

# Digital solutions to health risks raised by the COVID-19 infodemic

Policy brief



## Abstract

A policy brief is a short publication specifically designed to provide policy-makers with evidence on a policy question or priority. Policy briefs bring together existing evidence and present it in an accessible format and use systematic methods and make these transparent so that users can have confidence in the material. Policy briefs tailor the way evidence is identified and synthesized to reflect the nature of the policy question and the evidence available, and are underpinned by a formal and rigorous open peer review process to ensure the independence of the evidence presented.

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**World Health  
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## Contents

Foreword	iv
Acknowledgements	v
Abbreviations	v
Executive summary	vi
1. Introduction	1
2. Methodology	2
3. Health risks and harms due to the COVID-19 infodemic	3
4. Digital solutions to health risks raised by misinformation	5
5. Policy considerations	9
6. What WHO is doing to address the infodemic in the European Region and globally	10
6.1 Digital communication strategies for infodemic management	10
6.2 Mobile apps disseminating accurate health information	10
6.3 AI-based innovations for rumour tracking, community feedback and social listening	11
6.4 Training, events and conferences to promote infodemic management	11
6.5 Behavioural insights surveys, better rumour tracking mechanisms, multi-language fact-checking	11
6.6 Partnering with social media and web companies	11
7. Conclusions	13
References	14
Annex. Bibliographic search strategy	19
Additional reading	21

# 1. Foreword

We are delighted to present this policy brief addressing the application of digital solutions to health risks raised by the COVID-19 infodemic.

The spread of excessive, false and misleading information on COVID-19 has become a major cause of reduced effectiveness of national COVID-19 response efforts and has the potential to directly threaten lives and livelihoods of populations across the WHO European Region. The infodemic, as it is now commonly known, has the ability to cause confusion through an overabundance of information – including false and misleading information, and to encourage risk-taking behaviours that can seriously harm health and lead to mistrust in health authorities.

The European Region contains some of the world's most connected societies, where social media and internet use are an integral part of daily life and information can spread rapidly. While this level of access to information can be a major benefit in filling knowledge voids and reaching target audiences, it can also be used to amplify harmful messages.

Effective management of the infodemic requires systems-level interventions together with measures for individual capacity and skills building at country level. Such actions include equipping Member States with the digital tools and skills to identify and act upon sources and flows of rumours, mis- and disinformation, as well as developing digital, health and media literacy in populations to enable individuals to act on information, question misinformation and evaluate sources.

Based on our learnings from the COVID-19 pandemic, the findings and considerations in this policy brief offer some insight into how digital tools can be applied by Member States to prevent and mitigate the effects of misinformation and improve the online environments that are an essential source of information for many. We trust that it will offer health authorities across the European Region the knowledge to help position themselves as trusted sources and make access to online information safer, more reliable and more rights-based for all.

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## Abbreviations

AI	artificial intelligence
ECDC	European Centre for Disease Prevention and Control
RCCE	risk communication and community engagement
UHC	universal health coverage
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations Children's Fund

# Executive summary

The COVID-19 pandemic has been accompanied by feelings of uncertainty, worry and fear, which nourished a lack of trust towards health authorities, scientific communities and mass media, enhanced by false information spread on the Internet (1). This phenomenon associated with the pandemic has been called an information epidemic or “infodemic” and defined as “an overabundance of information including false or misleading information in digital and physical environments during a disease outbreak” (2).

Due to the spread of false and misleading health-related content, the COVID-19 outbreak response has in some cases become less timely and effective, negatively impacting the livelihoods and emotional well-being of populations (3). The exposure to false information – both online and offline – has been linked to increased health risks (4), having harmful or even deadly effects (5). Examples of negative behaviours include use of wrong or harmful treatments, lower uptake of protective measures including vaccinations (6), impaired mental health and emotional well-being (7), and lower trust in health-care providers (8).

In this scenario, the WHO Regional Office for Europe sought to answer the question of how digital solutions can be used to address the infodemic. A rapid review of the evidence revealed that digital solutions that aim to leverage technological innovations are best positioned to respond to the infodemic.

It is important to emphasize that online and offline environments are intertwined and the underlying factors of the COVID-19 infodemic are not purely digital, but they are rooted in complex historical and sociocultural contexts. Therefore, approaching the infodemic through digital interventions alone may not be sufficient. The below-illustrated digital solutions need to be combined with already tested offline approaches to outbreak response. Risk communication and

community engagement interventions are one of the main examples of best practices to be dovetailed with digital perspectives (9).

The identified digital interventions designed to tackle infodemics include:

- implementing fact-checking (10) and false information reporting mechanisms (11);
- adopting social listening tools augmented by artificial intelligence, which can help analyse the large-scale fast-flowing data, assess risks and identify infodemic signals (12);
- creating monitoring programmes (13), multi-stakeholders’ coordination initiatives (14) and national regulatory frameworks which respect the principles of freedom of expression (15);
- promoting digital health literacy (16) and inoculation interventions that improve people’s ability to spot misinformation (17).

Adopting these digital solutions calls for a whole-of-society approach to infodemic response. National health authorities, journalists, fact-checkers, civil society organizations, empowered citizens and other relevant parties all play an important role in building trust and tackling the spread of harmful health-related information (18).



## Six policy considerations

The WHO Regional Office for Europe highlights six policy considerations:

1. Reinforcing multistakeholder networks for infodemic management.
2. Strengthening overall risk communication and community engagement.
3. Implementing continuous monitoring of online harmful and false content.
4. Improving digital literacy approaches and organizing infodemic management trainings.
5. Advocating for infodemic management through communication campaigns.
6. Ensuring safe online platforms, which protect people from harmful content.





# 1. Introduction

As part of a multifaceted approach to tackling the COVID-19 pandemic, the United Nations has called on countries to take urgent action to address what has been described as the “infodemic”<sup>(2)</sup>. Caused by an excess of information, false information and rumours, the infodemic has exacerbated the threat to people’s health and well-being and contributed to the risk of social instability.

