The COVID-19 tale of the six European Microstates: How did these “overlooked” microstates fare?

Sarah Cuschieri 1*, Tamara Attard Mallia 2, Elaine Piccopo 2, Anna Pace 2, Daniela Chatlani 2, Karl Mifsud 2, Nicole Mifsud 2, Jake Vella 2, Andrea Cuschieri 2

1 Department of Anatomy, Faculty of Medicine and Surgery, University of Malta, Msida, Malta.
2 Faculty of Medicine and Surgery, University of Malta, Msida, Malta.

*, Corresponding author: Cuschieri, S. Department of Anatomy, Faculty of Medicine and Surgery, University of Malta, Msida, Malta. E-mail: sarah.cuschieri@um.edu.mt.


Abstract

Background: COVID-19 has impacted the European microstates of Andorra, Liechtenstein, Malta, Monaco, the Republic of San Marino, and Vatican City. Even though they have similar population sizes, they are rarely studied. The goal was to summarize the COVID-19 situation (January 2020–July 2021) for these microstates, as well as the outcome and immunization roll-out throughout the first 18 months. While researching COVID-19 incidence and mortality trends among microstates and their land bordering nations,

Methods: Epidemiological data was gathered from the database “Our World in Data,” whereas COVID-19-related tactics were based on Ministry of Health webpages and local newspapers. Using COVID-19 data (where applicable), the six microstates and their adjacent nations were compared.

Results: From the start of COVID-19 until August 1, 2021, the microstates reported a total of 60,174 positive cases and 730 deaths. Andorra had the greatest rates of COVID-19 infection (190 per 1,000) and mortality (1.66 per 1,000). The microstates had similar COVID-19 results, but their bordering nations shared the most striking similarities. COVID-19 cases, fatality rates, and vaccine doses all have a bidirectional link.

Conclusion: Whether land borders exist, timely mitigation measures and vaccination rollouts appear to be the keys to pandemic containment. The greatest pandemic impact on a country, however, appears to be dependent on cross-border transmission rates.

Keywords: Coronavirus; COVID-19; Vaccination; Morbidity; Mortality; Andorra; Liechtenstein; Malta; Monaco; Republic of San Marino; Vatican City

Introduction

The European continent is divided into four subregions by forty-four countries (1). The microstates are a collection of six countries that make up Europe's smallest states. Andorra, Liechtenstein, Malta, Monaco, the Republic of San Marino, and the Vatican City are small European countries with limited populations and geographical areas (2). Except for Malta, all microstates have land borders with larger countries (3). Malta: Malta is the only microstate that is a member of the European Union, consisting of two inhabited islands in the midst of the Mediterranean Sea (EU). As demonstrated in “Supplement table 1” (4,5), the microstates have comparable demographic features. Despite their meager natural resources, all the microstates have developed service economies (3). SARS-CoV-2, a novel coronavirus, emerged in the end of 2019, and the World Health Organization (WHO) declared it the COVID-19 pandemic in March 2020 (6). The virus quickly spread across countries, including microstates in Europe (2). The first COVID-19 case was reported on March 2nd in Andorra, March 3rd in Liechtenstein, March 7th in Malta, February 28th in Monaco, February 27th in the Republic of San Marino, and January 7, 2020, in Vatican City (7,8). Even though these microstates share both similarities and variations in their societal, cultural, and political structures, they still have distinct characteristics resulting from their limited geographical and population sizes that are rarely studied (3). Understanding the evolution of the COVID-19 pandemic at a population level in these microstates is more achievable and may be a key to a better understanding of the pandemic situation.
in their bordering larger countries or regions, since the COVID-19 pandemic is still progressing. It's important to remember that microstates have a lot in common with their larger neighbors, both in terms of population and dependence. This is the first study, as far as the authors are aware, to look at the influence of COVID-19 on Europe's microstates. Within the first 18 months of the pandemic, this study intends to give a descriptive account of the healthcare system's readiness, the COVID-19 advancement, public health mitigation initiatives, and vaccination roll-out across various microstates. This study will also look for any similarities in COVID-19 incidence and mortality between microstates and bigger surrounding countries (where applicable). Such observations would give evidence for policymakers at the national and international levels to employ in future pandemic control and response efforts.

Materials and methods

This is an observational study for the six European microstates based on COVID-19 epidemiological data and healthcare system preparation (Andorra, Liechtenstein, Malta, Monaco, San Marino, and the Vatican City). The research was limited to microstates on the European continent.

Data sources

The six microstates' Ministry of Health websites, published publications, and local newspapers were used to identify mitigation measures implemented from the start of the COVID-19 pandemic until August 1st, 2021. For the health systems data, the WHO European Observatory on Health Systems and Policies' COVID-19 Health System Response Monitor was used (9). The primary COVID-19 indicators and immunization data were obtained using the 'Our World in Data' (OWID) database (10). Through an automatic scrape and manual collecting and verification procedure, the OWID is a continuously updated database that aggregates COVID-19 distribution data from all reporting countries around the world onto one digital platform (10). From the onset of COVID-19 until August 1st, 2021, the following main indicators were considered for all six microstates: (i) weekly COVID-19 cases and cumulative incidence of COVID-19; (ii) COVID-19 weekly mortality; (iii) weekly total COVID-19 vaccine doses administered; and (iv) weekly fully vaccinated population. It’s worth noting that no vaccination data for the Vatican City could be found for this period.

Because five of the six microstates share borders with other countries (Andorra with France and Spain; Liechtenstein with Switzerland and Austria; Monaco with France; San Marino with Italy; Vatican City with Italy), the OWID database was used to obtain weekly epidemiological data on COVID-19 cases and mortality for these larger countries.

