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Europe's Covid-19 outliers: German, Austrian and Swiss policy responses during the early stages of the 2020 pandemic

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A R T I C L E   I N F O

Article history:
Available online 8 September 2020

Keywords:
Covid-19
Pandemic
Health Policy

A B S T R A C T

Objectives: This paper presents an overview of the policy responses in Germany, Austria and Switzerland (the DACH region) during the early stages of the 2020 Covid-19 pandemic (Feb.-June 2020), which provides the context for a comparative policy analysis. This analysis provides insight into the possible implications of the policy actions taken in the region.

Methods: An in-depth review and analysis of available data from the DACH countries was conducted. Data was collected from official government sources whenever possible, and supplemented by information from international databases and local reports. The data was then analyzed to identify common patterns as well as significant divergences across the DACH region, especially in the area of health policy and technology use.

Results: The DACH countries faced similar epidemiological situations during the Covid-19 pandemic, and were largely successful at preventing many of the negative impacts seen across the rest of Europe. Although many differences in health systems and governance structures existed, the policy responses in all three countries managed to address some of the most important factors in containing an infectious disease outbreak of this magnitude.

Conclusions: The actions taken by all three DACH countries appear to have been largely successful in reducing the health impact of Covid-19, allowing a return to normal economic activities much earlier than in neighboring countries. However, the implications of certain policies related to economic resilience and health system capacity cannot yet be fully evaluated and may even prove to have negative impacts into the future.

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1. Introduction

As the novel SARS-CoV-2 virus spread around the world in early 2020, leading to what is now known as the “Covid-19” pandemic, governments around the world rushed to implement various policy actions in an attempt to protect health while minimizing economic damage. In Europe, despite the overarching guidance of European Union institutions, there was little to no cooperation across state borders regarding a collective set of actions and as a result the impacts of the pandemic differed considerably between countries [1]. Within this mosaic of responses by governments in Europe, the actions of Austria, Germany, and Switzerland (the DACH region) proved to be particularly effective in preventing the spread of the virus and protecting the lives of their citizens. To a large extent, these three countries demonstrated the most crucial capabilities for dealing with an infectious disease outbreak of this magnitude: early response in the form of tracking, testing and containing cases and sufficient state capacity to quickly implement policy [1]. In addition to improved health outcomes, these accomplishments also appear to be correlated with reduced economic damage, in large part because the DACH region was able to safely begin easing restrictions and returning to normal activities earlier than their regional counterparts.

When compared with the death tolls and economic fallout experienced across the rest of Europe, the relative success story of the DACH region merits further analysis to determine if their re-
spective policy actions can provide a reference case for future pandemics. To investigate the commonalities and differences in policy implementation across the three countries, this paper presents a comprehensive, contemporary overview of the economic, health and social impacts of the Covid-19 pandemic in the DACH region, from the first confirmed cases until the easing of most restrictions in early June. This overview represents a novel body of research to address a lack of existing literature related to policy actions in this region during Covid-19, and it provides the foundation for a comparative policy analysis built on a large body of theoretical work focused on federalism, social policy, and health care systems during a crisis [2,3].

Within this comparative analysis, focus is placed on the interconnected nature of healthcare and the economy, the use of new innovations and technologies to assist with the implementation of various policy objectives, and the residual effects that Covid-19 restrictions might continue to have on economic, physical, and mental health. These themes serve as focal points for both the evaluation and comparison of various policy implications across the DACH countries, allowing for the formation of policy considerations that will help inform decision-makers during future pandemic scenarios.

2. Overview: the Dach region

Germany, Austria and Switzerland all share common borders in Central Europe and have substantial cultural, historical and economic ties. Unsurprisingly, these similarities also extend to many of the demographic variables that are relevant to assessing the impact of the Covid-19 pandemic at the population level (Table 1). In addition, the DACH countries share highly similar systems of federalism, which can be generally defined by broad autonomy being extended to their respective states (Austria and Germany) and cantons (Switzerland), and these federalist structures present an additional lens through which to evaluate their respective policy actions during the pandemic. In particular, the central governments of Austria and Germany normally have only a regulatory role in state affairs such as healthcare provision and education, while in Switzerland the central government is known as the “Federal Council” and plays an even smaller role in cantonal administration, but these roles shifted significantly in response to the loom-

Table 1
Demographic data relevant to the impact of Covid-19 in the DACH countries [5].

