

Public information about vaccines and treatments on COVID-19. Approach to the documentary sources of Institutions and Organizations

La información pública en torno a vacunas y tratamientos sobre la COVID-19.
Aproximación a las fuentes documentales de instituciones y organismos

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ABSTRACT

Introduction: The purpose of this study is a review of the current state in relation to information on the COVID-19 pandemic, vaccines and treatments to fight this coronavirus. The period of analysis is focused on 2020, 2021 and 2022. Relevant international institutional sources made up of several countries have been selected, such as the World Health Organization (WHO) and its Regions of Europe and the Americas, as well as the European Union. The research analyzes reports, projects, resources and surveys of public and private organizations of the main health agencies and centers in the United States, México, Spain, and the United Kingdom. **Methodology:** A qualitative-documentary methodology, of a critical-interpretative nature, has been used to analyze the texts produced by the Institutions and Organisms, chosen in turn through a systematic selective sampling based on deliberate and intentional selection criterion due to their perceived importance in the field of health. **Objectives:** To obtain a panoramic vision of the main publications around the proposed object and advance in the knowledge of communication patterns to contribute with the necessary information in the field of public opinion during the vaccination campaign against COVID-19. **Discussion and Conclusions:** We consider that the joint work of journalists, researchers, health personnel and health Organizations and Institutions is more necessary than ever so that information on COVID-19 adequately reaches the population as a public health strategy achievement. Likewise, it is necessary to know the strengths and weaknesses of the health system to rethink actions and strategies with regard to other pandemics or health crises that will arrive in the coming decades.

Keywords: Scientifics organizations; COVID-19; Health policy; Selection of documents; Medical treatments; Vaccines; Health information.

RESUMEN

Introducción: El presente estudio tiene por objeto una revisión del estado del arte en relación a la información sobre la pandemia de la COVID-19, las vacunas y los tratamientos para luchar contra este coronavirus. El periodo de análisis se centra en 2020, 2021 y 2022. Se han seleccionado fuentes institucionales internacionales relevantes conformadas con varios países, como es el caso de la Organización Mundial de la Salud (OMS) y sus Regiones de Europa y de Las Américas, así como la Unión Europea. Se analizan informes, proyectos, recursos y encuestas de organismos públicos y privados de las principales agencias y centros de salud de Estados Unidos, México, España y Reino Unido. **Metodología:** Se ha utilizado una metodología cualitativa-documental, de carácter crítico-interpretativo para analizar los textos producidos por las Instituciones y Organismos, elegidos a su vez mediante un muestreo selectivo sistemático en base a un criterio de selección deliberada e intencional por su importancia percibida en el ámbito de la salud. **Objetivos:** Obtener una visión panorámica de las principales publicaciones en torno al objeto planteado y avanzar en el conocimiento de los patrones comunicativos para contribuir con la información necesaria en el ámbito de la opinión pública durante las campañas de vacunación y de tratamientos contra la COVID-19. **Discusión y Conclusiones:** Se considera que es más necesario que nunca el trabajo conjunto de periodistas, investigadores, personal sanitario y Organizaciones e Instituciones de salud/sanidad para que la información sobre la COVID-19 llegue adecuadamente a la población como un logro de estrategia de salud pública. Asimismo, es preciso conocer las fortalezas y debilidades del sistema sanitario para repensar actuaciones y estrategias de cara a otras pandemias o crisis sanitarias que puedan llegar en las próximas décadas.

Palabras clave: Organismos científicos; COVID-19; Política de salud; Selección de documentos; Tratamientos médicos; Vacunas; Información de salud.

1. Introduction

On May 5th, the report of the fifteenth meeting of the Emergency Committee under the International Health Regulations regarding the 2019 coronavirus was issued, considering the three criteria of a Public Health Emergency of International Concern (PHEIC)¹: 1) if it still constituted an extraordinary event; 2) if it still posed a

¹ Emergencia de Salud pública de Importancia Internacional. Traducción de PHEIC por sus siglas en inglés.

risk to the public health of other states through international spread; 3) if it potentially required a coordinated international response. According to the content of the report, the Director-General of the WHO communicated the decision to conclude the consideration of the international health emergency (Adhanom, 2023a).

Since the WHO determined the state of alarm and declared a pandemic in 2020, three years and three months have passed. Officially, 6.9 million people have died, a figure considered very low. The WHO itself has estimated around 20 million deaths due to COVID-19 (Adhanom, 2023b, May 5th).

In the official declaration provided on the WHO website, Tedros Adhanom explained that "COVID-19 is now an established and ongoing health issue, no longer constituting a public health emergency of international concern" (2023b). In the view of the Emergency Committee, an opinion shared by the Director-General, although the SARS-CoV-2 has been and will continue to circulate and evolve, it is no longer something unusual or unexpected. They believe that the PHEIC has led countries to improve their capabilities "in terms of emergency coordination, collaborative surveillance, clinical care and risk communication, and commitment to communication [...] It has been a valuable tool in supporting the global response to COVID-19. The Committee agrees that it is the right time to transition to the long-term management of SARS-CoV-2 as an ongoing health issue" (Adhanom, 2023b).

In summary, according to WHO data, the mortality rate decreased "from a peak of over 100,000 people per week in January 2021, to just over 3,500 per week until April 24th of this year [...] The pandemic has posed, and continues to pose, a significant threat to public health" (Adhanom, 2023a). The Director-General of the WHO has called on countries to continue with surveillance and the response to SARS-CoV-2:

Thousands of people around the world are fighting for their lives in intensive care units, and millions more continue to live with the debilitating effects of persistent COVID. This virus is here to stay. It is still causing deaths and it is still evolving. The risk remains that new variants may emerge, leading to new spikes in cases and deaths. (Adhanom, 2023a)

As cases increased, measures were implemented that led to a reduction in incidence. As countries regained control over transmission and alleviated the burden on healthcare, many of these measures were relaxed or removed to allow for a more normalized way of life with the virus in circulation. While many countries are now reporting mild and asymptomatic cases, in others, the disease remains difficult to control. These factors are compounded by virus mutations. All of this highlights the importance not only of vaccines, undoubtedly the primary defense against COVID-19 but also the renewed relevance and significance of anti-COVID treatments for those who have contracted the disease. In the initial stages, these treatments were the only remedies available, albeit with uncertain outcomes.

According to data from the European Union, by the end of 2021, around 80% of the adult population had received a certain vaccination, and the European Commission (EC) had agreed on "contracts with pharmaceutical companies to secure the supply of more vaccines for young people, for international partners of the EU, for booster doses, and to protect us from new variants." Additionally, the Commission is working on preparations to address new virus variants (EC, September 7, 2022).

In 2022, the EC reported that 1.7 billion vaccine doses had been used in the European Union: "83.4% of the adult population is fully vaccinated, including booster doses, and new booster doses are being provided for those over 60 and vulnerable individuals" (EC, September 7, 2022). Referring to the WHO COVID-19 Dashboard (WHO, March 26, 2023), a total of 13,262,840,500 vaccine doses have been administered worldwide to date, with 5,085,684,058 people fully vaccinated and an additional 5,523,147,213 people having received at least one dose.

Currently, in addition to first-generation vaccines against the original virus, the European Medicines Agency (EMA) has only authorized the use of "binary" vaccines from Pfizer and Moderna, which also cover known mutations (EMA, January 20, 2023). In the United States, aside from first-generation vaccines against the original virus, all four original vaccines have been authorized in binary form, with restrictions for the Janssen

"Trust in science and scientists may have never been more important in recent times than during the coronavirus pandemic."

vaccine (Centers for Disease Control and Prevention [CDC], January 9, 2023). The WHO recommends several more binary vaccines (WHO, January 12, 2023).

Evidence regarding the effectiveness of vaccination against the dominant Omicron variant continues to grow. Its effectiveness concerning disease severity (mild/

moderate, severe, hospitalization, death) and the duration of protection has been reviewed and can be found in the technical reports published by the European Center for Disease Prevention and Control (ECDC, 2022a; 2022b). The results of these studies have led to the development of new vaccine modalities that provide protection against the dominant variant and are currently being administered. In the realm of vaccines recommended by the European Medicines Agency (EMA), the first Spanish vaccine, "Bimervax," from Hipra laboratories, is now available. It is a bivalent vaccine indicated as a booster dose for individuals aged 16 and older who have received the initial mRNA vaccination² series (*Agencia Española de Medicamentos [AEMPS]*, March 30, 2023).

