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Research Article / Araştırma

Analysing the relationship between countries' freedom level and the number of Covid-19 cases

Ülkelerin özgürlük düzeyi ile Covid-19 vaka sayısı arasındaki ilişkinin incelenmesi

Ümit Çıraklı[1], Merve Nur Alpaslan[2]

[1] Assoc. Prof. Dr., Izmir Bakircay University, Institute of Social Sciences, İzmir/Turkey, umit.cirakli@bakircay.edu.tr, 0000-0002-3134-8830
[2] Yozgat Bozok University, Institute of Social Sciences, Yozgat/Turkey, alpaslanmervenur@gmail.com, 0000-0003-0405-0059

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Corresponding Author/Sorumlu Yazar:
Yozgat Bozok Üniversitesi Sosyal Bilimler Enstitüsü, Sağlık Yönetimi Bölümü, Yozgat, alpaslanmervenur@gmail.com, 0000-0003-0405-0059

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ABSTRACT

Aim: Epidemic diseases have been encountered in many periods of history. Societies took precautions against the epidemic diseases they encountered, according to the science of their time. The aim of this study is to reveal whether the effects of the Covid-19 pandemic vary according to the freedom status of countries. **Materials and Methods**: In this study, multiple methods were used with a phased approach to reveal the relationship between the freedom index of countries and Covid-19 cases. In the study, firstly, cluster analysis was performed on the countries. Then, One-Way Anova and Kruskal Wallis analyses were applied to test whether there were differences between Covid-19 cases according to the freedom index groups of the countries, and the analyses were performed with the SPSS 22 program. Finally, the effect of the state of freedom on Covid-19 cases was investigated using panel data analysis, which is an econometric method. The start of the data set is April 1, 2021. The end of the data set was chosen as April 2, 2022. Eviews 9.5 statistical program was used for panel data analysis. **Result**: The study concluded that vaccines generally have a reducing effect on the number of deaths from Covid 19. In other words, while the number of vaccinated individuals increased in non-free countries, the number of deaths decreased. In free countries, the opposite is true. In other words, while vaccination numbers have a reducing effect on deaths in free and non-free countries; There is an increasing effect in semi-free countries.

ÖZ

Amaç: Tarihin birçok döneminde salgın hastalıklarla karşılaşılmıştır. Toplumlar karşılaştıkları salgın hastalıklarda kendi döneminin bilimine göre önlemler almıştır. Bu çalışmanın amacı Covid-19 pandemisinin etkilerini, ülkelerin özgürlük durumlarına göre değişip değişmediğini ortaya koymaktır. **Gereç ve Yöntem:** Bu çalışmada, ülkelerin özgürlük endeksi ile Covid-19 vakaları arasındaki ilişkiyi ortaya koymak için aşamalı bir yaklaşımla birden fazla yöntem kullanılmıştır. Çalışmada ilk olarak, ülkelere kümeleme analizi yapılmıştır. Daha sonra ülkelerin özgürlük endeksi gruplarına göre Covid-19 vakaları arasında farklılık olup olmadığını test etmek için Tek Yönlü Varyans ve Kruskal Wallis analizleri uygulanmıştır, analizler SPSS 22 programıyla yapılmıştır. Son olarak da ekonometrik bir yöntem olan panel veri analizi ile özgürlük durumunun Covid-19 vakaları üzerinde etkisi araştırılmıştır. Veri setinin başlangıcı 1 Nisan 2021 yılıdır. Veri setinin bitişi ise 2 Nisan 2022 yılı olarak seçilmiştir. Panel veri analizi için Eviews 9.5 istatistik programı kullanılmıştır. **Sonuç**: Çalışmada genel olarak aşıların covid 19 ölüm sayılarında azaltıcı etkisi olduğu sonucuna ulaşılmıştır. Diğer bir deyişle özgür olmayan ülkelerde aşı olan bireylerin sayısı yükselirken ölüm sayısı düşmüştür. Özgür ülkelerde ise tersi durum söz konusudur. Yani aşılama sayıları özgür ve özgür olmayan ülkelerde ölümler üzerinde azaltıcı etkiye sahipken; yarı özgür ülkelerde artırıcı etki söz konusudur.