United Nations Secretary-General António Guterres warned about the combined threat of COVID-19 and false information: “Our common enemy is #COVID19, but our enemy is also an infodemic of misinformation”<sup>(19)</sup>. Likewise, WHO Director-General Dr Tedros Adhanom Ghebreyesus emphasized the need to address both the biological and informational harms of COVID-19: “We are not just fighting an epidemic, we are fighting an infodemic”. At the seventy-third World Health Assembly in 2020, Member States endorsed WHA Resolution 73.1, which calls upon WHO to “address, and where relevant in coordination with Member States, the proliferation of disinformation and misinformation particularly in the digital sphere”.

In response to the infodemic, WHO has launched a variety of initiatives at global and regional levels. At regional level these include actions in the areas of: risk communication and community engagement (e.g. by monitoring for and responding to high-risk infodemic signals, including the recent spike in misinformation on protective behaviours, including COVID-19 vaccines)<sup>(9,20)</sup>; digital health (e.g. planned development of e-learning capacity-building targeted towards national health authorities); and behavioural and cultural insights (e.g. the development of a Health Evidence Network study on how inherent uncertainties and gaps in evolving evidence drive infodemic harms during large-scale epidemics and pandemics).

This tri-divisional project contributes in various ways to the core priorities and flagship initiatives of the WHO Regional Office for Europe’s European Programme of Work 2020–2025 – “United Action for Better Health in Europe” and its core priorities of protecting people from health emergencies and moving towards universal health coverage (UHC). The infodemic harms, in particular, those population groups who are already vulnerable from a UHC perspective, including those with lower health, digital and information literacy skills<sup>(21)</sup>, and one of the aims of infodemic management is to address these inequities in a sustainable manner.

In continuation of these efforts, the WHO Regional Office for Europe has decided to develop this policy brief that identifies digital solutions to the health risks posed by the COVID-19 infodemic. The nature of these solutions is either technological, political, regulatory, educational or communicative. This document collects them and shows relevant examples, retrieved from the WHO COVID-19 Research Database. The policy brief also aims to present policy considerations which can help Member States take concrete actions in addressing the COVID-19 infodemic using digital solutions.

## 2. Methodology

The evidence used in this policy brief was obtained through a rapid review of the most recent publications on digital solutions to health risks observed during the COVID-19 infodemic.

Keyword searches were performed in the WHO COVID-19 Research Database (22). This database gathers global literature on COVID-19, retrieved and catalogued from some of the main online databases – including Scopus, Medline, Web of Science, Europe PMC, Taylor & Francis and ProQuest Central, among others. In performing the searches, the main words describing the most well-known technological advances and digital solutions were combined with the terms “COVID-19” and “infodemic” appearing in the titles or abstracts. The words “COVID-19” and “infodemic” were, therefore, searched in combination with the terms “fact-checking”, “social listening”, “artificial intelligence”, “deep learning”, “machine learning”, “literacy”, “policy”, “regulation”, “regulatory” or “law”.

The study selection was based on the following inclusion criteria: the language of publication (European, precisely English, French, Spanish, Portuguese, Italian, Russian), the year of publication (2020 and 2021), the type of published materials (journal articles), the affiliation of most of the authors and the field study (in Europe). In total, 150 bibliographic titles and abstracts were reviewed, and 38 articles were included in the analysis. Selected evidence was then analysed through a quality assessment, by focusing on research methodology, field study and results. Digital solutions and innovations chosen were considered relevant to the European scenario, even based on the experience of WHO Regional Office for Europe in the fields of Infodemic Management during the COVID-19 pandemic.

In the Annex, the bibliographic search results are presented in detail. The sources used to inform this brief are either cited throughout the text and listed in the references or are listed by keyword in the “Additional reading” section. Additional sources were used, that were not identified in the review, in order to provide a fuller picture on some under-investigate topics. Furthermore, selected grey literature was also included, especially governmental documents, newspaper articles, and reports published by relevant stakeholders (i.e. the European Centre for Disease Prevention and Control (ECDC); the Inter-Agency Standing Committee; the European Commission; and the United Nations Educational, Scientific and Cultural Organization (UNESCO)).

### 3. Health risks and harms due to the COVID-19 infodemic

The COVID-19 infodemic has made it more difficult for health institutions to provide the public with scientifically sound information, as an overabundance of information, disinformation, misinformation and rumours are spreading continuously on the Internet (23). Consequently, users exposed to inaccurate information have in certain cases exhibited unhealthy and risky behaviour, both for themselves and for their communities (24).

For this reason, the ongoing infodemic constitutes one of the main challenges for governments in delivering a timely and effective COVID-19 response. The main impacts on population behaviour include the uptake of unproven and potentially harmful forms of treatment; neglect of personal protective measures, such as physical distancing and mask-wearing; and increased vaccine hesitancy. In addition to physical harms, the psychological effects of infodemic risks were also observed, and included adverse effects on the emotional well-being of individuals, an increased incidence of mental disorders and increased distrust towards the health system. Among the main cognitive and behavioural contributors to the infodemic were excessive social media usage and low digital health literacy (25). In this section, the policy brief explores some examples of cyber harms through a health-risk lens, thus focusing on physical and psychological harms caused by the COVID-19 infodemic.

#### Adopting wrong or harmful treatments

- Media reports on the use of some drugs as possible treatments for COVID-19 resulted in the spread of misinformation with regards to their usage. This led to an increased demand for these products, resulting in shortages, and increased incidence of their misuse due to self-medication, which was associated with harm and in some cases death (26).
- More than 100 cases of consuming disinfectant as a possible treatment for COVID-19 were reported by the state of Maryland in the United States of America (27).
- The United States National Poison Data System (NPDS) reported a 245% increase in self-medication with Ivermectin to treat COVID-19 between July and August 2021, in the United States, because of false information spread online (28).