Statistical methods

All data analysis and comparisons were done in Microsoft Excel®. Each microstate's monthly COVID-19 positive cases and cumulative incidence per 1,000 people were compared. Similar comparisons were conducted in relation to mitigating measures that had been put in place and vaccination rollouts (where data was available). Each microstate's infectivity fatality rates (IFR) every month were computed. The number of deaths was divided by the number of confirmed infectious cases (for each month) multiplied by 100. Comparative comparisons were conducted between the five microstates (Andorra, Liechtenstein, Monaco, San Marino, and the Vatican City) and the countries that bordered them on the land. Comparisons between the COVID-19 positive cumulative incidence per 100,000 population and the mortality incidence per 100,000 population across the study period were made. Since Malta is an island with no land borders, it was excluded from these comparative assessments.

Results

Epidemiological data

A total of 60,174 positive cases and 730 deaths have been documented across the six microstates from the start of COVID-19 to August 1, 2021. Although Liechtenstein had the greatest IFR, Andorra had the highest COVID-19 infectivity rate (190 per 1,000) and fatality rate (1.66 per 1,000). Table 1 shows a comparison snapshot for the major COVID-19 epidemiological data across the six microstates for week 30 of 2021 (July 26th to August 1st), whereas Figure 1A shows an overview of positive cases across the microstates from the commencement of COVID-19 to August 1st, 2021. During the first wave (January to May 2020), a similar low COVID-19 infectivity rate was recorded across the six microstates. During this time, however, the Republic of San Marino and Vatican City reported a higher total positive case rate (Figure 1B). Andorra (6.08) and the Republic of San Marino reported the highest IFR for the first wave (6.02). Since the commencement of COVID-19 till August 1st, 2021, the Vatican City has reported no COVID-19-related fatalities.

For all microstates, the second wave began in August 2020. Although there was a broad comparable pattern of positive cases from August 2020 to August 2021, as shown in Figures 1A and 1B, there were variances in infectivity and fatality rates between microstates. Indeed, Andorra had the most positive instances (178 per 1,000 people) over this time period (3 August 2020 to 1 August 2021), followed by the Republic of San Marino (129 per 1,000 population). For the same time period, Liechtenstein (1.97 IFR) had the highest IFR, followed by Malta (1.24). (3rd August 2020 to 1st August 2021).

Between the five microstates with land borders and their surrounding nations, the COVID-19 incidence and fatality cases per 100,000 population were compared. As shown in Figures 2A and 2B, there are clear similarities in COVID-19 incidence and death trends among microstates and their neighbors. Indeed,
Liechtenstein's COVID-19 incidence and mortality patterns were found to be nearly equivalent to those of its neighboring countries, Switzerland and Austria. Andorra and the Republic of San Marino were shown to have had considerably greater COVID-19 incidence rates than their neighboring countries at times (Spain and France for Andorra, Italy for the Republic of San Marino). Furthermore, during March and May 2020, the Republic of San Marino saw a larger peak in mortality incidence than Italy.

**Preparedness and mitigation strategies**

**Healthcare systems**

**Pre-COVID-19 healthcare system set-up**

Each of the six microstates has a government-funded healthcare system that provides universal health care to its citizens, as well as private healthcare systems. Citizens of Andorra, Malta, and Liechtenstein are enrolled in a national healthcare/social security system that covers state healthcare costs (11-13) (in exchange for financial payments). This system provides partial healthcare to Andorranos, most medical services to Liechtensteiner, and all services to Maltese aged (11-13). In Andorra, Liechtenstein, and Malta (11-13), there is just one state-owned hospital. Like Vatican City, Liechtenstein has healthcare agreements with hospitals outside the country (13,14). Indeed, the Directorate of Health and Hygiene of Vatican City offers emergency aid, medical consultations, diagnostic tests, and radiological scans. Hospitalizations and surgical treatments, on the other hand, are provided by the "Fondo Assistenza Sanitaria" (14). Monaco's healthcare system is supervised by "The Caisses Sociales de Monaco," which covers the healthcare of those Monegasque citizens who contribute to the system. Sammarinese are registered with the state's "Azienda Sanitaria Locale" national health insurance fund, whereas Monaco's healthcare system is supervised by "The Caisses Sociales de Monaco," which covers the healthcare of those Monegasque citizens who contribute to the system. While the Republic of San Marino only has one governmental hospital, Monte Carlo is home to four separate specialty hospitals (15,16).

**COVID-19 healthcare system preparedness**

As a result of the COVID-19 pandemic, most of the microstates' healthcare systems underwent infrastructure upgrades and undertook specific strategic measures. Andorra increased its intensive care unit (ICU) capacity from 10 to 37 beds (17), Malta increased its ICU capacity from 20 to 100 beds (18), and the Republic of San Mario increased its ICU capacity from 6 to 20 beds (9). A rise in hospital beds has also been noted (9, 17,18). To meet the influx of cases, non-medical spaces were also created up. Non-clinical facilities such as the hospital staff canteen and lecture rooms were turned into hospital wards in Malta, and oxygen points were constructed in corridors and public open areas in preparation for a possible significant increase of COVID-19 cases (18-20). External mobile clinic facilities were established up in Vatican City to cater for the medical needs of suspected positive cases as well as to conduct further examinations (21). Elective surgery and outpatient healthcare services were also suspended or canceled in Malta and Vatican City during the first wave (14,18).

