overall interim CFR of approximately 1%–3%. The reproductive number (R0) of the infection, that is, the number of cases directly generated by one case in a population in which all individuals are susceptible to infection, is estimated to be 2–3.

[54] By Rachael Rettner, LiveScience on February 7, 2020, "How Does the New Coronavirus Compare with the Flu?", Scientific American, Public Health".
[55] Source: European Centre for Disease Prevention and Control.
[56] Fatima Amanat and Florian Krammer "SARS-CoV-2 Vaccines: Status Report", Immunity, doi: https://doi.org/10.1016/j.immuni.2020.03.007.

The pandemic. Update information on the spreading of the COVID-19 can be found on the [Surveillance Atlas of Infectious Diseases](). Below are some information on the epidemics at the beginning and at the end of March 2020.

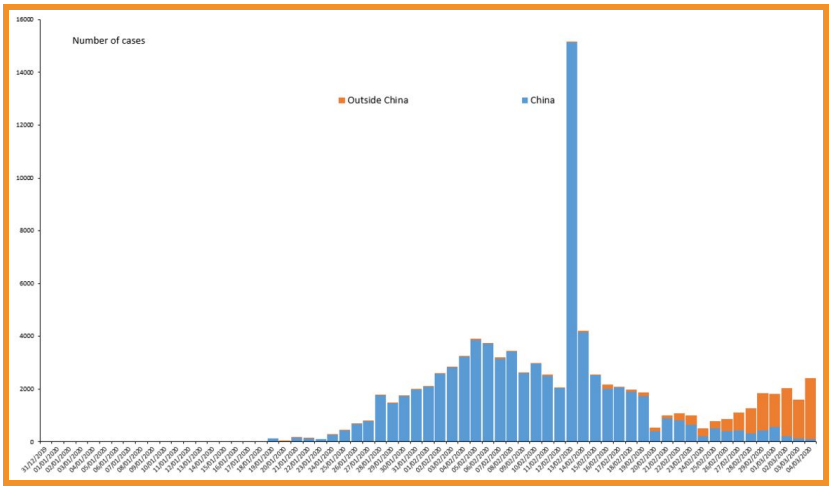


Fig. A.2 Distribution of COVID-19 cases worldwide, as of 4 March 2020[57]

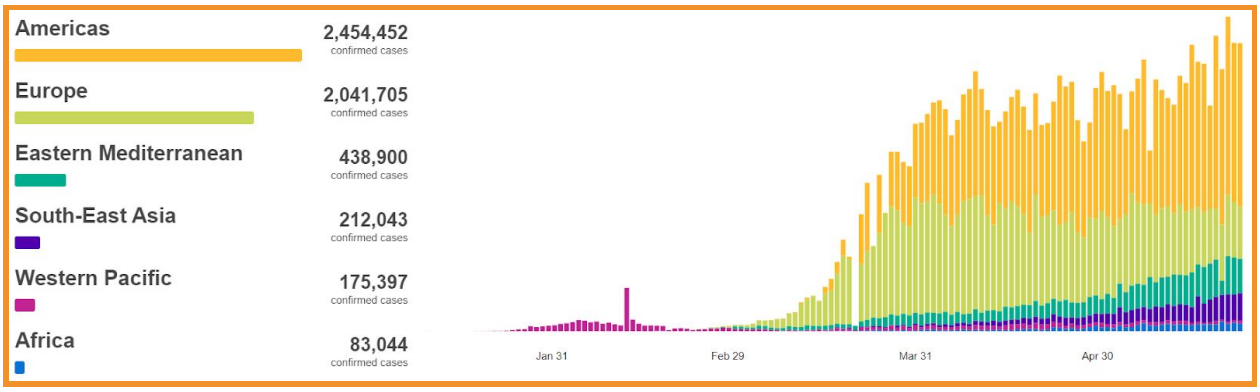


Fig. A.3 WHO Coronavirus Disease (COVID-19) Dashboard (Data last updated: 2020/5/26, 6:45pm CEST)