| Category (WHO European Region Average) | Germany | Austria | Switzerland |
|----------------------------------------|---------|---------|-------------|
| Government Type                        | Federal Parliamentary Republic | Federal Parliamentary Republic | Federal Republic Confederation |
| Number of Regions                      | 10 States | 9 Provinces | 26 Cantons |
| Population in millions (2019)          | 83.1    | 8.8     | 8.5         |
| Population density per km² (33.47)     | 237     | 109     | 216         |
| % Pop. above 65 (16.4)                 | 21.5    | 18.5    | 18.6        |
| Life expectancy at birth in years (77.9) | 80.9  | 81.7    | 83.6        |
| GDP/Capita (2018)                      | €43 823 | €47 376 | €76 214     |
| Unemployment rate (% of labor force)   | 3.0     | 4.7     | 4.6         |
| Prevalence of chronic conditions       | 10 400  | 6 600   | 5 700       |
| per 100 000 Diabetes (6 700)           | 19 800  | 20 900  | 18 000      |
| Hypertension (23 100)                  | 64.1    | 54.3    | 48.4        |
| Lung Cancer (47.5)                     | 21.9 / 20.3 | 20.8 / 18 | 21.7 / 17.3 |
| Age standardized obesity (BMI >30 kg/m²) prevalence (%) in men/women (20.9 / 23.9) [6] | | | |
| Influenza Mortality (rate per 100,000 inhabitants, 2018) | 9.9 | 5.7 | 6.4 |
| WHO estimated alcohol consumption in liters per capita (10.5) [6] | 11.6 | 9.9 | 10.1 |
| WHO estimated prevalence (%) of current smoking (27.3) [6] | 30.9 | 30.5 | 26.1 |
Table 2
Healthcare System Capacity in the DACH region prior to the 2020 Covid-19 outbreak [9].

| Category (WHO European Region Average) | Germany | Austria | Switzerland |
|----------------------------------------|---------|---------|-------------|
| Healthcare Financing Scheme             | Bismarck social health insurance system (89% of people are covered by statutory funds; 11% opt to move to private health insurance) €4 544 (11.5% of GDP) | Bismarck social health insurance system (private insurance plays a negligible role in care financing) €3 900 (10.3% of GDP) | Universal mandatory health insurance provisioned through private providers (under a system of regulated competition) €9 164 (12.4% of GDP) |
| Healthcare Spending per Capita (€/2 192) [5] | Health insurance schemes are self-governed by stakeholders. States are responsible for provision of hospital care under a general national legislative framework | Health insurance schemes are self-governed by stakeholders. States are responsible for provision of hospital care under a general national legislative framework | Cantons are individually responsible for decisions about provision and financing of healthcare, under a general national legislative framework |
| Healthcare Governance Structure         | Number of physicians per 1000 inhabitants (3.4) [5] | Number of specialist physicians per 1000 inhabitants | Number of specialist physicians per 1000 inhabitants (3.4) [5] |
| | 4.3 | 2.75 | 3.08 |
| | Number of nurses and midwives per 1000 inhabitants (8.3) [5] | Number of nurses and midwives per 1000 inhabitants | Number of nurses and midwives per 1000 inhabitants (8.3) [5] |
| | 13.2 | 7.1 | 17.5 |
| | Hospital beds per 100,000 inhabitants (590) [5] | Hospital beds per 100,000 inhabitants | Hospital beds per 100,000 inhabitants (590) [5] |
| | 800 | 740 | 450 |
| | Intensive Care Unit (ICU) beds per 1000 inhabitants | Intensive Care Unit (ICU) beds per 1000 inhabitants | Intensive Care Unit (ICU) beds per 1000 inhabitants |
| | 0.337 | 0.284 | 0.115 |
| | Hospitals per 1 m inhabitants | Hospitals per 1 m inhabitants | Hospitals per 1 m inhabitants |
| | 40.37 | 38.35 | 25.23 |

ing health crisis [4]. For the purposes of comparative policy analysis, the DACH region’s obvious parallels across socio-linguistic and governance categories make the DACH countries a sound grouping for deeper investigation.

2.1. Healthcare systems in the Dach countries

Similarities can also be found in the healthcare systems of the DACH countries. All three operate systems of mandatory universal health insurance that guarantee access to essential healthcare for all citizens, and in recent years, regional interdependence in the sector has been strengthened considerably by exceptionally high levels of human and information exchange and intergovernmental cooperation [8].

From a patient’s perspective, care received in any of these countries would mostly appear the same, but under the surface there are significant variations in capacity driven by more subtle differences in governance and finance structures (Table 2). As Covid-19 began to spread, these systems faced increasing stress and many of these differences were exposed, placing constraints on decision makers’ flexibility to implement adaptive policy measures.