INTRODUCTION

Infectious diseases have emerged in every period of their history. In the period when the first infectious diseases were experienced, the concept of disease was not fully understood. Shamans think that the reason for the collective deterioration of people in this period is that evil spirits kidnap human health (Genç, 2010). In the 1348s, the Black Plague epidemic was seen as the first major epidemic. Societies affected by the epidemic called the epidemic disease as the punishment of God. Throughout history, every epidemic has been distributed to societies through forms of interaction, such as migration, war, and trade. The major pandemics in history are Black Plague, Influenza, Typhoid, Swine Flu.

Today, Covid-19 is an epidemic that has reached pandemic proportions. The Covid-19 pandemic originated in Wuhan, China in 2019 and spread around the world. Following an increase in the number of cases, the World Health Organization (WHO) declared Covid-19 as a pandemic on March 11, 2020. Covid-19 SARS-COV-2 (severe acute respiratory syndrome coronavirus) is defined as a highly contagious and severe respiratory illness. As the virus has many pathogenic effects, its most serious effect is death (WHO, 2020). In

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August 2020, there were 18,354,342 cases and 696,147 deaths worldwide, while in May 2023, there were 765,903,278 cases and 6,927,378 deaths (WHO, 2020).

The rapid increase in the number of cases and deaths has mobilized rule makers and scientists working in the field. WHO announced Covid-19 measures to the whole world. These measures are to be vaccinated, to follow the distance rule of at least 1 m, to wear a mask, to choose an open area in public gatherings or to ventilate indoor spaces frequently, to pay attention to hand hygiene, and to rest at home even if there are minor symptoms. Attention has also been paid to hand hygiene and disinfectants (Pradhan, 2020). In addition to preventive measures, several countries have initiated studies on vaccine development. The development of the Covid-19 vaccine in a short time and in several countries has been seen as a great success (Mathieu, 2021). While the vaccine development process lasted for many years, the rapid death of people due to the pandemic accelerated the impact studies of the vaccine (Lee, 1981; Mathieu, 2021). The fact that the vaccine became injectable immediately after phase 1 studies made people and countries hesitant about the vaccine. However, after Phase 2 and Phase 3, confidence in the vaccine started to increase. The increase in the number of phase studies and the decrease in the number of deaths in the vaccinated groups also increased confidence in the vaccine (Guliyev, 2020; Greyling and Rossouw, 2022; Köse et al., 2022; İnce and Sayın, 2022). There are currently 13.38 million vaccinated people worldwide (OurWorldinData, 2023).

Covid 19, the biggest pandemic of the new century, affects people both socially, psychologically, and economically. The virus, which is managed by different policies worldwide, has been a challenging test. Changes in education, health, work, and being in public areas were observed. Tele-medicine, online education, remote working, 2 metre rules in public areas have been the rules adopted worldwide (Güngörer, 2020; Daniel, 2020; Tarkar, 2020; Çiçek et al., 2020; Balcı, 2020).

Every individual has certain rights and freedoms, and in addition, some rights are provided by the state to its citizens. The freedom areas of these rights have soft and wide borders in some countries, whereas in other countries, they have stricter and narrower borders. Concepts such as electoral rights, media freedom, democracy, and accessibility constitute the areas of freedom that people have. Many non-governmental organisations measure the freedom areas of countries through surveys. These organizations generally measure the way in which countries are governed and the relationship between the people and the state. Based on these measurements, countries are categorized as free, semi-free, and not free (Freedom House, 2023). More democratic societies are considered free, while more autocratic societies are considered unfree

In this study, the effects of Covid 19 were analysed according to the freedom status of the countries. In this study, the freedom indices of the countries were collected and divided into three groups using cluster analysis. The Covid-19 case, and vaccine numbers of each country divided into groups were also recorded, and the effects of the vaccine on the number of Covid-19 deaths were examined. The main purpose of this study was to measure the effect of the number of Covid 19 cases and vaccines on the number of deaths according to freedom status.

There are many studies on Covid-19 with psychological, social, and environmental effects. Simultaneously, in comparisons between countries, the ways in which countries manage the pandemic are also included. Previous studies were conducted with country groups such as the OECD, G-20, G-7, and Middle East North Africa (MENA). In Covid-19 studies conducted in the field, the scarcity of studies covering the majority of countries and paying attention to the freedom groups of countries has attracted attention. This study contributes to the existing literature. In addition, it is thought to be a guide for policies and practices that may occur in the future.

METHOD

Purpose of the Study

This study aimed to reveal whether the effects of the Covid-19 pandemic vary according to the freedom status of countries. For this purpose, the effects of Covid-19 on countries are analyzed comparatively by considering the freedom index scores of countries and the number of Covid-19 cases.

