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# COVID-19 endemic phase in Finland: An analysis of health policies and vaccination strategy

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ABSTRACT

*Objectives:* To analyze how the vaccines and various measures to control the pandemic affected epidemiological, health and socioeconomic outcomes of COVID-19 in Finland. The focus of the analysis is on the endemic phase of the COVID-19 pandemic.
*Methods:* The paper provides an overview of Finland's healthcare system, trends in COVID-19 morbidity, mortality and vaccination coverage data, political considerations, interventions to control the pandemic, as well as the economic impact of the pandemic in the endemic phase. Data were collected from various sources, including previous studies, government reports, national statistics and registers and general media.
*Results:* In Finland, the total number of COVID-19 infections increased significantly during 2022, but the number of serious forms of the disease decreased. The implementation of the vaccination strategy caused a diversity of opinions among authorities and experts. The governing of the pandemic was fully decentralized. Overall, there is a good vaccination coverage of the population. In the endemic phase society returned to live without restrictions.
*Conclusions:* It seems clear that vaccines played an important role in controlling the pandemic. Overall mortality increased substantially in 2022 causing life expectancy to fall. Moreover, different "excess death" indicators show an increase in 2021 and 2022, but the timing and magnitude of the effect varies. It is relatively safe to conclude that at least part of increase can be attributed to the pandemic, but a more exact conclusion calls for a comprehensive study. Similarly, understanding long covid and designing required intervention calls for more research.

## Introduction

Between the start of the COVID-19 pandemic and the end of 2022 over two million people in Europe died of the disease [1]. Like elsewhere, prompt changes in health policy were needed in Finland in response to the spread of the pandemic. These decisions addressed operational, workforce, safety, and other health system related issues but also several measures to control the epidemic involved other policy areas and deeply affected society at large. Therefore, the COVID-19 pandemic and its control formed multiple tensions within the society, and between governmental organisations, political parties, and experts [2]. Similar phenomena have surfaced in many countries [3].

The COVID-19 pandemic strained the capacity of governments, health systems, and healthcare providers to address emerging challenges promptly and in a coordinated manner [3]. In Finland, among other countries, the pandemic boosted the digitalisation of services the development of which has been on its way for a long time and which the government has tried to support for years and has targeted in public policies.

The COVID-19 epidemic started in Finland in mid-March 2020, soon after the WHO had announced the COVID-19 outbreak as a pandemic. Compared to many countries, the pandemic landed in Finland late [4].

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In Finland, almost 8000 deaths were reported by the end of 2022 [1]. According to the Government decree issued in February 2020 the COVID-19 disease was classified as a contagious disease posing a public health risk. This decision was not removed until in June 2023.

In May 2020 the Finnish Government adopted a hybrid strategy to manage the epidemic [4,5]. Hybrid strategy was based on both containment measures and testing, tracking and containment. The goal of hybrid strategy was to minimize the spread of the virus while trying to keep society and the economy as open as possible. In 2022, the main objectives of the hybrid strategy were to stabilize society, and to keep it as open as possible, to support post-crisis management and the reconstruction of society, and to prepare for the new waves of the global pandemic. The Finnish Government stated in October 2022 that based on the then current pandemic situation, extensive testing and tracing of COVID-19 infections were no longer needed among the general population [4].

Like in other countries, vaccinations were an important element in the Finnish Governmental Hybrid Strategy for managing the COVID-19 pandemic in 2021–2022 [6]. In Finland, political leaders at the national level were heavily involved in the governance of the pandemic, which was perceived as having both negative and positive impacts [2].

However, due to the emergence of new virus variants and limited supply of vaccines, decision makers, political leaders, and the public health authorities faced a constant need to adjust vaccination strategies. There was no consensus about the potential benefits of including all children in mass vaccination programmes and much debate about the prospects of achieving herd immunity through vaccinations [7]. While mass vaccination was assumed to be effective in reducing the risk of severe SARS-CoV-2 infections among vaccinated individuals, it was to some extent unclear how effectively COVID-19 vaccines would prevent people from spreading the virus to their close contacts [7].

In July 2022, the Finnish Institute for Health and Welfare (THL) stated that the COVID-19 pandemic was moving to an endemic phase. The acute COVID-19 crisis in Finland was assumed to be over, but less intense interventions continued. By mid-2022, the coverage of the COVID-19 vaccinations among the Finnish population was sufficiently high; the supply of medicines was good, and the mortality from COVID-19 and its complications had decreased.

This paper provides a retrospective analysis of the impact of COVID-19 vaccines and pandemic control measures on health and socioeconomic outcomes in Finland in the endemic phase of the COVID-19 pandemic. The paper provides an overview of Finland's healthcare system, COVID-19 morbidity, mortality and vaccination coverage data, political considerations related to, and interventions to control the pandemic, as well as the economic impact of the pandemic in the endemic phase. The data were collected from various sources, including previous studies, Finnish government reports, data from the Helsinki University Hospital, national statistics and registers and general media.

## COVID-19 vaccination policy in Finland

### *Finnish public health system*

In Finland, the Ministry of Social Affairs and Health (MSAH) is responsible for the planning, guidance and implementation of national health and social policy [2,6]. The Finnish healthcare system is mainly based on publicly financed and provided services to which everyone residing in the country are entitled. A comprehensive reform to the organization of health, social and rescue services took place in January 2023.