An impactful difference between the health systems in the DACH region is the role played by private actors in matters of financing. In Germany and Austria only a relatively small segment of the population holds private insurance, while health coverage in Switzerland is accessed almost entirely through private actors under a system of regulated competition, with large differences in cost between cantons [9]. As a tangible impact of this financing scheme on pandemic preparedness, Switzerland has experienced a twenty-year trend of hospital capacity reduction due to the high cost burden of inpatient care [10]. In contrast, Germany invested in more intensive care unit (ICU) capacity and Austria hired more physicians in recent years, augmenting their abilities to manage a pandemic. [9]

3. The Covid-19 pandemic in the Dach region

This section provides a detailed overview of the Covid-19 pandemic in the DACH countries based on official government data, beginning with the first confirmed cases in each country and continuing through the initial period of economic re-opening, between early June and early August. The trends presented here provide the context for the comparative policy analysis that follows, but it is important to note that as case numbers began to rise and governments moved towards more intensive policy responses, there was also a clear shift in their methods for collecting and reporting on available information. The movement of the DACH governments towards more comprehensive data management as the pandemic grew in severity can clearly be observed in the available information, but a discussion of the different approaches to information management over the course of the crisis is merited prior to an investigation of the data itself, not least because of the openness and transparency issues seen in other parts of the world during the crisis [11].

3.1. Data availability and transparency

In the early stages of the pandemic, health authorities in the DACH region began to build web portals that communicated basic information on virus-containment measures to the public. As the first deaths related to Covid-19 were reported and case numbers began to rise, the information presented by these sites became progressively more comprehensive as more data was demanded by both decision makers and citizens to justify increasingly severe policy responses.

In Germany, the Robert Koch Institute (RKI) is the primary public health agency responsible for disease monitoring and prevention and was the central entity collecting and publishing Covid-19 data. The German law governing pandemic response (Infektions- schutzgesetz) initially required local health departments to notify state governments in case of suspected and confirmed cases of Covid-19, but the reporting obligations for other detailed information differed widely between states. On March 4th, in an attempt to unify reporting procedures, the RKI introduced formal case definitions and surveillance, diagnostics and communication guidelines for Covid-19 [12]. As data collection became more streamlined across the country, the RKI began to use the updated information to identify knowledge gaps, resulting in a complete database of na-
tional ICU capacity (DIVI-Intensive Register Verordnung) [12]. The evolution of RKI’s daily epidemiology reports clearly reflects the growing competency of the agency as the pandemic progressed, as they began to incorporate more detailed epidemiological information over time such as cases and deaths by age bracket and gender [13].

In contrast with early data management in Germany, the Austrian Ministry of Health was quick to publish an online Covid-19 dashboard with national-level data supplied by all Austrian District Administration Authorities, Regional Health Directorates, the Ministry of Health and the Agency for Health and Food Safety under the mandate of the Epidemic Law §4 [14]. Similar to the RKI reports, this dashboard progressively incorporated more detailed information over time, although some incidents raised concerns about information transparency. Notably, on March 15th there was an unusually large single day spike in reported cases, which coincided with the official announcement of a regional state of emergency due to an outbreak in the state of Tyrol, making it likely that many of those cases were confirmed days earlier than they were reported [15].

In comparison with the other two countries, information management in Switzerland was made a priority early on in the pandemic and the country moved more rapidly towards detailed epidemiological data collection, although the reporting of this data was hindered by an outdated management system that relied on paper recordings and facsimile transmission, leading to many errors [16]. These initial challenges led the canton of Zurich to establish its own national database powered by an algorithm that constantly collected all available digital data (server scraping), which caused further controversy as their figures did not match the official ones due to differences in how deaths were counted [17]. Eventually, the Federal Office of Public Health (OFPH) digitized its systems and was better able to provide daily updates on the number of confirmed Covid-19 cases, deaths, and tests as well as more detailed data such as the impact of co-morbidities on case severity, which was absent from German and Austrian reports [18].

Although the governments of all three countries made consistent efforts to improve the available data and create more accountability, the constantly changing situation within hospitals, public health agencies and governments as the pandemic progressed make it reasonable to assume that much of the data reported are only approximations of the true figures. There also remain notable exclusions from reported information such as data based on socioeconomic or racial factors, which leaves important aspects of pandemic impact unavailable for analysis.

3.2. Health outcome trends in the Dach region during the pandemic

The first confirmed cases of Covid-19 in the DACH region appeared in Germany in late January, but these initial outbreaks remained contained. [19] The major outbreak in the region began in late February and can be traced to the heavily impacted Italian regions of Lombardy and Veneto, which are widely regarded as the epicenters of the European pandemic (Fig. 1). [20]

From there, the spread of new cases proceeded to the Swiss canton of Ticino and the Austrian province of Tyrol, both located on the Italian border. In Ticino, the situation was exacerbated by over 60 000 cross-border workers from Lombardy who are essential to the economy and healthcare system of the canton and were not prevented from entering the country until well after the pandemic had established itself [21]. A short time later, the virus spread into the southern German states of Bavaria and Baden-Wurtemberg, which have close ties with Tyrol [22].