Importance of Research

There are many studies on Covid-19 with psychological, social, and environmental effects. Simultaneously, in comparisons between countries, the ways in which countries manage the pandemic are also included. Previous studies were conducted with country groups such as the OECD, G-20, G-7, and Middle East North Africa (MENA). In Covid-19 studies conducted in the field, the scarcity of studies covering the majority of countries and paying attention to the freedom groups of countries has attracted attention. This study contributes to the existing literature. In addition, it is thought to be a guide for policies and practices that may occur in the future.

Research Methodology

In this study, more than one method was used in a phased approach to reveal the relationship between countries' freedom index and Covid-19 cases. First, a clustering analysis was applied to each country. Cluster analysis is the name given to the grouping of similar stakeholders in the entire dataset (Kaufman and Rousseeuw, 1990; Kalaycı, 2010). As a result of clustering, the countries were grouped according to their freedom status. Then, One-Way ANOVA and Kruskal Wallis analyses were applied to test whether there was a difference between Covid-19 cases according to the freedom index groups of the countries. One-way analysis ANOVA is used to test whether there was a difference between the means of more than two independent groups for a dependent variable. The non-parametric equivalent of one-way analysis of variance was the Kruskal-Wallis H test. This test is used in cases where parametric assumptions are not fulfilled, even though specified by measurement, or when numerical data are subsequently sorted and ranked as ordinal data (Dinno, 2015). Finally, the effect of freedom status on Covid-19 cases was investigated using panel data analysis, an econometric method. Panel data analyzes the relationship between many events at multiple times (Gujarati, 2003). There are at least two sub-dimensions in the panel data: subscript i denotes the horizontal cross-section and subscript t denotes the time dimension (Hsiao, 2007). In notation, i: 1...N, whereas t: 1...T is the total number of events occurring in time (Baltagi, 2005; Seetraran and Petit 2012).

Data Set and Scope of the Study

The datasets used in this study were assumed accurate and reliable. The study included 168 countries. The number of Covid-19 daily cases, daily vaccines, and daily deaths between 01.04.2021-02.04.2022 constituted the dataset of the study. The number of Covid-19 daily deaths in each country was the dependent variable, and the number of Covid-19 daily cases and daily vaccines were the independent variables. In this study, the annual freedom index of each country was used to determine freedom groups. The collected freedom indices were analyzed and divided into three groups. Each freedom group was analyzed the Covid-19 data.

The observation interval of the research data was 365 days. The beginning of the dataset was on April 1, 2021. The end of the dataset was selected to be April 2, 2022. While creating the research data, countries with no freedom score or Covid-19 data were excluded from the analyses.

Analysing the Data

The findings obtained as a result of the analysis are presented in tables. The countries to be analyzed were first subjected to cluster analysis according to their country freedom score. Eviews 9.5 statistical software was used for panel data analysis. In panel data analysis, the data sets to be analyzed were logarithmically transformed. It is known that in studies conducted with logarithmic transformation, the data are flexible (Çiftci, 2009; Wang, 2009) and there are no extreme value problems (Ayvaz Güven and Ayvaz, 2016). Panel data is the name given to the examination of changes over time in units such as individuals, countries, and companies. In short, it is the periodic examination of more than one factor over a certain period of time (Seetaram and Petit, 2003).

In this study, logarithmic transformation was performed. Then, the study data were subjected to unit root tests. In order for non-stationary data to be stationary, stationarity levels were examined in trendy, constant and trendless models. No results were found in the diagnostic tests. Cross-sectional dependency was not taken into account in the data. Among the data, first generation panel data analysis types were examined. Pedroni and Kao cointegration analyzes were performed using first generation unit root tests.

Limitations of the Study

The data obtained in this study were considered accurate. Covid-19 total number of vaccines, total number of cases, total number of deaths, and freedom index were used as the macroeconomic variables. The number of Covid-19 deaths was used as the dependent variable, and the number of Covid-19 daily vaccines and daily cases were used as independent variables. The freedom index was used to group the countries. It is known that there are situations that affect dependent variables other than independent variables. In this context, it is accepted that the estimation results are valid within the scope of the models used in this research. Another limitation of this study is the number of observations. Each country selected for the study had 365-day Covid-19 data. In some countries, deficiencies have been observed in the Covid-19 data. These deficiencies were corrected statistically and included in the analysis. Countries with no daily data were excluded from the study. This situation constitutes another limitation of this study. Countries with no freedom data and Covid-19 data were not included in the study.

