

Case series

Management of Severe Acute Respiratory Syndrome-Corona Virus-2 infection in the Principality of Monaco

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Abstract: Background: This work is a report of the present situation and management of Corona Virus (CoV) infection in the Principality of Monaco. Methods: To comply with the practices adopted by the World Health Organization (WHO) and neighboring Countries in this area, residents infected by CoV are the object of this health report. The Prince's Government also communicates the data relating to screening. These are stopped at Sunday January 1st included. Results: The results of this survey point out how this infection is still active in Monaco, although not at the emergency levels of 2020. Conclusions: These results call for not leaving prevention measures, both primary (vaccine) and secondary (personal protective equipment [PPE], social distancing, etc.) adopted until now and which gave so good results.

Keywords: Severe Acute Respiratory Syndrome; Corona Virus-2; Vaccination; Prevention; Management (List three to ten pertinent keywords specific to the article yet reasonably common within the subject discipline.)

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1. Introduction

Corona Viruses (CoVs) is a large family of viruses, which cause illnesses ranging from a simple cold (some seasonal viruses are CoVs) to more severe pathologies such as middle East respiratory syndrome (MERS) or severe acute respiratory syndrome (SARS) [1]. The virus identified in China in 2020 is a new CoV called SARS-CoV-2. The disease caused by this CoV has been named CoV disease (CoViD)-19. The main symptoms are:

- sore throat;
- dry cough;
- high temperature;
- chills;
- faintness;
- muscle aches;
- breathing difficulties;
- fatigue; and
- loss of smell and/or taste.

One of these symptoms is sufficient to suggest the diagnosis. Elderly people or people with comorbidities (diabetes, immune deficiency, chronic respiratory failure [CRF], cancer, etc.) are more likely to have a severe form [2,3]. The virus is carried by droplets, but can reach a nearby person (<1 meter [m]) or attach itself to a surface soiled by droplets, such as hands or tissues. This is why it is important to respect barrier gestures and social distancing measures. Like many viruses, by dint of circulating and being transmitted, CoV produces copies of itself. However, this multiplication is accompanied by some “modifications” of the genome. These changes are called “mutations”. Some of these mutations are favorable to the virus and allow it to survive in new people or new environments. Sometimes a mutation leads to the emergence of a new, slightly different strain of the virus, which is called a “variant”. SARS-CoV-2 mutates like any other virus. Screening for its variants is sought after a positive test for SARS-CoV-2. Regarding the symptoms, for the time being, according to the observations, clinical signs observed in people positive for the English variant under investigation (VUI)-202012/01 are exactly the same as during SARS-CoV-2 infection (fever, cough, loss of taste and smell, breathing difficulties, etc.).

In order to prevent the spread of CoViD-19, a person should observe the following preventive measures [4,5]:

- mandatory mask wearing in public places and queues;
- frequent hands washing (>10 seconds);
- kissing avoidance;
- handshakes avoidance;
- cough or sneeze into the elbow;
- touching eyes, nose, and mouth avoidance;
- crowds’ avoidance, keeping a distance of 1.50 m;
- traveling to infected areas avoidance; and
- single-use tissues using.

2. Materials and Methods

2.1. Epidemiological situation in the Principality of Monaco

The trend of the infection in the Principality of Monaco was generally comparable to that of the other neighboring European Countries such as France and Italy (with the exception of North Italy) [6], as was the incidence of other pathologies, even serious ones, which showed an apparent reduction (probably linked to the lower turnout of the population to health facilities for diagnosis and treatment) [7]. Another serious consequence of the pandemic was the reduction of blood and organ donations [8].

As of January 1st, since the start of the health crisis, the Principality’s health toll stood at 15,992 people infected by CoV. At the same time, 15,852 people were found cured. From December 26th to January 1st, 40 new positive cases of infection were revealed. As of January 1st, 11 people, including 7 residents, were hospitalized at the Princess Grace Hospital Center (CHPG). No one was being treated in intensive care, and 28 people were followed by the Home Monitoring Center which medically supports patients with few symptoms, invited to confine themselves to their homes. The number of tests carried out on resident and non-resident patients between December 26th and January 1st inclusive was 765 polymerase chain reaction (PCR) and antigen tests. The positive rate of tests carried out on residents and non-residents was 11.4%. The incidence rate, i.e., the number of positive people based on 100,000 people over the period of the last 7 days, was 102 (171 the previous week).

Figures 1 to 4 report the daily situation on January 6th, 2023. Figure 1 reports the new resident or Monegasque positive cases identified for 24 hours. The last detection was 6 cases. Figure 2 reports residents and Monegasque people currently hospitalized at the CHPG. This number (11 cases) includes non-residents currently hospitalized at the CHPG (8 cases). Figure 3 reports residents and Monegasque people monitored by the Home Monitoring Center. The last detection was 39 cases. Figure 4 reports residents and Monegasques who have recovered for 24 hours. 15,884 Monegasques and residents have recovered since the start of the epidemic. The last detection was 5 cases. Since the start of the epidemic, 65 deaths of Monegasque people or residents have been recorded (last detection: 0 cases).

As of January 22nd, since the start of the health crisis, the Principality's health toll stood at 16,045 people infected by SARS-CoV-2. At the same time, 15,965 people were found cured. From January 16th to January 22nd, 17 new positive cases of infection were revealed. As of January 22nd, 8 people, including 4 residents, were hospitalized at the CHPG. Three people, including 1 resident, were treated in intensive care. As of January 22nd, 9 people were followed by the Home Monitoring Center. The number of tests performed on resident and non-resident patients between January 16th and January 22nd inclusive was 708 PCR and antigen tests. Positive rate of tests carried out on residents and non-residents was 6.2%. Incidence rate was 43 (64 the previous week).

As of January 29th, since the start of the health crisis, the Principality's health toll stood at 16,059 people infected by SARS-CoV-2. At the same time, 15,982 people were found cured. From January 23rd to January 29th, 14 new positive cases of infection were revealed. As of January 29th, 7 people, including 4 residents, were hospitalized at the CHPG. No one was being treated in intensive care. Five people were followed by the Home Monitoring Center. As of January 29th, 655 PCR and antigen tests were carried out on resident and non-resident patients between January 23rd and January 29th inclusive. Positive rate of tests carried out on residents and non-residents were 5%. Incidence rate was 36 (43 the previous week).

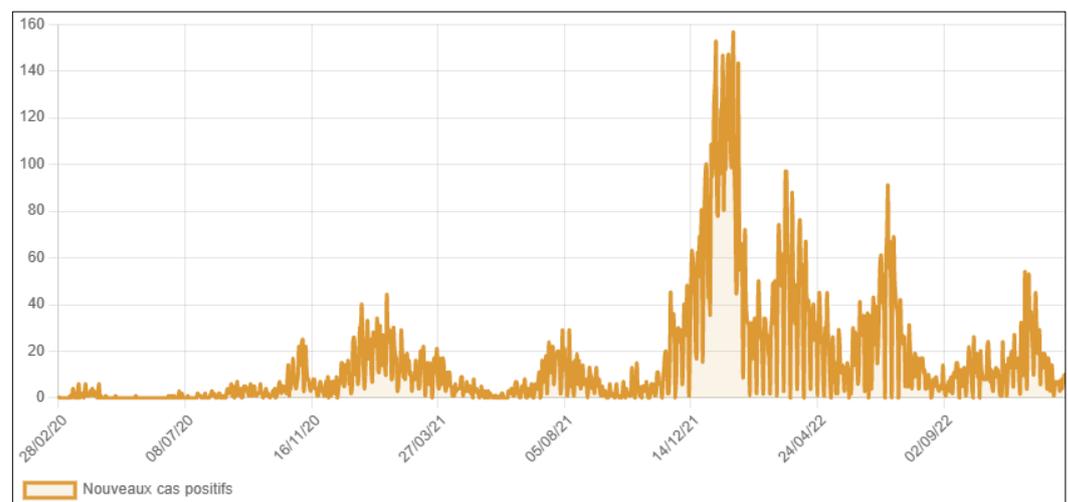


Figure 1. New resident or Monegasque positive cases identified for 24 hours.