#### Reducing uptake of protective behaviours and vaccination

- Studies show how COVID-19 misinformation is among the main causes of a delayed outbreak response due to the slowed adoption of preventive measures (29).
- Higher exposure to online misinformation has been observed to be associated with vaccine hesitancy, which has contributed to lower vaccination rates for COVID-19 and other childhood vaccine-preventable diseases (30).
- Conspiracy theories and rumour acceptance were related to lower willingness to respect protective behaviours, especially physical distancing, mask-wearing and vaccinations (31).
- Deliberate exposure to COVID-19 to induce immunity has been shown to lead to severe illness and even death (32).

#### Affecting mental health and emotional well-being

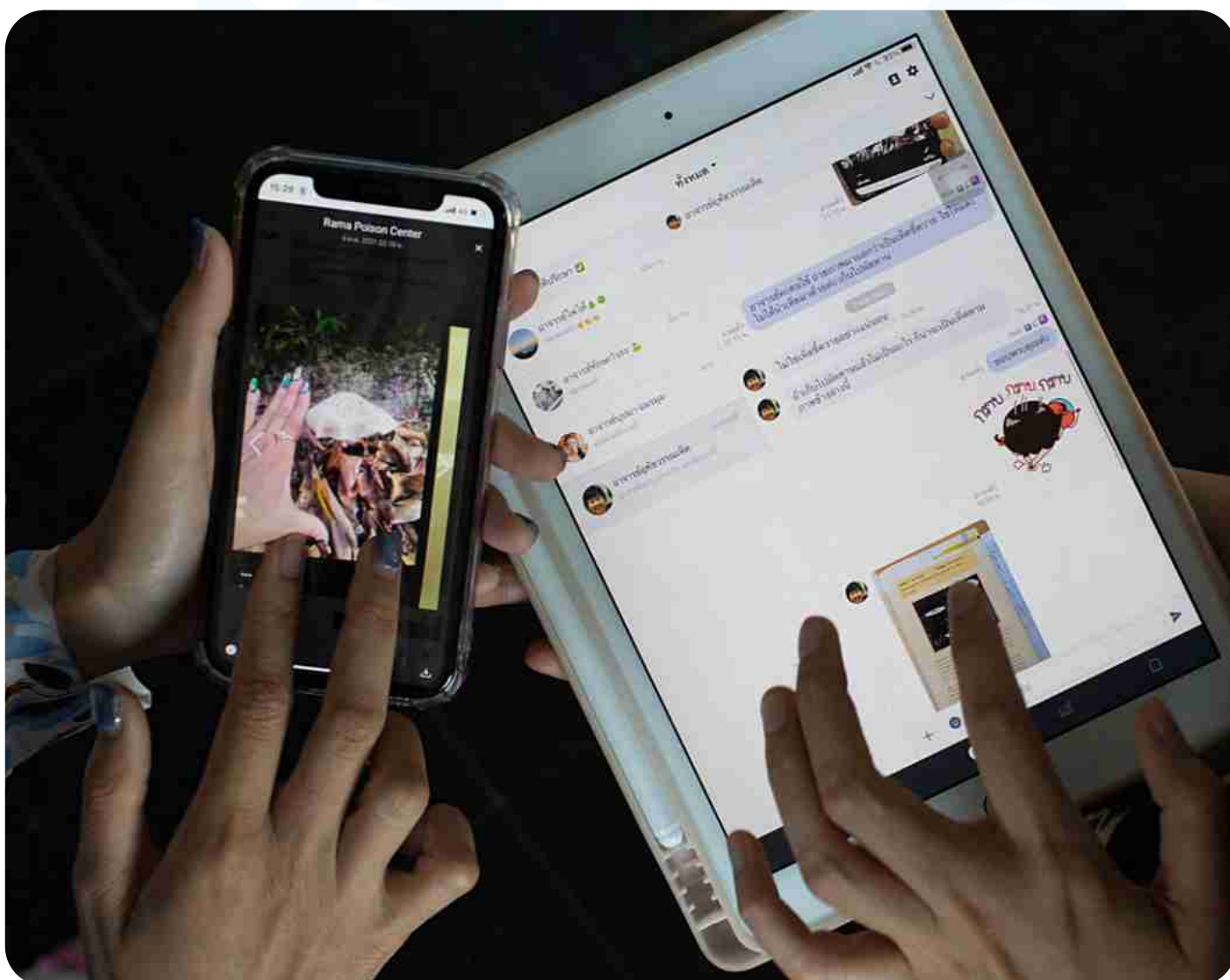
- Persistent fears, worries, uncertainties and stress provoked by misinformation may have long-term effects on the population, especially the most vulnerable members of the community (33).

- Higher levels of anxiety were seen in subjects who believed in COVID-19 related conspiracy theories – including those concerning biological warfare and 5G networks – which were nourished by unreliable sources. Symptoms of anxiety, depression and post-traumatic stress disorder were associated with exposure to misinforming messages (29).
- Some researchers suggest misinformation to be one of the contributing factors to suicide risk, due to its effects on mental health in high-risk and vulnerable groups (34).
- Distrust towards experts – fuelled by misinformation and distortion of medical statements – led some communities to self-medication, fear and misuse of pharmaceuticals (36).
- Health-care workers of the Red Cross in Paris highlighted how the rumours spread on social media platforms undermined the perception of public health authorities and reduced the effectiveness of response strategies. Also, the health workers reported feelings of anxiety and uncertainty due to the huge amount of contradictory information available online and offline (37).

#### Decreasing trust in the health system

- Conspiracy theories, rumours and misinformation diffused through social media and messaging applications such as WhatsApp, Viber and Telegram have increased mistrust in health workers and institutions, resulting in episodes of violence against medical staff (35).

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## 4. Digital solutions to health risks raised by misinformation

Since social media and the Internet are an important forum for the dissemination of overabundant, false and misleading information regarding COVID-19, they are also key spaces where solutions must be found and implemented. Several digital innovations have been developed, and previous methods strengthened, to respond to the infodemic. The nature of these solutions is not only technological, but also political, regulatory, educational and communicative.