The responsibility for organizing healthcare, social welfare and rescue services was transferred from municipalities and joint municipal authorities to new regional organizations termed wellbeing services counties. Preparations for the reform were very much carried out in the middle of the pandemic crises. In administrative terms, the reform has been the most significant change in the history of the Finnish health and social care system in the last 100 years.

After the reform there are 21 wellbeing services counties, and the division into counties is mainly based on the division into regions. However, as an exception compared to the rest of the country, the City of Helsinki continues to be responsible for organizing health, social and rescue services. The wellbeing services counties are self-governing, but their funding comes from the central government, as they do not have the right to levy taxes. Differences in the service needs of the counties are considered when determining funding [8].

As a marked objective, the Finnish health and social care system has a strong focus on promoting integrated health and social services [9]. The reform has been considered necessary to ensure equal services, reduce inequalities in health and wellbeing and curb the growth in costs.

### *COVID-19 vaccines in Finland*

In the approach to managing the pandemic, the vaccination strategy played a central role. Vaccinations were viewed as important to keep society open, to secure the capacity of the healthcare system and to reduce the incidence of severe forms of the disease [4]. Previous studies have stated that an optimized vaccination strategy can reduce the death toll and significantly mitigate the disease burden of the epidemic [10].

In Finland, the vaccination campaign started on 27 December 2020 with vaccinations of health and care workers caring for COVID-19 patients and of personnel and residents in long-term care units. Finland probably benefitted from the EU joint vaccine procurement program [6]. Finland followed a hybrid strategy to fight COVID-19, based on implementing targeted restrictions and a strong testing and tracing system.

The Finnish national COVID-19 vaccination strategy was prepared in a process led by the MSAH. The strategy has been implemented alongside the national hybrid strategy to contain the COVID-19 epidemic. The MSAH updated the coronavirus vaccination strategy on 22 June 2022 [11].

During 2020–2022 the municipalities decided on their vaccination schedules and announced where and when coronavirus vaccinations were administered. In 2022 the vaccines were primarily administered together with influenza vaccinations in November and December. However, the vaccination was available at a location designated by the municipality or at separate vaccination points throughout the year. Those at risk of serious disease due to chronic conditions or their age were also the target group for influenza vaccinations [12]. At the beginning of 2023, the wellbeing services counties organised vaccinations.

In Finland, five COVID-19 vaccines have been available: BioNTech-Pfizer, Moderna, Johnson & Johnson, Novavax and Valneva. Together with the EU, Finland has been strongly committed to solidarity in promoting global access to COVID-19 vaccines [6]. Finland has donated over five million vaccine doses through the global COVAX Facility [13].

According to the Finnish Institute for Health and Welfare (THL) in the late autumn 2022 [14] the need to boost vaccine coverage with booster doses varied by group and situation. Three vaccine doses were recommended for healthy people aged 18–59 and people in risk groups aged 12−17. Four vaccine doses were recommended for healthy people aged 60–64. However, a person who had had a COVID-19 infection and had received three vaccine doses was not considered to need a fourth vaccine dose, as having the disease is equivalent to receiving one vaccine dose. In addition, THL recommended another coronavirus booster dose in late autumn 2022 for those aged 12 or over with severe immunodeficiency, those aged 18 or over in medical at-risk groups, and those aged 65 or over. Fifth coronavirus vaccine booster doses were recommended for those aged 12 or over whose immune system was severely weakened [15].

By the end of August 2021, more than 70% of the population had received a first dose, but only 50% had received two doses or the equivalent [16]. A booster dose in the late autumn of 2022 was not

recommended for everyone as the vaccine doses previously recommended for healthy people under 65 years of age still provided protection against severe disease. A previous coronavirus infection was also considered a dose also for this group. By the end of February 2023, the vaccination coverage in the Finnish population was 79.3% for the first dose, 76.4% for the second, 54.2% for the third and 21.9% for the fourth dose [17].

On 20 December 2022 the Finnish Government stated that COVID-19 vaccines would also be delivered to private healthcare providers willing to administer vaccines. The goal of the decision was to boost the uptake of vaccines and to allow people other than those in the severe COVID-19 risk group to acquire further booster vaccinations. The latter objective was against the advice of THL which considered that three or four vaccination doses currently provided sufficient protection against the serious forms of the disease for those outside any risk groups.

According to THL, 572,000 doses of the original corona vaccine, BioNTech-Pfizer's Comirnaty, expired between January and February 2023. They were thus not given to the population.

A Finnish study [18] showed that the effectiveness of COVID-19 vaccine had decreased especially against mild forms of the disease due to the emergence of the Delta variant and waning vaccination protection. In January 2023, THL announced that the new highly mutated, so-called "Kraken" XBB.1.5 coronavirus subvariant had been found in Finland [19]. At the same time, WHO announced that current COVID-19 epidemiological picture was troubling, especially according to a quickly spreading recombinant sub-variant known as Kraken. This created pressure on health systems particularly in temperate regions of the northern hemisphere [20] (Table 1).

