

PIONEER OPEN SUMMER STUDY (POSS)

COVID-19 IN SWEDEN



by the Team: THE MIGHTY CHONDRIA

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¹ “Asymptomatic COVID-19 Patients Also Contaminate the Environment - COVID-19 HUB.” Google, Google, 2020,
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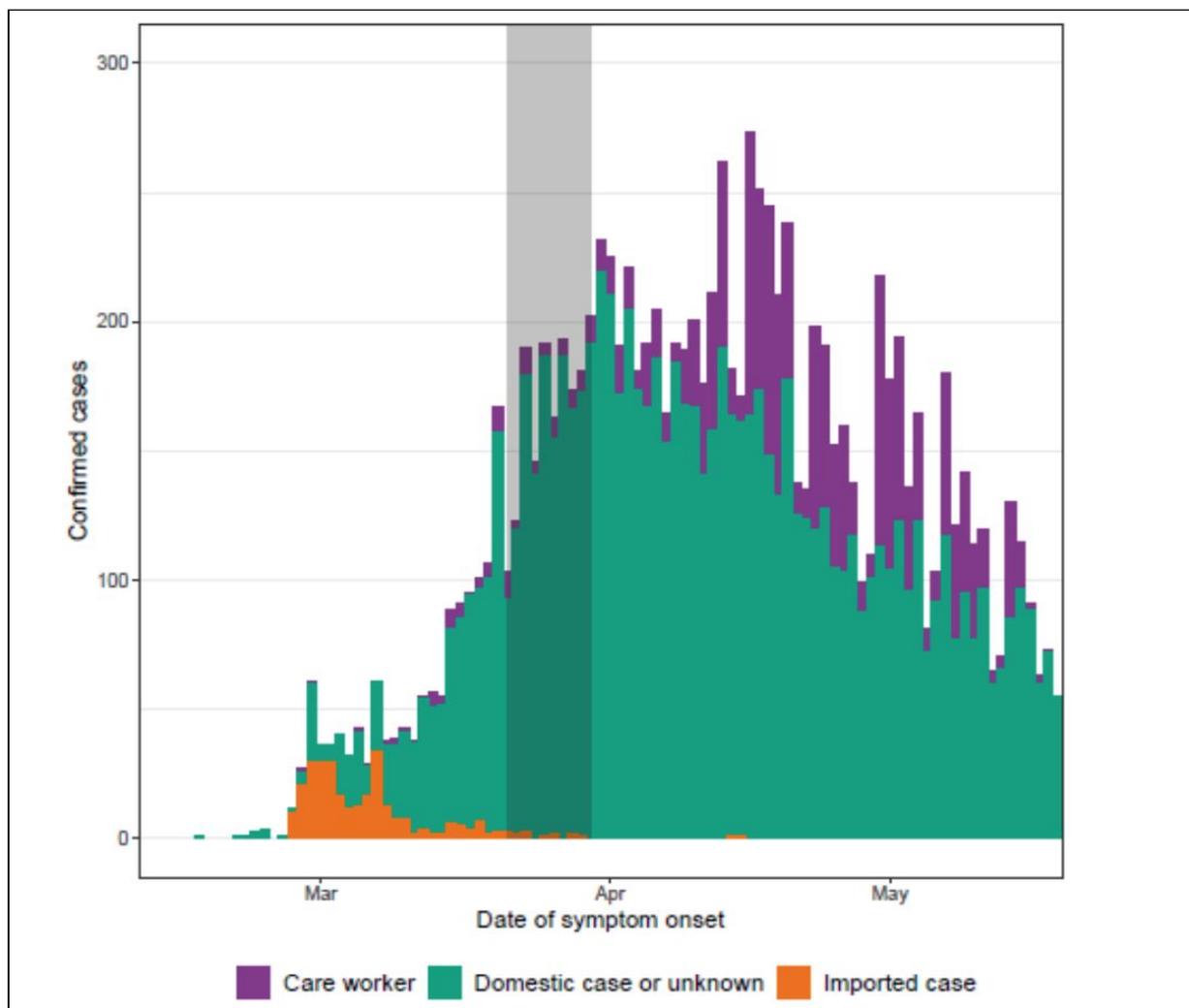
1. Introduction:

In Sweden, from January to September 2020, there have been 84,985 confirmed cases of Covid-19 with 5,835 deaths. Both in terms of medical sources and economic readiness, Sweden was caught off guard by the presence of Covid-19, as it's the case for the majority of the countries. Contrary to the rest of the world Sweden avoided going under lockdown during the pandemic. As a first-world country with good healthcare and an education system, the government heavily relied on its citizens to pursue social distancing.