Effective application of these digital solutions requires the involvement of relevant stakeholders in formal or informal COVID-19 infodemic management mechanisms. Digital infodemic interventions include:

- the implementation of fact-checking and false information reporting mechanisms;
- the adoption of social listening tools augmented by artificial intelligence (AI);
- the creation of monitoring programmes, multi-stakeholders' coordination initiatives and national regulatory frameworks which respect the principles of freedom of expression;
- the promotion of digital health literacy and inoculation interventions that improve people's ability to spot misinformation.

### Implementing fact-checking and false information reporting mechanisms

- One of the most popular interventions to counter misinformation has been fact-checking. In this field, evidence shows how warning labels may reduce the intention to share and the perceived credibility of fake news. Nevertheless, fact-checking effectiveness may be influenced by news formats, topics, sources, and users' political orientation and prior knowledge (10).

- A major challenge is that the pace of the careful work done by fact-checkers cannot keep up with the speed of misinformation spread (38), the amount of which is amplified using social bots (4).
- This well-known phenomenon became particularly critical with the enormous amount of COVID-19 misinformation that made it arduous for fact-checkers to respond to false claims (39).
- In response, automated fact-checking bots are being developed to aid the work of human fact-checkers, supporting them in accelerating responses, diffusing fact-checks, and identifying fake news or its patterns (40).
- Reporting mechanisms for COVID-19 misinformation have been updated by the main social media platforms to respond to the pandemic (11). For example, social media platforms have developed proprietary algorithms to identify false information, while also relying on reports from users and fact-checking organizations in order to remove or hide false information.

### Examples of fact-checking and reporting mechanisms

- Fact-checking organizations are offering their services to verify the truth of the information. Some of the most well-known are AFP Fact Check, FactCheck.org, Full Fact, NewsGuard, Poynter and Snopes. For example, Heath Feedback, a fact-checking organization, has created a worldwide network of scientists and health experts which help sort fact from fiction (41).
- Also, web-based platforms for fact-checking are being implemented, such as Logically, BoomLive, Lead Stories, Newschecker and PolitiFact. Several of them include a specific section for COVID-19 related fact-checks.



- The main social media and Internet companies proposed tools for fact-checking and reporting, like those of Google, Twitter and Facebook. The Google fact-checking tools consist of an Explorer and a Markup Tool with the purpose of verifying the truth of online information. The Twitter COVID-19 hub was visited by more than 160 million users between June 2020 and June 2021. Since the beginning of the pandemic, 43 010 tweets have been removed (71). In addition, Meta, the company behind Facebook, launched the Third-Party Fact-Checking Program (42).
- The EARS platform (Early AI-assisted Response with Social Listening) was developed by WHO to allow health decision-makers to view a real-time analysis of narratives happening in public online forums in multiple countries and languages (45).

### Creating monitoring programmes, multi-stakeholders' coordination initiatives and national regulatory frameworks which respect the principles of freedom of expression

#### Adopting social listening tools augmented by AI

- Social listening tools allow the gathering of information distributed on online platforms to capture and analyse keywords and sentiments with regards to COVID-19, and thus assess the volume, velocity and variety of false information and rumours (72).
- Natural language processing, the branch of AI that interprets human language, has been shown to be helpful in the automated detection of misinformation (43).
- AI solutions to combat false information require a multidisciplinary approach, using methods from different scientific fields: sociology (complex networks), computer science and linguistics (text mining), mathematics and statistics (machine learning) and physics (agent-based modelling) (38).

#### Examples of social listening tools augmented by AI

- Social listening tools are offered by CrowdTangle, Google Alerts, Social Mention, Talkwalker Alerts and TweetDeck, among others – with some features provided cost free and some premium features. Additionally, some tools include the analysis of social media contents, for example Awario, Cision, CrowdTangle, Social Mention, Talkwalker and TweetDeck (72).
- Bot Sentinel is a tool that identifies Twitter bots and accounts sharing unreliable contents, by means of AI and machine learning. Another example of a machine learning browser extension is Trusted Times, which classifies fake news and untrustworthy content (44).

- Technological innovations which have an impact on the health of citizens need to be supported by appropriate policy approaches. For example, evidence suggests that national policies may be enforced through good-quality statistics and precise definitions of indicators. Such an effort of national coordination is particularly necessary during an infodemic when the measurement scenario is more uncertain (46).
- The various stakeholders involved in infodemic response need to be coordinated through specific mechanisms aimed at allowing intersectoral interaction (74). The rapidity and efficacy of multistakeholder dialogues with online digital platforms in the European Union nevertheless may be strongly impacted by the degree of state involvement (47,48).
- National regulatory frameworks which tackle the spread of false information need to be built with utmost respect of freedom of speech and media pluralism. When taking measures to protect their populations from misinformation, states must not unduly infringe on human rights, particularly the freedom of expression (15).
- At the same time, self-regulatory monitoring programmes need to be based on principles of transparency in reporting harmful online content. Transparency standards help to ensure that social media platforms provide accurate reports of the size and scope of the infodemic challenge and mitigation measures, instead of underreporting (13).



### Examples of monitoring programmes, multi-stakeholders' coordination initiatives and national regulatory frameworks

- The COVID-19 disinformation monitoring programme is orchestrated by European Union institutions to encourage social media platforms to share achievements in reporting mechanisms and other initiatives aimed at managing the infodemic (11).
- The Online Safety Bill in the United Kingdom represents a positive advance, which includes – for the first time – mis- and disinformation in a national regulation. Through it, the Government of the United Kingdom recommends the following safety-by-design principles for web platforms: 1) platforms should take preventative steps to make sure their service reduces users' exposure to harm; 2) platforms should consider all types of users when assessing risks; 3) platforms should give users the tools and information they need to make safer choices online; and 4) platforms must be designed to keep children safe (16).
- Most adopted legislation considers the perpetrator – either as a person or as a media entity – liable for spreading false information, whereas the German Network Enforcement Act also holds online platforms liable for removing or moderating harmful content. This also implies the implementation of a monitoring programme on reporting of content flagged by users (17).
- Other legislative proposals tackle misinformation/disinformation by also highlighting the responsibilities of web companies. They are, for example, France's Fight against Online Hate Speech Law, Ireland's Proposal to Regulate Transparency of Online Political Advertising and Israel's Proposed Electoral Law Amendments and "Facebook Laws" (15).