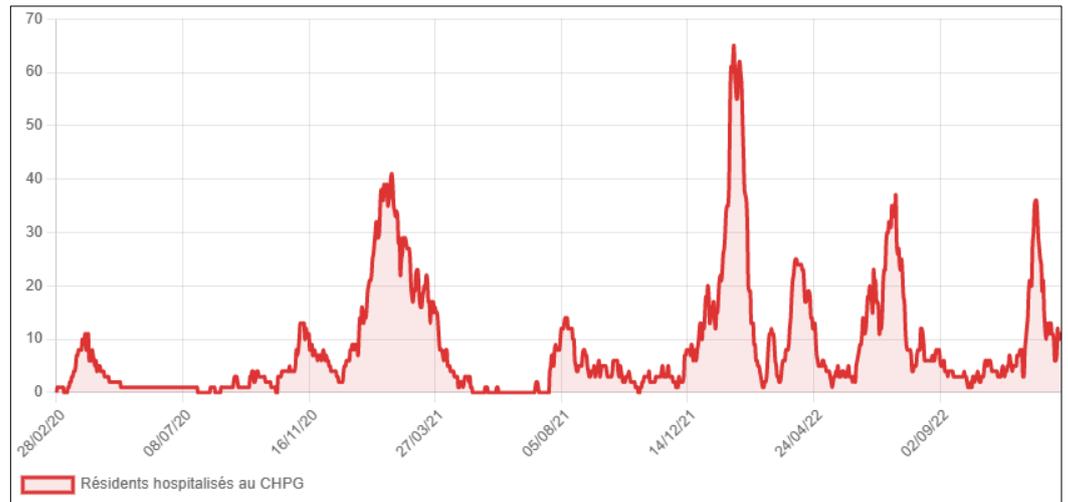


Figure 2. Residents and Monegasque people currently hospitalized at the Princess Grace Hospital Center (CHPG).

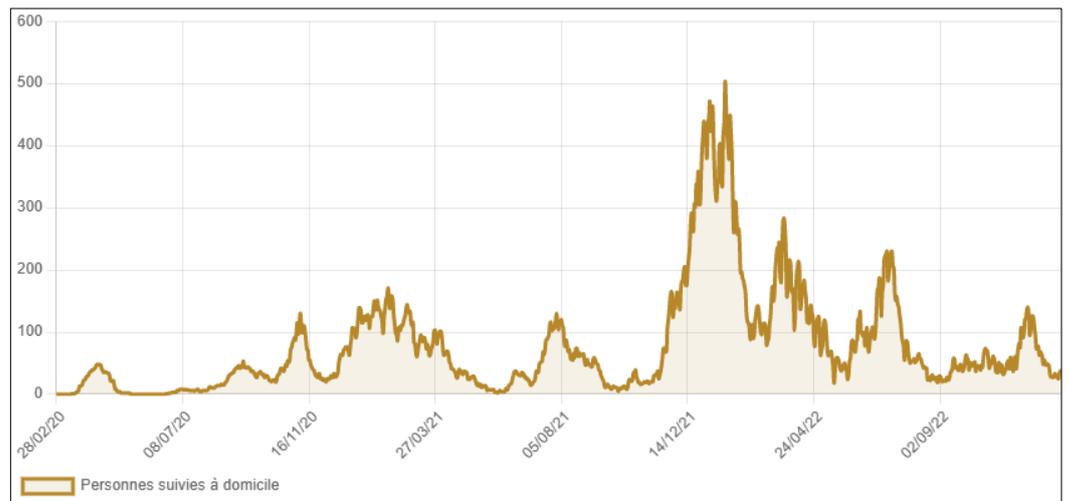


Figure 3. Residents and Monegasque people monitored by the Home Monitoring Center.

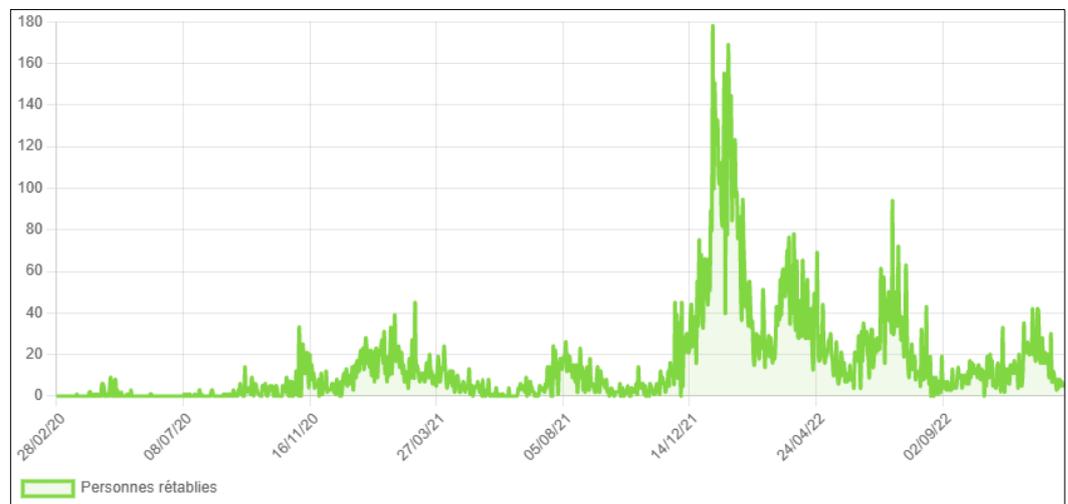


Figure 4. Residents and Monegasques who have recovered for 24 hours.

3. Results

3.1. Management

3.1.1. Testing and screening

The Prince's Government wanted to set up a National Screening Center (NSC). Its objective is to regulate and coordinate the performance of PCR tests in order to optimize the time to return results. This screening center welcomes any Monegasque, Monegasque resident or socially insured in Monaco, or any student attending school in Monaco, with or without an appointment, whether symptomatic or asymptomatic. Monegasque patients or residents must come with their identity document and a mask. Non-resident patients, non-resident employees, or schoolchildren must come with their identity document, a medical prescription for screening, and a mask. Minor patients who are not systematically accompanied by their legal representative or have parental authorization, cannot be screened.

If a person needs medical advice, they should call their primary or on-call physician. If necessary, he will offer them a teleconsultation. If a person has been in contact with a positive one within 2 days before their symptoms appeared or within 5 days before their test result, they are considered a "contact" case. So, even if they have no apparent symptoms, they should strictly respect the barrier measures (wearing a mask, hands washing, and social distancing), including with his loved ones. If after 5 days no symptoms have appeared, the risk becomes low that they have been contaminated. If they are diagnosed with CoViD-19, but the physician who examined them did not select criteria requiring hospitalization, they can stay at home. In this case, they will be supported remotely, for a period of 7 days after the start of their symptoms or, if they have no symptoms, for a period of 7 days from the date of their test. As part of their follow-up, they will be called once or twice a day by a physician or a nurse who will ensure their medical follow-up by telephone [9].

Depending on the nature of their contacts, a person can assess their level of risk and know the appropriate measures. If a person tested positive less than 60 days ago, they are not considered a "contact case". No more eviction unless symptoms. PCR, antigen, or self-test needs to be performed on day 2-day 3. Children under the age of 12 and people with a contraindication to nasopharyngeal sampling carry out a salivary test if necessary. In the event of a positive self-test, confirmation by PCR is necessary with isolation until the result is known. A positive PCR or antigen test results in isolation for 7 days from the symptoms or the positive PCR test if asymptomatic. A return to work or school on day 7 is only possible in the absence of fever and difficulty of breathing during the last 48 hours [10].

Asymptomatic or non-contact persons wishing to be tested for a trip or for a personal or professional reason must make an appointment at a private laboratory to carry out PCR. The employer cannot force a person to get tested. Nominative information is only known to persons authorized for the proper monitoring of patients while preserving the total anonymity of the treated persons. Global and anonymous statistical data may be disseminated by the Government in order to monitor the progression of the virus on the territory.