Although the virus outbreak in the DACH region shared similar origins with those in the rest of Europe, these similarities did not continue. The region experienced a surge in cases starting around March 6th but effectively reduced the number of daily new infections by April 20th (Fig. 2). Particularly striking is that although the number of cases per capita in Switzerland peaked substantially higher than in Germany and Austria, all three countries were able to reduce the spread of infection at a similar pace. Following the easing of strict restrictions in early June, the number of daily new cases in the DACH countries slowly grew again, but this growth did not reach the rapid pace of spread that was seen during the
initial outbreaks. Switzerland experienced the greatest resurgence in per capita case numbers during this period, but at a daily rate that was only 14% of that seen during the peak in March and April, with even lower rates in Germany and Austria (as of Aug. 9) [18].

The DACH countries also experienced comparably low mortality, especially in the earliest stages of the pandemic (Fig. 3). While European counterparts like Belgium, the United Kingdom, France, Spain and Italy suffered from some of the world’s worst Covid-19 mortality rates (between 43.87 and 84.58 per 100 000 population) [23], Germany and Austria managed to keep these figures much lower, at 10.51 and 7.60 respectively (on 10/06), with no significant rise in mortality in the months following economic re-opening [13,14].

In Switzerland, the rapid spread of infection in its French and Italian border regions led to one of the world's highest national rates of Covid-19 infection per capita, but the country still managed to prevent deaths more successfully than many of its European neighbors through the peak of the pandemic, with a rate of 22.60 per 100,000 population (on 10/06), a rate which remained stable after economic re-opening [18]. The relatively positive outcomes in the DACH region were likely partially due to elements of chance, as many individuals who initially sparked the outbreak in the DACH region were younger people who had been visiting ski areas or the carnival celebrations in Venice, leading to a generally more resilient patient population. [24] Due to cultural factors, intergenerational contact and cohabitation are also much lower in the DACH region than in other European countries, which may have also helped to further insulate vulnerable elderly populations. [4]

Despite the existence of some of these mitigating circumstances, the region did not escape entirely unscathed. Although mortality and case fatality rates remained lower than those in the rest of Europe, they still rose substantially in all three countries as the pandemic progressed. On March 20th, all three countries were maintaining case fatality rates under 1%, but one month later those rates had more than tripled, even as the number of new cases began to subside, largely driven by healthcare systems being overwhelmed in the most affected areas (Fig. 4). This was most noticeable in Switzerland, where ICU capacity in the most heavily impacted cantons was put under considerable duress due to a combination of high infection rates and low numbers of beds. Comparatively, Covid-19 patients barely occupied 10% of the ICU capacity in Germany and Austria at their demand peaks.

Despite more favorable health outcomes overall, the specific populations impacted by the Covid-19 pandemic in the DACH region followed similar trends to those seen in the rest of the world. In particular, the pandemic was disproportionately more serious for vulnerable populations, specifically those in older age brackets (Fig. 5) and had more severe health impacts on men than women (Fig. 6). In Germany, 85.2% of all reported deaths were people older than 69, even though that age group only accounted for 18.8% of all cases nationally, with Austria and Switzerland showing very comparable trends.

Although chronic conditions have also proven to be an important factor in case severity, only Switzerland reported detailed epidemiological data on patients with these conditions. Of all Swiss patients hospitalized with Covid-19, 87% had at least one chronic
condition (of those, 32% had Cardiovascular disease (CVD) and 23% had diabetes), and among those who died, that number rises to 97% (of those, 56% had CVD and 27% had diabetes) [18]. It is likely that these trends were similar in Austria and Germany given their demographic similarities with Switzerland in terms of chronic disease prevalence.

4. Policy actions to combat Covid-19 in the Dach region

The similar infection and health trends experienced in the DACH countries may prompt initial assumptions that all three countries took very comparable approaches to contain and treat the virus, but the overview and comparative analysis of policy actions presented in this section serves to illuminate some key differences (Figs. 7 & 8). To simplify the interpretation of the figures in this section, a policy categorization scheme is employed using three levels of severity: Minimal (recommendations by the government, not mandated in law); Medium (mandated by law, no punishment measures); and Significant (mandated by law with enforced punishment) [25].