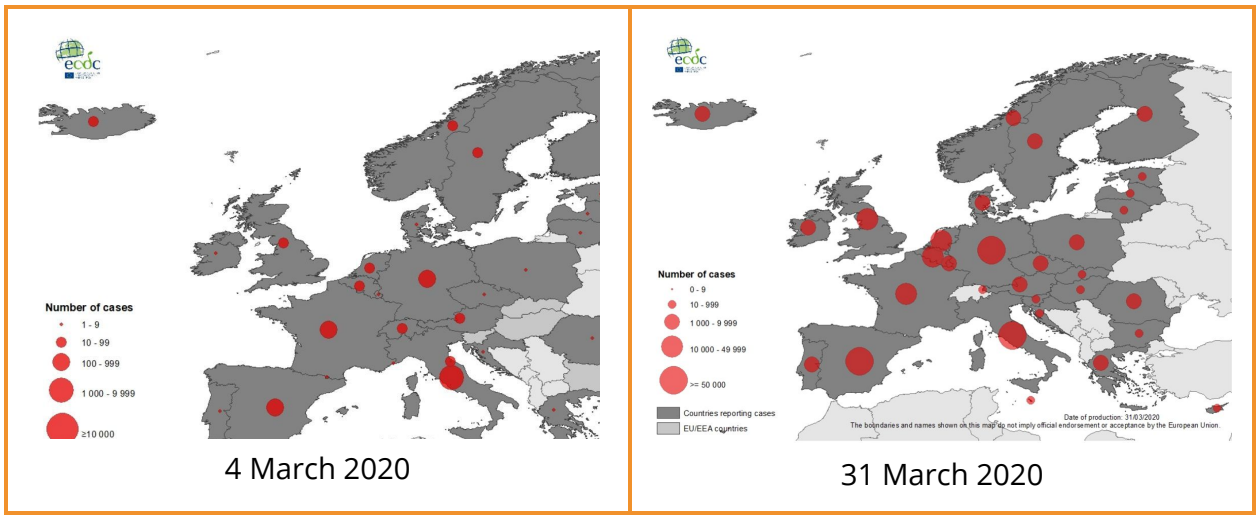


Fig A.4 Distribution of COVID-19 cases in Europe on 4 and 31 March 2020

[57] Source [WHO Coronavirus Disease (COVID-19) Dashboard]() (Data last updated: 26/05/2020)

The contagion. According to Byambasuren and coauthors (2020)[58], the asymptomatic proportion is around 16% (95% CI 12% - 20%) based on results from five unbiased studies. In Wuhan, China, it has been estimated that undiagnosed cases of COVID-19 infection, who were presumably asymptomatic, were responsible for up to 79% of viral infections. For society to resume, measures designed to reduce aerosol transmission must be implemented, including universal masking and regular, widespread testing to identify and isolate infected asymptomatic individuals.