3.1.2. Antigen test

This test, performed from a nasal swab, looks for proteins on the surface of the virus. They are only detectable if the virus is alive. The test does not need to be sent to a laboratory. A few drops of the reagent previously mixed with the collected sample are placed on a strip which changes color depending on whether the patient is positive or negative for SARS-CoV-2 (as for a pregnancy test). The result is fast. The waiting time for it can vary from 10 to 30 minutes [11,12]. To take the test, a person must go to the

pharmacy. The test is indicated if a person has to travel to a Country that accepts the antigen test to enter its territory or if they had symptoms for less than 4 days.

If antigen test result is positive, whether the patient is symptomatic or asymptomatic, they are considered a confirmed case and must self-isolate for 7 days from the positive test or the onset of their symptoms if these appeared before the execution of the test [13]. A person can get tested at any age, with or without a prescription and by appointment, from 12 years and over, by:

- physicians;
- nurses;
- medical biology laboratories;
- pharmacies;
- rescuers from the Monegasque Red Cross;
- soldiers of the Public Force; and
- security staff.

Antigen test is covered by the compulsory health insurance scheme.

3.1.3. PCR-testing

This test makes it possible to determine, by taking a nasal sample, if a person is infected. Reverse transcription (RT)-PCR test is a test that takes a few seconds and can be more or less painful depending on individual sensitivity [14]. To confirm or deny the presence of the virus, deep nasal cells are taken using a swab. The sample is then analyzed in the laboratory. Results are generally available on average within 24-48 hours. To take the test, a person must contact the Call Center so that it registers their request. Then they will be contacted directly by the NSC to arrange an appointment for their screening. To perform a PCR test, the patient, on medical prescription, can make an appointment or go without an appointment to the NSC or to a medical biology laboratory. If their PCR test is positive, they must isolate themselves for 7 days and they will be covered by a medical certificate to be given to their employer. The employer cannot request to receive the results of PCR tests of its employees. The employer can contact the Office of Occupational Medicine (OMT) to obtain confirmation of the possible return to work of its employees following the epidemiological investigation carried out. If a person has a negative RT-PCR test which was carried out in Monaco, they can request their recovery certificate by completing the online form.

3.1.4. Salivary test

It is not strictly speaking a test but a type of sample. The reference technique for the detection of SARS-CoV-2 remains RT-PCR as for the nasopharyngeal swab. Instead of looking for the virus in the nasopharynx as usual, a saliva sample is used. This less invasive technique is mainly used for the youngest, for children under 12 years, and people with a medical contraindication to nasopharyngeal sampling. The salivary test has the advantage of being more comfortable. It is recommended for testing low-risk contact cases in children residing or attending primary and secondary school in Monaco. This test does not require a prescription [15].

3.1.5. Self-test

Self-tests make it possible to know whether or not a person is positive for SARS-CoV-2 thanks to a nasal swab, but less deep and therefore less unpleasant than the usual PCR or antigenic tests. We must be careful, they are not enough on their own: in the event of a positive test, PCR test will be necessary to confirm it if necessary. It will not be possible to

use the result of a self-test to travel during this period of the fight against the spread of the virus. Only PCR test has probative value. Self-tests are available on Monegasque territory only in pharmacies. By self-testing every week or when a person has been in contact with another one declared positive for SARS-CoV-2, a patient increases the chances of detecting the virus at the start of the disease when they are most contagious. Self-test is recommended for asymptomatic people. It should not be used if a person is symptomatic or in contact cases. In these patients, it is imperative to perform a RT-PCR examination by nasopharyngeal swab. Self-test can be performed on people over the age of 15 years. If the result of self-test is negative, a person should continue to respect barrier gestures. On the other hand, if the result is positive, a person should isolate themselves for 7 days and respect barrier gestures, notify their attending physician, and make a RT-PCR test (people living under the same roof should also do a RT-PCR test). After 7 days, the patient should make a control test. If the result of the control RT-PCR test is positive, the person will continue their isolation and will respect the reinforced barrier gestures for an additional 7 days.

3.1.6. TROD test

This is a Rapid Diagnostic Orientation Test (TROD). They are of two types:

- serological TROD: its objective is to know if a person has been in contact with the virus; and
- antigenic nasopharyngeal TROD: its purpose is to find out if a person is infected with the virus at the time of the test.

3.1.7. Blood test

Blood test can be carried out in an analysis laboratory. It lets a person know if they have been in contact with the virus. In the event of a positive test, it may be necessary to carry out a PCR to find out if they are still infected with the virus. Only tests with European Conformity (CE) marking and included in a list published on the website of the French Ministry of Health may be used.

3.2. Vaccination

The general population is susceptible to contracting CoViD-19. However, some people are more at risk of serious forms. These people justify vaccination against SARS-CoV-2 with regard to one or more of the following comorbidity factors that may lead to a serious form of the disease, such as:

- obesity (body mass index [BMI] >30);
- chronic obstructive pulmonary disease (COPD) and severe respiratory failure;
- complicated hypertension;
- congestive heart failure (CHF);
- diabetes (type 1 and type 2);
- chronic kidney disease (CKD);
- cancers and malignant hematological diseases active and occurred in the last 3 years;
- solid organ or hematopoietic stem cells (HSC) transplantation;
- trisomy 21; and
- others to be specified.

If a patient has one or more of these risk factors, they can consult their physician to justify a vaccination against SARS-CoV-2. Then, with this medical prescription they contact the call center to inform them of their priority for vaccination. A vaccination appointment will be scheduled for them as soon as possible. In the center, the process takes about 30 minutes:

- registration at reception;
- medical consultation; and
- vaccination (this is a shot in the arm).

The patient must then wait about 15 minutes after vaccination to be sure that there is no secondary or allergic reaction. Fasting is not necessary. The patient can consult their family physician if they wish, but it is not necessary. At the National Vaccination Center (NVC), there will always be a physician to accompany them if necessary. There is no need to get tested. However, it is advisable to postpone the appointment in the following cases:

- if a patient shows signs of an infectious episode (temperature, cough, etc.);
- if a patient has been in contact with someone who tested positive for SARS-CoV-2 <7 days before;
- if a patient has been infected with SARS-CoV-2 in the last 3 months; and
- if a patient has a temporary contraindication to vaccination.

Vaccination is free in the Principality. It is strongly recommended to protect people from CoViD-19. Two vaccines are offered by the NVC to people wishing to be vaccinated against SARS-CoV-2: the Comirnaty Original vaccine and the Comirnaty Original/Omicron BA.4-5 vaccine from the Pfizer/BioNTech laboratories [16,17]. The Comirnaty Original/Omicron BA.4-5 vaccine is offered to people with a complete vaccination schedule (two doses or a single dose following a SARS-CoV-2 infection), regardless of the previously administered vaccine. It should be noted that this vaccine is adapted to the variants currently in circulation. The Comirnaty Original vaccine remains, for its part, administered for the primary vaccination of persons aged 12 and over.

Like all drugs, vaccines can cause side effects, although not everyone gets them. The following side effects have been observed on some people: redness around the injection site, fatigue, headaches, and to a lesser extent chills, body aches, and even fever or allergic reactions. In rare cases, a more severe reaction may also be observed. The risk of serious or long-lasting side effects is very low, but can never be excluded. This applies not only to vaccines against SARS-CoV-2, but also to any drug, including any vaccine. It is best to report suspected side effects to the healthcare professional who vaccinated the patient, at the NVC or by a mobile vaccination team by telephone.

The risk of contracting CoViD-19 is much lower in people who have received the vaccine, but this one – like any other vaccine – is not 100% effective [18]. Vaccines now available or under development reduce the severity of symptoms. When a person receives a vaccine is not immediately protected. Vaccine efficacy is obtained 7 to 14 days after injection (two doses for the majority of vaccines, one dose for Johnson & Johnson). Even vaccinated, a person could be infected without knowing it and transmit the virus to relatives. Wearing a mask is therefore still necessary. People who have or have had CoViD-19 must wait a minimum of 3 months before they can be vaccinated. Similarly, it is not recommended to be vaccinated in the presence of persistent symptoms (temperature and cough). As with all other drugs, the safety of SARS-CoV-2 vaccines is checked after they are marketed. Thus, all adverse effects are monitored at international and European level. For vaccines against SARS-CoV-2, existing surveillance systems have been strengthened both at European and national level.