FINDINGS

Cluster Analysis

In this study, first, countries with complete data were subjected to cluster analysis to divide into groups. In the analyses done with SPS program, countries were

divided into three different groups according to their freedom scores. During this analysis, data from a total of 169 countries were examined using cluster analysis. According to the results obtained, countries are divided into three different groups. Free (3), semi-free (2) and unfree (1). There is no visible difference in group distributions. The large group includes 33.7 percent of free countries, and the small group includes 33.1 percent of semi-free and non-free countries. The accuracy of the analysis made in the SPSS program confirmed from the verification bar.

Two main groups were used to measure countries' freedom scores: Social and political freedoms. In the clustering analysis conducted with these scores, three different groups were formed based on close and similar scores. In the analysis, the grouping in the range of 0.5 and 1 gains statistical significance.

Anova Analysis

After the countries were divided into 3 groups by cluster analysis, One-Way ANOVA was performed to test whether there was a difference in the number of Covid-19 cases according to the freedom categories of the countries. According to the ANOVA analysis results, significant differences were found between the values ($p<0.05$).

When the analysis results are examined, standard deviation comparisons of the number of deaths are made. When the standard deviations of the number of deaths are examined, it is observed that there are more deaths in free countries than in non-free countries and semi-free countries. According to the analysis, it was observed that the number of deaths was higher in free countries, and relatively less in non-free countries compared to other groups.

When the comparison scores of vaccination numbers between freedom groups are examined, it is observed that free countries are more than non-free and semi-free countries, and it is observed that non-free countries are more than semi-free countries. More clearly, it was seen that the most vaccinated group was free countries, and the less vaccinated group was semi-free countries.

When the comparison scores of the number of cases between freedom groups are examined, it is observed that non-free countries have more cases than semi-free countries and free countries. It has been observed that it is more common in free countries than in semi-free countries.

Normal distribution was not considered in the Anova test due to the abundance of data.

Unit Root Analysis

Unit root is a term used in econometrics, and it is also a changing concept whether econometric analyzes are stationary or not. The statement "there is a unit root" shows that there is no stationarity (Göktaş, 2015). Panel unit root analysis is an analysis developed to eliminate unit root problems in time series (mccoskey et al., 1998). There are differences between panel unit root analyzes and unit root analyses. This difference is because it can be examined in both time and distance units stored in the roots of the panel units, thus making the analysis more powerful (breuer et al. 2002).

In this section, all countries were analyzed without being divided into groups. Each country were analyzed

Table 1. Anova Analysis

	Anova Analysis			
	Average	**Standard Deviation**	**f**	**p**
	Total Number of Deaths			
Non-free Country	5895238,7006	2759802,50628	53,486	0.00
Semi-free Country	6193626,6286	2899017,32780		
Free Country	6070141,7295	2985974,07461		
	Total Number of Vaccinations			
Non-free Country	1690658,5181	1272216,15053	68,916	0.00
Semi-free Country	1631774,7033	1056044,72386		
Free Country	1779025,5779	1473266,71933		
	Total Number of Cases			
Non-free Country	3434126,9555	3497784,65576	896,941	0.00
Semi-free Country	2175166,7411	2474971,15173		
Free Country	3181454,1341	3278908,62955		

with Covid-19 groups. The dependent variable consists of the number of deaths and the independent variables consist of the number of vaccines and the number of cases. Before the analysis, the logarithm of the group containing the daily data of Covid-19 data was taken. Then, the firstgeneration unit root analysis was performed. The cross-sectional dependency was not taken into account in the unit root analysis. In the unit root analysis, it is observed that the non-stationary data are stationary in the constant and trendless model ($p<0.05$).

Table 2 shows levin lin chu test, im peseran and shin w-stat, adf-fisher chi-square, pp fisher chi-square fisher chi-square vaccine fragments, profile and case data at 1%. The significance level h(0) hypothesis was rejected and its alternative h(1) hypothesis was accepted ($p<0.05$). In the fixed and trendless model, the data record is seen to be stationary. No problems were found in the diagnostic tests.

Panel Cointegration Analysis

Panel cointegration analysis consists of two parts. The first part is Pedroni Cointegration Analysis, and the second part is Kao Cointegration Analysis.