**Table 1**
COVID-19 vaccination policy in different age groups in Finland. (Source: Finnish Institute for Health and Welfare 2023).

| Age group | COVID-19 vaccines and vaccination policy |
|---|---|
| 6 months to 4 years | A smaller dose of Biontech-Pfizer's Comirnaty. |
| 5–11 years | A smaller dose of Biontech-Pfizer's Comirnaty. |
| 12–17 years | The Biontech-Pfizer's Comirnaty vaccine can be offered.<br>Biontech-Pfizer's Comirnaty vaccines are used for the third dose.<br>For girls also Moderna's Spikevax BA.1 vaccine may be offered.<br>Variant-tailored products are primarily used as the third dose, as they extend the immunological base of the protection.<br>Persons in risk groups can be given Nuvaxovid as a booster if they cannot be vaccinated with an mRNA vaccine for a medical reason. |
| 18- 64 years | A new vaccination series is started with either the Biontech-Pfizer Comirnaty vaccine or the Novavax's Nuvaxovid vaccine. An exception is men aged under 30 for whom the Nuvaxovid vaccine is not recommended.<br>The primary option for a third dose is a variant mRNA vaccine. These are Biontech-Pfizer's Comirnaty variant vaccines or Moderna's Spikevax BA.1 vaccine.<br>For men under 30 years of age, only Biontech-Pfizer vaccine is recommended third dose, regardless of the products they have received as their previous doses.<br>For those aged who cannot be given an mRNA vaccine because of factors such as a serious allergy, Novavax Nuvaxovid vaccine or as a secondary option the Janssen vaccine may be given instead.<br>A person cannot choose the adenoviral vector vaccine themselves, as the use of the vaccine in this age group cannot normally be considered medically justified in the current epidemiological situation of coronavirus in Finland.<br>The vaccination series may also be supplemented with another coronavirus vaccine if there is no medical impediment to the use of the other product. It is also permitted to use three different vaccines products.<br>As boosters, Comirnaty or Spikevax variant vaccines are primarily administered as they expand the immunological base of the protection. |
| 65 and over | Offered any of the adult coronavirus vaccine that are in use in Finland. These are the Comirnaty and Spikevax vaccines, Janssen's adenoviral vector vaccine or the Nuvaxovid protein-based vaccine.<br>A person may choose the preparation that they prefer when starting their series of vaccines.<br>If a person has received the AstraZeneca or Janssen vaccine as the first dose and does not want an adenoviral vector vaccine as their next vaccination, they may instead receive an mRNA vaccine or the Novavax vaccine.<br>A coronavirus vaccination series may also be supplemented with another coronavirus vaccine if there is no medical impediment to the use of the other product. It is also permitted to use three different vaccines products.<br>As boosters, Comirnaty or Spikevax variant vaccines are primarily administered as they expand the immunological base of the protection. |

*The conflict between political and expert opinions on vaccination strategy*

Globally, the pandemic has triggered widespread disinformation that has undermined both the understanding and acceptance of science and public policy. However, Finland has reported that trust in the information provided by the central and local governments remained high throughout the pandemic. This has obviously been supported by transparent public communication [21]. Nevertheless, many issues related to the pandemic, such as the vaccination strategy, have raised intensive public debate, which over the course of the pandemic focused on different issues, such as the availability of vaccines, the priority order of vaccinations and the possible prioritization of different regions within the country, based on their situation in terms of COVID-19 infection rates in their populations [6].

A recent issue which has also caused disagreement between government agencies and experts is the recommendations on COVID-19 vaccine boosters for the winter 2022–2023 issued by THL. The boosters were recommended for all aged 65 or more, those aged 18 or more belonging to medical risk groups, and those over 12 with a serious immunodeficiency. THL was criticises as the recommendations were stricter than in many other EU countries. Additionally, for instance, labor market organisations requested that the fourth dose of COVID-19 vaccinations should be offered to all of the working age population. In December 2022, the government decided that COVID-19 vaccinations should be delivered to companies providing occupational and private health services. The aim was to offer COVID-19 vaccinations also to those who were not in any risk group. The THL recommendations also divided regional health authorities. Many decided to follow the recommendation, but some for instance, recommended a fourth vaccination dose for health and social care workers.

Some medical experts criticised THL for a lack of integrity in terms of its COVID-19 research and policy recommendations. The critics claimed that due to conducting research on the impact of the combination of COVID-19 infections and vaccinations on hyperimmunization among patients, leading THL vaccination researchers may have recommended more conservative vaccination policies. The claims led to an inquiry by MSAH which clarified THL's role as a research organization giving policy recommendations. In addition, THL as well as other decision makers have been criticised on COVID-19 control policies on social media. Some critics, such as the Independent Finnish COVID-19 Advisory Network, have claimed that the Finnish policies have been too sloppy, others have claimed that the policies were too strict and not based on real risks related to the COVID-19 epidemic. Because of the debate, a large number of specialists in infectious diseases in Finland signed a public letter to support THL and its role in giving advice on COVID-19 control policies.