### Promoting digital health literacy and initiatives aimed at inoculating against misinformation

- One of the main strategies to counter online misinformation has been the promotion of media and information literacy, with the purpose of bolstering prevention and reducing the appeal of disinformation and conspiracy theories (49).

- More specific approaches to tackling COVID-19 related misinformation include introducing educational modules on digital health literacy from a younger age. Digital health literacy has been seen to improve individuals' comprehension of public health information, increase healthy behaviours, reduce harm, promote protective attitudes towards others and themselves, assist in identifying rumours and misinformation on social media, and decrease vaccine hesitancy and conspiracy theories, while promoting informed health decisions (50).
- News literacy programs may be aimed at empowering users' ability to recognize and share correct information and encouraging them to produce verified news. Consequently, information professionals should be encouraged to build international ethical codes and educate users to recognize verified information (51).
- Some perspectives use inoculation theory to develop "psychological vaccines" – interventions such as games and videos aimed at improving people's ability to spot manipulation techniques commonly used with COVID-19 misinformation (52).
- Another approach uses campaigns against the infodemic, such as the United Nation's Verified, which was launched globally in April 2020 to address the infodemic around COVID-19 (53).

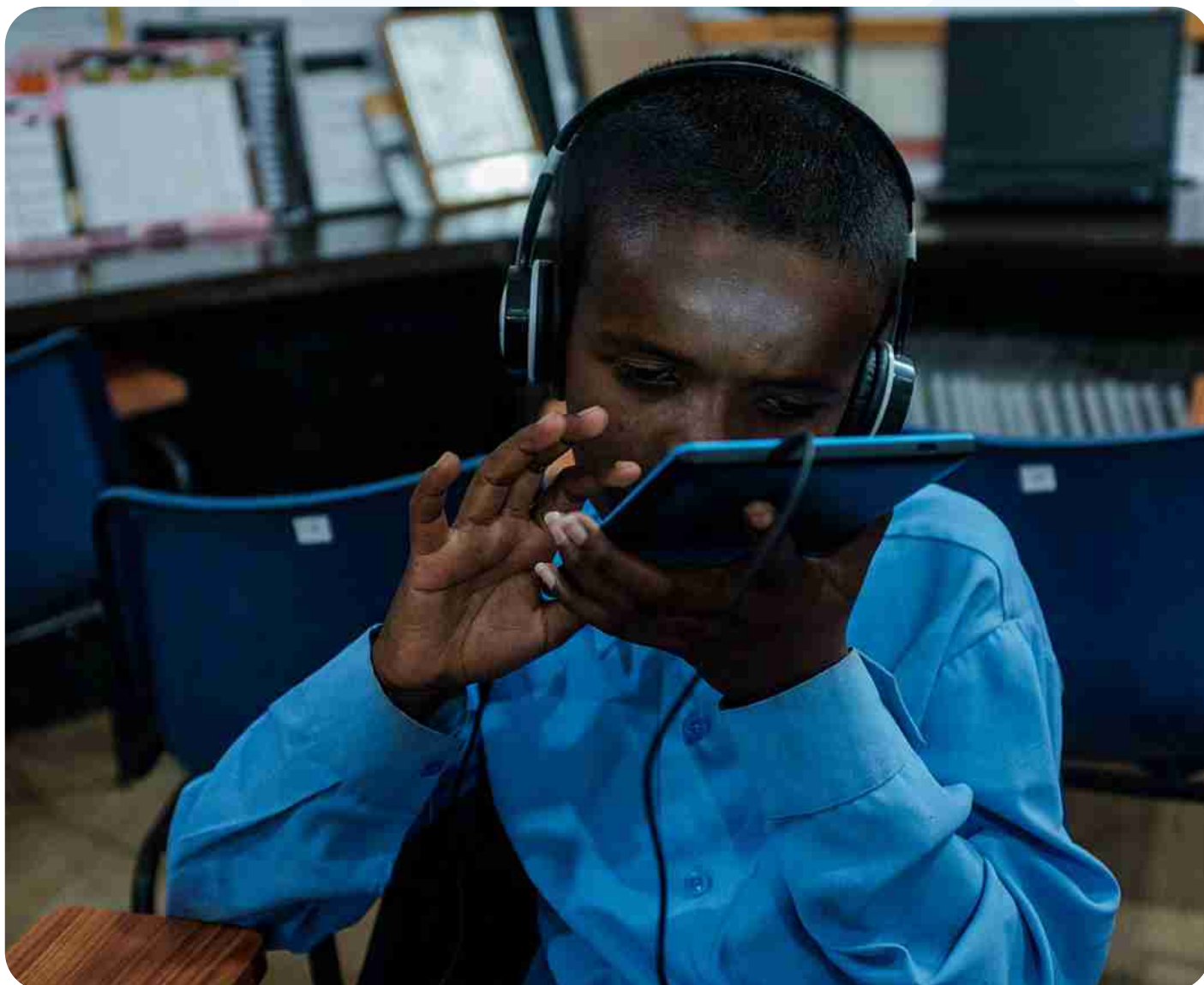
### Examples of digital health literacy and initiatives aimed at inoculating against misinformation

- Media and information literacy packages are made available by UNESCO to counter disinformation, fight discrimination and promote best practices (54).
- With regards to news literacy, an example of its application is NewsGuard, a Microsoft-sponsored program which rates the trustworthiness of websites through an extension of the Internet browser Edge (55).
- Inoculation games and videos have also been released, like GoViral, a game developed by the University of Cambridge, the media agency DROG and the United Kingdom's Cabinet Office (56).

The WHO Regional Office for Europe developed information resources and risk communication interventions intended to provide trustworthy health information, identify infodemic risks and analyse the response landscape.