Recently, the World Health Organization's (WHO) Strategic Advisory Group of Experts on Immunization (SAGE) has revised its vaccination recommendations to adapt to the impact of variants like Omicron and the high level of immunized population. Additional booster shots beyond the initial series are no longer routinely recommended for "medium-risk" individuals, as the benefits have been considered marginal. Healthy children and adolescents have been deemed of "low priority," and vaccination has not been recommended for them, but it has been maintained for older individuals and high-risk groups. The mechanics of additional booster doses for high-risk groups have been reviewed and set at 6 to 12 months after the last dose. Updates to bivalent vaccines have also been reviewed, and the mRNA vaccine BA.5 has been recommended for the primary series (WHO-SAGE, March 28, 2023).

Regarding treatments for those who have contracted the disease, the situation has also seen a significant change. Far from the speculations of the "Trump era," various types of treatments have been scientifically defined and verified, and their use has been authorized in both the European Union (EMA, January 20, 2023) and the United States (CDC, February 10, 2023). These treatments have also been recommended by the WHO and PAHO (2023).

2. Objectives

The aim is to analyze the function and scope of health communication in society by institutions and organizations during the COVID-19 pandemic to identify the impact of institutional messages on public opinion in vaccination campaigns and disease control through treatments:

First Objective: To gain a comprehensive understanding of the main institutional publications related to the stated objective.

Second Objective: To advance the understanding of the communication patterns they exhibit, assessing their effectiveness in resonating with society.

Both objectives are aimed at providing accurate and necessary information to the public, both in the current COVID-19 vaccination campaign and in future campaigns, as well as in the acceptance of medical treatments once the virus is contracted.

² Schedule of the first three doses of vaccines, respecting the minimum intervals between them.

3. Methodology and literature review. reports and projects

The research conducted for this study focuses on the analysis of information from institutions and organizations related to the pandemic. Following the research project's framework, we have selected relevant international institutional sources comprising multiple countries. These include organizations like the World Health Organization, the European and Americas regions of the WHO, as well as the European Union. Subsequently, we have chosen the primary national and public institutional sources from the United States, Mexico, Spain, and the United Kingdom. Finally, we have collected what we consider to be key reports, resources, projects, and surveys from relevant private organizations related to the stated objectives.

To address the subject of study, a qualitative-documentary methodology, characterized as critical and interpretative, has been employed, following the approach of authors such as Hoyos-Botero (2000) and Galeano-Martín and Vélez-Restrepo (2002). This methodology involves the analysis of produced texts (Gómez-Vargas et al., 2015). The process initially includes planning and designing the work, managing and analyzing data, and formalizing and developing the model (Gómez-Vargas et al., 2015). This process allows for the activities of inquiry, identification, selection, classification, and systematization that facilitate subsequent analysis.

Table 1. *Institutions and Organizations: Documentary Sources on COVID-19.*

INTERNATIONAL INSTITUTIONAL SOURCES COMPRISING MULTIPLE COUNTRIES	<p><u>World Health Organization:</u></p> <ul style="list-style-type: none"> - WHO Global - WHO European Region - WHO Region of the Americas 	<p><u>European Union:</u></p> <ul style="list-style-type: none"> - European Commission - European Centre for Disease Prevention and Control (ECDC) - European Vaccination Information Portal
NATIONAL PUBLIC INSTITUTIONAL SOURCES	<p><u>United States:</u></p> <ul style="list-style-type: none"> - National Institutes of Health (NIH) - Centers for Disease Control and Prevention (CDC) 	<p><u>Spain:</u></p> <ul style="list-style-type: none"> - Ministry of Health - Carlos III Health Institute (ISCIII) - Spanish Foundation for Science and Technology (FECYT)
	<p><u>Mexico:</u></p> <ul style="list-style-type: none"> - Secretariat of Health (SSA) - National Institute of Public Health (INSP) 	<p><u>United Kingdom:</u></p> <ul style="list-style-type: none"> - Institute of Global Health Innovation. Imperial College London
DOCUMENTARY SOURCES FROM PRIVATE ORGANIZATIONS	<p><u>United States:</u></p> <ul style="list-style-type: none"> - Johns Hopkins University Coronavirus Resource Center (JHCRC) 	<p><u>United Kingdom:</u></p> <ul style="list-style-type: none"> - Wellcome Trust. Encuesta Wellcome Global Monitor 2020 sobre COVID-19

Source: Author's own work.

4. International institutional sources comprising multiple countries

4.1. World Health Organization. WHO Global

The World Health Organization (WHO) is the world's leading health institution, and its reports have a global impact, transcending the boundaries of individual countries. As an organization dedicated to health, vaccines and treatments are important areas of study. During the initial wave of the pandemic, work began on the global collaboration project, the Access to COVID-19 Tools Accelerator (ACT-A), aimed at accelerating the development of diagnostics, treatments, and vaccines for COVID-19. This initiative was jointly led by the WHO, the Coalition for Epidemic Preparedness Innovations (CEPI), the Gavi Vaccine Alliance, the Global Fund, and the Wellcome Trust, among other organizations. As a result of this collaboration, specific vaccines were developed in record time (WHO, 2020, April).

Despite still being in the midst of the COVID-19 pandemic, vaccines to combat the disease are now available. However, a recurring problem emphasized by the WHO was the vaccine hesitancy among a portion of the population and the consequent risk of not achieving "herd immunity" (WHO, 2019, January 10). To address this issue, the WHO established the Vaccine Safety Net (VSN) in 2003, providing reliable information. VSN consists of a diverse group of digital information resources, from websites to social media platforms worldwide, offering well-founded scientific information on approved vaccines.

The next step was the approval of the Global Vaccine Action Plan for the period 2011-2020 (WHO, 2013), which included objectives aimed at addressing vaccine hesitancy. In 2018, the SAGE Working Group Report also addressed the issue of vaccine hesitancy (WHO-SAGE, 2018).

In 2021, the WHO presented the Immunization Agenda 2030 (IA2030), which highlighted COVID-19 as one of its key elements and emphasized the need to control it through vaccination. The Decade 2021-2030 Agenda is based on previous information regarding the challenges posed by infectious diseases. Consequently, the WHO considers immunization to be a significant factor in people's right to physical and mental health. It's important to consider the annual report, World Health Statistics 2021 (WHO, 2021b), which covers a range of health topics, including the COVID-19 pandemic. Additionally, the 2022 statistical report further focuses on the pandemic (WHO, 2022).

In September 2022, the WHO published the "COVID-19 Strategic Preparedness and Response Plan 2022: Global Monitoring and Evaluation Framework" (WHO, September 30, 2022). This report has a strategic objective: to study the evolving situation of the COVID-19 epidemic over time to use this information in the ongoing monitoring of the pandemic and make informed decisions based on the evidence that emerges.

In May 2023, two days before declaring the end of the pandemic, the foundations of its termination considerations were published: "Strategic Preparedness and Response Plan for 2023-2025 (SPRP): From emergency response to long-term COVID-19 disease management: sustaining gains made during the COVID-19 pandemic" (WHO, May 3, 2023). This represents the advanced continuation of the strategies prepared in 2022. The goal is to end the emergency phase of COVID-19 and transition to its comprehensive management within broader disease prevention and control programs. The achievement is expected through the reduction and control of the virus's incidence and its variants, using prevention, diagnosis, and treatment, including the management and integration of COVID-19 among the five core components of the WHO: "emergency coordination, collaborative surveillance, community protection, safe and scalable care, and access to countermeasures" (WHO, May 3, 2023).