**Swabbing and testing sites**

Throughout the pandemic, nasopharyngeal swab polymerase chain reaction (PCR) and antigen tests for COVID-19 were available. Andorra established 59 StopLabs (17); Liechtenstein established one swabbing site in Vaduz, with rapid antigen tests available at local pharmacies (22); Malta established seven swabbing sites across the islands (23); Monaco established two PCR test sites, with 23 pharmacies carrying our antigen testing and another 20 pharmacies providing Rapid Diagnostic Orientation Test (TROD) (24). San Marino, on the other hand, provided testing in hospitals and at patients' homes (25). Testing methods differed between microstates and at different times of the pandemic. During the first wave (17), Andorra did mass serological screening, while the Vatican City conducted anti-SARS-CoV-2 antibody testing on inhabitants and staff regardless of any interaction with positive patients or symptoms (26). Random swabbing tests were performed on healthcare personnel in Malta during the first wave, including those working in nursing homes and an immigrant center (18).

**Containment measures**

The first wave (which began in March 2020) saw the closure of schools, non-essential shopping outlets, the entertainment industry, religious activities, travel restrictions, and lockdowns across the microstates, as it did in most other countries around the world. However, as demonstrated in “Supplement figures 1 to 13”, these containment efforts, including mask-wearing mandates, varied among the COVID-19 phases. In March 2021, only Malta was subjected to an additional lockdown.

**COVID-19 vaccination**

The European Medical Agency (EMA) has licensed four vaccinations for public administration (as of August 2021) (27). Only Malta purchased doses of all four vaccines that had been approved (28). Pfizer BioNTech, Moderna, and AstraZeneca dosages (29, 30) were acquired by Andorra. Pfizer BioNTech and Moderna were used to inoculate Liechtenstein's population (31). Monaco, the Republic of San Marino, and the Vatican City, on the other hand, each ordered eight, thirty, and thirty-two Pfizer BioNTech vaccines (8, 30, 32). Only Malta is a member of the European Union (EU), and it has profited from EU joint procurement (30). The vaccines were secured in various ways by the other microstates. Andorra and the Republic of San Marino used a hybrid method, obtaining vaccines bilaterally.
The COVID-19 vaccination campaign began on January 19th, 2021 (33), Liechtenstein on January 21st, 2021 (34), Malta on December 27th, 2020 (28), Monaco on December 31st, 2020 (35), the Republic of San Marino on January 25th, 2021 (36), and Vatican City on January 13th, 2021. (37). Despite having a comparable vaccination strategy that targeted the elderly, the most vulnerable, and healthcare workers, “Supplement table 2” shows that there were some variances. Only the Republic of San Marino's vaccination plan emphasized people who had already been infected with COVID-19 within the previous six months (30).

A total of 999,220 doses have been provided in Andorra, Liechtenstein, Malta, Monaco, and the Republic of San Marino as of August 1st, 2021. From the beginning of the vaccination rollout until August 1st, 2021, Figure 3A depicts the cumulative fully vaccinated population per 1,000 throughout these 5 microstates. Malta appeared to have the fastest vaccination rollout among the four microstates at the time of writing (10), with 87 percent of the population fully vaccinated (at the time of writing) (10). The Republic of San Marino's vaccine rollout ranked second among the five microstates at the time of writing (10), with 69 percent of the population fully vaccinated, compared to 49 percent of Liechtenstein's population, 47 percent of Monaco's population, and 44 percent of Andorra’s population (10). As the fraction of the population fully vaccinated grew, the number of reported COVID-19 cases decreased, as indicated in Figure 3B. It should be emphasized that seasonality and implemented mitigation measures could have influenced this association. COVID-19 instances began to rise in Andorra, Malta, and Monaco as the summer proceeded and non-essential cross-border travel became permissible, as seen in Figure 3B.

Discussion

According to the current study, European microstates were afflicted by the COVID-19 pandemic in the same way that the rest of the world was. COVID-19 outcomes are similar across microstates when universal COVID-19 containment mechanisms (social distancing, gathering regulations, lockdowns, etc.) are used. Indeed, the initial COVID-19 wave saw a similar COVID-19 spread across the six microstates as uniform mitigation measures, including lockdowns, were implemented. Despite this, infectivity rates in the Republic of San Marino and Vatican City were greater than in the other microstates. When compared to their larger neighboring country, Italy, this was also true. This could be explained by the fact that these two microstates had inadequate pandemic preparedness prior to COVID-19's emergence, making them strongly reliant on Italy and resulting in significant cross-border infectivity. In comparison to other large European countries, Italy, particularly the Emilia Romagna area, was reported to be substantially afflicted by COVID-19 during this period (38,39). Indeed, microstates are well-known for relying heavily on their larger neighbors for the majority of their goods, including labor (3). Andorra, which had the greatest COVID-19 impact of all microstates during the 1.5-year COVID-19 epidemic, could have experienced something similar. Indeed, it is widely accepted that the microstates rely heavily on their larger neighbors for most of their supplies and even labor (3). A similar occurrence could have occurred in Andorra, which had the largest COVID-19 impact of all microstates over the 1.5-year period of the COVID-19 pandemic. Andorra is strongly reliant on tourism and, as a result, requires cross-border migration to maintain economic stability. As a result, cross-border transmission from France and Spain, both of which have been severely damaged by COVID-19, is thought to have contributed to the observed COVID-19 impact (40, 41).