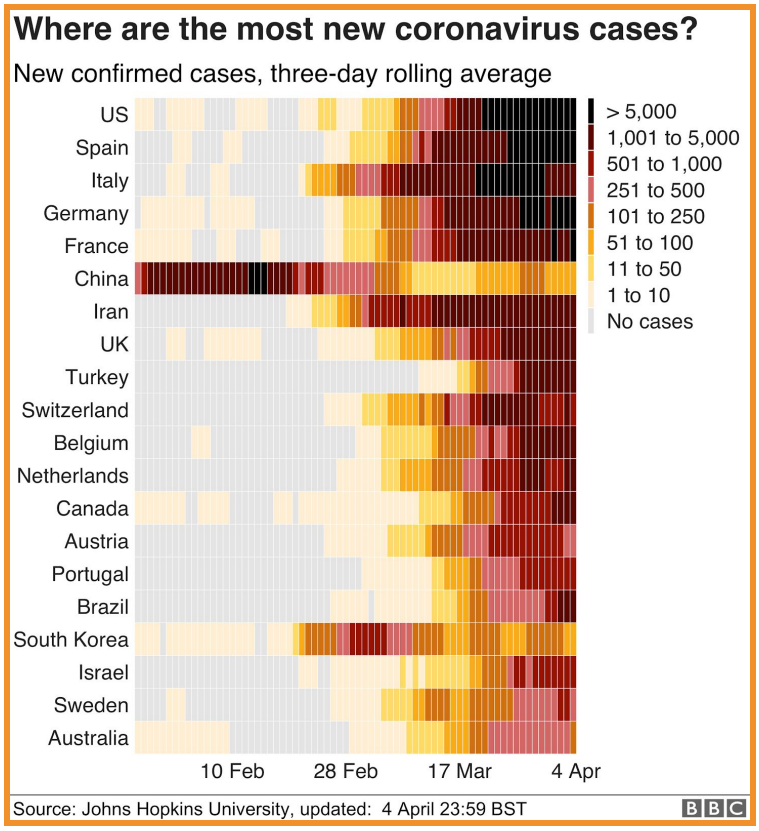


Fig. A.5 Lowering new cases in South Korea and China[59].

Testing. One of the pandemic response problems was the lack of testing kits[60] for confirming infection. FIND and the WHO have made available a diagnostics resource centre designed to support policymakers and healthcare providers with up-to-date information on tests and testing for SARS-CoV-2. The COVID-19 *Clinical Research Coalition*[61] is also supporting WHO's efforts to counter the COVID-19 pandemic. The COVID-19 host genetics initiative brings together the human genetics community to generate, share and analyze data to learn the genetic determinants of COVID-19.

[58] Oyungerel Byambasuren, Katy Bell, Louise McLaws, "Estimating the extent of true asymptomatic COVID-19 and its potential for community transmission: systematic review and meta-analysis", medRxiv preprint 15 May 2020, doi: https://doi.org/10.1101/2020.05.10.20097543.
[59] Source "Coronavirus pandemic: Tracking the global outbreak" By The Visual and Data Journalism Team, BBC News, 05/04/2020.
[60] Cormac Sheridan "Fast, portable tests come online to curb coronavirus pandemic", Nature 23 MARCH 2020.
[61] Global coalition to accelerate COVID-19 clinical research in resource-limited settings. The Lancet. doi:10.1016/S0140-6736(20)30798-4