The first major divergence between the three countries was in how their federal governance structures adapted to the crisis. When Switzerland and Austria declared a National State of Emergency on March 16th, a lack of clarity regarding emergency powers led to the normally highly independent states and cantons ceding many of their decision-making powers to the central governments. This allowed measures such as border closures, event restrictions and the closure of schools, restaurants, bars, and shops to be uniformly implemented [27]. One significant exception is the harder-hit canton of Ticino, which was allowed to operate on a different timeline and implement more severe policies such as factory and construction site closures despite the central government prohibiting other cantons from doing the same, such as when the canton of Uri’s attempt to prohibit elderly people from grocery shopping was blocked [28].

In Germany, the constitution has more explicitly defined provisions for emergency powers, and states retained more decision-making capacity, creating a more uneven landscape of policy actions across the country [29]. There were no binding nation-wide policies regarding specific public protection orders, meaning that although most states typically took similar measures, they did so along different timelines, with heavily impacted states such as Bavaria implementing policies that were unique from those in the rest of the country. The implications of this uneven policy landscape on immediate health outcomes between states appear to be minimal, but there may be potential future consequences for economic and mental well-being.

Another point of divergence between the DACH countries are the various steps each country took to augment their health system capacities, either by repurposing existing resources or through the mobilization of new ones. In Germany, this came in the form of the “Covid-19 Hospital Relief Act” which came into force on March 25. It guaranteed funding to hospitals and other health care providers such as psychiatrists and physiotherapists and included incentive payments for hospitals that could temporarily boost ICU capacity by postponing non-urgent surgeries [30]. This allowed for German ICU capacity to be quickly expanded from 28,000 to almost 40,000 beds, which created a substantial cushion that better protected citizens and even allowed for patients to be brought in from overwhelmed areas of France and the Netherlands [31].

In contrast, the Austrian and Swiss plans to maximize healthcare system preparedness were based more on repurposing resources than creating new ones. On March 12, orders were put in place by the Austrian government to reorient hospital department staffing, with better equipped hospital units becoming dedicated Covid-19 treatment centers. Approximately 10,000 citizens completing their mandatory civil service were also moved into healthcare support roles as social care workers and paramedics [26]. In Switzerland, the Federal Council mobilized over 8 000 military personnel to assist the healthcare sector with security and logistics when it declared an “extraordinary situation” on March 16th [26].

Many of these measures helped to relieve the overall burden on healthcare systems in the DACH region during the pandemic and keep mortality from Covid-19 relatively low, but the effects that these system changes had on patients who were suffering from other health issues remains unclear. Swiss doctors reported a steep drop in emergency room visits that can be partly explained by non-Covid-19 patients coming to the hospital much later in the course of their disease, leading to more adverse outcomes [32]. Many individuals who had surgeries postponed and faced increased barriers to receive treatment for other conditions may have also experienced significant deteriorations to quality of life that are difficult to effectively measure in the short term but may have substantial long-term health and economic impacts.

To mitigate this, all three DACH countries attempted to implement technological solutions that could minimize disruption to ba-
nic healthcare services. In Germany, health insurance reimbursement for some digital services had been introduced in late 2019, but in the face of the pandemic this policy was temporarily expanded to include complete reimbursement for telehealth [33]. The head of the German Health Innovation Hub stated that this measure had instigated a race among telemedicine providers to become certified for reimbursement by the insurance companies. This also correlated with a strong increase in demand: in January and February, practitioners in Germany reported completing 1700 video consultations, but in March that number surged to over 19,500 [34].

The use of telehealth was also heavily encouraged by insurers in Austria and Switzerland, although in the latter, many mental health providers struggled to meet the stringent regulatory requirements of the cantons and could not offer insured services. To help fill the gaps, there was a greater reliance on telephone hotlines, which had exceptionally high utilization rates. Die Dargebotene Hand, the foremost mental health telephone support line in Switzerland, recorded their highest ever amount of calls in 24 hours on March 13th, the day school closures were announced, and similar services across the DACH region also struggled to manage rising demand [35].

Although these efforts to improve access to mental and behavioral health services likely had a positive impact on population health, there is doubt that they were enough to meet the demand for services, especially considering the shortfall of professionals and months-long waiting times for mental health care that existed prior to the pandemic [36]. The widespread use of telehealth services and hotlines also served to highlight other disturbing trends: reports of domestic violence increased in Austria and Germany while social restrictions were at their most severe, and because this is something that is chronically underreported it is possible that these reports still underestimated the real situation [37].

4.1. Testing

Alongside health system capacity, a robust testing strategy is also regarded as a vital tool in containing a pandemic because it builds a foundation for evidence-based decision-making and advanced contact tracing methods [1]. Despite this, the implementation of testing strategies in the DACH region was somewhat delayed and there was considerable divergence in testing efficiency across the three countries both during the early stages of the pandemic and following economic re-opening (Fig. 9).