Malta, as the only microstate island with no land borders, did the best out of all the microstates in Europe during the first wave (18). The scenario in Malta demonstrates that travel limitations, in combination with other early public health initiatives and behavioral changes, can reduce virus transmission (42). Diverse relaxation measures, on the other hand, result in different consequences. This was the case in Malta, where measures were entirely loosened over a few weeks at the start of summer 2020, allowing enormous gatherings, resulting in the early arrival of the second wave in August 2020. (43). By the end of summer 2020, the other microstates had begun to face elevated infectivity rates on par with their areas bordering larger countries. However, different mitigation measures were implemented by different microstates in the second and previous waves, resulting in different COVID-19 outcomes. Except for Malta (in March 2021), lockdowns were not implemented again, and borders remained open, increasing the likelihood of cross-border transmission. As a result, challenging a particular country to maintain a low infectivity rate and advocating for a pan-European commitment to limit viral transmission are both viable options (44). In fact, only lockdowns appear to fully lower infectivity rates, as seen in Malta, where a second lockdown dramatically reduced COVID-19 case counts after a very high infectivity rate and a healthcare system on the verge of failure (45). Small countries are confronted with inadequate public health resources, which must be addressed. As a result, when the caseload surpasses the capacity of surveillance and contact tracing systems, an increase in cases is expected. In such a case, shifting from a containment to a rapid mitigation phase is warranted (46). This demonstrates the importance of prompt public health response and mitigation efforts (47).

The long-term control of this pandemic is expected to be COVID-19 vaccine, albeit this is very contingent on an efficient worldwide vaccination strategy and the introduction of new variations of concern (48).
Table 1. Comparisons of the main COVID-19 epidemiological data across the six microstates for the 30th Week of 2021 (July 26th to August 1st)

<table>
<thead>
<tr>
<th></th>
<th>Andorra</th>
<th>Liechtenstein</th>
<th>Malta</th>
<th>Monaco</th>
<th>San Marino</th>
<th>Vatican City</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total population (n)</td>
<td>77,265</td>
<td>38,137</td>
<td>442,772</td>
<td>39,525</td>
<td>34,017</td>
<td>800</td>
</tr>
<tr>
<td>Total positive cases (n)</td>
<td>14,678</td>
<td>3,085</td>
<td>34,380</td>
<td>2,913</td>
<td>5,091</td>
<td>27</td>
</tr>
<tr>
<td>% cases of total population infected</td>
<td>19.00%</td>
<td>8.09%</td>
<td>7.76%</td>
<td>7.37%</td>
<td>14.97%</td>
<td>3.36%</td>
</tr>
<tr>
<td>Total deaths (n)</td>
<td>128</td>
<td>59</td>
<td>423</td>
<td>33</td>
<td>90</td>
<td>0</td>
</tr>
<tr>
<td>% mortality of total population</td>
<td>0.17%</td>
<td>0.15%</td>
<td>0.10%</td>
<td>0.08%</td>
<td>0.26%</td>
<td>0%</td>
</tr>
<tr>
<td>Recovered (n)</td>
<td>14,550</td>
<td>3,026</td>
<td>33,957</td>
<td>2,880</td>
<td>5,001</td>
<td>27</td>
</tr>
<tr>
<td>IFR</td>
<td>0.87</td>
<td>1.91</td>
<td>1.23</td>
<td>1.13</td>
<td>1.77</td>
<td>0</td>
</tr>
</tbody>
</table>

IFR – infectivity fatality rate

Figure 1A. Stacked area representation of COVID-19 positive cases per 1,000 population across the six microstates from February 2020 till 1st August 2021
Figure 1B. COVID-19 infectivity and infectivity-fatality-ratio (IFR) between March 2020 till 1st August 2021 across the six European microstates.
**Figure 2A.** Comparison assessment of the COVID-19 incidence per 100,000 population across the five inland microstates and their land border countries
Figure 2B. Comparison assessment of the COVID-19 mortality per 100,000 population across the four inland microstates and their land border countries.

Figure 3A. Cumulative fully vaccinated population incidence across Andorra, Liechtenstein, Malta, Monaco, and the Republic of San Marino.
Figure 3B. Comparison assessment of COVID-19 cases and fully vaccination population per 1,000 across Andorra, Liechtenstein, Malta, Monaco and Republic of San Marino.
Only Malta, out of the six microstates, is a member of the European Union and benefits from the advanced purchase agreement (APA). Following the EMA’s clearance, Malta began receiving vaccination doses in instalments, as per the APA agreement (27, 49). Only Malta purchased vaccine doses from all EMA-approved manufacturers and was the first to begin vaccination campaigns (28). The other microstates had to find alternative ways to buy vaccine doses and then start their own immunization campaigns. Given that the microstates had similar vaccination policies in place, the purchase disparity could have contributed to the microstates’ differing vaccination rollout times. Vaccine apprehension could potentially be a role in the disparity in vaccination coverage. In fact, in early January, healthcare professionals in Andorra expressed apprehension about being immunized, in contrast to Malta’s approach (50, 51). Nonetheless, as the vaccination campaign progressed, all microstates saw a drop in COVID-19 infectivity. To avert outbreaks, public health and social distance measures, such as travel restrictions, should be gradually removed in accordance with the population’s vaccination rate, supply, and effectiveness (52). COVID-19 containment is jeopardized by the introduction of highly transmissible variations, which is a deterrent factor. Indeed, the introduction of the Delta variety in early summer 2021 could have resulted in an increase in cases across most microstates. As a result, future policy decisions should take into account the lessons learned from prior COVID-19 outbreaks while continuing the push for widespread vaccination (53).