This paper discusses the controversial model that the Swedish Government followed against Covid-19 pandemic. The subject is addressed in various perspectives, under five different categories: Infections and Fatality Rates, Hospital Resources and Future Models, Mitigation Efforts, Economic Impacts, and Treatment and Vaccine Development.

2. Infections and Fatality Rates (Doruk Uyum):

Figure 1: Epidemic Trajectory by Case Type in Stockholm



The graph above represents the number of cases for COVID-19 in Sweden among care workers, citizens and foreigners. As of May 25th, there are 1,942 confirmed deaths reported in Stockholm, corresponding to a fatality rate of 0.1%.

Many families travelled to Italy, specifically to the Alps, for skiing during the winter holiday week, which occurred between 24 February to 1 March. This corresponds with the outbreak in Lombardy which is located in north Italy. Lombardy had its first infection on February 20th and the initial death caused by the virus occurred on the 22nd, indicating that it had already spread. Many Swedes got the virus in Lombardy. Additionally, unlike other countries, testing wasn't as easily available for citizens. After testing became available worldwide on March 13th, the majority of the testing was concentrated around suspected cases requiring hospital care, and to some extent health care workers.

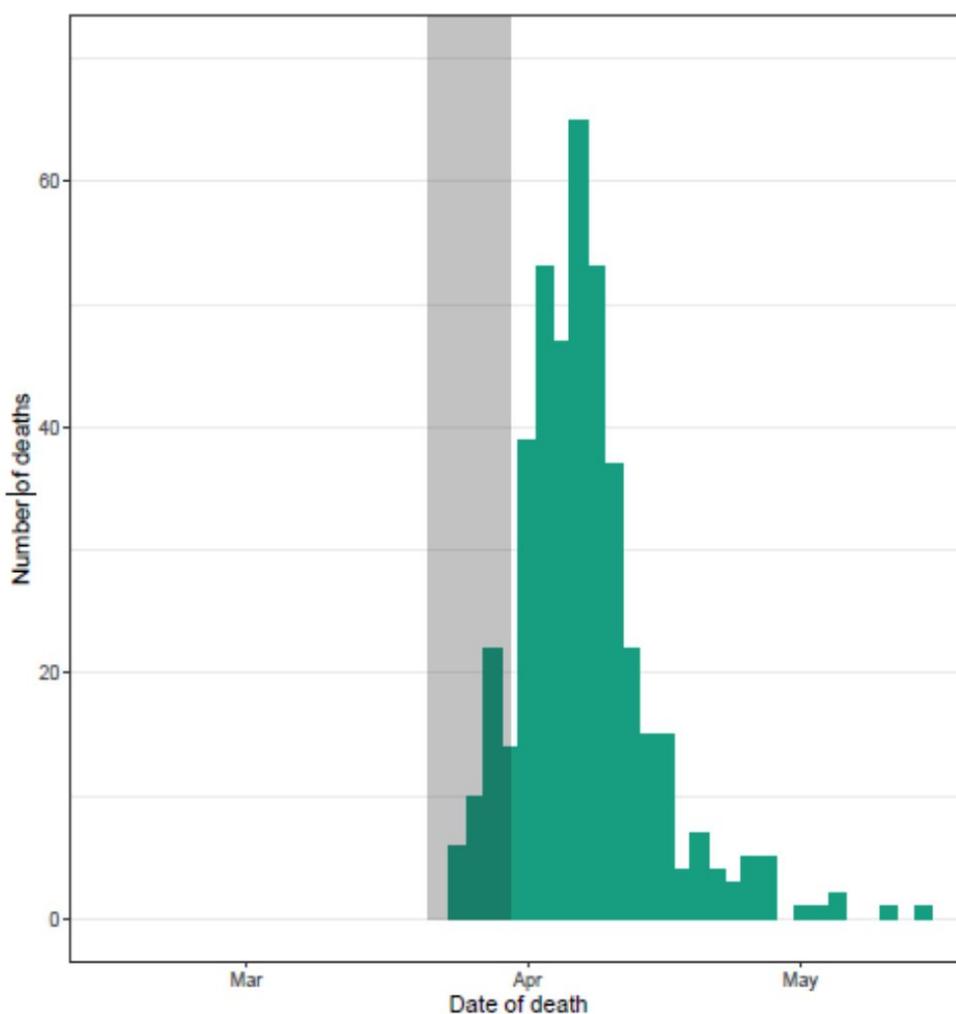
Table 1: Descriptive Statistics

	Estimation sample			Stockholm			Rest of Sweden		
	All	No care workers	Deaths	All	No care workers	Deaths	All	No care workers	Deaths
Imported case	0.8		0.0	2.6		0.2	3.4		0.8
Health care worker	4.6		0.2	16.8		0.2	39.0		0.1
Male	54.2	55.2	57.4	46.8	51.6	54.0	38.2	49.6	56.1
Nursing home	18.8	19.9	38.0	19.3	23.9	45.6	9.9	17.0	37.1
≥ 1 risk factors	69.9	71.7	91.6	65.2	72.8	92.0	50.2	67.5	91.5
≥ 2 risk factors	49.7	51.9	76.8	45.7	53.4	76.8	30.2	46.1	73.8
Intensive care	9.2	9.2	10.2	6.7	7.8	9.2	5.3	8.3	11.0
Deceased	25.9	27.3		17.2	21.3		9.2	15.8	

The consequences of the lack of precautions that could've been taken if tests were available and if quarantine was enforced by the government are shown above. It can be inferred from the table that males and people in nursing homes have higher fatality rates. On the other hand, healthcare workers have the lowest death rate of 0.2 in Stockholm and 0.1 in the rest of Sweden.

