Research Article

INVESTIGATION THE EFFECT OF GEOGRAPHICAL ISOLATION ON COVID-19 PANDEMIC IN TERMS OF ISLAND COUNTRIES

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Abstract

Contact monitoring and isolation are also highly important in the COVID-19 pandemic as in other outbreaks. In this study, it is aimed to analyze the geographical features of the island countries, which are separate from the mainland, in contact monitoring and isolation with data. The study comprises island countries. Analysis results show that there is a positive, significant correlation between the death/case rate and 65+ population (r= .332) ($p<0.05$). Regression analysis was used to reveal the effect of 65+ population and the total population on the death/case rate. The analysis results show that the model established for the effect of 65+ population on the death/case rate is statistically significant ($F=4.214$; $p<0.05$). It was determined that 65+ population has a positive effect on the death/case rate ($\beta=0.302$). In the model, the correlation coefficient of 65+ population to explain the death/case rate is 0.302. The effect of explaining the death/case rate is 9.1%. In terms of the total population, there is no statistical significance. Studies have shown that countries separate from the mainland and use the distinctive feature of their geographical features in contact monitoring and isolation have reduced or stopped the transmission rate of COVID-19 with the measures they have taken.

Keywords: Geographical Isolation, COVID-19, Island Countries

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Coğrafi İzolasyonun COVID-19 Salgın Sürecindeki Etkisinin Ada Ülkeleri Açısından İncelenmesi

Öz

Diğer salgınlarda olduğu gibi COVID-19 salgınında da temas izleme ve izolasyon oldukça önemlidir. Bu çalışmada, anakaradan ayrı olan ada ülkelerinin coğrafi özelliklerinin temas izleme ve izolasyon halinde verilerle analiz edilmesi amaçlanmaktadır. Çalışma ada ülkelerini kapsamaktadır. Analiz sonuçları ölüm/vaka oranı ile 65+ nüfus ($r= .332$) arasında pozitif ve anlamlı bir ilişki olduğunu göstermektedir ($p<0.05$). 65+ nüfus ve toplam nüfusun ölüm/vaka hızı üzerindeki etkisini ortaya çıkarmak için regresyon analizi kullanıldı. Analiz sonuçları, 65+ popülasyonun ölüm/vaka oranı üzerindeki etkisi için kurulan modelin istatistiksel olarak anlamlı olduğunu göstermektedir ($F=4.214$; $p<0.05$). 65+ popülasyonun ölüm/vaka oranını olumlu etkilediği belirlendi ($\beta=0,302$). Modelde 65+ popülasyonun ölüm/vaka oranını açıklamaya yönelik korelasyon katsayısı 0.302'dir. Ölüm/vaka oranını açıklamanın etkisi %9.1'dir. Toplam nüfus açısından istatistiksel bir anlam ifade etmemektedir. Çalışmalar, anakaradan ayrı olan ve coğrafi özelliklerinin ayırt edici özelliğini temas izleme ve izolasyonda kullanan ülkelerin, aldıkları önlemlerle COVID-19 bulaşma oranını azalttığını veya durdurduğunu göstermiştir.

Anahtar Kelimeler: Ada Ülkeleri, Coğrafi İzolasyon, COVID-19

INTRODUCTION

So far, we know that coronaviruses have caused diseases in many animals, including camels, cats, cattle, and bats, while seven HCoV (Human coronaviruses) are known that can infect humans. While some of these viruses emerged in the mid-1960s, some encountered in the last thousand years (Cascella *et al.,* 2020). While novel coronaviruses occurred in dissimilar diseases such as severe acute respiratory syndrome (SARS) in 2002 and the Middle East respiratory syndrome (MERS) in 2012 (Bosch *et al.,* 2004; Groot *et al.,* 2013), in late December 2019 a new case of coronavirus was observed in cases of pneumonia in Wuhan, one of the major cities of China's Hubei province (Cascella *et al.,* 2020; Huang *et al.,* 2020; Li *et al.,* 2020; Lu *et al.,* 2020). Within a few weeks, the virus spread rapidly in Wuhan city, and national and international travels of infected people during the Chinese New Year holidays sped up the spread of the infection to the World (Heymann & Shindo, 2020). This spreading coronavirus was temporarily called as the new Coronavirus (2019-nCoV) (Lu *et al.,* 2020; Cascella *et al.,* 2020), and later experts from the International Committee for the Taxonomy of Viruses (ICTV) called the virus as SARS-CoV-2 due to its similarity to the SARS epidemic (Cascella *et al.,* 2020). On January February 30, 2020, the WHO declared SARS-CoV-2 a Public Health Emergency of international importance (Zheng *et al.,* 2020), and on February 12, 2020, named the disease Coronavirus disease 2019 (COVID-19) (WHO, 2020). Although COVID-19 causes a mild illness such as seasonal flu in most infected people, older people have a higher risk of developing more important complications in those with diabetes, lung disease, and other chronic diseases (Heymann & Shindo, 2020; CDC, 2020), and can cause death because of progressive respiratory failure (Zhou *et al.,* 2020).