Tools and Resources from the WHO Global

Among the documentary resources available on its website, we highlight the following tools: the WHO COVID-19 Dashboard, as mentioned earlier, with the global situation and weekly updated data³. It provides official daily counts of COVID-19 cases, deaths, and vaccine usage reported internationally. The interactive COVID-19 Timeline (WHO, January 20, 2023) also has updated data. Additionally, the World Health Observatory (WHO, January 20, 2023) offers weekly epidemiological updates and monthly operational updates. The first resources provide an overview of COVID-19 cases and deaths on a global, regional, and national level, highlighting data and pandemic trends. The latter resources inform about the actions taken by the WHO and its partners.

Another important resource is the COVID-19 Vaccine Tracker and Landscape database (WHO, January 20, 2023), which provides situation reports on new variants in different locations worldwide. It is updated twice a week after searching, collecting, and cross-verifying data from multiple sources, including the Cochrane mapping tool for vaccines and treatments, the PubMed biomedical literature database, the ClinicalTrials.gov database of clinical studies, and the WHO International Clinical Trials Registry Platform, among other collaborators. In the same vein, we mention the WHO's COVID-19 Research Database. It serves as a comprehensive multilingual source of current literature on the topic and can link to other scientific databases such as WoS, Scopus, Medline, ProQuest, scientific journal articles, preprints, and more.

We also include the resource "Clinical management of COVID-19. Living guideline"⁴ (WHO, January 13, 2023). It contains the most up-to-date recommendations for the clinical management of individuals with the disease. This is the sixth version of the "Living Guideline" and incorporates new evidence to update recommendations for COVID-19 therapy in collaboration with the Magic Evidence Ecosystem Foundation, which provides its Magicapp research platform to the WHO. The current Guideline, as well as previous versions, is available online and in PDF format through the WHO website, Magicapp [<https://cutt.ly/P4Zfy1R>], and the British Medical Journal (BMJ), which collaborates with the WHO and includes infographic content [<https://cutt.ly/r4ZfEZw>].

4.2. The WHO European Region

It is one of the six WHO Regions and has its Regional Office and a dedicated website [<https://cutt.ly/B4ZfXzo>] with headings that have the same names as other Regions' websites⁵. However, the content under these headings is specific to each Region. In WHO/Europe, you can find news and information related to vaccination in Europe, publications relevant to the Region, the COVID-19 situation panel in Europe, and Region-specific projects and tools. In addition, there are press releases, informative videos, materials for use in the Region's countries, social media buttons, and access to networks.

COVID-19 is present in almost all of the headings, but it is most extensively covered in two of them: "Health topics" and "Emergencies." In both, there is information related to COVID-19, although there is some overlap. For example, both contain "Pandemic of coronavirus disease (COVID-19)" with similar information.

As a specific document, we highlight the "Report on the Health of Europe 2021: Review of health-related SDGs in the era of COVID-19" (WHO/Europe, 2022). The website specifies that this report is produced every three years as the main publication of the WHO Regional Office for Europe. It aims to provide information on the

³ Starting from February 20, 2023, the panel is updated once a week. The Johns Hopkins University Resource Center no longer offers global updates since September 2022. The European ECDC also stopped providing them from August 2022.

⁴ The platform allows you to write and publish in a very structured way. It is a tool that does not require the installation of any software.

⁵ They change the name in some cases, but not the type of information it contains. For example, in Europe, publications, campaigns and tools are under "Our work". In the Americas, the same content is under "Resources", and there is no "Emergencies" section. All health content is under "Topics".

regional progress toward the Sustainable Development Goals related to health and the consequences of the pandemic.

Regarding web tools developed in the European Region, it's worth mentioning the launch in 2020 of a tool for conducting the *Behavioural Insights Survey on COVID-19*⁶. In 2022, the WHO provided a reminder on its global website about the two years of operation of this application:

WHO/Europe launched a tool for behavioral insights to help countries monitor people's perceptions, behaviors, and well-being during the pandemic. To date, the tool has been used in 30 countries in the Region. WHO has provided most of these countries with extensive technical support for data collection, analysis, interpretation, and reporting (WHO, 2022, July 29).

Another implemented tool is HealthBuddy+ (WHO/Europe, n.d.), a multilingual interactive solution developed by the WHO Regional Office for Europe and the UNICEF Regional Office for Europe and Central Asia to access up-to-date and evidence-based information about the disease. It is a web and mobile application designed to answer users' questions about COVID-19. It consists of three elements: a chatbot where users can ask questions and access information about the coronavirus, a tool for reporting rumors, allowing users to report false information, which will be cross-referenced with accurate information, and finally, surveys to allow the public to share information about the pandemic. The content is continuously updated and available in 20 languages in the European Region.

4.3. The Region of the Americas of the WHO (PAHO)

La Organización Panamericana de la Salud (OPS) is the International Health Agency of the WHO for the Region of the Americas, as well as the Specialized Health Agency of the Inter-American System. It has its Regional Office and its website [<https://www.paho.org/es>], which features headings common to the websites of the other Regions, but also contains a lot of its own content.

COVID-19 has its specific website [<https://www.paho.org/es/temas/coronavirus>] with very precise and accessible information about the disease, authorized vaccines, and data and statistics from various epidemiological alerts, which link to data from other WHO Regions. It has two sections with information: "Pandemia COVID-19" and "Vacuna COVID-19." The former is divided into four sections that provide updated information: "Daily Data; Weekly Report; Situation Reports, and Epidemiological Alerts" (WHO/Americas, 2023, March 6).

"Vacuna COVID-19" contains two sub-sections specific to the Region and a third from the global WHO (WHO/Americas, n.d.). The first contains information about immunizations and vaccines for various diseases, not exclusive to COVID-19. The global sub-section is specific to vaccines against the coronavirus. In each of the sections, there are various web resources that aid in the effectiveness of explanations to users: videos, audios, infographics, news from the WHO/OPS Press Center, and interactive dashboards. The COVAX Interactive Vaccine Dashboard from OPS (WHO/Americas, 2023, March 22) is very comprehensive and is updated twice a week.

Among the documents specific to the Region, we highlight, first, the Strategic Plan of the Pan American Health Organization 2020-2025 (WHO/Americas, 2017), which establishes the commitment between the States that make up the OPS and the Health Office for the following five years. They consider this Plan as the main element to carry out the Sustainable Health Agenda for the Region of the Americas 2018-2030 (SDA 2030) and to achieve the Sustainable Development Goals (SDGs) in the Region.

In 2021, the Annual Report of the Director of the Pan American Health Office 2021 was presented: "Continuing to work to overcome the COVID-19 pandemic," which includes the principles of SDA 2030, as well as those of

⁶ Social survey with behavior perspectives. A project conducted with the University of Erfurt (Germany) and the Cosmo Group.

the Strategic Plan 2020-25 (WHO/Americas, 2021, October 16). In 2023, the Report of the Regional Workshop on Lessons Learned on Preparedness and Response during the COVID-19 Pandemic in the Region of the Americas was published (WHO/Americas, 2023, June 3). This report gathers the most important experiences that can be useful for all healthcare systems in the countries of the Region, promoting cooperation in the event of future pandemics.

Recently, the results of the survey "Knowledge, Attitudes, and Practices of Healthcare Workers Related to COVID-19 Vaccines in Latin America" (WHO/Americas, 2023) have also been published. The report presents the responses of 6,700 healthcare professionals in 16 countries in the Region. Emphasis is placed on this healthcare workforce due to the trust they inspire in the population, considering it crucial to understand their thoughts and actions regarding vaccines to develop strategies that ensure public acceptance.

4.4. The European Union (EU)

4.4.1. The European Commission (CE)

The European Commission is the politically independent executive arm of the European Union. The Commission is solely responsible for proposing new European legislation and implementing decisions of the European Parliament and the Council of the EU" (EC, n.d.). Regarding the management of COVID-19, three strategies are outlined:

EU Vaccine Strategy (EC, 2020): This strategy is focused on research and vaccine production for COVID-19. The European Commission aimed to make the vaccine development process more efficient. The European Medicines Agency has conducted several reviews since its launch.

Therapeutic Treatments for COVID-19 Strategy (2021, October 22): The Commission created a portfolio of authorized therapeutic treatments, including antiviral monoclonal antibodies, oral antivirals, and immunomodulators for hospitalized patients.