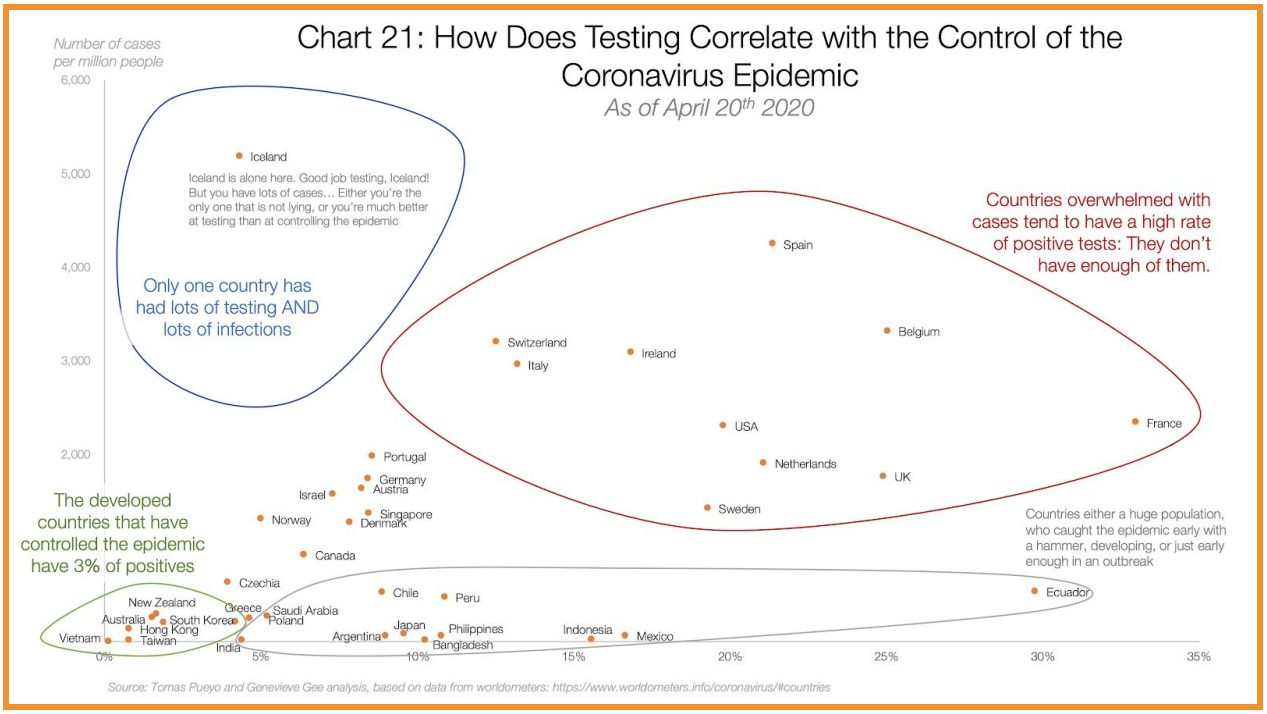


Fig. A.6 Relationship between testing and epidemic control

Treatments. Based on Sermo's results[62], the three most commonly prescribed treatments forCOVID-19 patients are 56% analgesics, 41% Azithromycin, and 33% Hydroxychloroquine.

The vaccine. SARS-CoV-2 vaccines will be essential to reduce the morbidity and mortality rate if the virus establishes itself in the population. Clinical trials with the nucleotide analog remdesivir and protease inhibitors, as well as other treatment options, are ongoing in China and the United States, and trial results are expected by the end of April 2020. There are currently no approved human coronavirus vaccines. As no coronavirus vaccines are on the market and there are no large-scale manufacturing capacities for these vaccines yet we will need to build these processes and capacities.

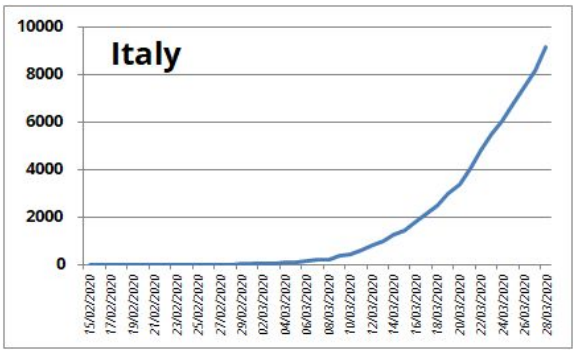
Symptoms and mortality rate. According to Wynants and coauthors (2020)[63], "the most reported predictors of presence of covid-19 in patients with suspected disease included age, body temperature, and other symptoms. The most reported predictors of severe prognosis in patients with covid-19 included age, sex, features derived from computed tomography scans, C reactive protein, lactic dehydrogenase, and lymphocyte count." A

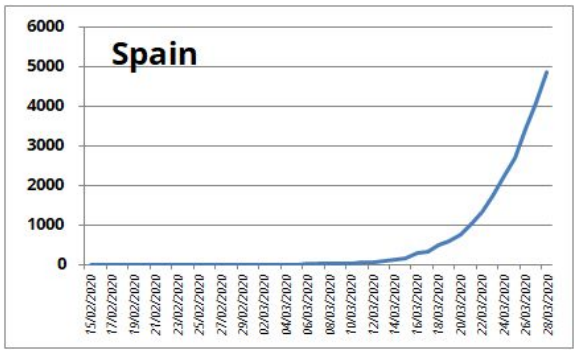
[62] Sermo "Breaking Results: Sermo's COVID-19 Real Time Barometer Study", WAVE I: March 25-27.

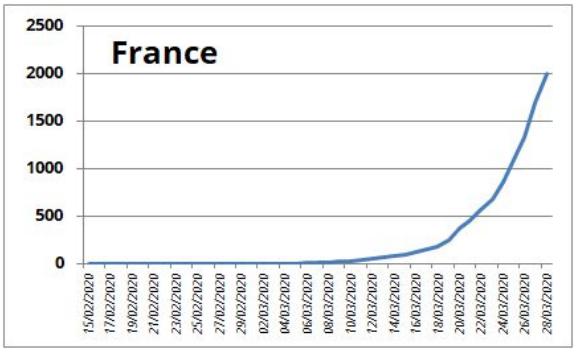
[63] Wynants Laure, Van Calster Ben, Bonten Marc M J, Collins Gary S, Debray Thomas P A, De Vos Maarten et al. Prediction models for diagnosis and prognosis of covid-19 infection: systematic review and critical appraisal BMJ 2020; 369 :m1328. The article analyses 27 studies of prediction models for diagnosing covid-19. All studies were rated at high risk of bias, mostly because of non-representative selection of control patients, exclusion of patients who had not experienced the event of interest by the end of the study, and high risk of model overfitting.