Table 2: IFR Estimates for Stockholm

	Population share (%)	Cases	Deaths	Infected	IFR (%)
All ages		1,667	432 (397; 464)	74,089 (41,660; 117,419)	0.58 (0.37; 1.05)
Age 0–69	88.3	868	61 (47; 76)	65,446 (36,800; 103,721)	0.09 (0.06; 0.18)
Age 70+	11.7	799	371 (344; 396)	8,643 (4,860; 13,698)	4.29 (2.67; 7.73)

Figure 2: Distribution of date of death in estimation sample

The graphs above represent the number of deaths and age groups in Sweden due to Covid-19 between February and June. In the data, it is estimated that the Infection Fatality Ratio (IFR) is 0.6%, with a 95% confidence interval of 0.4–1.1%. In the age group up to 69

years, the fatality rate is about 0.1%. On the other hand, for 70 years or older, it is estimated that the fatality rate is 4.3%. Comparing among the total number of cases from the given table of samples represents the case majority in Sweden. This suggests that these numbers and estimations are generalizable.

Men are dominant between cases with a percentage of 54.2%, and even more overbearing for fatality rates with a percentage of 57.4%. The over-dominant majority is represented by elders who make up 50.6% of cases. Additionally, this age group also accounts for 85.9% of the total deaths.

In the table above, it is seen that the fatality rate and the increasing age is exponentially proportional. The death rate for 70+ citizens is 4.29% being 4 times higher than any other age group. This is a result of the diminishing immune system in the elderly. The high IFR of the 70+ age group increases the IFR for all ages up to 0.58% even though the IFR for 0-69 is only about 0.09%.

As the graph above illustrates, the death rates in Sweden started skyrocketing towards the end of March. This is due to the spread of the virus between the Swedish after getting exposed to the virus from Italy. This put a couple of weeks in between as it took time for the virus to spread and also because the virus doesn't kill instantly. The death rate in Sweden climaxed on 8th of April with 64 deaths within a single day. Though the mortality rates decreased rapidly afterwards, proving that the majority of the Swedish either recovered from the virus or successfully avoided it.