Pfizer/BioNTech vaccine contains a messenger ribonucleic acid (mRNA) molecule with instructions to produce a protein from SARS-CoV-2. Pfizer/BioNTech does not contain the virus itself and cannot cause CoViD-19. Pfizer/BioNTech works by preparing the body to defend against CoViD-19. The mRNA vaccine does not contain an adjuvant (aluminum or other). This vaccination is an ultra-innovative technology, which breaks with conventional vaccines. These consist of injecting the virus into the body, either in an attenuated form or in an inactivated form, to provoke an immune response. The mRNA technique consists of sending a message, a sort of “recipe” to be applied, which is then quickly destroyed. As their name suggests, they contain RNA. Present in all living beings, it is a molecule almost identical to deoxy-ribonucleic acid (DNA). RNA is said to be a “messenger” when its shape temporarily copies that of a DNA fragment. It transcribes the genetic information of part of the virus. The injected mRNA strands carry CoV genes responsible for synthesizing a protein (the “spike” protein). Once injected into the body, mRNA enters human cells. When a person receives the vaccine, some of his cells read mRNA instructions and momentarily produce the spike protein. The genes are “read” by the “cell factories”, which manufacture this protein. This is a protein on the surface of SARS-CoV-2 that the latter needs to be able to enter the cells of the body. Basically, the body is given a kind of CoV bar-code. The proteins, produced in large numbers by the cells, are then detected, which triggers an immune reaction. The person’s immune system then treats this protein as a foreign body, produces antibodies, and activates T cells to attack it. If the person subsequently comes into contact with the SARS-CoV-2, their immune system will recognize it and be ready to defend the body against this virus. In other words, the immune system will make antibodies to neutralize CoV. These same antibodies will be able to recognize and effectively fight CoV if it tries to infect the body later. Once this RNA is “read”, it is quickly destroyed and no trace of it remains in the body. As this technique provokes a moderate immune reaction, it requires the administration of two doses 21 days apart, to ensure long-lasting protection [19,20].

Vaccination in the Principality, offered on a voluntary basis, takes place at the NVC and is done by appointment only. Anyone, whether Monegasque, resident, or pupil/student attending school or working in Monaco, can receive the vaccine free of charge. For people working in the Principality, it is advisable to have proof of activity. For minors, they must be accompanied by a legal representative as well as the duly completed authorization (either the joint authorization of legal representatives, or the authorization in the case of a single legal representative). Only the SARS-CoV-2 vaccine is administered at the NVC. If a person wants to get the flu vaccine, it is up to them to contact their physician or pharmacist. They can opt for simultaneous vaccination (the same day), the only requirement being to change the injection site. In all cases where there is an infection with SARS-CoV-2, the person benefits, 11 days after this infection, from a certificate of recovery as soon as the conditions of establishment are respected (RT-PCR test or positive antigen). Therefore, in some cases, a vaccinated person may benefit from a complete vaccination schedule and a recovery certificate at the same time. And in cases where their vaccination schedule is incomplete, they can benefit from this recovery certificate. The booster vaccination is done only with an mRNA vaccine (Pfizer/BioNTech or Moderna), regardless of the vaccine used during the primary vaccination. This involves the administration of an additional dose of vaccine (or half a dose for the Moderna vaccine), intended to maintain a good level of protection by stimulating the immune system. Children aged 5 to 11 years receive a pediatric dose.

Vaccination is one way to deal with the virus. In the absence of a curative treatment, it is, with the application of barrier measures, the only possibility of protection. It prevents serious forms of the disease, hospitalizations, intensive care admissions, and deaths. For the elders, vaccination is extremely effective. So, this is the most effective vaccine for people who need it the most. A person has to be voluntary and express their consent to get vaccinated. The family physician has a priority because no one knows a patient’s

medical profile better than him. Each city physician has received training on the scientific advances of the currently available vaccine. The CoViD-19 Call Center is not competent in medical matters but can give information concerning the conditions of access to vaccination. The 3rd dose or the 4th dose (first or second booster dose) is open without prescription to people over 18 years of age. For children aged 12 to 17 years, this dose is subject to presentation of a medical prescription and parental consent. Monegasque schoolchildren or employees who received their primary vaccination in Monaco also have the possibility of carrying out their booster doses at the NVC. The 3rd or 4th dose can be administered as early as 3 months from the last SARS-CoV-2 infection or the last injection for people considered at risk (aged 60 years or over or with comorbidities). For people aged under 60 years with no comorbidities, the time limit is 6 months from the last injection. This vaccination is free. A booster dose (5th dose or more) can be administered within 3 months of the last infection or injection:

- to people who are immunocompromised or at high risk of complications, aged 18 years or over, on medical prescription; and
- to any volunteer aged 60 years or over.

3.2.1. Vaccination monitoring

Figures 5 to 9 show the position as of December 30th, 2022 on vaccination monitoring, while Table 1 reports the breakdown of injections by Country of residence (sources: Ministry of Health and Social Affairs, Digital Services Department, and Monegasque Institute of Statistics and Economic Studies [IMSEE]).

Table 1. Breakdown of injections by Country of residence.

Country	First dose	Second dose	Unique dose	Booster 1	Booster 2	Buster 3 and more	Total
Monaco	22,210	22,052	2,119	17,692	3,584	286	67,943
France	5,548	5,405	1,308	3,647	207	21	16,136
Italy	142	137	16	66	1	-	362
Others ¹	60	55	2	30	9	3	159
Total	27,960	27,649	3,445	21,435	3,801	310	86,400

¹Others of which not specified

3.2.2. Serological monitoring

After an infection or after a vaccination against SARS-CoV-2, the body reacts by producing different antibodies that can be measured. By a simple blood test, it is possible to inform a person of their level of protection or to know if they have been infected by the virus. It should be noted that duration of the antibodies may vary from one individual to another, which is why a follow-up every 6 months is recommended, for the purpose of protecting individuals and those around them. In order to know and monitor the level of protection of the population against CoViD-19, the Prince's Government is offering people residing in the Principality of Monaco to have their serological monitoring carried out free of charge. The objective is to determine the patient's level of protection against CoViD-19. Thanks to the various results collected by the health authorities, it will be possible to reliably establish epidemiological surveillance of the Principality. Anyone previously vaccinated, or who has been infected with SARS-CoV-2 and wishing to know their level of protection against CoViD-19 can call in order to be subsequently called back for an appointment. The results will be returned according to the same methods as for PCR tests carried out at the NSC using the computer system developed by the Digital Services Department [21,22].

3.3. Health measures in force

Personal data are only known to persons authorized for the proper monitoring of patients while preserving the total anonymity of the persons treated. Global and anonymous statistical data may be disseminated by the Government in order to monitor the progression of the virus on the territory.

The obligation to present a health pass is abolished for all users, customers and employees, in all sectors except for access to health establishments and collective accommodation structures for the elderly. However, certain categories of people remain subject to the vaccination obligation, such as people working or intervening as volunteers, pupils or students in Monegasque health establishments (hospitals, clinics, etc.), in structures welcoming people elderly or disabled, or in contact with elderly or frail people. From Saturday June 4th, 2022, the obligation to wear a mask indoors and outdoors is lifted everywhere except in health establishments and accommodation facilities for the elderly. It should be noted that within the NVC and the NSC, as well as in the facilities where physicians, dental surgeons, midwives, psychologists, osteopaths, pharmacists, and medical assistants work, the obligation to wear a mask may be imposed by the person in charge of the said facilities. In addition, the use of the mask remains strongly recommended for people at risk or during large gatherings in closed places.