Strategy for "Long COVID" (EC, 2022): The European Commission's strategy for COVID-19 therapy supports the development and availability of medications for the treatment of this condition, complementing the Vaccine Strategy

4.4.2. European Center for Disease Prevention and Control (ECDC)

The European Center for Disease Prevention and Control (ECDC) is a public health agency of the European Union. ECDC experts assess risks for Europe and provide guidance to help countries prevent and respond to public health outbreaks and threats. The ECDC's functions are diverse and encompass public health surveillance, epidemiological information, scientific advice, public health training, and more. The ECDC maintains an institutional website with comprehensive and up-to-date information on the coronavirus [<https://www.ecdc.europa.eu/en/COVID-19>] and publishes technical reports, among which the following are highlighted:

"COVID-19 Testing Strategies and Objectives" Report (ECDC, 2020) describes sustainable testing strategies and objectives for SARS-CoV-2 in populations, aiming to achieve specific public health goals in various epidemiological situations. The "Systematic Review of Social Media Monitoring Methods and Vaccine Hesitancy-Related Interventions" Report (ECDC and VCP, 2020) represents a review conducted by the ECDC and the Vaccine Confidence Project (VCP) that delves into knowledge and research related to social media and vaccination. Its purpose is to gain insights into vaccine hesitancy within social media platforms.

In more recent reports, the ECDC has reviewed the effectiveness of vaccines against virus variants and made modifications to achieve better coverage against mutations: "Public health considerations and evidence to support decisions on the implementation of a second mRNA COVID-19 vaccine booster dose" (2022a) and "Preliminary public health considerations for COVID-19 vaccination strategies in the second half of 2022" (2022b).

Currently, their specific website has suspended the publication of COVID-19 cases and death data worldwide. They request checking WHO data and the WHO Weekly Operational Updates page for non-EU countries. However, they continue to provide weekly updates for the European Union and remain a comprehensive documentation resource offering various COVID-19 materials: videos, infographics, seminars, social media updates, e-learning courses, external links, and coronavirus incidence surveillance.

4.4.3. The European Vaccination Information Portal (EVIP)

The European Vaccination Information Portal (EVIP) [<https://vaccination-info.eu/es>] aims to "provide accurate, objective, and up-to-date data on vaccines and vaccination. It offers an overview of the mechanisms implemented in the European Union to ensure that available vaccines meet safety and efficacy standards" (EVIP, September 11, 2020). This site is driven by the ECDC and the European Commission, representing a European Union initiative following the Council Recommendation on strengthening cooperation against vaccine-preventable diseases adopted in December 2018 (EU, December 28, 2018).

During the first wave of the pandemic, it maintained a section for COVID-19, although it lacked content for several months. Currently, it is a space with relevant information on COVID-19 vaccination options, providing valuable documentary sources for understanding the topic. Regarding vaccines, the European Vaccination Information Portal refers to vaccines authorized by the EMA and offers comprehensive information about the advantages and disadvantages that patients may encounter (EVIP, April 15, 2023).

Concerning this topic, it also directs users to various European Union agencies and provides updated information about different diseases and vaccine safety. It includes links to official websites containing important vaccination-related content in the European Union.

5. Public National Institutional Sources

5.1. United States

5.1.1. National Institutes of Health (NIH)

They belong to the Department of Health and Human Services of the United States and constitute the principal research agency in medicine. They have developed a specific website for COVID-19 [<https://COVID19.nih.gov/>] that provides information on all aspects affecting the disease. It includes treatments, vaccines, tests, and clinical trials with the most up-to-date information.

The page "Coronavirus Disease Treatment Guidelines" (NIH, January 30, 2023) is important, as it contains the latest decisions regarding treatments that may have been implemented previously. Each decision and its rationale are specified in each section by the Treatment Guidelines Panel. Another noteworthy website is the Disaster Research Response Resources (DR2) Portal. COVID-19-related resources provide links to websites where researchers can find resources related to COVID-19, in addition to those available on the DR2 Resources Portal (NIH, n.d.).

The NIH places great emphasis on direct research. There is a website specifically prepared for the public interested in volunteering for experiments, containing well-explained explanations; it is a very comprehensive resource: "NIH Clinical Research Trials and You," which on the COVID-19 page is referred to as "COVID-19 Clinical Trials" (NIH, June 8, 2022), and its content is tailored to understanding clinical trials.

They present sections detailing ongoing studies, various treatments, vaccines, and specific training on treatments and their phases, with explanations of vaccines, as well as where to find the most up-to-date and reliable information on the situation and the types of tests available to detect the virus. The "Frequently Asked Questions" section also includes extensive information aimed at potential participants in clinical trials, as well as reputable information sources for content verification (WHO, Johns Hopkins Center, ECDC, etc.).

The information includes details about the COVID-19 Prevention Network (NIH, February 2023). It is a website with relevant content and varied, highly educational resources, always with up-to-date information. Both for the NIH and the public, they have the ClinicalTrials.gov database showing federally and privately supported clinical trials studying COVID-19 in the United States and worldwide, as well as their own database of ongoing clinical trials for treatments and vaccines against the disease.

Within the NIH, the National Institute of Allergy and Infectious Diseases (NIAID) is included. The SARS-CoV-2 has been present from the beginning on its main website, although they have a specific page dedicated to COVID-19 and other coronaviruses [<https://cutt.ly/24ZjnaX>]. The COVID-19 page provides a broad and well-explained overview of the different possibilities offered by both treatments and vaccines⁷. Igualmente, presenta información para voluntarios en ensayos clínicos de COVID-19 y diversos recursos didácticos.

5.1.2. Centers for Disease Control and Prevention (CDC)

The CDC is a public organization that safeguards health and is part of the Department of Health and Human Services. It is the country's foremost agency for disease prevention and health promotion. They have a specific website dedicated to COVID-19 [<https://cutt.ly/KwqUg9fE>] that includes information on vaccine types (January 9, 2023) and treatments and medications (February 10, 2023). In "CDC's Answers," they specify their mission:

The CDC is gathering information and providing recommendations about vaccines being distributed in the United States after receiving emergency use authorization from the Food and Drug Administration. While the CDC is not involved in creating vaccines, we have been working closely with health departments and other partners to develop vaccination programs (CDC, February 12, 2021).

CDC Tools and Resources

The recommendations to take extra precautions against COVID-19 occupy a significant portion of their website. They have developed a Microsite on COVID-19 (CDC, July 9, 2022) that offers a Public Health Media Library. It includes a variety of electronic resources: podcasts, infographics, images, videos, widgets, with the intention of providing comprehensive information.

They present important tools such as the COVID-19 Data Tracker (CDC, March 23, 2023), which provides information on updates regarding vaccines and treatments and is updated daily from Monday to Friday for the United States. Another tool is V-safe (CDC, January 18, 2023), which focuses on detecting issues with vaccines in general and specifically with COVID-19 vaccines. It is a smartphone-based system that monitors the health of individuals who have received a vaccine.

5.2. Mexico

5.2.1. The Secretariat of Health (SSA)

Mexico does not have a specific official website for COVID-19; the information is hosted on the Government's website [<https://www.gob.mx/>], but currently, access is not allowed. The first accessible page is that of the

⁷ The NIAID is one of the three developers of the "Moderna" vaccine.

Secretariat of Health (SSA) [<https://www.gob.mx/salud>], which publishes weekly reports on daily averages of COVID-19 infections, as well as technical announcements from the General Directorate of Epidemiology.

Among their documents, we highlight the web resource "Clinical Guide for the Treatment of COVID-19 in Mexico" (SSA, August 5, 2021), which includes all public health institutions and contains relevant information on regulations for pandemic control, approved vaccines and treatments, risk factors, recommendations according to user types, and pharmacological interactions between medications. Currently, it is not accessible to the general public, only for healthcare personnel⁸.

The Secretariat has implemented the Information System of the IRAG Network (SSA, March 20, 2023). It is a platform that provides statistical, geographical, and temporal information on the state and evolution of hospital occupancy nationwide to facilitate data consultation. It is designed and developed by the Institute of Geography of the National Autonomous University of Mexico. The data it contains come from statistical sources of the Secretariat of Health.