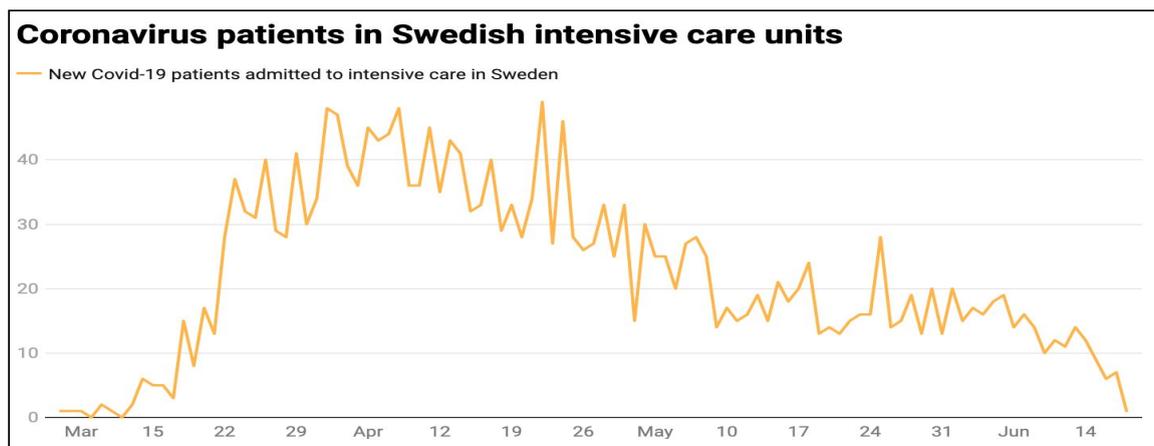
3. Hospital Resources & Future Models (Pelinsu Erel):

Hospital resource use displays how equipped a place is to treat their patients, in this case, Covid-19 patients. For fighting against Covid-19 some crucial hospital resources are beds, ICU beds, and invasive ventilators. The treatment of coronavirus patients often requires intensive care, therefore ICU beds and ventilators are a necessity for many hospitals compared to normal times. The intensive care is defined as "a level of care that involves close monitoring and advanced treatment of critically ill patients" by the Swedish Intensive Care Register.

Severe Coronavirus patients mostly rely on machines to keep their organs working, and many hospitals in Sweden categorize coronavirus care as intensive if a ventilator is needed. At the beginning of the coronavirus pandemic, Sweden had approximately 526 intensive care beds which were among the lowest number of intensive care beds in Europe. Fortunately, the number scaled up to over 1100 available beds that were fully able to accept patients, in a few weeks. The Karolinska hospital, one of the biggest hospitals in Sweden, sets an example for the increase in the hospital resources. At the peak of the crisis, Karolinska Hospital had 140 intensive care patients with spare beds to take in even more patients. But, how did Karolinska and many other hospitals across Sweden manage to increase their number of hospital resources? Many hospitals followed similar methods to increase their resources. Some of the methods included: opening up postoperative wards for Covid-19 patients, ordering new pieces of equipment from other countries such as the UK and France, making use of old ventilators, using anesthetic machines as ventilators, borrowing ventilators from private care-givers.

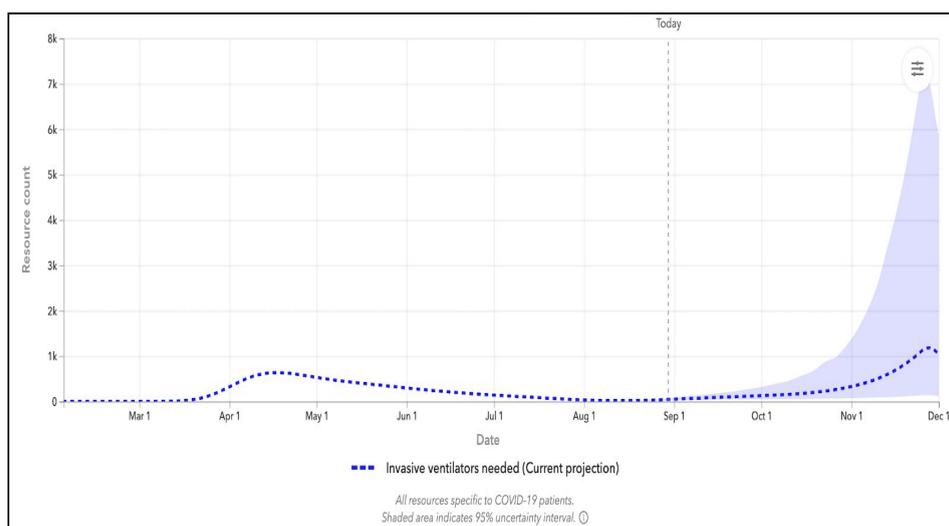
Sweden aimed to flatten their curve of coronavirus patients in need of intensive care to avoid the possible overwhelm for the healthcare system. As it can be seen from the graph below, the number of coronavirus patients in Swedish intensive care units peaked during April and then started to decrease, flattening after May.