There are a few limits that must be acknowledged. All of the epidemiological data in this analysis was based on the sources’ reporting and accuracy. There was no information on COVID-19 instances stratified by age or gender. Other data sources were identified in addition to OWID; however they lacked sufficient information to allow us to undertake analytic analysis. Low-quality data or data that was deemed untrustworthy were omitted to ensure that the study provided accurate descriptions. Furthermore, we lacked data on care capacity, population, disease trends, and tracking capacity, limiting our epidemiological studies and data output quality. Due to an inability to identify COVID-19 admissions and ICU data for all microstates, the impact of COVID-19 on the healthcare system through COVID-19 admissions and ICU could not be studied. These constraints could have influenced epidemiology interpretation and resulted in certain errors. As a result, only descriptive observations could be made, and the incidence of cases was the sole indicative indicator that could be utilized for comparisons. The COVID-19 situation at a national level could have been influenced by social variables, economic levels, and economic structure, as well as any political difficulties between governments. However, this information was not available, posing a barrier to properly comprehending COVID-19 interactions and effects within the microstates. Because vaccine data for Vatican City could not be found across several sources, this microstate had to be excluded from vaccination analysis. Furthermore, this was an observational study with the goal of providing a descriptive assessment of the COVID-19 scenario among the six microstates rather than attempting to determine the causality of the COVID-19 outcomes or evaluating pandemic governance between countries. The contributors went to great lengths to find correct information from reputable sources. It does not, however, rule out the potential of some missing data. Future research should be undertaken to investigate the microstate COVID-19 situation in greater depth and confirm the findings of this study.

Conclusion

Although the six European microstates have limited populations and physical territories, they are spread out over the continent. Although there were some similarities in the COVID-19 results amongst the microstates, the microstates and their land-bordering nations shared the most striking similarities. Whether a country has land borders or not, timely mitigation measures and vaccination rollouts appear to be critical to the pandemic’s containment. The greatest pandemic impact on a country’s population, on the other hand, appears to be dependent on cross-border transmission rates. This necessitates a pan-European strategic planning process as well as united action plans.

Acknowledgments: None. Funding: No funding.

Conflict of Interests: All authors declare no conflict of interest.

Ethics approval: No ethical clearance required as no human or animal subjects were involved.

Consent to participate: Not applicable.

Consent for publication: Not applicable.

Availability of data and material: All data is available at OWID database: https://ourworldindata.org.

Author contributions: SC was responsible for the study design, data analyses and writing of article. EP was responsible for Andorra’s data collection and coordinating the mitigations data. JV was responsible for Liechtenstein’s data collection. AP was responsible for Malta’s data collection and coordinating the vaccination data. DC was responsible for Monaco’s data collection and coordinating the vaccination data. NM was responsible for the Republic of San Marino’s data collection. KM was responsible for the Vatican City’s data collection. TAM was responsible for the coordination of COVID-19 epidemiological data and mitigations data. AC helped in the data analyses and creation of graphs.
References


### Appendix

**Supplement table 1.** Demographic characteristics of the microstates

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Andorra</th>
<th>Liechtenstein</th>
<th>Malta</th>
<th>Monaco</th>
<th>San Marino</th>
<th>Vatican City</th>
</tr>
</thead>
<tbody>
<tr>
<td>Archipelago size</td>
<td>468Km²</td>
<td>160Km²</td>
<td>316Km²</td>
<td>2.1Km²</td>
<td>61Km²</td>
<td>0.49Km²</td>
</tr>
<tr>
<td>Land borders</td>
<td>Spain and France</td>
<td>Switzerland and Austria</td>
<td>None</td>
<td>France</td>
<td>Italy</td>
<td>Italy</td>
</tr>
<tr>
<td>Population size</td>
<td>77,265</td>
<td>38,137</td>
<td>442,772</td>
<td>39,525</td>
<td>34,017</td>
<td>800</td>
</tr>
<tr>
<td>Female Life expectancy at birth (2019)</td>
<td>84.9 years</td>
<td>85 years</td>
<td>84.9 years</td>
<td>82.3 years</td>
<td>84.3 years</td>
<td>-</td>
</tr>
<tr>
<td>Male Life expectancy at birth (2019)</td>
<td>79.8 years</td>
<td>79.9 years</td>
<td>80.2 years</td>
<td>77.9 years</td>
<td>80.0 years</td>
<td>-</td>
</tr>
</tbody>
</table>

**Supplement table 2.** Comparison assessment of the different vaccination strategies across the six microstates.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Residents in social and health centers, for the elderly or disabled, and the workers of these centers, Residents in nursing homes</td>
<td>Healthcare workers and long-term care facility workers (public and private sector)</td>
<td>Residents 75+</td>
<td>ISS Operators, Disabled people,</td>
<td>Priority given to health and public safety personnel</td>
<td></td>
</tr>
<tr>
<td>Health professionals and those with highest exposure,</td>
<td>Persons living in long-term care facilities – elderly and mental health</td>
<td></td>
<td>Guests and employees of structures dedicated to the most fragile people</td>
<td>Elderly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>People with disabilities who require professional support measures at home to the virus,</td>
<td>Persons aged 85 and over</td>
<td></td>
<td>Private facility operators,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Workers of companies that offer home care services to people with severe disabilities,</td>
<td></td>
<td></td>
<td>Healthcare workers diagnosed with COVID-19 recover,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary care physicians and other essential health personnel who are involved in vaccination and pandemic response</td>
<td></td>
<td></td>
<td>Seniors over 75+, Fragile patients with polypathologies</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ISS – Istituto per la Sicurezza
Supplement table 2. Comparison assessment of the different vaccination strategies across the six microstates (continued).