The Principality of Monaco issues 2 types of health pass:

- the Monaco Safe Pass, valid in the Principality and in all Countries of the European Union (EU); and
- the European Health Pass, which is valid in all Countries of the EU and in Countries having agreements with France and the EU, as well as in Albania, Andorra, Armenia, Bahrain, Benin, Cape Verde, Colombia, South Korea, United Arab Emirates (UAE), Ecuador, Georgia, Faroe Islands, Indonesia, Iceland, Israel, Jordan, Kosovo, Lebanon, Liechtenstein, North Macedonia, Madagascar, Malaysia, Morocco, Moldova, Montenegro, Norway, New Zealand, Panama, Republic of El Salvador, United Kingdom (UK), San Marino, Serbia, Seychelles, Singapore, Switzerland, Taiwan, Thailand, Togo, Tunisia, Turkey, Ukraine, Uruguay, Vatican, and Vietnam.

The European Pass is the result of the conversion of the Monaco Safe Pass into a European Health Pass recognized in all Countries of the EU. Monegasques and residents who apply for this pass are required to give their informed consent in order to communicate their personal data to a French information system to allow conversion into a certificate valid in Monaco, in the EU, and in Countries with agreements with France and the EU. No data will be stored in France. It is not necessary to complete the online form to enter and/or stay in the Principality. If a person was vaccinated in Monaco or tested positive in Monaco and have recovered from CoViD-19, the health pass makes it possible to indicate with certainty whether they are:

- fully vaccinated (i.e., their vaccination cycle is complete): vaccination cycle is considered complete 7 days after the last dose received;
- recovered from CoViD-19 for a minimum of 11 days and a maximum of 6 months; and
- in possess of a negative PCR or antigen test of <24 hours.

It takes the form of a document that a person can print or keep on their smartphone. It is equipped with a quick response (QR) code which will be scanned by the people in charge of control and which will validate their status in relation to CoViD-19. People can go to collect their health pass in paper format, or request it online. Once the last dose of their vaccination cycle has been received, they will receive a health pass that they can

present and/or install on their smartphone. However, it takes 7 days after their last dose for their health pass to be valid and accepted by verification applications. Presentation of the health pass is no longer necessary in the Principality with the exception of the following cases:

- people working or intervening as volunteers, pupils, or students in Monegasque health establishments (hospitals, clinics, etc.), in structures welcoming the elderly or disabled, or in contact with elderly or fragile people;
- visitors to the CHPG or a residential establishment for dependent elderly people (EHPAD); and
- people wishing to enter the Principality.

In general, no employer can require his employees to present a health pass to go to the workplace. However, there are exceptions. Since October 30th, 2021, date of entry into force of the law relating to the obligation to vaccinate against SARS-CoV-2 for certain categories of people (see above), also concerned are people exercising the following professions: physician, dental surgeon, midwife, pharmacist or pharmacy preparer, medical assistant, osteopath, any non-medical staff exercising their activity with one of the professionals mentioned here when they are in direct contact with the patients of these professionals, any soldier in the fire brigade, any person carrying out a home help activity with people aged at least 60 years, dependent people, or disabled people, and finally, any person ensuring a medical transport activity. This staff must present a vaccination schedule justifying the complete vaccination course. Indeed, vaccination against SARS-CoV-2 very effectively and reliably protects against this disease not only the vaccinated people but also the people with whom they are in contact. Thus, the objective of this text is to protect these professionals and workers from the particular risks of contamination by SARS-CoV-2 for themselves, but also for the vulnerable or fragile people they care for. At their request, managers of health establishments and caring for the elderly are authorized to request the production of the health pass for visitor access to certain services. This does not apply to patients having an appointment for a medical consultation or having to go to the emergency room. A health pass in no way exempts from complying with the health rules in force in the Country of destination. It is advisable to find out about the measures in force in the Country of destination. In addition, a health pass does not replace traditional travel documents such as passports, visas, etc. A person can make an online request with the contact details of the vaccinated person and receive their digital health pass by indicating their electronic mail (e-mail) address, if the person does not have one. They will then be able to integrate it into their mobile phone so that they can have it on the go. In all cases where there is a SARS-CoV-2 infection, the person benefits, 11 days after this infection, from a certificate of recovery as soon as their conditions of establishment are respected (RT-PCR test). Therefore, in some cases, a vaccinated person may benefit from a complete vaccination schedule and a recovery certificate at the same time. And in cases where their vaccination schedule is incomplete, they can benefit from this recovery certificate.

Personal data concerning a patient contained in their health pass certificate are collected and processed by the State of Monaco, in accordance with the provisions in force in the Principality of Monaco. Regarding the Monaco Safe Pass, all data are stored in the Principality of Monaco. Concerning the European Health Pass, data are communicated to a French information system to allow the conversion of the Monegasque Health Pass into a Monaco/EU Pass and/or Monaco/EU/Countries having agreements with France and the EU. When checking a health pass in the Principality, the data visible to the controller are only last name, first name, and date of birth of the user, and the color of the health pass.

The reader application does not give any details about the type of proof checked, nor the reason for the possible invalidity of the proof.

3.3.1. Family and friends

As more than half of contaminations occur during moments of conviviality with family or friends, it is important to remain vigilant in terms of barrier gestures. Vaccination, which is free and open to all residents over the age of 12 years, allows to protect oneself and others. Use of the mask remains strongly recommended in the presence of people at risk or during large gatherings in closed places. Health facilities should be contacted for details. The health pass may be required to visit health establishments. This does not apply to patients having an appointment for a medical consultation or having to go to the emergency room. The health pass may be required to go to establishments welcoming the elderly. It is advisable to contact the establishments for the modalities. If a person is infected, the probability that it infects the other inhabitants of the home is extremely high. However, a person can take precautions by adopting the barrier gestures valid elsewhere. If suspicions are strong, people should avoid sharing meals and using different bathrooms, if they can, above all in the event of the appearance of symptoms suggestive of CoViD-19 in a child or in a member of the family, in particular in the event of a fever (38 degrees centigrade or Celsius [°C] or more).

3.3.2. Exits and purchases

It is no longer mandatory to request a health pass from customers of restaurants and bars, both indoors and outdoors. Wearing a mask is no longer compulsory either outdoors or indoors, except in health establishments and accommodation facilities for the elderly.

3.3.3. Catering establishments, bars, hotels, and casinos

The obligation to present a health pass to access restaurants and bars is lifted. Restaurants, bars, ice cream parlors, and tea rooms are open. There is no longer the obligation to wear a mask indoors for both staff and visitors. These establishments are open. Staff are no longer required to wear a mask during service. Casinos and gaming rooms are open. For people wishing to enter the Principality and visitors to the CHPG or an EHPAD, the validity of the tests is fixed at 24 hours. In the absence of a QR code, a paper receipt may serve as sufficient proof.

3.3.4. Sport

The practice of sport indoors and outdoors is no longer subject to the prior validation of a health protocol [23]. Access to sports halls is no longer subject to the obligation of prior reservation and removal of any gauge in the collective locker rooms. From May 23rd, 2022, public and private swimming pools assigned to a professional or associative activity, private swimming pools for collective use of an apartment building, saunas, hammams, and whirlpool baths reopened.

3.3.5. Purchases

The obligation to wear a mask outdoors and indoors is removed, both for staff and for visitors and customers, in shops and other closed places open to the public in the Principality. On the other hand, wearing of the mask remains required in public transport. However, this obligation does not apply to children under the age of 5 years. In general, wearing a mask is no longer compulsory outside except in a certain number of places, so health establishments and EHPADs remain subject to this obligation. Similarly, everyone is invited to observe a health safety distance of at least 1 m with anyone outside the home. In addition, use of the mask remains strongly recommended for people at risk or during large gatherings in closed places. Many measures are taken to ensure maximum health security.

3.3.6. School and working

A child considered as a contact case will have to carry out, on day 2-3, either a self-test, an antigen test, or a nasopharyngeal PCR test (or saliva PCR for children under 12 years). They must be put in eviction until the result of the test only if they present symptoms. If the test result is negative, the child will be able to continue or resume their school activity. If the result is positive, the child will need to self-isolate for 7 days from the date of onset of symptoms or positive test if asymptomatic. A positive self-test result must be confirmed by nasopharyngeal PCR test (or saliva PCR for children under 12 years). The obligation to wear a mask at school has been lifted, for both students and teachers.