*Other interventions in society*

From the beginning the Finnish hybrid strategy was strongly focused on vaccinations to keep the society open. Over 2021 and 2022 the control policies moved from the general restrictions to a situation where restrictions and protective measures were targeted at large public events, restaurants, and pubs, preventing the spread of the virus, and protecting the elderly and other people in risk groups [5]. The general

mask recommendation was lifted in April 2022 by THL. However, the masks were still recommended especially for those aged 12 and over who were not vaccinated. In Finland the schools were not closed again after the spring of 2020, even though the infection rates increased during the 2021 and 2022.

Pre-pandemic practices were reinstated at border checks. All health security measures at Finland's borders due to communicable diseases ended on 30 June 2022. This meant that travellers arriving in Finland were no longer obliged to present any COVID-19 certificates or to be tested for COVID-19 [22].

In 2023, no Covid-19 restrictions have been in place in Finland, even though a relatively high number of disease cases have still occurred.

*The impact of the pandemic on the healthcare workforce*

The pandemic had a severe effect on both emotional and physical health among healthcare workers in different countries [3].

While vaccinations were voluntary for the public throughout the pandemic, in February 2022 the COVID-19 vaccination was made mandatory for health and social care workers who were in close contact with patients or clients at high risk of severe COVID-19 disease [6]. Additionally, a nurses' strike took place in Finland in the spring of 2022, which had a significant impact on the functioning of the health service system. On 11 March 2022, the nursing associations gave a strike warning in six hospital districts, affecting 25,000 nurses. On the 17th, a new strike warning was given affecting 13 hospital districts and up to 40,000 nurses. The small strikes took place and lasted two weeks. Along with the pandemic, the exceptionally large strike had a large impact on the healthcare capacity, especially overburdening emergency care and leading to hundreds of canceled surgical operations.

The National Supervisory Authority for Welfare and Health (Valvira) revoked the healthcare professional practice rights of 997 individuals who asked to have their rights revoked in 2022 [23]. The figure is considerably higher than in 2021, when just 46 individuals requested the revocation of their rights. Of the individuals who asked to have their rights revoked, 657 were practical nurses with a protected occupational title and 289 were licensed nurses. There were no physicians in this group. However, it is not possible to draw any conclusions on the reasons why these individuals wished to give up their professional practice rights. The reasons given by applicants included, among others, embarking on a new career, retirement, disapproval of recent developments in the healthcare sector and the legal requirement for healthcare staff to be vaccinated against COVID-19 [23].

## COVID-19 trends in Finland

*COVID-19 statistics in Finland*

The first COVID-19 death in Finland was reported on 21 March 2020. From the beginning of the pandemic THL was the main national statistical and registry authority for the health and social sector, it is also responsible for collecting the COVID-19 data [5]. By 20 April 2023, the number of laboratory-confirmed COVID-19 cases had increased to 1.5 million (see Fig 1.) Fig. 2 shows the number of COVID-19 vaccinations as shares of the population.

Regarding the first dose, the coverage was 91% (4524,379 doses), while for the second doses, the coverage was 78%, with a total 4347,929 second COVID-19 vaccination doses given. About 55% of the Finnish population received a third COVID-19 vaccination dose, i.e., 3080,090 doses. Fourth dose of the vaccination has been given to 1257,169 people, i.e., about 23% of the population [24].

Fig. 3 shows the monthly number of visits to all public primary healthcare services. The number of visits was highest during 2022. The monthly physical care contact among all public primary healthcare service providers and outpatient care physicians was relatively similar in 2021 and 2022 (Fig. 4). Online contacts with primary healthcare were clearly the highest in the early stages of the pandemic (Fig. 5). The number of hospitalized COVID-19 cases in primary healthcare inpatient care wards and specialist hospital inpatient care wards in Finland since January 2020 was the highest in 2022 (Fig. 6).

*Rates of mortality and life expectancy*

Finland followed the WHO guidelines to record COVID-19 mortality rates from February 2020. By the end of 2022, a total of 5055 COVID-19 caused deaths were registered. In addition, 2500 deaths were registered in which COVID-19 was considered to have influenced the death [24]. The number of COVID-19 deaths was relatively low in 2020 and even in early 2021, but rapidly increased from the end of 2021 despite very good vaccination coverage. The increase in the number of COVID-19 deaths was associated with high COVID-19 prevalence. COVID-19 mortality was strongly associated with old age and co-morbidities, the median age at death being 83 years. By the end of 2022, only four children (age groups 0–19) had died of COVID-19 in Finland; that is 3.5 deaths per million children of aged 0–19.