As with other respiratory pathogens, a significant effort is needed to control pandemics (Li *et al.,* 2020), because viruses transmit from person to person through respiratory droplets from coughing and sneezing (Cascella *et al.,* 2020. It is especially important to apply the measures to groups at risk (Li *et al.,* 2020). In this process, low levels of mortality will be the highest priority for individuals (Andersan *et al.,* 2020). Indeed, it is estimated that this process will take time and that the possible vaccine production will not be for another 1 to 18 months (Andersan *et al.,* 2020). By applying measures only to observed cases (treatment, isolation, etc.) in the control of pandemics of infectious diseases, resources are used efficiently but are not sufficient. The spread of control to the entire population (such as mass vaccination, prophylactic treatment) is highly costly and not always possible (Klinkenberg *et al.,* 2006). Therefore, the furthest opportunity to ease the process now is voluntary and mandatory quarantine methods, closure of educational institutions, closure of the places where the infection is detected, prevention of meetings, and isolation of people and cities. With these measures, it is ensured that the pandemic continues to be stable and that the peak point will be moved into the future (Andersan *et al.,* 2020). Contact tracking plays a critical role in controlling emerging pandemics (Hellewell *et al.,* 2020; Klinkenberg *et al.,* 2006; Peak *et al.,* 2017). As a matter of fact, in the SARS epidemic and smallpox that started in 2003 (Glasser *et al.,* 2011), similar isolation methods could be controlled (Klinkenberg *et al.,* 2006). The importance of natural isolation is evident in the pandemic that started on 12 December 2019 and led to 6,057,853 laboratory-approved cases, with 371166 deaths until 1 June 2020 (WHO, 2020).

In this context, it is understood that isolation is a crucial issue in the fight against pandemics, and the risk of contamination can be reduced to a minimum, especially with the isolation of cities. After the 29 January 2020, when the first case in Italy was seen, people traveled to other cities and increased the speed of transmission and spread of the virus and weakened its controllability. The importance of the isolation of the town is obvious, and it is thought that the island countries may be more helpful according to mainland countries when viewed from a geographical perspective. In this respect, we carried this study out to examine the situation of island countries in terms of case death rates in the COVID-19 pandemic process and to compare with some variables (population, population over 65, the death/case rate).

1.METHODS

This paper seeks to reveal whether there is a significant relationship between the death/case rate and variables. The sample selection method was not used in the investigative. All island countries in the world are included in the research. The data were collected from WHO (2020), World Bank (2020), and the government dataset of the countries for some data not obtained from WHO and World Bank. The data were analyzed by SPSS 22.0. To analyze the data, descriptive statistics, as well as correlation analysis and regression analysis, were used. The appropriateness of the distribution of variables was analyzed by the Shapiro-Wilk test. The analyses were carried out within the reliability range of 95%.