At the beginning of the outbreak in Germany, testing costs were covered by insurance only in cases where an individual had been in contact with confirmed cases or arrived from a designated high-risk area. On February 28th, coverage was extended to all tests recommended by a physician, but as concerns grew about test shortages RKI began to call for an end to testing of asymptomatic people, leading to selective testing processes that artificially inflated the positive test rate [29]. As test supply chains were secured over time, testing policies were broadly expanded, and by May 22nd all
people admitted to nursing homes and hospitals were being routinely tested, leading to a consistent rise in testing rates through August [12].

Austria had also been relatively stringent with its testing policies until March 24th, when the government announced a switch to a different testing method that would allow for a rapid scale-up of tests performed [38]. This increase in capacity did correlate with higher testing rates, but this was dampened by the testing policy remaining relatively strict: persons who were not showing symptoms were not entitled to testing, and people who did have symptoms were only tested if they had been in contact with a confirmed case or travelling through a high-risk area [39]. Once these policies were relaxed in late April, Austria was testing at the highest rate among the DACH countries.
As in Germany, concerns about test shortages develop among decision makers in Switzerland which led them to move towards a more conservative strategy following an initially broad approach. In late March, testing was restricted to members of vulnerable populations and people who required hospitalization for Covid-19 symptoms, which resulted in a very high positive test rate (between 13–15%) and a decrease in overall testing[48]. To improve testing supplies, the Swiss government engaged with nationally based pharmaceutical companies such as Roche to have them refocus parts of their business towards producing Coronavirus tests[40]. This helped allow for a shift in strategy on April 23rd, when testing was expanded to include every person who showed symptoms compatible with Covid-19, leading to a gradual rise in tests completed into August[41].

4.2. Contract tracing technology

As testing strategies began to improve and cases were being more reliably detected, decision makers in the DACH region looked to implement new technologies that would allow for faster and more effective contact tracing[42]. In early March, 130 researchers from across Europe began the Pan European Privacy-Protecting Proximity Tracing Initiative (Pepp-PT) with the goal of developing Europe’s digital solution for tracing chains of infection[43]. They created a platform for mobile apps based on the Pepp-PT technology, which would allow these apps to collect data about devices that have been within at least two meters of each other before storing it on a central server and using encryption to ensure data privacy. Despite a widespread desire for effective contact tracing, this technology was the source of considerable controversy in the DACH region[44] (Table 3).

At the time Pepp-PT was launched, Austria was already implementing its own app using decentralized data storage, which was gaining momentum and had over 400,000 users by the middle of April. This gave Austrian officials a large degree of freedom to dismiss Pepp-PT technology as dangerous for privacy and lacking in transparency[45]. These criticisms crept across regional borders; in Switzerland, the Pepp-PT technology sparked a fierce debate about government control and privacy, leading to the development of a new technological model: Decentralized Privacy-Preserving Proximity Tracing (DP-3T). Switzerland’s decision to develop their own contact tracing technology was politically popular, but it also pushed back the release date of their app[48]. This delay may have had serious implications for Switzerland’s contact tracing capacity; the population’s willingness to install the app dropped substantially during the delay period as case numbers began to drop and the threat from the virus became less conspicuous, although this same trend was also seen in Austria and Germany[49].

In Germany, the Ministry of Health first moved to adopt Pepp-PT for their contact tracing app, but eventually decided to re-evaluate after Apple and Google announced decisions to develop programming interfaces only for decentralized contact tracing platforms[50]. On April 26th, after weeks of uncertainty, it was reported that Germany would not adopt Pepp-PT and instead develop an app based on a decentralized approach to data storage[51]. On top of the initial data protection concerns, the delays in Switzerland and Germany have raised further questions about the resources used to develop the apps, especially after a declaration by the European Commissioner for Justice and Consumer Protection stating that contact tracing apps would have to be completely deactivated once the pandemic is over[52].

5. Economic policies in response to Covid-19

While effective testing and contact tracing began to provide hope for a safe return to normal activities, the DACH countries were still faced with the economic damage wrought by the social restrictions and other policies designed to protect against Covid-19. In an effort to counteract this, all three DACH countries introduced substantial relief programs (Table 4). Kurzarbeit schemes, which allow employers to remove employees from the payroll and have their wages subsidized by unemployment insurance, were made central to these programs in all three countries in an attempt to reduce friction in the labor market upon the re-opening of the economy[53]. Beyond this, each country implemented unique financial stimulus plans to broadly support the economy.