During the early pandemic and heavy restrictions on social contacts, the prevalence of other respiratory infections was lower, and especially deaths due to influenza were fewer than in previous year. This might have balanced the mortality statistics of 2020 and 2021. However, mortality in older age groups increased significantly in 2022. While the final statistics on the causes of mortality for 2022 have not yet been published by Statistics Finland, preliminary estimates by THL suggest

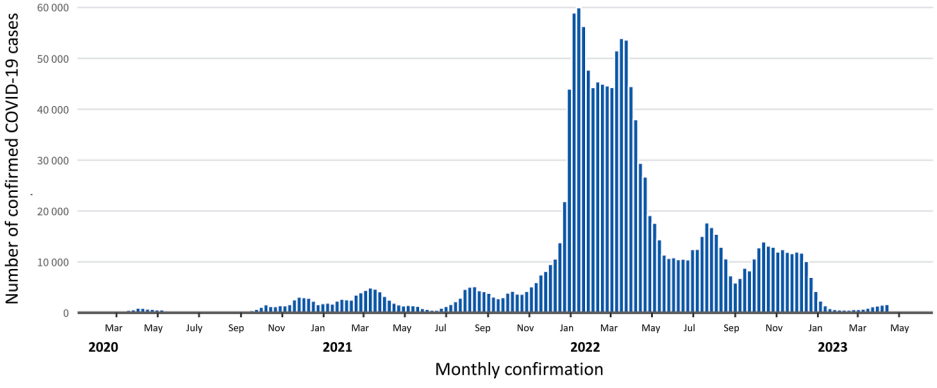


**Fig. 1.** Monthly number (1st day of the month) of COVID-19 cases by laboratory confirmation date in Finland in 2020–2023. Source: Finnish Institute for Health and Welfare (THL). X-axis descriptions modified by authors.

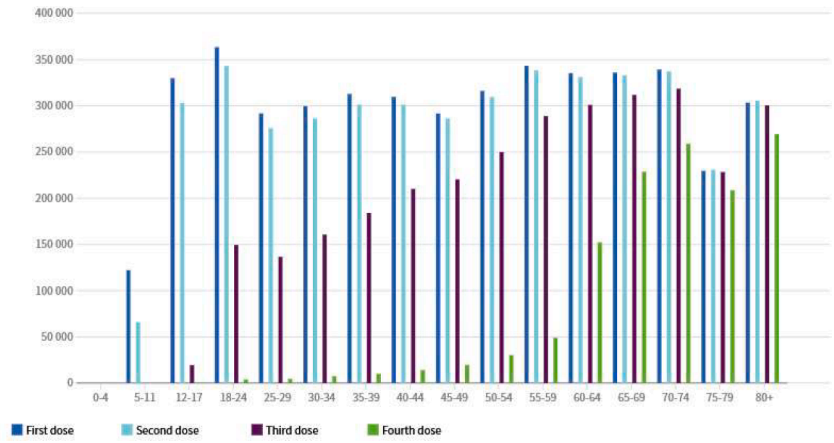


**Fig. 2.** COVID-19 vaccination coverage on 25th May 2023. Source: Finnish Institute for Health and Welfare (THL).

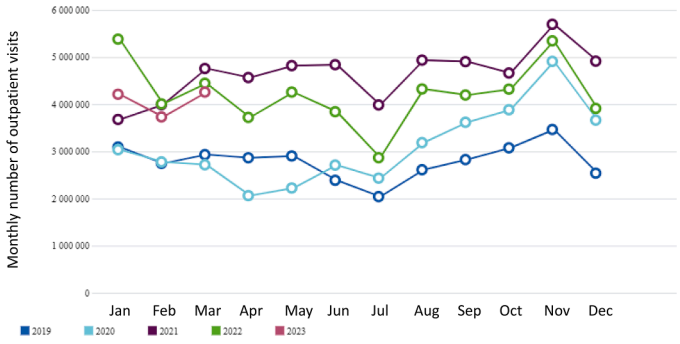


**Fig. 3.** Monthly number of outpatient visit among all public primary healthcare service providers, all categories, all professions, and all contact channels in Finland in 2019–2023. Source: Finnish Institute for Health and Welfare (THL), Avohilmo Registry.

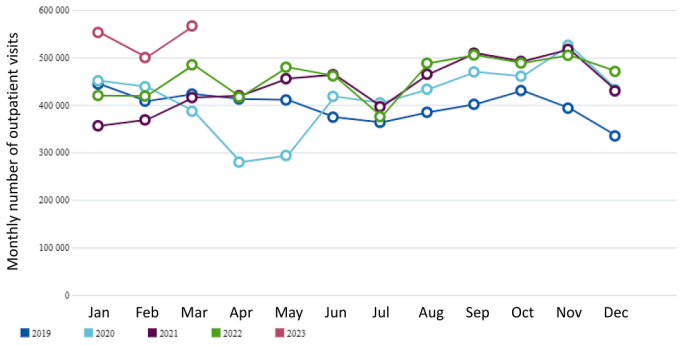


**Fig. 4.** Monthly number of outpatient visit among all public primary healthcare service providers, outpatient care physicians' physical contacts in Finland in 2019–2023. Source: Finnish Institute for Health and Welfare (THL), Avohilmo Registry.

that there was a significant increase in COVID-19 related deaths in 2022. However, the statistics from 2021 indicate that there were also remarkable increases in dementia and Alzheimer's disease related deaths, quantitatively dominating the increase due to COVID-19 [24, 25].

It can be argued that changes in general mortality may give a better understanding of COVID-19 related deaths than the number of deaths with a COVID-19 diagnosis due to the effects stemming from overburden health systems, poorly registered causes of deaths, as well as problems connected to multiple diagnoses. According to Statistics Finland [25, 26], the change in mortality was so remarkable that life-expectancy at birth dropped by roughly half a year in 2022. For females, the change was even larger as the trend had occurred already in mid-2021.