Graph 1: *Coronavirus Patients in Swedish Intensive Care Units*

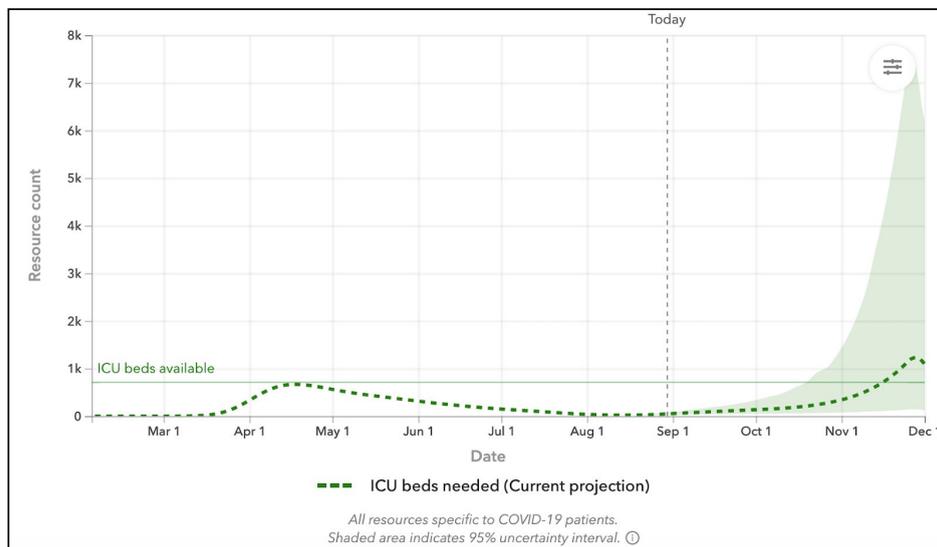


The following graphs display the curve of invasive ventilators and ICU beds needed during the Covid-19 pandemic in Sweden. According to the graphs, the need for both was highest in April, during the peak of the Pandemic for Sweden, and it started decreasing from May to September. The graphs predict that there will be an increase in the need for both ICU beds and ventilators from October to December. This conveys the possibility of a second wave in Sweden during autumn and winter.

Graph 2: *Displaying the Number of Ventilators Needed*



Graph 3: Displaying the ICU Beds Needed



The strategy that Sweden followed was highly criticized by many. Swedes were able to go to school, bars, restaurants, and in many cases to their offices, although the gatherings over 50 were banned. During the crisis, Sweden Government followed their state epidemiologist, Anders Tengell's advice who said that there was no need for a national lockdown. Swedish government encouraged their citizens to social distance but other than that, the normal life continued for Swedes.

Some believed that the model followed was causing excessive deaths when compared to other Nordic Countries. The deaths in Sweden were approximately five times higher than the deaths in the other Nordic Countries, considering the number of inhabitants.

Some countries considered Sweden's Model as a future model against coronavirus for some time, but the ideas were quickly abandoned after the number of deaths in Sweden started to rise in April. In addition, the model believed to be proper for countries with higher living standards. Sweden benefits from numerous favorable conditions such as unparalleled levels of public trust in the government, strong public health, and education system when it comes to ask and encourage its citizens to take responsibility for social distancing. This approach proved to be too costly for many other countries, especially for third world countries. This suggests a reason why Sweden can't be a model for the future of fighting against Coronavirus.

When it comes to Sweden's future model, there are not any announced changes in the government's policy against Covid-19. Some believe that the model that was followed caused many Swedish people to gain immunity against the virus. The number of cases expected for the second wave seems to be lower than the first one. Furthermore, as the doctors learn more and more about the virus each day, the ratio of patients cured to all corona patients during the second wave is believed to be higher than the first wave.

4. Mitigation Efforts (Ata Ulaş Güler) :

Although Covid-19 pandemic impacted many countries similarly, the response from some governments was different. Sweden, unlike many neighbouring countries, did not impose a strict quarantine on its population. "Instead, the government has called on citizens to