<table>
<thead>
<tr>
<th>Phase</th>
<th>Population/Group</th>
<th>Inpatient care staff, outpatient care staff, state hospital staff</th>
<th>All other frontliners;</th>
<th>Residents 65+</th>
<th>People between 60 and 75 years old, School staff, Police Forces</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>People over 70, vulnerable people (e.g. transplanted patients and people receiving dialysis)</td>
<td>Health professionals who carry out healthcare activities with a higher risk than the general population which were not included or not vaccinated in phase I,</td>
<td>Persons 80-85 years of age</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Primary caregivers of people who are cared for at home with large dependency</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Minors which meet the criteria set out in phase I and which have not been able to vaccinate by age criteria</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Phase 3 (a): People aged &gt;60 or &lt;70 years who have not been vaccinated in the previous stages,</td>
<td>Those working in the medical primary care</td>
<td>Vulnerable population</td>
<td>Medical and care staff</td>
<td>People between 16-18 and 59 years old, People diagnosed with COVID-19 recovery</td>
</tr>
<tr>
<td></td>
<td>People at risk of hospital admission, morbidity and mortality due to COVID-19 presenting certain pathologies not included in the previous stages and which have not yet been vaccinated</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Workers in supervised flats and shelters,</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Essential front-line personnel who have not been vaccinated previously,</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Penitentiary centers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Phase 3 (b): People aged &gt;50 or &lt;60 years who have not been vaccinated in the previous stages</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

www.ijehs.com 2022, Vol. 3, No. 4: e31
Supplement table 2. Comparison assessment of the different vaccination strategies across the six microstates (continued).

<table>
<thead>
<tr>
<th></th>
<th>Rest of the population</th>
<th>People born in 1951 and older</th>
<th>Rest of the population in decending age group order</th>
<th>Persons with these risk factors are prioritised when registering: Obesity (BMI &gt;30), COPD and severe respiratory failure, Complicated arterial hypertension, Heart failure, Diabetes (Type 1 and Type 2), Chronic kidney failure, Cancers and malignant haematological diseases that are active and date from fewer than 3 years ago, Solid organ or haematopoietic stem cell transplantation, Trisomy 21 Others to be specified</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Risk groups under 70 years of age</td>
<td>Remaining population</td>
<td>People aged over 18 who present risk factors for co-morbidity according to a list drawn up by the French High Authority of Health taken up in Monaco.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Remaining population</td>
<td>Rest of population</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ISS – Istituto per la Sicurezza

References

Table 1. Lockdowns instituted by the microstates from the onset of COVID-19 till 1st August 2021

<table>
<thead>
<tr>
<th>Country</th>
<th>Jan-06 to Feb-02</th>
<th>Feb-03 to Mar-01</th>
<th>Mar-02 to Apr-05</th>
<th>Apr-06 to May-03</th>
<th>May-04 to May-31</th>
<th>Jun-01 to Jul-05</th>
<th>Jul-06 to Aug-02</th>
<th>Aug-03 to Aug-30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andorra</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liechtenstein</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malta</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monaco</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>San Marino</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vatican City</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

N.B. Start and end dates of lockdowns noted down in the figure.

Key

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>Easing of restrictions</th>
</tr>
</thead>
</table>

Supplement figure 1. Lockdowns instituted by the microstates from the onset of COVID-19 till 1st August 2021

References


<table>
<thead>
<tr>
<th>Country</th>
<th>Feb-03 to May-03</th>
<th>May-04 to Jul-05</th>
<th>Jun-01 to Jul-02</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andorra</td>
<td>Aug-31 to Oct-04</td>
<td>Oct-05 to Nov-01</td>
<td>May-01 to Apr-04</td>
</tr>
<tr>
<td>Liechtenstein</td>
<td>Mar-01 to Apr-05</td>
<td>May-31 to Jul-04</td>
<td>68</td>
</tr>
<tr>
<td>San Marino [6, 7]</td>
<td>Mar-01 to May-02</td>
<td>May-04 to Jul-02</td>
<td>48</td>
</tr>
<tr>
<td>Vatican City [8]</td>
<td>Mar-01 to May-02</td>
<td>May-04 to Jul-02</td>
<td>83</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>85</td>
</tr>
</tbody>
</table>

N.B. The closure periods (in days) are illustrated within the figure.

Key:

- **Closed**
- **Open**

### Supplement figure 2.

Mitigations involving non-essential shops instituted by the microstates from the onset of COVID-19 till 1st August 2021

### References


COVID-19 outcome in European microstates


<table>
<thead>
<tr>
<th>Country</th>
<th>Jan-06 to Jul-05</th>
<th>Jul-06 to Aug-02</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andorra [1]</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Liechtenstein  [2]</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Malta [4]</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Monaco [7]</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>San Marino [5]</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Vatican City   [8]</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Country</th>
<th>Aug-31 to Jul-04</th>
<th>Jul-05 to Aug-01</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andorra [1]</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Liechtenstein  [3]</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Malta</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Monaco [7]</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>San Marino [6]</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Vatican City   [8]</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

N.B. The rows with N/A represent unidentified data for the marked period

**Key:**
- Remote Working
- Yes
- No
- Optional

**Supplement figure 3. Mitigations involving remote working instituted by the microstates from the onset of COVID-19 till 1st August 2021**

**References**


Cuschieri, S. et al.