In addition to diagnosed causes of death and general mortality, there is a third approach to measuring COVID-19 mortality. In "excess deaths" calculations the number of observed deaths is compared to the contrafactual death numbers, based on a statistical model describing "normal" circumstances. Currently there are three sets of excess death calculations available for Finland:

1 The EU Statistical Office Eurostat calculates a monthly excess death indicator by comparing the number of deaths in 2021 and 2022 to the average deaths in 2016–2019 [27]. The indicator was negative in early Spring 2021 but showed a 10–20 percent excess death rate in Autumn 2021 and 2022.
2 OurWorldinData [28] uses a regression analysis to create baseline death numbers. Despite a somewhat different methodology, the results are quite similar to those published by Eurostat, but the variation from month to month seems to be bigger. In January 2023 the cumulative deaths from all causes since January 2020 were 6% higher in Finland that the estimated model predicted.
3 EuroMOMO publishes "Z-scores" for several countries, where an approximative standard deviation is used to normalize mortality figures [29]. The normalization takes into account the large annual variation in mortality, even in "normal" circumstances. Results show that the Z-score for Finland exceeded the baseline in the second half of 2021 and in 2022, with only a few exceptions. Although the estimated Z-scores for Finland exceeded the level that EuroMOMO calls a "Substantial increase" only in two months in the summer in 2022, it is important to note that high mortality scores occurred for an extended period and thus cannot be interpreted as random.

All available excess death calculations for Finland show abnormally high death numbers during the COVID-19 years. However, as there is no commonly agreed methodology to produce a baseline, there is substantial variation in the timing and magnitude of "excess deaths". A special problem is connected to the age structure. The population in Finland is older than in many European countries and the number of people in age groups with high general mortality is increasing fast. If this effect is not properly considered, there might be bias in the calculations.

Final challenge regarding excess death calculations has been already mentioned: the baseline death figures should properly reflect changes in the overall determinants of mortality, namely changes in the age structure of populations. As far as such calculations are not available, the only safe conclusion is that part of the excess deaths could be the result of the change in the age structure of the Finnish population. According to THL, 25% of the excess mortality is explained by the aging of the

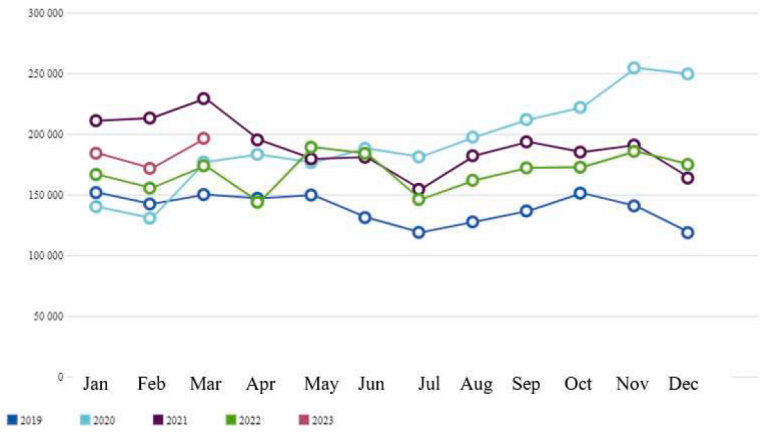


**Fig. 5.** Monthly number of outpatient visit among all public primary healthcare service providers, outpatient care physicians' online contacts in Finland in 2019–2023. Source: Finnish Institute for Health and Welfare (THL), Avohilmo Registry.

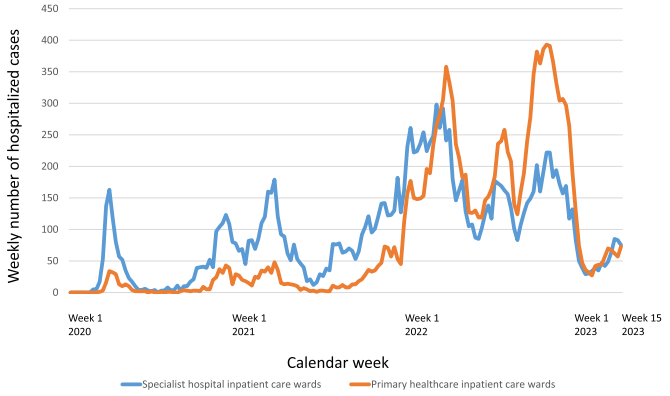


**Fig. 6.** Number of hospitalized COVID-19 cases by week in primary healthcare inpatient care wards and specialist hospital inpatient care wards in Finland since January 2020 to week 15, 2023. Source: Finnish Institute for Health and Welfare (THL).

population, and 75% is the correct excess mortality. The most likely explanation for this is COVID-19 [30].

### *Long-term COVID-19 treatment*

WHO has urged countries and national authorities to make support available for people suffering with long-COVID symptoms. It has stated that governments and health services should act now to provide evidence-based interventions for all long COVID-19 patients to ensure a tailored, safe, and supported recovery that reduces long-term disability. Studies show that around 10–20% of people infected by SARS-CoV-2 may go on to develop symptoms that can be diagnosed as long COVID [31].