5.2.2. The National Institute of Public Health (INSP)

It is the institution responsible for developing public health policies and research, and it falls under the jurisdiction of the Ministry of Health. Additionally, it has implemented an interactive dashboard working with official coronavirus data, the Analytical Dashboard for Monitoring Documented Cases of SARS-CoV-2 in Mexico, developed by the Public Health Intelligence Unit (UISP) of INSP. This dashboard provides maps, graphs, and other relevant information on the development of the pandemic across the country, in each municipality, and in each healthcare institution from 2020 to the present. The data is updated daily (INSP and UISP, April 28, 2023).

One of its key documents is the Institutional Memory 2017-2022 (INSP, 2022, pp. 72-81), which outlines the level of scientific production during that period. This includes the National Health and Nutrition Survey (ENSANUT), conducted by the Center for Research in Evaluation and Surveys (CIEE), an entity of INSP. Conducted annually, it involves the entire population with 15-20 minute personal interviews and is considered a reference document for understanding the health and nutrition situation in the country. Starting in 2020, the COVID-19 factor is introduced to monitor the pandemic, transforming it into a continuous survey over the five-year period from 2020 to 2024.

The ENSANUT Surveys (INSP-CIEE)

The first of this new stage corresponds to the National Health and Nutrition Survey 2020 on COVID-19. National Results (INSP-CIEE, 2021). In addition to considering information on the health and nutrition of the Mexican population, as has been done for years, a section on the actions and consequences of COVID-19 was incorporated. This section included a study of COVID-19 antibodies in the population, providing important information for the development of certain public health protection policies. Data was obtained from 10,216 households with 9,464 hematological samples. The fieldwork extended from August to November 2020.

The second is the National Health and Nutrition Survey 2021 on COVID-19. National Results (INSP-CIEE, 2022), with the same objectives as the previous one. Representative information and blood samples were obtained from 12,619 households during the months of August to November 2021. In this edition, the measurement of antibodies against the virus included the application of vaccines.

The ENSARS-CoV-2 Surveys (INSP-CIEE)

Simultaneously, the INSP and CIEE conducted a round of telephone surveys on COVID-19 as the sole topic: the National Survey of Population Characteristics during the COVID-19 Pandemic (ENSARS-CoV-2). The objective

⁸ The last publicly accessible update located (5 August 2021) is a good example of the scope of its content.

was to describe, in a sample of adults aged 20 and older, health characteristics, food security, and associated social factors to estimate the level of vulnerability, disease control, as well as mobility and the maintenance of social distance during the pandemic. The study, which includes behavioral insights content, consists of two independently published parts: the baseline stage and the follow-up.

The "Baseline Stage" corresponds to the report ENSARS-CoV-2. Results of the baseline assessment of the national survey of population characteristics during the COVID-19 pandemic (INSP-CIEE, July 2020). It was conducted between May 11 and May 30, 2020, with a sample of 1073 people and a duration of 20 minutes per individual. Only sociodemographic data and housing characteristics were requested in this stage. Along with them, other common data were requested with the "follow-up stage": income, employment, tobacco and alcohol consumption, domestic violence, non-communicable chronic conditions, physical activity, hours spent outside the home and in what situations, dietary habits...

The "Follow-up Stage" corresponds to the report that makes a comparison of both stages, Ensars-CoV-2. National survey of population characteristics during the COVID-19 pandemic: comparative results of the first and second survey. The respondents from the previous assessment were contacted again, with an 85.5% response rate, according to the survey data. It was conducted from June 29 to July 16, 2020 (INSP-CIEE, October 2020).

Additionally, during September and October 2020, the ENSARS-CoV-2 survey for girls and boys under 12 years old was conducted, which also includes behavioral insights content (Shamah-Levy, March 18, 2021), through an electronic survey directed at 3,007 individuals responsible for minors. The form asked participants to compare the habits of girls and boys in March 2020 with the date (September-October) when the form was completed. Topics included nutrition, physical exercise, sedentary behavior, healthcare, pandemic care, education, and the feelings the situation had caused them.

5.3. Spain

5.3.1. Ministry of Health

It is the main entity responsible for providing epidemiological information regarding the COVID-19 pandemic through reports produced by the Center for Coordination of Alerts and Emergencies (CCAES)⁹ and the National Center of Epidemiology (CNE)¹⁰ of the Carlos III Health Institute (ISCIII)¹¹, based on information provided by the Autonomous Communities. Their activity is evident in reports updating the COVID-19 situation (CCAES, April 21, 2023), rapid risk assessment (CCAES, January 20, 2023), or Monitoring Indicators (CCAES, April 21, 2023), among others, available on the website [<https://www.sanidad.gob.es/>].

Additionally, for decision-making, information from the National Epidemiological Surveillance Network, coordinated by CCAES and CNE-ISCIII, is considered. This network incorporates various types of information about the population, complementing surveillance efforts and allowing for an understanding of the behavior and activity of the National Health System (SNS) in response to the pandemic.

Among the health-related documents, in a moment of recovery following the pandemic, we highlight the Public Health Strategy 2022: Improving the health and well-being of the population. It is a comprehensive coordination project in the field of public health. As specified in the publication itself:

⁹ "Responsible for coordinating the management of information in the event of a health alert/emergency and for drawing up and developing preparedness and response plans for public health threats. preparedness and response plans for public health threats. It is part of the General Directorate of Public Health of the Ministry of Health" [<https://cutt.ly/OwqY90RA>].

¹⁰ "Its functions are public health surveillance, the epidemiological study of diseases, the quantification of their impact and the monitoring of their evolution. monitoring of their evolution. It is part of the ISCIII" [<https://repositorio.isciii.es/handle/20.500.12105/2292>].

¹¹ Autonomous public body for scientific support to the National Health System, health control and research. [<https://www.isciii.es/QuienesSomos/Paginas/QuienesSomos.aspx>]

It constitutes the first common roadmap for our entire territory and establishes priority actions to be carried out, creating a framework for coordinating all stakeholders. It will be the instrument that efficiently articulates and links different public health initiatives developed at the international level with national (general, regional, and local) policies, taking into account Spain's political and organizational configuration. It is based on 5 axes of public health that are widely accepted: Determinants of health, with a strong focus on addressing health equity. Health in All Policies. One Health Approach. Sustainable Development Goals 2030. Governance for health (MISAN, 2022a, p. 1).

Another important and well-crafted document with a visual style is the Annual Report of the National Health System 2020-21. As the name suggests, it is an annual report. This edition is produced in the context of a pandemic and gathers information from the years 2020 and 2021. It provides not only general health data, which in this 2022 report focuses on respiratory, cardiovascular, cancer, and mental disorders, but also includes information on the performance of the healthcare system during the COVID-19 pandemic and the perception of its work by citizens throughout Chapter 6 "Response of Health Services to COVID-19" (MISAN, 2022b), which constitutes one-third of the publication.

This chapter includes the following contents: "Diagnostic capacity"; "Healthcare capacity"; "Primary Care activity related to COVID-19"; "COVID-19 hospital activity and occupancy"; "Impact of COVID-19 on access to the healthcare system"; "Impact of COVID-19 on ordinary care activity"; "COVID-19 vaccination"; "Experience and opinion of the population regarding the pandemic". Regarding this last point, it is information that is usually collected through the Health Barometer, with personal surveys. However, as specified in this document, it was not possible to conduct these surveys in 2020 and 2021 due to the pandemic. Nevertheless, the document incorporates content provided by the Opinion Barometer of the Center for Sociological Research (CIS), which included a set of health-related questions during that period to fill the existing gap (MISAN, 2022b).

In the selection of documents, we also highlight the two phases of the National Sero-epidemiological Survey of SARS-CoV-2 Infection in Spain (ENE-COVID). The first phase was carried out in four rounds. In the presentation provided by the Ministry of Health regarding this survey within its "Final Report" (July 6, 2020, p.1-3), it specifies that it is a study in collaboration with the Carlos III Health Institute, the Health Services of the Autonomous Communities, and the National Institute of Statistics. The content is detailed: "It is a comprehensive longitudinal sero-epidemiological study, population-based, with the objectives of estimating the prevalence of SARS-CoV-2 infection by determining antibodies against the virus in Spain and assessing its temporal evolution. The 3 rounds of ENE-COVID (04/27-05/11, 05/18-06/01, and 06/08-06/22) include 68,296 participants" (MISAN and ISCIII, July 6, 2020, p.1).