Through risk communication and community engagement (RCCE), the Regional Office has focused on building and maintaining bidirectional trust between at-risk and affected communities and emergency response authorities. During the COVID-19 outbreak, infodemic management has been embedded in RCCE (9). The priority has been to ensure that affected populations have timely access to quality and relevant health information, and that misinformation is properly tackled. To this end, concrete actions have been undertaken by WHO to manage the infodemic in the European Region, as described in section 6 in this policy brief.

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## 5. Policy considerations

This policy brief highlights the need for specific improvements and developments that call upon stakeholders in the European Region to cooperate in infodemic management. To this end, the Regional Office highlights the six policy considerations described here below.

**1. Reinforcing multistakeholder networks for infodemic management.**

Infodemic management networks can contribute to building bi-directional trust between people and institutions, through the amplification of positive health messages by trusted influencers.

**2. Strengthening overall risk communication and community engagement.**

RCCE is a public health intervention essential to emergency response and critical to risk management. Political and financial commitment are vital to develop RCCE capacity at the level needed to support infodemic response.

**3. Implementing continuous monitoring of online harmful and false content.**

Member States can create a process for routinely examining infodemic signals (information voids, overabundant or false information, and rumours) in the main social media channels and other digital and online forums in their country.

**4. Improving digital literacy approaches and organizing infodemic management trainings.**

Infodemics can be prevented or mitigated by redesigning, enhancing and organizing initiatives to improve digital health literacy, critical thinking and infodemic management, with the purpose of increasing resilience to false information.

**5. Advocating for infodemic management through communication campaigns.**

Social mobilization can help empower citizens and engage them to contribute to building a safer online public sphere, for example by flagging and reporting false information.

**6. Ensuring safe online platforms, which protect people from harmful content.**

Infodemic management may involve policy changes that nudge digital platforms to stop the spread of misinformation through regional or national regulatory frameworks which promote transparency and external oversight of data and algorithms, with the aim of ensuring users' safety, health and well-being, while respecting freedom of expression.

## 6. What WHO is doing to address the infodemic in the European Region and globally

### 6.1 Digital communication strategies for infodemic management

The WHO Regional Office for Europe is making an unprecedented effort to inform stakeholders about the most recent scientific updates. Via social media, web platforms and traditional media, verified information is disseminated in all countries, and misinformation is directly tackled, by means of weekly news and daily rollouts. Examples of these strategies are the weekly collection of social and news media, web analytics and online search data with regards to the COVID-19 infodemic, as well as the visual network analyses showing misinformation ecosystems. The Regional Office COVID-19 Incident Management Support Team (IMST) Communication Pillar has developed an implementation guidance on advancing infodemic management within RCCE in the European Region, which is in the process of being published.

Additionally, WHO has launched digital campaigns to promote accurate health information (57), such as the one on handwashing; other campaigns include #doitall (58), #summersense (59), #safehand (60), #healthyathome (61) and #thankshealthheros (62).

Moreover, WHO is publishing myth busters (63), live Q&A interviews with experts, and an Infodemic Management News Flash, which informs readers about the most recent activities and events on a global level, and the main challenges and solutions highlighted locally (64). Additionally, the Regional Office publishes a newsletter that rounds up the latest updates on COVID-19 every two weeks; it includes guidance, interviews, tweets, epidemiological updates and country stories from WHO channels.

A weekly update on COVID-19 data and news is provided through Flu News Europe, which was born from the collaboration between the Regional Office and ECDC (65). Press conferences and live media briefings on COVID-19 are run in English and Russian; here, media from across the Region find their answers to an average of 350 media queries per week. This stream of regional risk communication is supported by country-focused communications.

### 6.2 Mobile apps disseminating accurate health information

The Regional Office partnered with the United Nations Children's Fund (UNICEF) in Europe and central Asia in April 2020 to make a freely available interactive COVID-19 chatbot, called HealthBuddy+, which provides expert advice through AI. The chatbot is available in 20 regional languages, and is accessible on the Internet, mobile applications (iOS/Android), and messaging platforms (Telegram, VKontakte, WhatsApp and Facebook Messenger). The digital solution provides evidence-based content and health advice on COVID-19, and links users to country-specific information. The mobile app also features an interactive poll, where users can voice their thoughts on key elements of the pandemic (78). Embedded in 15 partner platforms, HealthBuddy+ reached about 4 million individuals by the end of 2021.

Globally, WHO developed two mobile apps, respectively named WHO Info and WHO Academy, with the purpose of diffusing trustworthy pieces of advice, tips and scientific knowledge. WHO Info publishes health information for the public in six languages, in the form of news, feature stories, fact sheets, disease outbreak updates and public health emergency information. WHO Academy has been specifically created for the COVID-19 outbreak and is aimed at informing health workers by providing them with online guidance, tools, training and workshops (66).

### **6.3 AI-based innovations for rumour tracking, community feedback and social listening**

HealthBuddy+ also allows rumour tracking and community feedback through AI. Since its launch, nearly 800 reports in 16 languages have been collected (67). The rumour reporting function helps shed light on emerging and circulating rumours in the Region, which are analysed by language and then across the entire Region. The Regional Office has also used the AI-based news gathering, monitoring and analysis tool uCrawler to monitor fact-checking websites across the Region, and the social listening tool CrowdTangle to help monitor and assess infodemic signals.

Globally, WHO established a social listening tool, called EARS (Early AI-supported Response with Social Listening), based on AI, to identify emerging health narratives and “information voids” to help inform health decisions (68). Finally, WHO refined an infodemic observatory to assess the spread of misinformation and disinformation, through AI, data science and network science techniques.

### **6.4 Training, events and conferences to promote infodemic management**

The Regional Office has mobilized an Infodemic Management Team to help Member States detect, assess, analyse and respond to infodemic risks. To this end, national authorities and infodemic responders can benefit from a three-module training on infodemic management. The Leadership module equips national health authorities and partner organizations at the managerial and policy-making levels with necessary infodemic background and key technical skills to engage and manage national and subnational infodemic management stakeholders operationally. The Response module provides infodemic responders with advanced technical skills and knowledge of tools that will enable them to better understand, respond to and recover from infodemics. Finally, the Coordination module facilitates network building and planning between, on the one hand, national health authorities, WHO country offices and partner organizations and, on the other, fact-checkers, misinformation and disinformation researchers, journalists and other stakeholders involved in infodemic management.