The Social Insurance Institution of Finland (Kela) provides social security coverage for Finnish residents and many Finns living abroad through the different stages of their lives. In 2021, a total of 430 people with long-term COVID-19 diagnoses received sickness allowance paid by Kela. At the end of September 2022, the total number was 1440 [32].

HUS (formerly the Helsinki and Uusimaa Hospital District) runs one of the five university hospitals operating in Finland. Due to the high morbidity of COVID-19, HUS opened an outpatient clinic for the long-term effects of COVID-19. The first patients were treated in June 2021. Common long-term effects of COVID-19 infection include fatigue, anosmia, lung dysfunction, abnormal chest X-ray/CT scans and neurological disorders [33].

According to HUS, treatment in the outpatient clinic was symptomatic and rehabilitative in nature, and the treatment methods were based on instructions from WHO, previous research-based knowledge on post-infection symptoms and experiences from similar units in the UK and Sweden. Treatment in the clinic required a physician's referral and a positive PCR or antibody test. One requirement was that the symptoms of the infection had lasted at least three months [34].

The statistics for outpatient visits to the clinic were exported from the internal reporting system of HUS, and permission to use the data in this article was received from the clinic (Fig. 7). From the data we can conclude that during 2022, which is the first full year for the clinic, the average number of visits per month was 312. The highest number of visits was 455, in September 2022. The total number of visits in 2022 to this clinic was 3739. For comparison, in HUS the number of outpatient visits for respiratory medicine in 2021 was 90,565, and for physical and rehabilitation medicine 28,089 [35]. Referrals to the outpatient clinic for long-term effects of COVID-19 are handled within the specialty of physiatry or physical and rehabilitation medicine.

## Economic consequences of the pandemic

The economic consequences of the pandemic turned out to be less drastic in Finland than originally expected in 2020 [5,6]. Although GDP contracted 2.4% in 2020, growth started again in summer 2020 and by 2021 GDP exceeded pre-pandemic level and in 2022 growth continued [36].

Initial economic losses were much smaller in Finland than on average in the EU and this can be at least partly attributed to fewer confirmed COVID-19 cases and consequently less strict restriction measures [6]. However, the total European economy started to recover

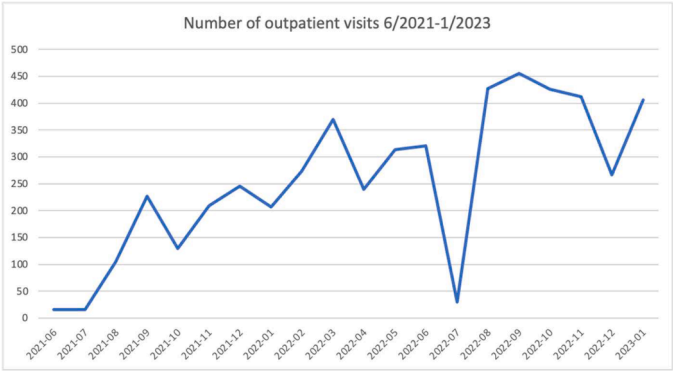


**Fig. 7.** HUS long-covid outpatient visits to the clinic from June 2021 to January 2023. Source: HUS, Finland.

almost as fast as the Finnish GDP and in 2022 there was no relative advantage anymore in the Finnish economic development. This coincided with the worsening of the relative epidemic situation in Finland in late 2021 and 2022.

The Finnish seasonally adjusted employment rate (20–64 years) dropped more than two percentage points to 74% in late spring 2020, mainly due to the effects of restriction measures in the service sector. Even though the pandemic is not totally over, the labor market has recovered more than fully. In line with overall economic recovery, the employment rate has increased fast since then, and it is now at an all-time-high almost at 79%.

As noted by Tiirinki et al. [4], the pandemic affects a small open economy like Finland via economic sentiment and thus investments, via international trade and global financial markets and via government restriction measures. Those effects lost their relative importance in late in 2022 as the Russian military offensive in Ukraine and consecutive sanctions started to dominate inflation, foreign trade, and thus overall economic developments, at least in Europe.

In addition to COVID-19 restrictions, governments implemented large economic stimulus packages, to counteract the worsening economic sentiment, declining private income and consumption as well as to stimulate businesses, especially in services such as hospitality and tourism. In Finland, stimulus packages and reduced tax income increased the general government deficit from EUR 2.3 billion in 2019 to EUR 13.3 billion the next year. Although the deficit has since decreased, the general government debt-to-GDP ratio has increased from below 60% in 2019 to 73% in 2022 [33]. The Ministry of Finance estimates that two thirds of increase is due to COVID-19 related expenditure (unpublished memorandum).

The increase in general government debt from EUR 155 billion in 2019 to over EUR 190 billion in 2022 has clearly contributed to the quick recovery of the Finnish economy by stimulating aggregate demand and thus consumption and investments. However, it means that the pandemic will be visible in the government balance sheets for decades, causing higher interest expenditures and affecting the government's capability to offer services and benefits and to absorb future economic shocks.

In addition to fiscal policies, adaptive monetary policy contributed to the recovery. Although it might be too early to be sure, it is possible that the strong contraction in 2020 and weak expectations in 2021 induced central banks globally to continue an expansive monetary stance longer than necessary and thus contributed to the inflation peak in 2022.