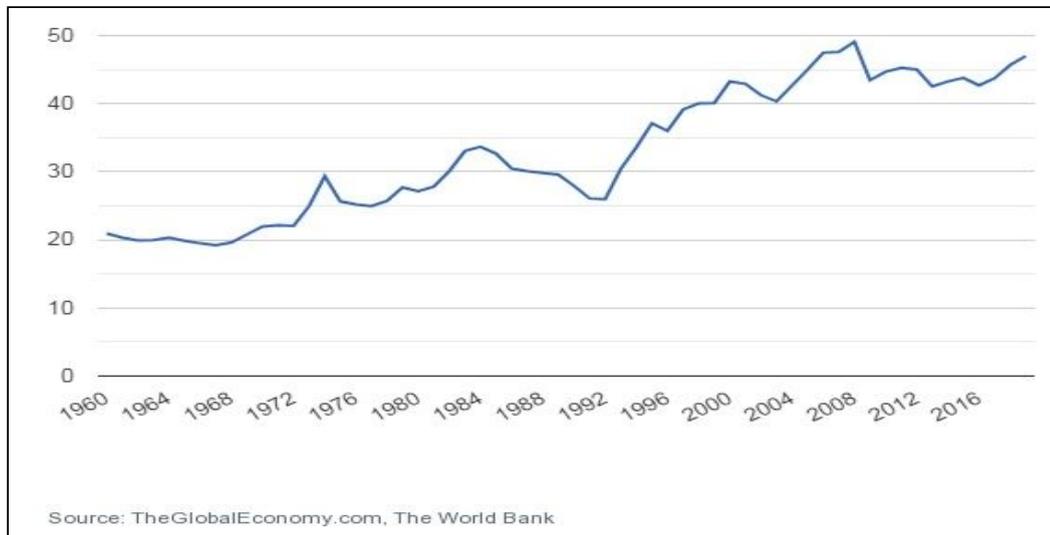
‘take responsibility’ and follow the recommendations of the health authorities” (Holroyd). This general strategy parallels Sweden's former Prime Minister’s philosophy known as Palme philosophy.

- “(a) When each and every person living in Sweden feels free, she or he feels valuable.
 (b) When a person perceives her/himself as valuable, she or he will take responsibility over her/his actions and behavior.
 (c) A responsible person who is not subject to coercion, force or command-and-control type of governance and policy or the like, is able to learn and actually will proactively educate her/himself.
 (d) A responsible and learning-orientated person will wash her/his hands, will stay home, will volunteer to help the elderly, disabled and, the social service system and the health-care system, will go to bed early, wake up early, eat healthy, exercise and adopt a balanced lifestyle in terms of work and relaxation”* (Korhonen 11).

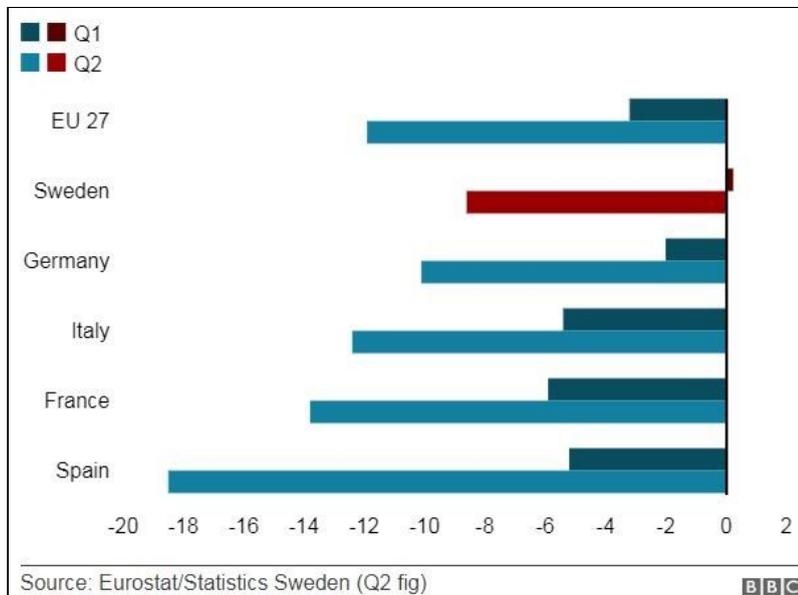
Palme legacy emphasizes the freedom of every person as part of the free community. Above mentioned *a-d* steps can be considered as the general strategy behind Sweden’s mitigation efforts. This liberal approach from Sweden government did not allow strict restrictions on public gatherings. Instead, they made the government rely on standard precautions and see “herd immunity” as a potential goal for gaining resistance. Standard precautions can be exemplified as hygiene routines, possible physical distancing, avoiding large gatherings, etc. Government has particularly touched on visiting elderly people during the pandemic. Authorities discourage any unnecessary contact with these people who are above 70 and have any chronic illnesses. Also, the Swedish government did not implement any particular requirement for wearing masks in public areas. Health authorities released a detailed guideline for particular people who may feel ill or have met someone whose Covid-19 test was confirmed to be positive. Guidelines are constituted of standard warnings, ranging from isolation to standard hygiene rules.