The fourth round took place between November 16 and November 29, 2020, with a total of 51,409 participants (MISAN and ISCIII, December 15, 2020, p.1). Regarding the second phase of the survey, the Ministry of Health explains the reasons and objectives:

The recovery of activity following the end of the state of alarm last June has been accompanied by the emergence of outbreaks of SARS-CoV-2 infection and a growing number of cases throughout the country. For this reason, it has been deemed appropriate to launch this second phase of ENE-COVID, with the following objectives: To know the percentage of people who currently have antibodies against the SARS-CoV-2 virus in Spain, by autonomous communities and cities, by provinces, in men and women, and in different age groups. To know the percentage of people who have developed or acquired antibodies since the first wave. To study the evolution of antibodies and the factors associated with their persistence (MISAN, November 3, 2020, p.2).

Another document worth highlighting is the European Health Survey in Spain 2020 (EESA 2020). On the website dedicated to EESA 2020 by the Ministry of Health and the INI, the following information is provided:

The European Health Survey in Spain (EESA) 2020, conducted by the National Institute of Statistics (INE), is the Spanish part of the European Health Interview Survey (EHIS), coordinated by the European Statistical

Office. The questionnaire for Spain has been jointly adapted by the INE and the Ministry of Health to allow for the comparison of results with the main indicators of the National Health Survey (ENSE). Additionally, a series of variables have been added through an agreement between both organizations. The EESE is a study aimed at understanding the health status, health-related behaviors, and the use and access to healthcare services of the non-institutionalized adult population residing in Spain (15 years and older) through a common European questionnaire administered with the help of a computer (INE and MISAN, 2020, pp.1-2).

The survey is conducted every five years, collecting health information from the population residing in the country aged 15 and older in their homes, using the adapted common European questionnaire. Data collection took place between July 15, 2019, and July 24, 2020, with a sample of 22,072 personal interviews. The questionnaire comprises four main sections: the sociodemographic section (home and person), the health status section, the healthcare section, and the health determinants section (INE and MISAN, 2020).

Reports produced by the Health Barometer (BS) and the Opinion Barometer (BO) are also important. The Health Barometer surveys are the responsibility of the Ministry of Health, in collaboration with the Center for Sociological Research. The data collection frequency is annual, but it did not gather information in 2020 and 2021 due to the situation posed by COVID-19, as mentioned earlier. For the same reason, in 2022, it changed its information collection method from personal to telephone interviews. Until 2021, the BS collected information through questionnaires and direct personal interviews, asking about how the population perceived health system services, their impression of the impact of health policies, their knowledge and attitude towards health problems of interest at the time, as well as the degree of acceptance of information campaigns. The questionnaire also has a variable part that is modified to adapt to each annual study. Common variables include age, gender, level of education, activity, municipality size, income level, and autonomous community (MISAN-INE, March 2022).

Every year, the information is collected in three phases, three "waves." The annual state survey, combining the three waves, has around 7,800 home interviews in total (2,600 each phase) with individuals aged 18 and older. In 2022, the Health Barometer presented its first wave in March (MISAN-INE, March 2022). In June, it presented the second wave (MISAN-INE, June 2022), and in November, the third (MISAN-INE, November 2022). At the end of the year, a joint report with conclusions was published (MISAN-INE, March 2022)¹². In 2023, the first wave of the BS has already been published (MISAN-INE, 2023, March).

Regarding the Barometer of Opinion, the surveys and data publication are the responsibility of the CIS. Their operation is based on interviews in a population sample aged 18 and older, conducted monthly. The primary objective is to measure the public opinion of the country each month, a consultation period much closer to when something happens. A fixed set of questions serves as a guide to designing indicators presented by the BO. Additionally, each month, the Barometer may contain a variable group of questions dedicated to the topic of greatest interest to society at that time (CIS, 2023).

Considering the absence of the Barometer Sanitario in 2020 and 2021 and the ongoing pandemic, starting from May 2020, the CIS Barometer incorporated questions about health status, the COVID-19 vaccine, the use of health services for COVID-19, and measures to control the virus. As an example, we have selected the survey corresponding to that first date of change in its questionnaire, which dedicates its first 23 questions to the topic of COVID-19 and then intertwines that theme with others of a different nature (CIS, 2020, May).

Tools: Key Indicators of the National Health System (INCLASN)

It's an excellent interactive tool for information retrieval, presented directly in one of the main tabs on the Ministry's website, "Health in Data," and through the "Ministry" tab within the "National Health System"

¹² There must be some mistake, as the joint report is dated March, but it does not correspond to the Study number, which is 8822; that of the first wave is 3357. 8822; that of the first wave is 3357. Nor does it correspond to the same content, which is actually the total.

section. It involves a selection, among all the data contained in the National Health System, of elements considered especially relevant to cover citizens' health aspects, the functioning of the public health system, and factors determining health. This list provides selected information from the health system, showcasing variations and trends.

It includes three main parameters with a total of 12 primary indicators. Each of these has various secondary indicators. The first parameter, "Health," has 3 primary indicators and a total of 46 secondary indicators. The second parameter, "Social Determinants of Health," has 3 primary indicators with a total of 25 secondary indicators. The third parameter, "Health System," has 6 primary indicators with a total of 116 secondary indicators, all presented in a tool that allows the application of disaggregation variables to determine the years, Autonomous Communities, or gender¹³. The result of crossing all these options are reports that we can personally obtain on what interests us, and they are generated automatically (MISAN, 2023).

5.3.2. The Carlos III Health Institute (ISCIII)

"It is attached to the Ministry of Science and Innovation [...] but is functionally dependent on the Ministry of Health for the activities it carries out in the field of health" (ISCIII, 2021, 28 December). Its main website [<https://www.isciii.es/>] devotes a special place to the topic of COVID-19, which is developed in a prominent section of the website: "COVID-19 in Spain" [<https://cneCOVID.isciii.es/>] It contains official updated information, reports, studies, surveillance panels, documents from the National Centre of Epidemiology, etc.

We found documentary content on COVID-19, such as the ENE-COVID study, carried out in collaboration with the Ministry of Health, "whose objectives are to estimate the prevalence of SARS-CoV-2 infection through the determination of antibodies against the virus in Spain and to evaluate its evolution over time" (MISAN and ISCIII, 2020, 6 July, p.1), the Information on research projects financed by COVID funds (ISCIII, n.d.), which contains 50 research projects on the subject, and the ENE-COVID Senior trial conducted "in collaboration with the Ministry of Health and the Ministry of Science and Innovation [...] which analyses the efficacy of immunity against Sars-Cov-2, as well as its duration" (ISCIII, 2022, 19 January).

It's important to mention the SiVira Report on the surveillance of influenza, COVID-19, and respiratory syncytial virus (RSV) for the 2021-2022 season (ISCIII, 2022). As reported on the website of the Biomedical Research Networking Center for Epidemiology and Public Health (CIBERESP):

It's a report on the results of the second season of comprehensive surveillance of acute respiratory infections, focusing on three viruses: influenza, SARS-CoV-2, and respiratory syncytial virus (RSV), building on previous experience in influenza surveillance. The report summarizes the work carried out by all participating autonomous communities in the SiViRA surveillance system, within the framework of the National Epidemiological Surveillance Network (RENAVE), coordinated by the ISCIII. [...] The joint comprehensive surveillance model represents a paradigm shift in surveillance objectives. It aims to adapt previous influenza surveillance systems to monitor influenza, COVID-19, and RSV through a single, more sustainable and efficient surveillance system. (CIBERESP, 2022).