An employer cannot impose holidays without respecting a notice period. Law N. 619, establishing the system of paid leave, provides that this period is at least one month. It can be reduced by special agreement to 15 days. A person must perform an antigen test or a nasopharyngeal PCR test on day 2-3. They should not evict themselves unless they have symptoms. If the test result is negative, they can continue or resume their professional activity. If the result is positive, they must respect a 7-day isolation from the date of onset of symptoms or positive test if asymptomatic. Provided they have no symptoms, they will only have to carry out a PCR or antigen test on day 2-3. In the event that the person has symptoms or is considered a case-contact, if insured with the State Medical Benefits Office (SPME), being symptomatic or a highly exposed contact case, they must approach a Liberal Physician or an Occupational Physician from the Office of Occupational Medicine (OMT) in order to be established for an initial work interruption or an extension of this behind and notify their hierarchy of the time of absence. The insured must communicate to the SPME part 1, duly completed and signed, and part 2 to their superiors of the initial work interruption prescription within 48 hours of the effective interruption of duties and the prescription of the extension of the work interruption at the latest 48 hours before the end of the stoppage preceding the new interruption. If the insured person is declared positive for SARS-CoV-2, they must use teleconsultation to obtain from their attending physician an initial interruption of work or an extension thereof. Upon receipt of the prescription, the insured must send it in scanned version by e-mail. At the same time, the attending physician must send the policyholder the prescription on paper so that he can sign it and then send part 1 to the SPME and part 2 of this document to the hierarchy within the deadlines mentioned above. Without an initial work interruption prescription and/or a prescription for its extension by the attending physician, the absence of the insured from their work station is declared unjustified and their salary will not be paid to them during the duration thereof. In the event of non-compliance with the aforementioned transmission deadlines for the initial work interruption prescription or its extension, the SPME does not cover the absence of the insured under illness. This absence is then medically unjustified and does not give rise to the payment of daily allowances. So, they should quickly inform their employer of their positivity so that he can contact the OMT as soon as possible in order to trigger an epidemiological investigation of contact cases at professional level. The employer cannot request to receive the results of PCR tests of its employees. The employer can contact the OMT to obtain confirmation of the possible return to work of its employees following the epidemiological investigation carried out. The employer cannot force a person to get tested. If a person is asymptomatic or not a contact case and wish to be tested, they must make an appointment at a private laboratory to perform PCR test.

The Prince's Government extends free vaccination to people insured under Monegasque plans. This is part of the Principality's vaccination strategy, which aims to eventually offer vaccination coverage to all of its resident population and its workers. Volunteers are invited to report their intention to be vaccinated to the CoViD-19 Call Center, reachable 7 days a week or online on the website. They will then be called back to

schedule an appointment to be vaccinated at the NVC, provided with an identity document and proof of professional activity in the Principality. The vaccine will be administered after a pre-vaccination medical consultation at the NVC. This practitioner will be able to provide complete information on the vaccine available and will indicate whether vaccination is possible, taking into account any medical history. The appointment for the booster injection will be fixed during the first injection. To quickly break the chains of contamination by detecting people who are SARS-CoV-2 positive, it is important to get tested when a person returns from a stay or vacation. Remote work for employees of the Principality residing in France, Principality of Monaco, and Italy, is extended until June 30th, 2023. For employees residing in France and Monaco, employers are invited to “switch” to the teleworking system governed by law N. 1.429 of July 4th, 2016 relating to teleworking. During breaks, it is also imperative to continue to carefully respect barrier gestures in order to limit the risk of contamination as much as possible.

The Prince’s Government encourages workers returning from a stay abroad to get tested. A person can contact the NSC. The presence of symptoms may justify the employee returning directly home or teleworking, carrying out a PCR or antigen test and, if necessary, consulting a city physician. In the event of a positive result, they will have to isolate themselves for 7 days. In the event of a negative result, they may resume their professional activity. They must contact the OMT and/or by completing the secure form to inform it of the SARS-CoV-2 positive highly probable case, provide it with the contact details of this person (last name, first name, date of birth, mobile phone number, e-mail address, and Common Center of Social Security [CCSS] or SPME social insurance number) and draw up a list of contact cases with this same information. Epidemiological investigation can then begin for the occupational physician. If a collaborator/employee tests positive for SARS-CoV-2 and is present at their workplace, they must immediately return home and self-isolate for 7 days (from the date of onset of symptoms or positive test if asymptomatic). Asymptomatic contact cases will be able to continue their professional activity and will only have to carry out a PCR or antigen test on day 2-3. The employer quickly notifies the OMT by telephone (weekdays) and/or by completing the secure form. The employer cannot request the communication of the test result – which is a matter of medical secrecy – in order to accept the employee’s return to work. Nor it is authorized to have tests carried out with the aim of determining whether employees are positive for SARS-CoV-2 (Personal Information Control Commission [CCIN] opinion, May 2020). The employer can contact the OMT to obtain confirmation of the possible return to work of its employees following the epidemiological investigation carried out.

Remote working allows companies and employees to set up a more flexible way of organizing work at employees’ homes in order to allow business continuity, while responding to the constraints that may have arisen from the health crisis (in particular respect for the rules of social distancing, protection of vulnerable people, or closure of schools). Remote working is open to all employers and employees in the Principality, provided that the domicile is located in Monaco, France, or Italy. Businesses established in Monaco encountering proven financial difficulties can request a review of their situation, with a view to benefiting from a staggering of their tax debts (business income tax [ISB] and/or value added tax [VAT] only). However, it will be up to the companies concerned to comply with their reporting obligations within the legal deadlines. The CoViD-19 Companies Unit of the Welcome Office (WO) remains attentive to companies in difficulty due to the global crisis [24].

3.3.7. Travels

For people’s safety:

- buses are disinfected twice a day;
- hydro-alcoholic gel dispensers have been installed in each bus;

- passenger information on the direction of travel when boarding, alighting, and in the bus is displayed on the ground and on the doors of the bus; and
- getting off the bus from the front is prohibited.

Even if it is no longer compulsory in France, wearing a mask is compulsory in all public transport, in taxis, and in large discount vehicles, throughout the territory. The obligation to wear a mask for the Monaco Bus Company (CAM) bus drivers has been lifted insofar as they are isolated from passengers by a transparent wall. Following the rapid spread of the Delta variant in several regions of Europe, the Prince's Government invites all residents returning from a stay abroad to be tested. Before going abroad, people should find out about the level of risk in the Country and consult the gouv.fr website. This procedure does not concern access to places and establishments in the Principality subject to a health pass. Since August 12th, 2022, access to the Principality is no longer subject to the presentation of a valid health pass. Stopovers by foreign pleasure craft with a home port outside Monaco are once again possible in the ports of Monaco. Yachts with crew submit a medical declaration of health to the Maritime and Airport Police Division (DPMA) of the Department of Public Security 48 hours before their call. Travel rules remain the measures taken by each destination Country. It is therefore advisable to inform oneself well before leaving. Some Countries require a PCR test despite full vaccination, because vaccines protect from severe forms but do not prevent contracting the disease. Based on this observation, a PCR test is therefore requested, in order to ensure that a person is not carrying the virus without realizing it. Any person (resident or non-resident) can carry out a PCR test in a certified laboratory. The laboratory issues the necessary certificates to anyone wishing to go abroad. Residents and Monegasques also have the option of carrying out their PCR test at the NSC without a prescription and by appointment only. The Prince's Government recommends avoiding unnecessary travel to regions heavily impacted by the virus. In order to improve its response to crisis situations, the Crisis Center of the Ministry for Europe and Foreign Affairs (MEAE) has designed a portal allowing French and Monegasque travelers who wish to do so, to declare free and easily their trips abroad. The aim is for the MEAE or the Embassy of the Country concerned to be able to identify and quickly locate French and/or Monegasque nationals who may be in the Country when the crisis breaks out and to be able to contact them in the event that relief operations would be organized. By using the Ariane portal, during their trip, and if the situation in the Country justifies it, they will receive by e-mail or short message service (SMS) information and safety instructions, the contact person designated on their account may also be notified if necessary.