Pedroni Cointegration Analysis

In traditional cointegration analyzes applied to time series, the integration of some linear variables individually is observed. The combinations of these variables are defined as stationary, and the cointegration coefficients that make this combination stationary are called cointegration vectors (Pedroni, 1999).

Kao Cointegration Analysis

In his study, KOA (1999) first presents the existence of intersections specific to each section and takes homogeneity into consideration. In his study with ADF and DF tests, the null hypothesis is the absence of cointegration. In his study on panel data, he examines the relationship between homogeneous cointegration vectors and applies the AR coefficient but does not allow multiple externalities in the cointegration vector (Asteriou and Hall, 2007).

This section looks at the cointegration analysis across countries. It is examined whether the stable COVID-19 data is related to the whole country in the long term. Pedroni and Kao cointegration tests are performed on the data.

Table 3 gives the result of Pedroni cointegration analysis. As a result of the analysis, it is observed that there is cointegration in 5 of the 7 groups. In the Pedroni test group, the majority reject the hypothesis H (0) there is no cointegration. It is observed that there is cointegration in the long run.

Table 3 shows the Kao cointegration analysis result. As a result of the analysis, the H (0) hypothesis of no cointegration is rejected and it is observed that there is cointegration in the long term ($p<0.05$).

Table 2. Unit Root Test

	Number of Cases (0)		Number of Deaths (0)		Number of Vaccinations (0)	
	Statistic	**p**	**Statistic**	**p**	**Statistic**	**p**
Levin, Lin& Chu	(-15,47)	0.000	(-5,389)	0.000	(-42,599)	0.000
Im, Pesaran and Shin W-stat		0.000	(-35,524)	0.000	(-320,08)	0.000
ADF- Fisher Chi-square	1580.71	0.000	2851.39	0.000	3527.0	0.000
PP Fisher Chi-square	9722.94	0.000	14711.3	0.000	7996.78	0.000

Table 3. Pedroni and Kao Cointegration Analysis

Pedroni Cointegration Analysis							
	Statistic	**p**	**Statistic**	**P**		**Statistic**	**p**
Panel v-Statistic	23.205	0.0000	-2.584.971	0.9951	Group rho-Statistic	-6,7231	0.0000
Panel rho-Statistic	-34,1650	0.0000	-3.268.280	0.0005	Group PP-Statistic	0.430213	0.6665
Panel PP-Statistic	-25,0515	0.0000	-6.100.111	0.0000	Group ADF-Statistic	13.73414	1.0000
Panel ADF-Statistic	-19,7365	0.0000	8.135236	1.0000			
Kao Cointegration Analysis							
					t	p	
					(-15,4645)	0.000	
Residual variance					0.000		
HAC variance					0.001		

Overall Comparison of PMG ARDL Test

PMG ARDL (Pooled Mean Grup Autoregressive Distributed Lag) consists of combining the coefficients of the variables and taking their average. In addition, it ensures that all effects of cross-sectional unit variables are the same in the long run, while allowing them to be specific to units in short panels. In PMG analysis, it allows the assumption of homogeneity for long-term coefficients and the assumption of heterogeneity in short periods (Peseran, 1999; Çoban, 2020; Güler and Özyurt, 2011; Fonchamnyo et al., 2021).

PMG analyzes the ARDL model with the time series specified for each of the countries to be analyzed, and also has the additional advantage of showing the results of the variables in both the short and long term (Pesaran, 1999).

Under this heading, the results of the PMG ARDL analyses for non-free, semi-free, and free countries as well as for the overall comparison of countries are presented. The results of the analyses of country groups are explained in detail under each heading. Under this heading, the long-run results of the PMG ARDL tests are shown in Table 4. Seeing the country groups of the PMG ARDL test together provides a more comfortable interpretation of the analysis. In the table, the reflections of the number of cases and vaccines, which are independent variables, on the number of deaths, which is the dependent variable, were measured with the PMG ARDL test. Long-term results are given in the general comparisons of non-free, free, and semi-free countries and countries.

When Table 4 is analyzed, it is observed that each 0.1% increase in the number of vaccines in non-free countries leads to a 0.03% decrease in mortality and it is observed that each 0.1 percent increase in the number of cases causes a 0.85 percent increase in mortality non-free countries. In semi-free countries, it was concluded that each 0.1 percent increase in the number of vaccines caused a 0.55 percent increase in mortality. . For every 0.1 percent increase in the number of cases, there is a 0.10 percent decrease in mortality in semi-free countries. According to the result of the analysis for free countries, it was determined that each 0.1% increase in the number of vaccines caused a 0.07% decrease in mortality rate. It was observed that each 0.1 per cent increase in the number of cases corresponded to a 0.52 percent increase in mortality in free countries. In the comparison of countries, it was concluded that each 0.1 percent increase in the number of vaccines corresponded to a 0.06 percent decrease in mortality. It was observed that each 0.1 percent increase in the number of cases caused a 0.53 percent increase in mortality.