On March 27th, Germany took on an additional €156 billion (4.5% of GDP) in government debt to increase the Ministry of Health (MoH) budget and provide support payments to small enterprises and the self-employed, following an extension to public loan access of up to €400 billion on March 23rd[54]. Rapid application processing allowed money to be distributed almost immediately, but this also caused an increase in fraud, which led to a temporary suspension of support payments in some states[55]. These emergency measures were given a massive boost on June 3rd, when the government announced a comprehensive €130 billion stimulus package including tax reductions, incentives to buy electric vehicles, funding for struggling businesses, and financial support for cultural organizations[56].

In Austria, a €39 billion (8.7% of GDP) support package was announced on March 15th, but the distribution of funds was much more convoluted due to political maneuvering. On March 18th, three days after the initial package was introduced, the government announced the relaunch of a larger aid package, including €15 billion for emergency help, €9 billion in credit guarantees and €10 billion in tax deferment, attached to the mantra “no one will be left behind”[57]. The wide variety of available funding options
coupled with complex eligibility requirements resulted in considerable confusion, and eventually the finance minister was forced to establish a special hotline to help citizens navigate these aid packages [57]. On June 16th, the government raised the economic support package to €50 billion and simplified some of the application processes in the face of growing signs of economic recession [14].

The situation in Switzerland was more straightforward. On March 13th, the Federal Council made CHF 10 billion (1 CHF = 0.93 €) available for unemployment and small business support and instituted a freeze on debt repayment. This amount was increased in stages as pandemic restrictions grew more severe, and by April 23rd the fiscal packages amounted to CHF 65 billion (9.4% of GDP) and had been expanded to include some support for larger businesses. However, this package was not increased further to support economic re-opening, as was the case in Austria and Germany [18].

5.1. Economic and financial outlook

As the pandemic continued, it became clear that the emergency economic policies in Germany and Switzerland had been more effective than those in Austria, where the complexity and politicization of support measures had a negative effect on their overall impact (Table 5). As of April 27th, the share of Austrian businesses and employees that had received benefits was far less than their counterparts in Germany or Switzerland, and Austria also received a larger number of unemployment claims as a share of the labor force. Although Austria’s economic support policies appear to have lagged behind DACH standards, they seem more favorable when a global perspective is taken; the United States saw unemployment claims of 14.8% of the labor force, and only 2.9% of the labor force in the United Kingdom received benefits from their economic packages [53].

Another indicator of economic policy success is the national market indices, which are not a perfect proxy for economic health but do reflect the general trajectory of the DACH economies during the pandemic (Fig. 10). Following the initial outbreak of Covid-19, the main market indices of Germany (DAX), Austria (ATX) and Switzerland (SMI) shared a steep downward trajectory with the worst losses occurring as lockdown policies were implemented. The ATX experienced the largest downturn, with a loss of almost 45% by mid-March relative to the first day of trading in February, while the SMI and DAX were much better insulated from the crisis. Possibly as a result of ineffective economic stimulus, the ATX remained deflated as of early August while the DAX and SMI had almost returned to their pre-pandemic values.

It remains too early to determine what the long-term consequences of the pandemic policies might be, but another short-term indicator is quarter-over-quarter GDP, and all three DACH countries confirmed losses for the first quarter (Q1) of 2020: 2.2% in Germany, 2.7% in Austria, and 2.6% in Switzerland [60–62]. Much more data needs to be observed and collected regarding the overall health and economic impacts of pandemic policy actions in the DACH region, notably with regards to mental health and long-term economic outcomes, but with this early GDP data it is possible to conduct a rudimentary economic analysis to estimate the potential costs associated with the protection of public health. Using each country’s reported GDP losses from Q1 as a proxy for cost and a recently published Bayesian modeling analysis to estimate the number of lives each country saved (up to May 4th) by instituting containment measures [63], a basic cost per life saved figure can be calculated for each DACH country:

- Germany - €155 100 per life saved
- Austria - €157 066.26 per life saved
- Switzerland - €352 550 per life saved

It should be noted that the numbers are highly speculative, as GDP cannot be taken as a perfect proxy for the costs of lockdown, and estimates of lives saved were derived from imperfect statistical models and would be far more informative if specific data about life years was available instead given the skewed distribution of mortality across age groups. Nonetheless, it appears that Switzerland paid a much higher economic price as a result of its pandemic containment measures, which is likely due in part to its much higher GDP per capita but also its less effective initial response and ensuing higher mortality rates. Future research efforts in this area should be focused on thorough data collection and sound method-
ological choices in order to deliver estimates that will be of continued relevance to policy makers as the Covid-19 situation continues to evolve. Attention should also be paid to how these economic impacts may serve to exacerbate existing issues with healthcare service provision caused by Covid-19, potentially driving a greater reliance on the availability of cost-effective technological solutions.