<table>
<thead>
<tr>
<th>Jan-06 to Feb-02</th>
<th>Feb-03 to Mar-01</th>
<th>Mar-02 to Apr-05</th>
<th>Apr-06 to May-03</th>
<th>May-04 to May-31</th>
<th>Jun-01 to Jul-05</th>
<th>Jul-06 to Aug-02</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andorra [1]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liechtenstein [2,3]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malta [4]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monaco [7]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>San Marino [8,9]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vatican City [10]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Aug-03 to Aug-30</th>
<th>Aug-31 to Oct-01</th>
<th>Oct-05 to Nov-01</th>
<th>Nov-02 to Nov-29</th>
<th>Nov-30 to Jan-03</th>
<th>Jan-04 to Jan-28</th>
<th>Feb-01 to Feb-04</th>
<th>Mar-01 to Apr-04</th>
<th>Apr-05 to May-02</th>
<th>May-03 to May-30</th>
<th>May-31 to Jul-04</th>
<th>Jul-05 to Aug-01</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andorra [1]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liechtenstein</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malta [5, 6]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monaco</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>San Marino</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vatican City</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

N.B. Halting of religious activities period (in days) are illustrated within the figure

Key:

<table>
<thead>
<tr>
<th>Religious Activities</th>
<th>Stopped</th>
<th>Allowed</th>
</tr>
</thead>
</table>

Supplement figure 4. Mitigations on religious activities instituted by the microstates from the onset of COVID-19 till 1st August 2021

References


COVID-19 outcome in European microstates


<table>
<thead>
<tr>
<th>Country</th>
<th>Jan-06 to Feb-02</th>
<th>Feb-03 to Mar-01</th>
<th>Mar-02 to Apr-05</th>
<th>Apr-06 to May-03</th>
<th>May-04 to May-31</th>
<th>May-05 to Jul-05</th>
<th>Jun-01 to Jul-05</th>
<th>Jul-06 to Aug-02</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andorra [1, 2]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liechtenstein [6, 7]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malta [8]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monaco [9 - 11]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>San Marino [12]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vatican City [13]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Country</th>
<th>Aug-03 to Aug-30</th>
<th>Aug-31 to Oct-04</th>
<th>Oct-05 to Nov-01</th>
<th>Nov-02 to Nov-29</th>
<th>Nov-30 to Jan-03</th>
<th>Jan-04 to Jan-31</th>
<th>Feb-01 to Feb-28</th>
<th>Mar-01 to Apr-04</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andorra [3, 4]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liechtenstein</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malta</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monaco</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>San Marino</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vatican City [14, 15]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

N.B. The rows with N/A represent unidentified data for the marked period

Key

- T: tourism only open for charters and boats; H: hotels open; S: Ski resorts; T+H: both tourism and hotels closed; T+H: tourism and hotels both closed

<table>
<thead>
<tr>
<th>Period</th>
<th>Andorra</th>
<th>Liechtenstein</th>
<th>Malta</th>
<th>Monaco</th>
<th>San Marino</th>
<th>Vatican City</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apr-05 to May-02</td>
<td>S</td>
<td>H</td>
<td>H</td>
<td>T+H</td>
<td>N/A</td>
<td>T</td>
</tr>
<tr>
<td>May-03 to May-30</td>
<td>S</td>
<td>H</td>
<td>H</td>
<td>H</td>
<td>N/A</td>
<td>T</td>
</tr>
<tr>
<td>May-31 to Jul-04</td>
<td>H</td>
<td>H</td>
<td>H</td>
<td>H</td>
<td>N/A</td>
<td>T</td>
</tr>
<tr>
<td>Jul-05 to Aug-01</td>
<td>S</td>
<td>H</td>
<td>H</td>
<td>H</td>
<td>N/A</td>
<td>T</td>
</tr>
</tbody>
</table>

Hotels & Tourism

- Closed
- Open for Charters and Boats
- Open for Schengen, EU and UK
- Open

T + H: both tourism and hotels closed; T: tourism only open for charters and boats; H: hotels open; S: Ski resorts; Monaco: From end of June onwards tourism was open for Schengen, UK and EU countries and Hotels were open

Supplement figure 5. Mitigations on hotels and tourism instituted by the microstates from the onset of COVID-19 till 1st August 2021

References


<table>
<thead>
<tr>
<th>Andorra</th>
<th>Liechtenstein</th>
<th>Malta [1]</th>
<th>Monaco</th>
<th>San Marino</th>
<th>Vatican City</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan-06 to Feb-02</td>
<td>Feb-03 to Mar-01</td>
<td>Mar-02 to Apr-05</td>
<td>Apr-06 to May-03</td>
<td>May-04 to May-31</td>
<td>Jun-01 to Jul-05</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Andorra</th>
<th>Liechtenstein</th>
<th>Malta</th>
<th>Monaco</th>
<th>San Marino</th>
<th>Vatican City</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug-03 to Aug-30</td>
<td>Aug-31 to Oct-04</td>
<td>Oct-05 to Nov-01</td>
<td>Nov-02 to Nov-29</td>
<td>Nov-30 to Jan-03</td>
<td>Jan-04 to Jan-31</td>
</tr>
</tbody>
</table>

**Key:**
- **Closed**
- **Open**
- **No airport**

**Supplement figure 6.** Mitigations involving the airport instituted by Malta (the only microstate with an airport)

**References**

### COVID-19 outcome in European microstates

<table>
<thead>
<tr>
<th></th>
<th>Jan-06 to Feb-02</th>
<th>Feb-03 to Mar-01</th>
<th>Mar-02 to Apr-05</th>
<th>Apr-06 to May-03</th>
<th>May-04 to May-31</th>
<th>Jun-01 to Jul-05</th>
<th>Jul-06 to Aug-02</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malta [16]</td>
<td><img src="https://www.regierung.li/files/attachment/86-durchf%C3%BChrung-veranstaltungen.png" alt="" /></td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Monaco</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>San Marino [18]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vatican City [20]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

N.B. The rows with N/A represent unidentified data for the marked period.