When the PMG ARDL comparison was made between country groups, the highest effect of each 1% increase for the vaccine on deaths was observed in non-free countries (-0.03%), general comparison of countries (-0.06%), free countries (-0.07%) and semi-free countries (0.55%), respectively. For each 1% increase in the number of cases, the most significant effects on country groups were observed for non-free countries (85%), countries in general comparison (53%), free countries (52%), and semi-free countries (-0.10%).

Discussion And Conclusion

As a result of the PMG analysis, in the general comparison of non-free countries, free countries and countries among the country groups included in the analysis, it was observed that the increase in vaccination reduced deaths and also the increase in cases increased the death rate. In countries that are not free, vaccination is mandatory. During the pandemic period, people who were not vaccinated were prevented from entering public institutions, social areas, exams and transportation centers. This obligation has increased the reducing effect of vaccination rates on death rates in non-free countries. In their studies on South Asian countries, which are in the group of free countries, it was concluded that Asian countries follow stricter policies and are interested in both case and death rates, and both economic incentives and health incentive packages stop the progress in the number of cases (Cheng Yang et al. 2021; Khan et al., 2021). We see the vaccination studies, social support and case reduction measures that countries will take in many areas. Khedhiri (2023), who examined mask distance and hygiene reminders, case and death rates of MENA countries, does not mention that even if the regions

Table 4. PMG ARDL General Table of Countries

Dependent Variable	Number of Vaccines	Number of Cases
Number of Deaths According to Country Groups	Coefficient	Coefficient
Not Free Countries	-0.03	0.85
Semi-Free Countries	0.55	-0.10
Free Countries	-0.07	0.52
Comparison of Countries	-0.06	0.53

are the same, the case and death rates of countries with different policies differ.

In free countries, the decrease in death rates after the first phase was implemented increased the public's tendency towards vaccination. The increase in non-vaccination as a result of trust in the vaccine has led to a decrease in death rates. Piovani et al. In the study conducted in OECD countries, the measures taken by the countries in the first wave to prevent cases (closing schools, closing public areas) caused the number of cases to decrease and thus the deaths to decrease at the same rate. In this study, which has similar results to our study, we observe the relationship between the number of cases and the death rate of many liberal countries, while only one of the 20 countries is a non-free country (Turkey). In the study conducted by Münir and Münir (2023) with 153 countries, they concluded that civil libertarian countries provide additional protection against vaccine protection. In addition, Greyling and Rossouw (2022) concluded in their studies of anti-vaccine individuals in the north and hemisphere that the increase in the vaccination rate and the decrease in death rates showed a positive and pro-vaccine attitude in the public. In countries with democratic freedom, the case rate is higher but the death rate is lower.

It is observed that in the semi-free country group, the increase in vaccination rates is equivalent to the increase in the death rate. The rate of case numbers and deaths are inversely proportional. In the category of semi-free countries, studies on India's vaccination efforts and Covid-19 management process show that although there is an increase in the number of cases in India, the death rates are not as high as in South Asian and Western countries. The reason for this is the young population, genetic factors and the 21-day complete lockdown experienced at the beginning of the pandemic process (Jain et al., 2020). Mexica, on the other hand, has ensured reliable adoption of the vaccine rate by the public in the studies conducted, and according to the number of cases, while the deaths of the middle-aged population increased in the studies conducted in 2020, 2021 and 2022, decreases in cases and deaths were observed in general (Parra et al., 2023). In the study, it was concluded that case and death rates affect each other. Similar results were obtained in the studies carried out. In addition, Lazarus et al., (2021) compared 19 countries in their study and concluded that vaccines negatively affect death rates, and it is also observed that the public's tendency towards vaccination increases with employer and government support.

The following are suggested from the conclusions of the study: As a result of immunization studies, it is observed that people have difficulties in accessing the vaccine. Policies aimed at increasing the number of vaccinations, especially in semi-free countries, should be followed. In this study, civil and political freedom scores were examined. In future studies, the freedom index should also be examined with its sub-dimensions.

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