Globally, WHO boosted international dialogue through events, conferences and trainings. Three WHO infodemic management conferences have been organized, where intersectoral dialogue on misinformation between all stakeholders involved was encouraged (69). WHO, together with the academic sector, has developed a public health research agenda for infodemic management, and the new discipline of infodemiology has been strengthened. The WHO Information Network for Epidemics (EPI-WIN) has organized several training activities on infodemic management.

### **6.5 Behavioural insights surveys, better rumour tracking mechanisms, multi-language fact-checking**

The Regional Office collaborated with a community of 2000 young people in the European Region for message outreach, rumour tracking and community-feedback initiatives; and with religious leaders from diverse faiths to debunk vaccines myths and increase vaccination uptake (70). The Regional Office also created a behavioural insights methodological tool for monitoring public knowledge, risk perceptions, behaviours and trust in a rapid, flexible and cost-effective way, and has conducted surveys in many countries in the Region throughout the pandemic. One of the goals of the tool was to highlight potential risks of misinformation and distrust, to better enable early response (71). Furthermore, WHO is creating a repository of about 200 active fact-checking organizations aimed at verifying COVID-19 false facts in more than 40 languages (72).

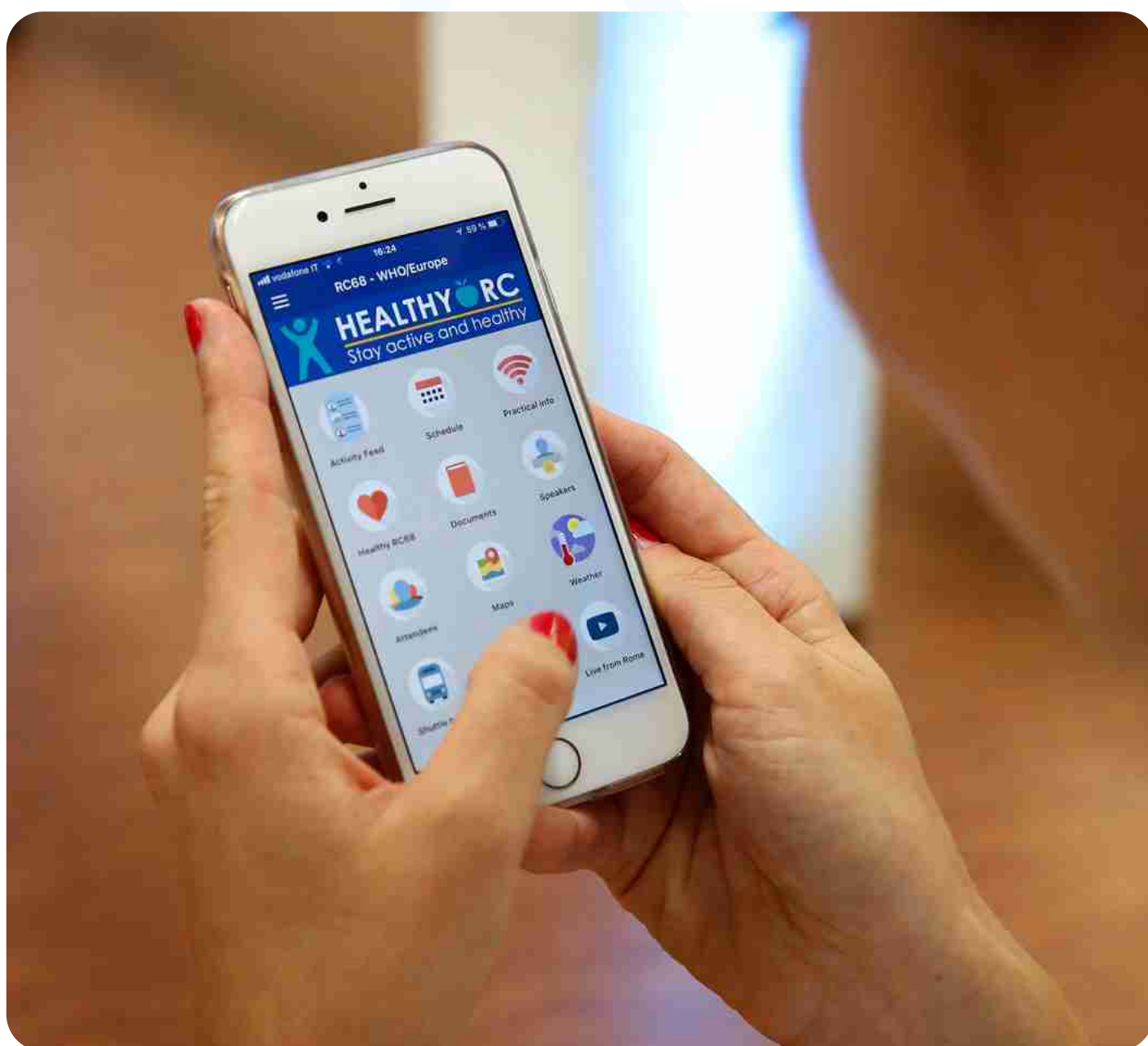
### **6.6 Partnering with social media and web companies**

The regional COVID-19 response landscape is shaped by different stakeholders, in particular government counter-misinformation teams; United Nations agencies and international partners (the International Federation of Red Cross and Red Crescent Societies (IFRC), the United Nations Development Programme (UNDP), UNICEF and WHO); media and journalist groups; community response groups; and influencers and organizations dedicated to fact-checking, disinformation analysis and response. The Regional Office enhanced partnerships with countries, other United Nations agencies, the tech industry, the media system and civil society, and supported national partners in building country tools and developing training for infodemic response.