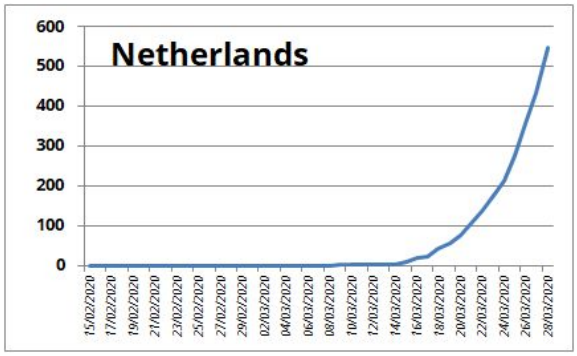
study assessing risk factors for crude mortality rate in patients with COVID-19 conducted on 392 patients in Madrid show that the median age of those who ended up in emergency units was 71.5 years, and 52.6% were men. 64.3% of patients had a comorbidity, hypertension being the most common. increasing odds of in-hospital death associated with age over 65, coronary heart disease, and both lower lymphocyte count and and higher LDH per 1-unit increase and per 100 units respectively. In this study, COVID-19 was associated with a crude mortality ratio of 19.2% and a mortality ratio of 34.7% in admitted patients, considerably above most of the ratios described in the Chinese series.

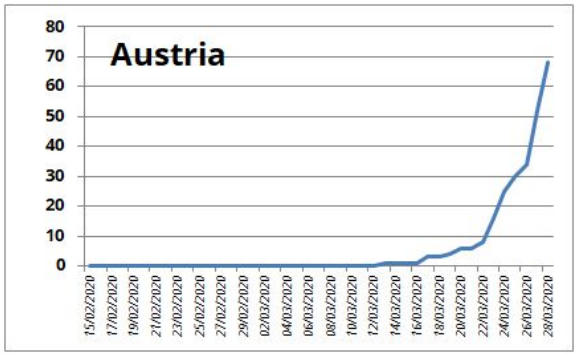
Table A.1 Total declared deaths caused by COVID-19 between 15/02/2020 and 28/03/2020

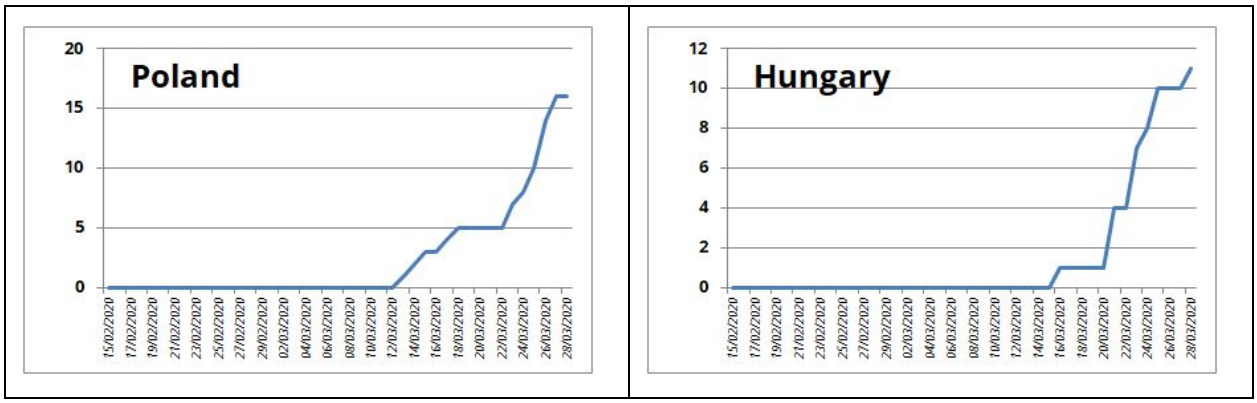












Source: Authors' elaboration of WHO data retrieved from Our World in Data (data files available for download)