## Other effects of the pandemic for society and lessons learned

The positive effects of the COVID-19 pandemic on Finnish society must not be ignored. Hygiene has become more important than before the pandemic. To some extent, social norms have changed and for instance employees typically go to their workplaces when they are completely healthy, without even a slight cold. Additionally, families have spent more time together. This may explain why the birth rate rose temporarily in the first COVID-19 years. Nature experiences have also become more important for Finnish people [37].

The COVID-19 pandemic accelerated healthcare digitization [38]. Additionally, the role of telemedicine has grown exponentially worldwide [39,40]. In Finland for example, telemedicine was implemented during the COVID-19 pandemic to ensure patient treatment in Head and Neck Center of Helsinki University Hospital [41]. The Finnish national contact tracing app Koronavilkku ('Corona Blinker'), developed by THL, was introduced in August 2020, [42] but it was discontinued in June 2022. However, not all people were equally able to access and benefit from digital health services during the COVID-19 pandemic [40].

Hundreds of good operating models or best practices related to COVID-19 have been gathered on the Innovillage Internet platform (innokyla.fi). Innovillage is an innovation community in the health and welfare sector that is open to everyone. Innovillage offers development tools, both online tools and tools based on face-to-face meetings. It reflects the activity of sharing best practices widely between social- and healthcare actors.

## Conclusions and policy implications

As this article is written, people in Finland like elsewhere have been living with the COVID-19 pandemic for over three years. It is too early to draw final conclusions, but in the following we will summarize preliminary observations about the Finnish experience.

As vaccination coverage has increased in the population at the same time daily life in society has returned mostly to how it was before pandemic and government restrictions. Tracking the COVID-19 disease has been discontinued. Society has learned to live with the corona virus, and it no longer visibly affects ordinary life in the spring and summer of 2023.

Governing pandemic responses also offer several lessons for the future in terms of healthcare. It must be considered that already at the beginning of the pandemic in 2020, the President of Finland proposed a multidisciplinary group of experts, so-called "corona fist" approach to lead the crisis at the national level. However, despite that, a decentralized management model with different authorities was seen as the only legally possible option. Still, despite several structural problems and debates related to health policy and vaccination strategy, Finland seems to have had key elements which can be linked to a successful pandemic response. These included sufficient state capacity, strong formal political institutions, health, and social policies to support the compliance of the people and a high level of societal trust, which reduced the need for mandatory restrictions [43].

Public communication is a critical function of health systems, and is essential for coherent health policies, as well as being a key tool for effective policy design as well as in implementation [3]. However, in Finland the COVID-19 pandemic brought conflicts and power struggles to the surface between the different levels of state and regional authorities in political governance and decision-making as well as within the research community. The national implementation of the vaccination strategy evoked conflicting views and some observers also pointed out its weaknesses. Public communication on the COVID-19 policies has been criticized as fragmented and divergent, and for the lacking sufficient national coordination.

Although the total number of COVID-19 infection cases was significantly higher in 2022 than in previous years, control measures, such as physical restrictions and mask recommendations, were abandoned in Finland. Nevertheless, the number of COVID-19 patients admitted to hospitals was especially in 2022 a significant and continued to burden the healthcare system. It is likely that the vaccination strategy prevented at least a critical increase in the number of patients requiring intensive care, but this requires further analysis.

In this study, we described the potential impact of the COVID-19 pandemic on overall mortality in Finland at a general level. The figures relating to overall mortality are complex and straightforward conclusions should be avoided, although COVID-19 seems to be an important factor behind the increase in mortality. For reliable conclusions, a comprehensive study should be carried out to demonstrate the real impact of COVID-19 on trends in mortality and general life-expectancy as well as to decompose the direct influences of COVID-19 infections and other possible factors, such as delayed treatments, or changes in health behavior and living conditions. It is important to understand whether the observed cessation of the long-term decrease of age-adjusted mortality and decrease of life expectancy are a permanent phenomenon.

The appropriateness of economic policies in the context of the pandemic is an interesting question for future research. The observed swift economic recovery, not only in Finland, but also globally, associated with increase in indebtedness, as well as the inflation peak soon afterwards, suggests that a more cautious and shorter-term stimulus

package could have been justified.

Although it may sound contradictory, the more the pandemic proceeds, the more difficult it is to draw conclusions on the impact of the COVID-19 pandemic on society. Other unforeseeable events, such as the Russian invasion of Ukraine, have impacted various aspects of society. A multidisciplinary study on the effects of the pandemic needs to be carried out in the future.

The pandemic is in an endemic phase and the most severe crisis is over. This is confirmed by the fact that the Finnish government has approved on June 2023 an amendment to the Government Decree on Communicable Diseases by which COVID-19 caused by the SARS-CoV-2 virus will no longer be classified as a generally hazardous communicable disease. In future, COVID-19 will be defined as a monitored communicable disease.

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Not needed.

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## Declaration of Competing Interest

The conflict of interest for the authors of this study should be noted. The study should not be considered as representing the official views of the authors' affiliations. The opinions and arguments expressed are those by the authors.

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