5. Economic Impacts (Nil Mehtap Çalış):

Sweden’s economy relies heavily on international trade and the exportation of goods. From 1960 to 2019, the percentage of exports in GDP increased from 20.93% to 47.01% (*Graph 4*), making exportation cover almost half of Sweden’s economic income.

Graph 4: Sweden - Exports, percent of GDP²

The lack of demand for exported goods with Covid-19 shrunk the economy of Sweden. The fall is the greatest Sweden has experienced during at least the last 40 years in a quarter of a year. The economy shrunk by 8.6% between April and June, compared to January to March. However, the European Union, in general, experienced a greater fall of 11.9% in GDP (Table 3).

TABLE 3: % Change in Quarterly GDP³

² "Sweden Exports, Percent of GDP - Data, Chart." *TheGlobalEconomy.com*, www.theglobaleconomy.com/Sweden/exports/.

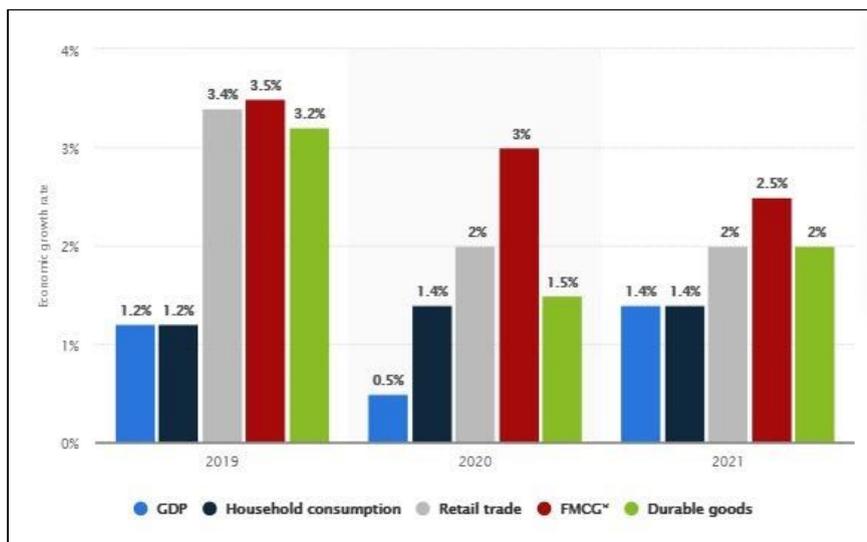
³ "Coronavirus: Sweden's Economy Hit Less Hard by Pandemic." *BBC News*, BBC, 5 Aug. 2020, www.bbc.com/news/business-53664354#:~:text=Sweden, which avoided a lockdown,from the previous three months.&text=Individual nations did even worse,13.8% and 12.4% respectively.

In order to prevent a larger decrease in the economy, Sweden had a more relaxed approach to Covid-19. The government chose to keep most of the workplaces open to limitate the job losses, rather than closing the shops and putting the citizens into quarantine. The citizens were allowed to go to work, but in order to avoid increasing the infected percentage, they were also encouraged to stay at home if they didn't feel well. As a result, while the society remained outside more than the other parts of Europe, plenty of Swedes still chose to stay away from work and public places.

Despite the fall, Sweden's economy is not in a recession⁴ yet, since the growth of 0.1% was seen during the first quarter of the year. Robert Bergqvist, the chief economist at SEB bank, said that the Swedish GDP in the first half of the year had declined "only by around half as much as GDP in the euro area."

The predictions for Sweden's economy suggest that economic growth will still be observed during 2020 and 2021. GDP is expected to increase by 0.5 percent in 2020 and by 1.4 percent in 2021 (Table 4). This increase can be expected since the current predictions are accurate as Sweden's ambassador to the United States said "We expect our economy to shrink between 4-10% in 2020" in April⁵ and the observed shrink is 8.6%. However, more observations are needed throughout the year to ensure the accuracy of future predictions.

TABLE 4 : Forecasted impact of COVID-19 on the economy in Sweden 2019-2021⁶



⁴ An economy is generally deemed to be in recession if it contracts for two consecutive quarters. ("Definitions, Meanings, Synonyms, and Grammar by Oxford Dictionary on Lexico.com." *Lexico Dictionaries | English*, Lexico Dictionaries, www.lexico.com/.)