At a global level, several infodemic management initiatives have seen WHO partnering with digital platforms, such as Google, Twitter, Facebook, TikTok, LinkedIn, WhatsApp and YouTube. An example of these initiatives of cooperation to respond to the infodemic is the *Google SOS alert*, which makes scientific health information more available and visible on Google channels for content search and mapping (73). Another initiative has been the WhatsApp service *WHO Health alert*, which provides updated health information to users in seven languages (74). Moreover, a devoted section of the WHO website encourages users to use the reporting systems of social media platforms to report false content directly (75).

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## 7. Conclusions

The health impact of the COVID-19 pandemic has been exacerbated by the “infodemic”: an overabundance of information, misinformation, disinformation and rumours, spread especially through social media platforms.

Harmful effects caused or exacerbated by the infodemic include adoption of wrong or harmful treatments, reduction in uptake of protective behaviours and vaccination, negative impacts on mental health and emotional well-being, and increased distrust towards the health system. To respond to the increasing amount of false or misleading information available online, this policy brief provides an overview of available evidence retrieved through the WHO COVID-19 Research Database and other relevant sources to identify digital solutions to help mitigate the impact of the COVID-19 infodemic.

Based on the evidence presented in this brief, viable operational considerations for action by Member States include: implementing fact-checking and false information reporting mechanisms; adopting social listening tools enhanced by artificial intelligence; creating monitoring programmes, multi-stakeholders’ coordination initiatives and national regulatory frameworks which respect the principles of freedom of expression; and promoting digital health literacy and inoculation interventions that improve people’s ability to spot misinformation. The brief also proposes a list of policy considerations for all stakeholders, including: reinforcing multistakeholder networks for infodemic management; strengthening overall risk communication and community engagement; implementing continuous monitoring of online harmful and false content; improving digital literacy approaches and organizing infodemic management trainings; advocating for infodemic management through communication campaigns; and encouraging policy changes to make online platforms safer for users.

In section 6, the brief outlines how the WHO Regional Office for Europe is shaping its own role in bringing to life the above operational and policy considerations, in support of and close coordination with Member States and other subnational and international governmental and nongovernmental stakeholders. Concrete examples of these efforts include digital communication strategies; mobile apps disseminating accurate health information; AI-based innovations for rumour tracking, community feedback and social listening; training, events and conferences to promote infodemic management; behavioural insights surveys, better rumour tracking mechanisms and multi-language fact-checking; and partnerships with social media and web companies. With this publication, another valuable tool is added to this list.

The implementation of the digital solutions and policy considerations above calls for a whole-of-society approach with the collaboration of all stakeholders involved in infodemic management, ranging from users themselves to social media platforms, the information technology sector, health policy-makers, and fact-checking and civil society organizations, among others – with a shared objective of improving the Region’s public health response to the COVID-19 infodemic and enhancing preparedness for future health emergencies. It also contributes to the European Programme of Work 2020–2025 – “United Action for Better Health in Europe”, and the call to action in World Health Assembly Resolution 73.1 for WHO and its Member States to address the proliferation of disinformation and misinformation.

Although this policy brief focuses on digital solutions to infodemics, it also underscores the importance of complementing online approaches with offline measures. This is especially true for further implementation and improvement of already known and tested risk communication and community engagement best practices.

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## Annex.

### Bibliographic search strategy

The bibliographic search strategy consisted firstly in selecting sources per main keywords by identifying all sources where the terms “COVID-19” and “infodemic” appeared in the titles or abstracts within the WHO COVID-19 Research Database (22). The words “COVID-19” and “infodemic” were then searched in combination with the terms “fact-checking”, “social listening”, “artificial intelligence”, “deep learning”, “machine learning”, “literacy”, “policy”, “regulation”, “regulatory” or “law”. The study selection was based on the inclusion criteria indicated in Table A.1, along with the language of publication (European, precisely English, Spanish, Portuguese, Italian, Russian), the year of publication (2020 and 2021), the type of published materials (journal articles), the affiliations of most of the authors and the field study (in Europe).

The following provides an example of how the strategy search was carried out for the search term “artificial intelligence”.

- References mentioning “COVID-19” and “infodemic” in titles and abstracts and including the term “artificial intelligence” in the body text were included, producing seven in total.
- All seven references that included “COVID-19” and “infodemic” in titles and abstract and “artificial intelligence” in the body text were in English.
- Among them, only journal articles were retained and only when their research focus was on a European field study or most of the article’s authors were European. Two articles were therefore included.

- Following the initial selection, to avoid the mistaken inclusion of the same articles in the total search results, each reference was included only once. This step was needed particularly for terms referring to close research areas, such as “artificial intelligence”, “deep learning” and “machine learning” on the one hand, and “law”, “regulatory” and “regulation” on the other.
- Finally, after reading the whole-body text, only references mentioning digital solutions were included.

This same procedure for inclusion was applied to all the keywords listed above, as shown in table A.1, leading to 38 articles being included in the analysis.

Table A.1. Bibliographic search results per keyword and inclusion criteria

Terms	Total results	Language of publication (European)	Type of published materials (journal articles) and either field study (European) and affiliation of most authors (European)	Used only once	Relevant to digital solutions
Artificial intelligence	7	7	2	7	7
Deep learning	7	7	3		
Machine learning	15	15	5		
Fact-checking	27	24	21	8	7
Law	2	2	2	6	5
Regulatory	7	7	3		
Regulation	5	5	2		
Literacy	59	55	16	13	12
Policy	28	27	9	4	4
Social listening	11	9	4	4	3
<b>Total</b>	<b>168</b>	<b>158</b>	<b>67</b>	<b>42</b>	<b>38</b>

The sources used to inform this brief are either cited throughout the text as references or are listed by keywords in the “Additional reading” section.

## Additional reading

This section lists sources that informed this policy brief in identifying the main digital solutions cited in recently published literature from the WHO European Region and found in the WHO COVID-19 Research Database. As these sources have been selected through the bibliographic search criteria described in the Annex, they are ordered per main keywords and in alphabetical order. The sources are not cited in the body text nor listed in the references.

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