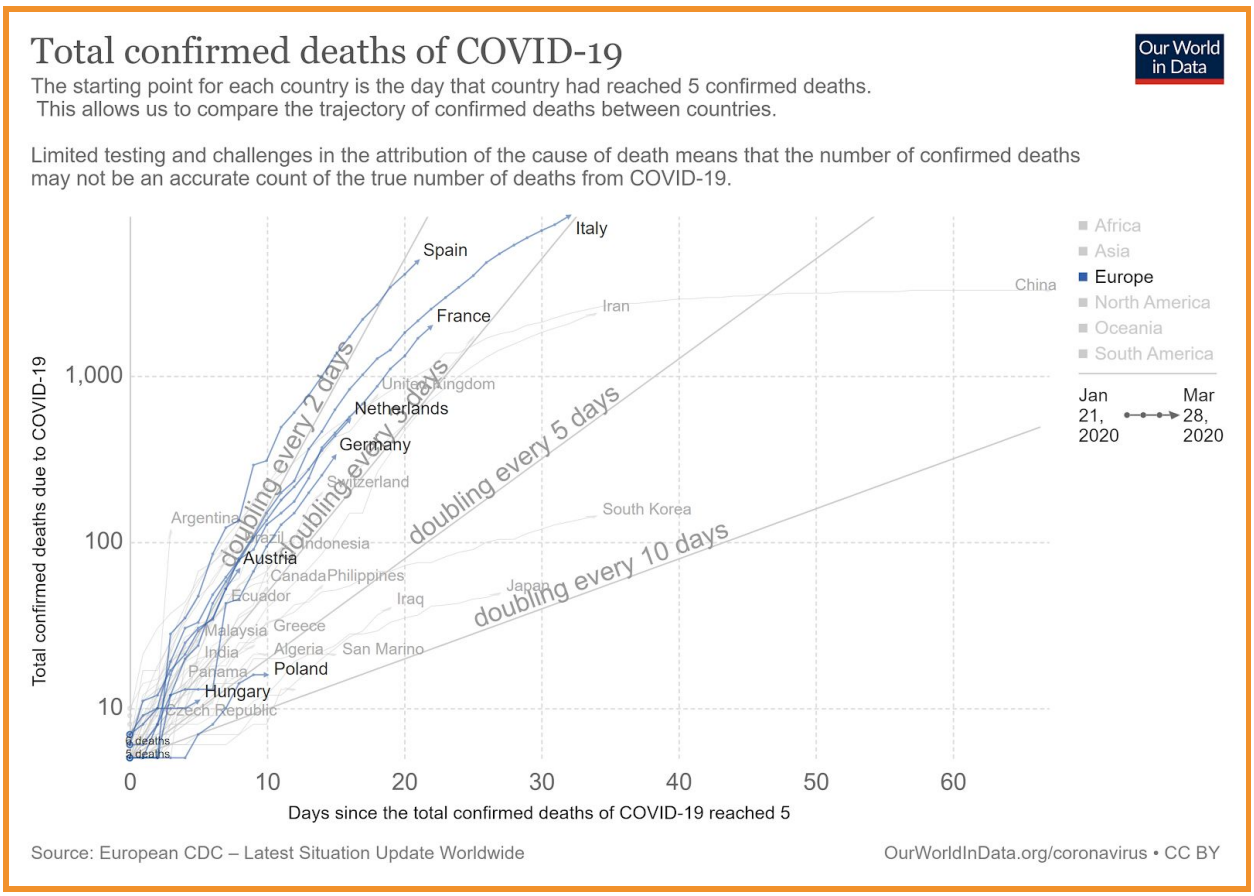


Fig. A.7 Total confirmed deaths of COVID-19 in eight EU countries retrieved from Our World in Data (table: trajectories of deaths).