6. Exit strategies

Largely due to the financial pressures caused by their lagging economies, decision makers in the DACH region faced increasing pressure throughout the month of April to ease restrictive policies and return society to normal activities. On April 15th, Austria made the first moves towards reopening and chose a staggered exit strategy, beginning with the opening of small stores and progressively opening other businesses and schools in 2-week intervals until the eventual opening of hotels and museums at the end of May. This national strategy was very closely mirrored by Switzerland, but moving forward the central government has promised to allow the cantons more emergency powers, so the initial unity in re-opening policies may become more complicated and merits further research (Fig. 11) [64].

In contrast, Germany had a much more inconsistent exit strategy, which is directly tied to the autonomy that the federal states retained throughout the pandemic. While the states were mostly aligned in implementing pandemic restrictions, they took highly varied approaches to easing them (see Appendix 1). A demonstrative example is the opening of zoos and museums, which was allowed on April 22nd in little-impacted Brandenburg but not allowed until May 11th in harder-hit Bavaria [58]. The central government did however make two national policy announcements on May 6th that constrained the states’ autonomy: continued contact restrictions of 1.5 m and an “emergency brake” mandating the reintroduction of restrictions once infection rates spread to more than 50 acute cases per 100,000 people in a given area. These measures were reinforced and extended with another announcement on May 26th [12].

Following the easing of restrictions to allow economic re-opening and the small resurgence in cases in the DACH countries, considerable questions remain about the effectiveness of ongoing policy actions. As case numbers slowly rose, governments in the DACH region largely maintained mandatory mask policies for public spaces and messaging campaigns for physical distancing but also continued to allow larger social gatherings, with the exception of major events such as concerts and conferences [13,14,18]. Despite the apparent hesitancy to reinstate more strict containment measures, it can be argued that the rise in cases was less of concern for these countries because of the actions that they took earlier in the pandemic; Switzerland, Germany and Austria all largely maintained their previous increases to ICU capacity while also increasing their weekly testing rates by over 40%, allowing them to protect their healthcare systems while pursuing a return to economic normalcy [13,14,18]. Whether or not this strategy will prove to be an eventual net benefit for the DACH region is an important area for further research moving forward.

7. Conclusions

The complexity and scale of the Covid-19 pandemic created turbulence across all areas of modern human existence, from health to economics to social life. In the face of this crisis, the DACH countries were able to mount an effective response compared to many of their European counterparts, reducing the overall health impacts and allowing for a relatively quick return to normal economic activity. In Austria and Switzerland, power was consolidated in central governments while in Germany states retained their autonomy, but both governance approaches appear to have been effective in containing the health crisis. All three countries were able to leverage state resources to efficiently implement protective policies, and despite some early hiccoughs all three were also able to develop testing strategies and contact tracing capacities that will help them manage a safe easing of restrictions.

Although it is tempting to hold the policy responses of the DACH region up as an example to follow for pandemic management based on its relative success, policymakers should take extreme caution in trying to adapt DACH strategies for use elsewhere. There are many non-replicable factors beyond direct policy actions that may have played a role in how the pandemic unfolded, such as the DACH populations’ trust in government, which is among the highest in the world and could have been vital to apparent policy success [65]. The available data for these countries also remains incomplete, and the economic and social restriction policies that were implemented based on that data may yet prove to have unsteady foundations, as the full scope of their consequences
will take years to become apparent enough for a reliable cost-benefit evaluation. To further develop knowledge related to pandemic responses across countries, further research should also be conducted regarding the cultural aspects of contagion transmission and the role of trust in government in policy implementation during a pandemic.

Despite these limitations, there are general policy lessons in the response of the DACH region that should be considered by all policymakers in future infectious disease outbreaks. Primarily, a unified, decisive and swift implementation of containment and prevention policies relies on the ability of states to maintain flexible governance and healthcare structures that can adapt quickly to changing circumstances. As policymakers look to move past containment and re-activate their economies, the flexibility that DACH governments have demonstrated becomes even more important, as it is apparent that the threat of the pandemic will have to continuously be balanced against the need to return to normal economic activity. This effort will rely on the critical testing and tracing technologies that have been developed and how decision makers are able to integrate them into their ongoing strategies, but above all it will require a continuous process of policy creation and revision as we gain more insight into the true impacts the pandemic has had on society.

Acknowledgements

Francesco Paolucci, PhD, Professor of Health Economics and Policy; Naomi Moy, PhD

Author Statements

Funding

None.

Declaration of Competing Interest

None declared.

Ethical approval

Not required.

Appendix 1. - Individual state re-opening timelines in Germany [13]

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Health Policy and Technology 9 (2020) 405–418

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