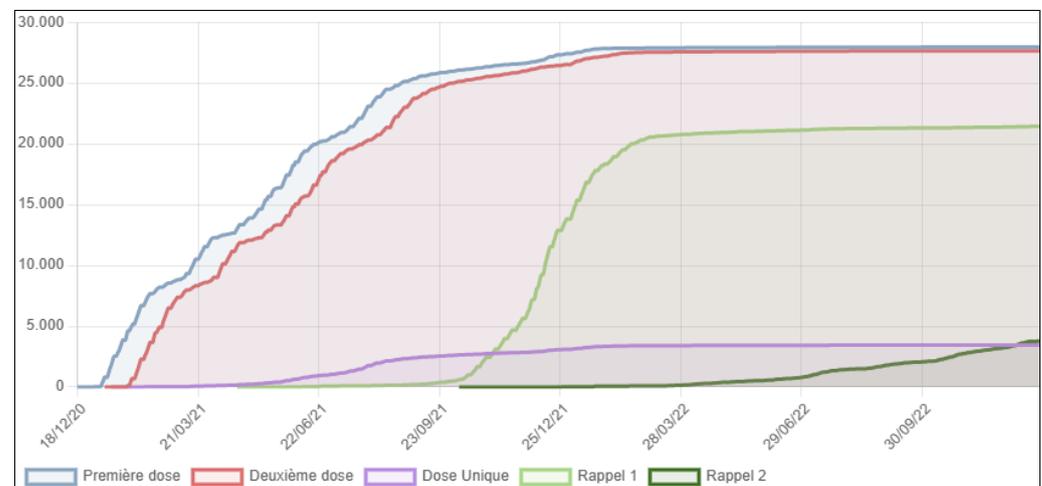


Figure 5. Evolution of the number of vaccine injections according to the type of doses.

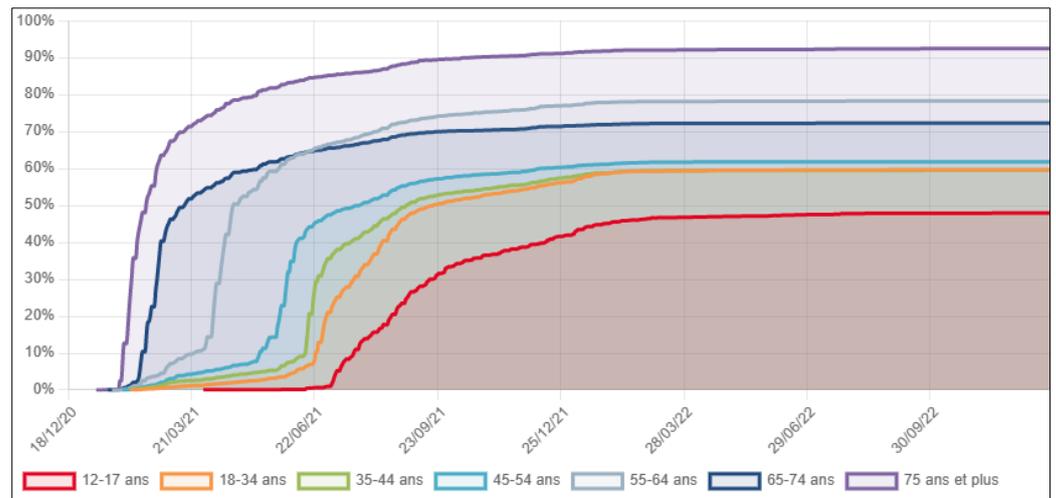


Figure 6. Evolution of the complete primary vaccination rate¹ of residents according to age group. (¹ Rate of complete primary vaccination: share of the population having a second injection of a two-dose protocol or an injection of a single-dose protocol.)

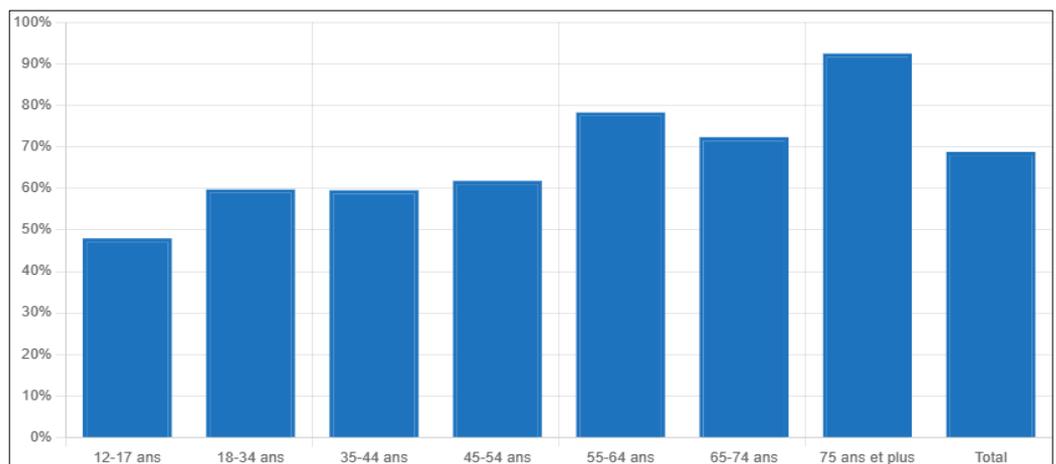


Figure 7. Complete primary vaccination rate of residents by age group.

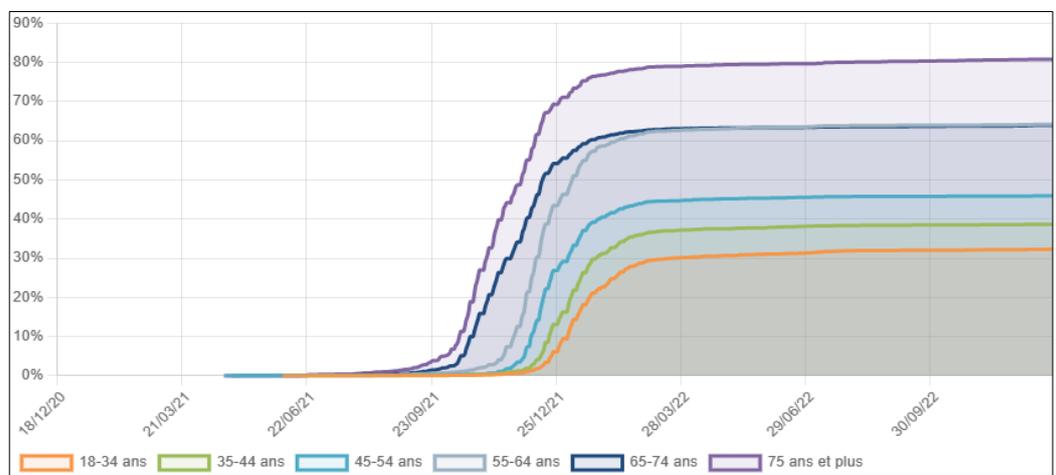


Figure 8. Evolution of the vaccination rate with at least one booster dose¹ of residents according to age group. (¹ Vaccination rate with at least one booster dose: share of population vaccinated with a third injection of a two-dose protocol or a second injection of a single-dose protocol.)