Also noteworthy is the WHO/Europe Cosmo-Spain survey: Monitoring behavior and attitudes of the population related to COVID-19 in Spain. The results of this survey, which started in May 2020, concluded in November 2022, and was conducted in 12 rounds, undoubtedly provide important information. On the ISCIII website dedicated to this survey, information is provided:

The ISCIII coordinates the World Health Organization Behavioral Insights survey on COVID-19 in Spain, with the aim of monitoring the behavior and attitudes of the population related to COVID-19 in our country [...] This study has been launched in 31 other countries, where it has already proven to be useful

¹³ A fourth variable by socio-economic status is in the process of being included.

for identifying the information needs and preferences of citizens in "real-time," understanding the level of acceptance and adherence to implemented or planned measures, identifying risky behaviors, the impact of misinformation, and psychological factors in preventive behavior (WHO/Europe-ISCIII, 2022).

The results have been regularly published on the Cosmo-Spain website [<https://portalcne.isciii.es/cosmo-spain/>]. Regarding the information tools used, we highlight the COVID-19 Panel on the situation and evolution of the pandemic in Spain, which provides a double periodic update on the incidence situation accumulated by province: in the last 7/14 days, always for the population of 60 and older, with information by locations and indicators on how the virus is developing (ISCIII, 2023, March 24).

5.3.3. Spanish Foundation for Science and Technology (FECYT)

The Spanish Foundation for Science and Technology (FECYT), [<https://www.fecyt.es/es/info/presentación>] which operates under the Ministry of Science and Innovation, has the mission of catalyzing the relationship between science and society. It aims to promote the growth of scientific culture in Spain and facilitate the transfer of knowledge through dissemination, education, training, information, and advice (2023a).

In the "Estudios e Informes" (Studies and Reports) section, the results of the 10th Social Perception of Science Survey 2020 were presented in 2021 (FECYT, 2021a). This survey is noted for having the widest sample and the longest history of such studies in Spain. It measures the impact on society of various initiatives aimed at developing scientific and innovation culture, allowing the observation of changes and new trends (FECYT, 2021, June 6, s.p.). The contents are organized into blocks such as "Interest in scientific and technological topics," "Image of the situation of scientific and technological research in Spain," and "Situation of the COVID-19 pandemic," among others.

Regarding the latter area, work began on surveys conducted between 2020 and 2021: "El factor social de la gestión sanitaria: Actitudes hacia la vacunación y cumplimiento de las medidas anti COVID-19" (The social factor in health management: Attitudes towards vaccination and compliance with anti-COVID-19 measures) (FECYT, 2021b), a survey conducted between May 3 and 21, 2021.

In 2021, they published "Evolución de la percepción social de aspectos científicos de la COVID-19" (Evolution of the social perception of scientific aspects of COVID-19), with data from the survey related to the first round between June 25 and July 15, 2020, and the second round between January 4 and 22, 2021 (FECYT, 2021c).

In 2022, FECYT produced two reports that analyzed the response of Spanish society to the COVID-19 disease from the perspectives of research, businesses, and the general public: "Informe Avance de resultados. Lecciones y retos tras dos años de pandemia" (Advance Report of Results. Lessons and challenges after two years of the pandemic) (FECYT, 2022a) corresponding to March 2021, and "Informe Tendencias. Lecciones y retos tras dos años de pandemia" (Trends Report. Lessons and challenges after two years of the pandemic) (FECYT, 2022b) corresponding to July 2021.

Finally, the results of the fourth and last round (November-December 2021) "Percepción Social de los aspectos científicos de la COVID-19" (Social Perception of Scientific Aspects of COVID-19) were published, where it is specified: "This fourth round of the survey continues with the aim of understanding the evolution of attitudes towards COVID-19 vaccination and monitoring preventive measures in the different phases that are happening in this pandemic" (FECYT, 2022c, p.4). Regarding the collected samples, they provide the following information:

The four surveys, conducted through computer-assisted telephone interviews, have a total sample of 8,408 interviews representative of the population residing in Spain over 18 years old. Additionally, some of the questions collected in these studies were also included in the "Encuesta de Percepción Social de la Ciencia y la Tecnología 2020" (Social Perception of Science and Technology Survey 2020), reaching 16,362 interviews that allow observing central aspects of pandemic management such as attitudes towards COVID-19 vaccination (FECYT, 2022c, p.4).

The results of the 11th Survey, Perception of Science and Technology in Spain 2022, have just been published in 2023. The survey aims to find out about the beliefs, values, attitudes and behaviour of the population in Spain with respect to science and technology. It allows us to observe changes and new trends among different population groups and to analyse how the Spanish public's perception of science has evolved (FECYT, 2023b, p.3).

This new installment does not specifically focus on COVID-19, but we can clearly see the influence and effects of the pandemic on the percentages of responses to certain questions. The question about "Searching for information on health or medicine topics" decreases slightly compared to 2020, going from 77.9% to 73.6%. In their comments, FECYT emphasizes the data: "Among people who seek information, there are significant changes in the sources they turn to: Internet and social networks decline (48.2% compared to 66.1% in 2020), while the percentage of those who consult the pharmacist increases, and the one who consults a doctor or nurse remains stable" (FECYT, 2023b, p.29). Regarding the "Assessment of the public health system," the comments also reflect the impact of the pandemic: "the positive assessment of the public health system in 2022 is 67.1%. It drops after the peak observed in 2020 (78.3%) during the pandemic" (FECYT, 2023b, p.30). As for a particularly important topic like "Perception of vaccines," FECYT notes:

There is still a high level of trust in vaccines, with results similar to those recorded in the 2020 survey, with percentages exceeding 80% of people agreeing that Vaccines are necessary to protect people's health. The only changes are observed in the level of agreement: If a child is vaccinated, they may have serious side effects, which increases from 22.9% to 26.7%. (FECYT, 2023b, p.31).

Directly connected, we find the question about "Distrust in relation to vaccines." What FECYT concludes is that "There is a slight increase in adherence to items on the conspiracy and vaccines scale compared to the previous edition in 2020. For example, while in 2020, 24% totally or quite agreed that Pharmaceutical companies hide the dangers of vaccines, in 2022, this percentage reaches 30%" (FECYT, 2023b, p.32). Finally, the question about the "COVID-19 vaccine" is directly related to the coronavirus. The results conclude that "of those who have been vaccinated against COVID-19 (91.4%), a third are completely sure that they would get a booster dose if offered. On the contrary, almost one in five respondents is sure that they would not get vaccinated again" (FECYT, 2023b, p.34).

5.4. United Kingdom

5.4.1. Institute of Global Health Innovation (IGHI). Imperial College of London

Around COVID-19, we find two reports prepared on two behavioral insights surveys, based on the survey conducted between April 2020 and March 2022 and the survey conducted between March and May 2021. This work was carried out by the Institute of Global Health Innovation (IGHI) in collaboration with the market research and data analytics company YouGov.

Report of the Survey April 2020-March 2022 (IGHI)

COVID-19 Global Behaviours and Attitudes. A review of the survey results of over 450,000 people in 9 countries. Insights and trends in people's behaviour related to COVID-19. In 2020, a group of experts from IGHl concluded that there wasn't enough reliable data on how the population was responding to the government's guidelines. To obtain the necessary information, they partnered with YouGov to launch a survey in 29 countries. The goal was to understand people's attitudes towards the pandemic. This survey was conducted between April 2020 and March 2022 (IGHI & YouGov, 2022).

Throughout the survey, some countries were included for only a period, and others were included the entire time. "Nine of the initial 29 countries have continuous survey data over the two years and are included in the report: Australia, Canada, Denmark, France, Germany, Italy, Japan, Spain, and the UK" (IGHI & YouGov, 2022, p.3). This report includes two countries that did not respond to questions about COVID-19 posed in the Wellcome Global

Monitor 2020 survey on COVID-19 (Wellcome Trust, 2021a): Australia and Japan. The survey questions cover data on testing and symptoms, analyzing behaviors, and the level of compliance with preventive measures.

Tools of the Survey 2020-22 (IGHI)

The survey results are publicly available through a GitHub repository and an interactive dashboard. The GitHub is the Data Repository for the COVID-19 Behavior Tracker Data Center. It is designed to provide behavioral analysis on how different populations are responding to the pandemic and how it is assisting public health agencies in their efforts to control the impact of the disease. The Interactive Dashboard is a panel on the Data Center where survey data is also made available to the public interactively.