**Key:**

<table>
<thead>
<tr>
<th>Gathering Limitations</th>
<th>Over 1000</th>
<th>Upto 1000</th>
<th>Upto 300</th>
<th>Upto 100</th>
<th>Upto 30</th>
<th>Upto 10</th>
<th>Upto 5</th>
<th>No limits</th>
<th>Limits Unspecified</th>
</tr>
</thead>
</table>

1 (Malta): 7th August - 100 people indoors and 300 people outdoors for mass events (every event would be limited by the size of the venue, with no more than one person for every four-square meter)

^^ (Malta) although the six-person limit has been removed. Large, mass gatherings are still banned.

### Supplement figure 7. Mitigations on gatherings instituted by the microstates from the onset of COVID-19 till 1st August 2021

### References


Supplement figure 8. Mitigations on non-essential travel instituted by the microstates from the onset of COVID-19 till 1st August 2021

References

Table 1. Mitigations on mask wearing instituted by the microstates from the onset of COVID-19 till 1st August

<table>
<thead>
<tr>
<th>Country</th>
<th>Jan-06 to Feb-02</th>
<th>Feb-03 to Mar-01</th>
<th>Mar-02 to Apr-05</th>
<th>Apr-06 to May-03</th>
<th>May-04 to May-31</th>
<th>Jun-01 to Jul-05</th>
<th>Jul-06 Aug-02</th>
<th>Aug-03 Aug-30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andorra [1 - 3]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liechtenstein [7]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malta [13]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monaco [16 - 19]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>San Marino [23]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vatican City [25 - 27]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* in shops, schools, public areas, indoors and public transport
** in queues
*** in crowded areas
+ in St peter’s Basilica
**** in all public spaces
***** everywhere
N.B. The rows with N/A represent unidentified data for the marked period

Key

- Mask mandate with fine
- Mask mandate w/o fine
- Mask mandate + fine unspecified
- No mandate

Supplement figure 9. Mitigations on mask wearing instituted by the microstates from the onset of COVID-19 till 1st August

References


### Key

*Childcare and kindergarten closed on 16/3/2020. Date of reopening was not found; Primary schools closed from 16/3/2020 to 25/5/2020; Secondary schools closed from 16/3/2020 to 18/5/2020; Post-secondary schools closed from 16/3/2020 to 11/5/2020.


*** Post-secondary schools only applicable at Vatican City; / All schools closed on 16/3/2020; Childcare reopened on the 18/5/2020; All other schools reopened 2/6/2020; // All schools closed 12/3/2020 and reopened at the end of June; /// All schools closed on 2/3/2020.


Nurseries reopened on 8/6/2020.

Primary reopened on 10/6/2020.


$ staggered opening of schools

### Supplement figure 10. Mitigations on schools instituted by the microstates from the onset of COVID-19 till 1st August

### References


COVID-19 outcome in European microstates


### Supplement figure 11. Mitigations on restaurants instituted by the microstates from the onset of COVID-19 till 1st August

### References


### Table

<table>
<thead>
<tr>
<th>Country</th>
<th>Jan-06 to Feb-02</th>
<th>Feb-03 to Mar-01</th>
<th>Mar-02 to Apr-05</th>
<th>Apr-06 to May-03</th>
<th>May-04 to May-31</th>
<th>Jun-01 to Jul-05</th>
<th>Jul-06 to Aug-02</th>
<th>Aug-03 to Aug-30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andorra [1]</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Liechtenstein [7–9]</td>
<td>80</td>
<td>60</td>
<td>68</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Malta [14, 15]</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Monaco [18, 19]</td>
<td>78</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>San Marino [21]</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Vatican City</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

N.B. The rows with N/A represent unidentified data for the marked period

### Key

<table>
<thead>
<tr>
<th>Bars</th>
<th>Closed</th>
<th>Open with specific hours</th>
<th>Outdoor open only</th>
<th>Open with a seating limit</th>
<th>Fully open</th>
</tr>
</thead>
</table>

*Seating limit and must remain seated
** No seating limit and must remain seated
*** with seating limit also

### Supplement figure 12. Mitigations on bars instituted by the microstates from the onset of COVID-19 till 1st August

### References


Andorra [1–5]

<table>
<thead>
<tr>
<th>Jan-06 to Feb-02</th>
<th>Feb-03 to Mar-01</th>
<th>Mar-02 to Apr-05</th>
<th>Apr-06 to May-03</th>
<th>May-04 to Jun-01</th>
<th>Jul-01 to Jul-05</th>
<th>Jul-06 to Aug-02</th>
<th>Aug-03 to Aug-30</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Liechtenstein [4,5]

| N/A              | N/A              | N/A              | N/A              | N/A              | N/A              | N/A              | N/A              |

Malta [8]

| N/A              | N/A              | N/A              | N/A              | N/A              | N/A              | N/A              | N/A              |

Monaco [11,12]

| N/A              | N/A              | N/A              | N/A              | N/A              | N/A              | N/A              | N/A              |

San Marino [14,15]

| N/A              | N/A              | N/A              | N/A              | N/A              | N/A              | N/A              | N/A              |

Vatican City N/A N/A N/A N/A N/A N/A N/A N/A

N.B. The rows with N/A represent unidentified data for the marked period

Key

<table>
<thead>
<tr>
<th>Closed</th>
<th>Open</th>
<th>Specific hours</th>
</tr>
</thead>
</table>

Supplement figure 13. Mitigations on gyms instituted by the microstates from the onset of COVID-19 till 1st August

References

COVID-19 outcome in European microstates