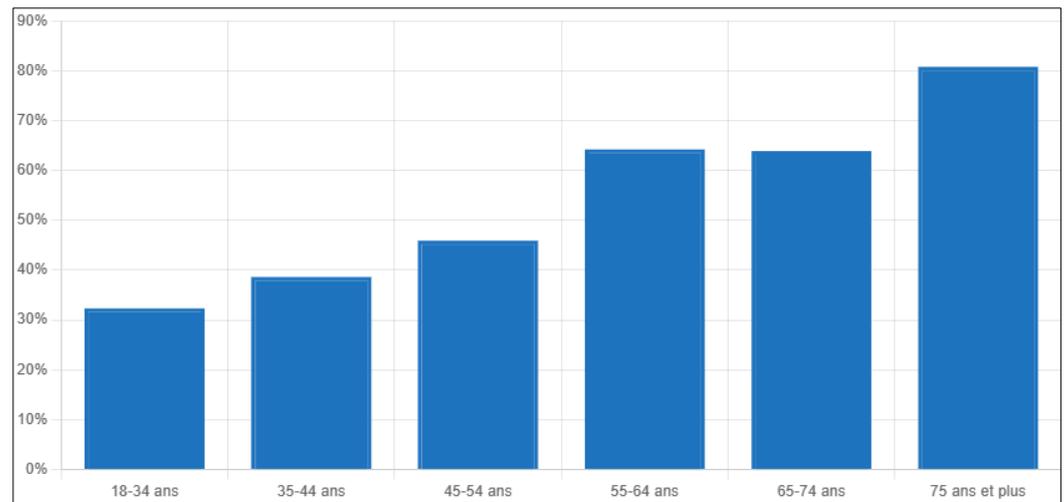


Figure 9. Rate of vaccination with at least one booster dose of residents by age group.

4. Discussion

Since March 2020, we have been experiencing a situation of health emergency due to this pandemic viral infection. Many Countries have alternated closures and openings. Lockdown, colored zones, and infections that cannot be kept under control. We stayed at home and avoided contact with everyone. Like us, millions of other people around the world had to change their habits drastically and suddenly: we worked or studied at home, we had to limit and justify our outings and meetings, and we stood in long lines in front of supermarkets. In some Countries, SARS-CoV-2 epidemic is the most serious event that has occurred since the post-war period and with the most profound impact on everyone's lives [25-27]. For months, we haven't talked about anything else even if now, with the contagion curve decreasing thanks to vaccinations, the situation has improved and we are moving towards a return to normalcy. However, the situation was very serious and still is in some Countries not reached by vaccines: in various Countries infections continue to increase, health systems are in great difficulty, and many people have lost and will lose their jobs. Where vaccines are slowly covering the entire population, and as the emergency subsides, question about the future is increasingly pressing [28-30].

The pandemic will have many consequences. Some seem inevitable, such as the economic crisis, the increase in poverty and social inequalities, the exacerbation of preexisting situations of discomfort, marginalization, and loneliness. Others, however, are the subject of hypotheses and conjectures, hopes, or fears [31-33]. What is certain is that the near future will be marked by the effects of this event on daily life, economy, society, education, work, and much more. There are those who believe, for example, that some of our habits will undergo irreversible changes. We will no longer get close to others, we will always wear a mask, we will enter public spaces in a few at a time, and we will always wash our hands. Meetings, dinners, concerts, rallies, and parties as we have known them may no longer be held [34,35]. Among the possible harmful consequences of the pandemic, there is fear of an excessive extension of State and police control over our lives. Movements and travel have also experienced a profound crisis as a result of the pandemic. For those who move to another Country, perhaps running away from their own, like the thousands of migrants trying to reach Europe, everything will be even more difficult than it already is. Tourist trips have suffered a drastic decline even if we have now witnessed the progressive reopening of towns. In recent decades, world tourism has increased dramatically. With low-cost flights, millions of people have begun to travel and many cities have partially changed their economies according to this unprecedented influx of people. Now, there are those who say that for a long time we will not go back to traveling as before.

Both for health safety reasons and because most of us will not be able to afford it. Also due to the increase in costs (especially flights), it is possible that tourism will return to being the luxury activity it was in the past. For the environment, for example, this could be good news, as well as for some cities, which have recently bent – perhaps excessively – their economies and their spaces to tourism, the same could be bad news.

There are many scenarios and hypotheses about the future. An interesting position is that of those who argue that “we will not go back to normal, because normality was the problem” – meaning that we must do everything to take advantage of this event and change the fate of our societies and the planet. There are many reasons why “normality was the problem”. Among others, the most evident are that:

- the capitalist economic system produces increasingly serious inequalities; and
- we are proceeding at full speed towards an irreversible environmental disaster: the earth becomes desert, air and water are increasingly polluted, temperature rises, glaciers melt, and hurricanes and cyclones multiply.

Many then wonder if the epidemic could be an opportunity to radically change our system of production and consumption. The epidemic alone will not solve climate crisis. Indeed, it will produce other crises, economic and social. However, it is possible that this event will push us to finally initiate those radical transformations that are necessary to avert the immense risks of the environmental crisis. Changing the habits of individuals (buying sustainable products, not wasting, using the bike, etc.) will not be enough to solve the problem. We need interventions and decisions from above, which concern the exploitation of resources and production methods, must be decisions taken by national and international Governments. Individual habits and choices, however, can exert an influence, even a significant one, on those decisions. One thing that surprises and that cannot always be explained is that we are all aware that, if we continue like this, the crisis will be irreversible (if it isn't already). We know that resources will run out, that wars will multiply, that the consequences of pollution will kill us. We know it, but we do (almost) nothing to avoid it.

If a pandemic breaks out and we know that to avoid contagion we must avoid gatherings and always use the mask, we will adapt and everything will be done to avoid the worst. CoV pandemic never seems to end. The solution seemed to come with vaccines but the discovery of new variants calls everything into question. There are fears of new waves of infections, it is feared that vaccines may not be sufficient to contain the spread of variants, there is fear of a return to the subdivision of regions according to infections and, therefore, of colors as well as long quarantines after trips abroad. In short, a return to movement restrictions and social distancing, a return also to distance learning which is once again peeking out among the many bugbears of the coming months [36-39]. Meanwhile, new rules have been approved by the Government which will serve to manage the coming months, rules necessary to intervene in a different way on a situation which, despite everything, has changed compared to some months ago. And so only the data on infections and deaths will no longer count but the occupation of intensive care and ordinary wards: a region will go from a white to a yellow zone if the former exceed 5% and the latter 10% [40].

5. Conclusions

March 31st, 2022 was the date set by the Government to put an end to the emergency, thanks to the drop in infections and the decrease in hospitalizations and intensive care. How did things change after March 31st? We no longer needed to have the health pass to go to work, to enter shops, bars, restaurants, cinemas, and theaters... in short, in all those places where it was required; students returned to school benches without the need to

take advantage of distance learning, measures relating to quarantine and self-surveillance were relaxed; smart-working was regulated nationally, it became an alternative to face-to-face work and not a tool to be used only in an emergency; these are points to think about [41–43]. As we have seen with the case of masks – whose obligation being outdoors without gatherings expired on February 11th and was not welcomed by all as a liberation – a return to normality will have to be gradual. Maybe out of fear or out of a habit that makes us feel safe. From March 31st, 2022 there was a change, a return to normality but it was a different everyday life for everyone from pre-pandemic life [44–46].

The term “no vax” classifies people who are against vaccines. In this period however, when we talk about no vax, we are referring mainly to those who are against SARS-CoV-2 vaccine who have taken to the streets and continue to demonstrate and to protest against the limitations imposed by the health pass obligation. Anyone who hasn’t been vaccinated doesn’t have the health pass that allows to enter restaurants, cinemas, gyms, etc., in short, access indoor places including workplaces starting from October 15th, 2021. Anyone who does not have a health pass must take a SARS-CoV-2 testing – which is valid for 48 hours – every time they want/need to access one of these places. The test, in fact, issues a health pass valid for 48 hours. Recently, protests against the health pass have become more violent, even leading to street clashes. The positions have become exasperated and the no vaxes claim the right to be able to lead a normal life like vaccinated people since the Government has not imposed vaccination obligation. But without vaccines, without the people who got vaccinated, it would never have been possible to reduce infections, to get back to normalcy [47,48].

As in the pandemic, so in the environmental crisis, the different aspects of public life are never separate. Politics, economy, individual habits, and social realities are always linked to each other. Perhaps this event could help us finally take a different direction, precisely because it reminded us abruptly and unequivocally of the existence of this bond. Perhaps, therefore, those who invite us, with the end of the pandemic, not to return to previous normalcy and to invent a new one instead, are right [49].

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