Report of the Survey March-May 2021 (IGHI)

Report May 2021: Global attitudes towards a COVID-19 vaccine. Insights and trends in people's behavior related to COVID-19. (IGHI & YouGov, 2021). The report analyzes attitudes towards COVID-19 vaccines in 15 countries between March and May 2021¹⁴. This report focuses on the results of each country separately and contains general conclusions that can be compared when needed, using web-based tools.

6. Resources, Surveys, and Reports from Private Organizations on COVID-19 Vaccines and Treatments

6.1. Johns Hopkins University Coronavirus Resource Center (JHCRC)

This website [<https://coronavirus.jhu.edu/>] has been an essential tool for tracking the international COVID-19 pandemic. From the beginning, it was available to anyone interested in monitoring the information, from governments to individuals. Until September 21, 2022, it provided nearly real-time updates. After that date, it shifted to daily updates instead of hourly updates and changed its data collection methods. Currently, it has ceased its operations, and the contents are no longer updated, but they can be viewed in a static format. It maintains two repositories with information collected by the Resource Center between January 22, 2020, and March 10, 2023. One contains global data on infections and deaths (JHCRC, 2023a, March 30). The other contains vaccination data for the U.S. and the world, testing information, and demographic data (JHCRC, 2023b, March 30).

Despite these changes, the JHCR website continues to offer very important information, and its contents are up-to-date. "News" [<https://hub.jhu.edu/>] provides the latest updates on COVID-19 research, vaccines, public health measures, and treatments. "Public Health" [<https://publichealth.jhu.edu/>] maintains the "COVID-19 Projects and Initiatives" page to share the latest research and practices. "Vaccines" [<https://view-hub.org/>] offers an exceptional interactive platform based on maps to navigate through research reports on the use and impact of eight types of vaccines, in addition to COVID-19 vaccines. "Treatment" [<https://www.hopkinsmedicine.org/coronavirus>] provides various online portals that offer information on COVID-19 patient care, vaccines, and testing. It does not contain information on disease control treatments other than vaccines.

Other tools and Resources (JHCRC)

The video from the Fridays "Johns Hopkins COVID-19 30-Minute Summary" dated October 14, 2022, is still available on their website, along with previous videos, but it was the last in the series. The Johns Hopkins Center invited viewers to send questions to pandemic experts, which were answered during the live virtual expert briefing on COVID-19 each week (JHCRC, 2022, October 14).

¹⁴ The included countries are: Australia, Canada, Denmark, France, Germany, Israel, Italy, Japan, Norway, Singapore, South Korea, Spain, Sweden, the United Kingdom, and the United States (Report p.1). These countries also include the same ones that did not respond to the COVID-19 questions in the Wellcome Global Monitor 2020 Survey, making it a complementary resource [<https://cutt.ly/94Zv1Cm>].

E-learning courses related to the virus are still being offered in "Fundamentals of COVID-19: Understanding the COVID-19 Pandemic" (JHCRC, 2023c, March 30). Regarding vaccines and treatments, their explanatory videos continue in "Module 3: Medical Therapies and Vaccines in Development" (2023d, March 30), which discusses the development of vaccines, available therapy types, their advantages, disadvantages, and more.

The Vira chatbot is active [<https://vaxchat.org/es>]. This tool was initially offered as a website and, starting from January 2022, as a WhatsApp version, with a brief period of inactivity at the end of the year. Its purpose is to allow the public to ask questions about COVID-19, helping to combat misinformation and the growing public mistrust of vaccines. The tool provides immediate concise answers to user questions. Questions about vaccines or treatments in more depth are examined by experts before providing responses. Reliable sources are also provided in the answers for users to access more information.

6.2. Wellcome Trust: Wellcome Global Monitor 2020 Survey on COVID-19

The Wellcome Global Monitor: COVID-19 explores in a comprehensive way how the pandemic has affected people's lives worldwide and how it has influenced their perceptions of science, healthcare systems, and governments. The contents of this report are the results of nationally representative surveys conducted in 113 countries and territories between 2020 and early 2021. In most countries, data collection took place between September and early December 2020, a period during which, according to data collected by the World Health Organization, coronavirus cases increased in various regions. Survey periods in some countries extended from December 2020 to January or even February 2021. The resulting survey report was published in November 2021 (Wellcome Trust, 2021b).

The Global Survey conducted by the Gallup analytics and advisory company asked people, among a wide range of questions, about the impact of the pandemic on their lives, whether they supported their government's participation in global efforts to prevent future diseases, and how they viewed their government's handling of scientific advice regarding COVID-19. Among the main global results, it is highlighted that only a quarter of the public stated that they believed their government valued the opinions and expertise of scientists "a lot." As for people's opinions about science and scientists, their trust has increased. Globally, those who said they trust scientists "a lot" increased from 34% in 2018 to 43% by the end of 2020 (Wellcome Trust, 2021c, ch.3).

7. Discussion and conclusions. Critical reflection

We consider that the joint effort of journalists, researchers, healthcare professionals, and health organizations and institutions is more necessary than ever to ensure that information about COVID-19 reaches the population effectively as part of a public health strategy. It is also essential to understand the strengths and weaknesses of the healthcare system and the outcomes in order to rethink actions and strategies for future pandemics or healthcare crises that may arise in the coming decades.

Information and scientific communication help provide a greater understanding of health, medicine, treatments, and their social impact. They focus on risk management with the intention of contributing to improving public health and disease prevention or harmful practices. The growing demand for health-related information by the public has led many healthcare centers, institutions, foundations, and hospitals to create websites or participate in social media to connect patients with experts and promote society's "shared responsibility" for their health. This concept has been referred to as a "liquid hospital." As we have seen in this article, it also includes forums to aid health education, which is particularly important during crises such as the COVID-19 pandemic.

Science in general, and health information in particular, should be made more accessible to the public. The internet and social media are powerful dissemination tools. Thanks to new technologies and the development of social networks, the goal is to involve society in the

"Can be useful for all healthcare systems in the countries of the Region, promoting cooperation in the event of future pandemics."

scientific process and not only disseminate health information but also socialize it. However, social media are also spaces where inaccuracies are common due to a lack of rigor in the information provided. Being part of this networked society requires skills in retrieving relevant information, the ability to interpret that information, and transform it into knowledge. Health literacy is necessary in a world where information flows are vast and rapid.

Trust in science has been strengthened: "Trust in science and scientists may have never been more important in recent times than during the coronavirus pandemic, as most people have been asked to change their lives in response to recommendations made by the scientific and medical communities" (Wellcome Trust, 2021c, ch.3).

The FECYT considers that this crisis has shown us that the pandemic situation has had and continues to have a significant impact on our daily lives. Therefore, the health measures taken should consider not only the society as a whole but also take into account the various social groups it comprises: "Public health recommendations have the challenge of identifying the disease's behavior on one hand, and anticipating the reactions of different social groups to restrictions on the other hand, in order to contain the virus's spread" (FECYT, 2022c, p.106).

In the same vein, the WHO expressed a similar sentiment during the presentation of the Strategic Preparedness and Response Plan for 2023-2025, a document outlining strategies to combat COVID-19 for the next two years:

While the world continues to learn and apply lessons for managing COVID-19, countries are striving to maintain the significant progress made over the past 40 months. The pandemic once again demonstrates that health is not only central to development but is also essential for economies, societies, national security, and political stability. When health is at risk, everything is at risk (WHO, May 3, 2023, p. 2).

Two days later, Tedros Adhanom announced the decision to end the international health emergency, providing a significant summary of the situation and emphasizing recognition of international coordination and commitment to global health:

COVID-19 has been much more than a health crisis. It has caused severe economic disruptions, wiping out trillions of GDP, disrupting travel and trade, closing businesses, and pushing people into poverty. It has exposed the inequalities in our world, with the poorest and most vulnerable communities being the hardest hit and the last to access vaccines and other tools. The health emergency has ended, but it is not a reason to let our guard down. It is time for countries to transition from emergency mode to managing COVID-19 alongside other infectious diseases (Adhanom, May 5, 2023, s.p.).

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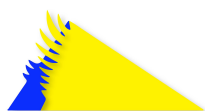
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