⁵ Mai, H.J. "Sweden Records Largest GDP Drop Since 1980, But Outperforms Many Other EU Countries." *NPR*, NPR, 7 Aug. 2020,

www.npr.org/sections/coronavirus-live-updates/2020/08/06/899776725/sweden-records-largest-gdp-drop-since-1980-but-outperforms-many-other-eu-countri.

⁶ Department, Published by Statista Research, and Aug 3. "Sweden: Economic Growth Forecast COVID-19 2019-2021." *Statista*, 3 Aug. 2020,

www.statista.com/statistics/1107232/forecasted-impact-of-covid-19-on-the-economy-in-sweden/.

6. Treatment & Vaccine Development (Berfin Güzel):

The main objective of the Government of Sweden is to increase the number of Covid-19 tests run throughout the country to increase the tracing of the disease and reduce the spread of infection. Therefore, The Public Health Agency of Sweden has the duty to carry out tests on everyone with symptoms of Covid-19 and tests to identify those who have had the disease.

Currently, there are two different types of tests for Covid-19:

Diagnostic Tests: shows whether you have or have recently had an active Covid-19 infection. These tests include molecular level PCR (Polymerase Chain Reaction) tests which detect the genetic material of the virus and antigen tests, which detect the specific proteins on the surface of the virus.

All the regions in Sweden are responsible for conducting PCR tests in cases of active infections. This application is essential as the PCR tests are mainly preferred when the amount of virus is important to diagnose the disease, which is the case for Covid-19.

Serological (antibody) Test: shows whether you have had Covid-19 and developed antibodies, which are made by the patient's immune system against the virus, and therefore have a protection against the disease to an extent.

Testing Process:

The test sample is often taken by a healthcare professional like most of the countries while sometimes, people can take a PCR test sample themselves at home, known as **self-sampling**.

It's important to note that, though, there are no serological (antibody) tests that an individual can carry out by themselves at home that are recommended by the Public Health Agency of Sweden.

Vaccine Development:

At the moment, there is no developed vaccine or approved medicine against Covid-19, as it's the case for the whole world. However, the testing process and studies regarding the isolation of the virus proceeds.

The Swedish Medical Products Agency is collaborating with other medical product agencies in Europe and around the world in order to investigate different medical treatments and thus contributing to the work on the development of a vaccine.

Treatment Process in Sweden:

Most people who experience Covid-19 illness will recognise the symptoms of a normal cold or intense flu and do not need to seek medical care. A smaller group of people who become infected, fall seriously ill and may need hospital care. As a result, it is advised in Sweden that if the condition of the patient worsens suddenly or experience breathing

difficulties even when resting, they should contact the health service immediately.

Rehabilitation after Treatment:

The period of medical care may be long for patients who develop Covid-19, especially if they have been in intensive care. In some cases, symptoms can persist for a long time after a person has 'recovered' from Covid-19. Because of these, Sweden follows a method in which when someone experiences persistent physical or psychological problems after being infected, they should contact the health service.

The National Board of Health and Welfare in Sweden has produced information for healthcare professionals containing practical advice on exercise and treatment after Covid-19 for the growing need for rehabilitation after Covid-19 infection.

Warning from the Government:

The Swedish Food Agency encourages the public to be alert regarding food supplements and other food items that are claimed to cure or prevent Covid-19.

Many products have emerged during the pandemic, mainly online. However, claiming that food supplements or other food items either cure or protect against Covid-19 is illegal, as there is no scientific evidence for the ingredients of such products. Therefore, The Swedish Food Agency collaborates with other government agencies to stop these sales.

The public can submit a report to the municipality's food inspectors or send an email to the Swedish Food Agency if they encounter any products claiming to cure Covid-19.

7. Conclusion:

All in all, this paper discussed the current situation in Sweden regarding how the Government managed the Covid-19 virus. Initially, the authorities didn't take any critical actions regarding quarantine and the protection of the citizens. However, in the long term, they observed that this model would be ineffective. As a result, they started managing their current hospital capacities and medical resources in a way that would help reduce infection and fatality rates. This different approach from the Swedish Government, contrary to the other European countries, has allowed a wide range of research to be written in such a short amount of time. Furthermore, the model encouraging people to continue their work prevented the economy from shrinking as much as the other European countries. To sum up, during this global pandemic Sweden followed an unorthodox model, which aimed to flatten the curve of coronavirus patients without a lockdown procedure.

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