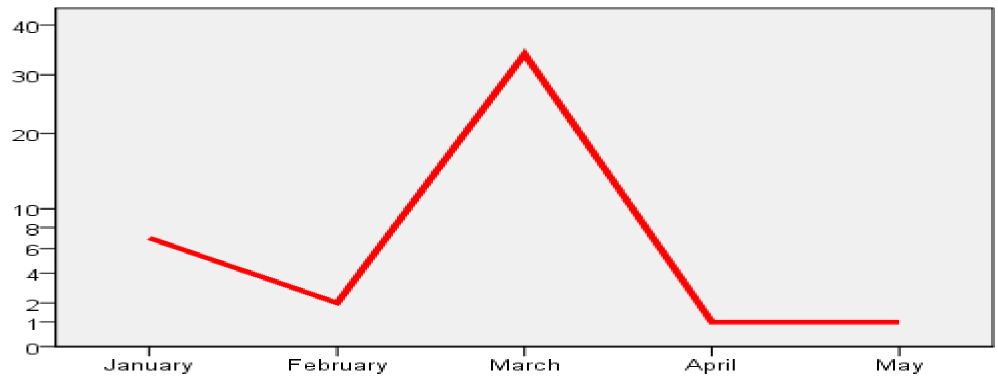
2.RESULTS

Table 1. Descriptive Statistics

Variables	N	Min	Max	Mean
Population	55	11508**	267,663,435*	13,003,399
Number of Cases	44	8	274,766	10176
Death	44	1	38,489	1013
Death/Case Rate	44	.00	.14	.0295
Case/Population Rate	55	.000	.07	.00084
65+ population	55	2,00	28,00	9,4225

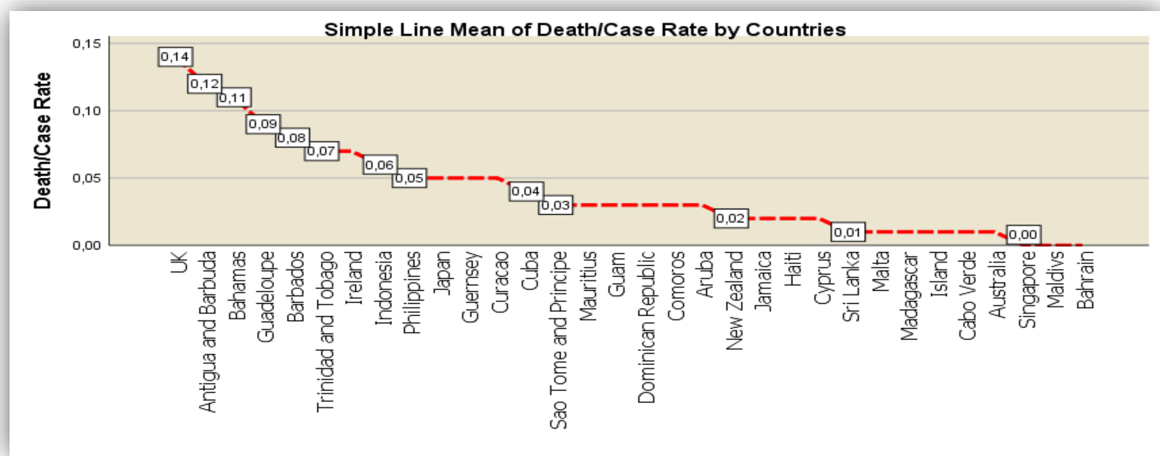
In the above table, Indonesia* is the country with the most populous population among the island countries and is also ranked fourth in the world. Japan is 10th in the world population and 13th in the Philippines. The country with the lowest population in the world is Tuvalu **. Although the population of the Faroe Islands over 65 is the 5th among the island countries, there are no deaths with 187 cases. Considering the case/population rate, Bahrain has the highest rate among island countries (.007). Looking at the population rate over 65, Bahrain has the lowest proportion (.02), while Japan has the highest rate (.28). There were no cases reported by WHO in Kiribati, Vanuatu, Tuvalu, Tonga, Solomon Islands, Samoa, Palau, Nauru, Micronesia, Marshall Islands, and American Samoa. There were no cases reported by WHO in Kiribati, Vanuatu, Tuvalu, Tonga, Solomon Islands, Samoa, Palau, Nauru, Micronesia, Marshall Islands, and American Samoa. Faroe Islands, French Polynesia, St. Vincent, and the Grenadines, Timor-Leste, Grenada, New Caledonia, Fiji, Dominica, St. Although there were cases in 11 countries with Kitts and Nevis, Greenland, Seychelles, and Papua New Guinea, no deaths were found.

Figure 1. The Number of Countries where the First Case was seen by Months



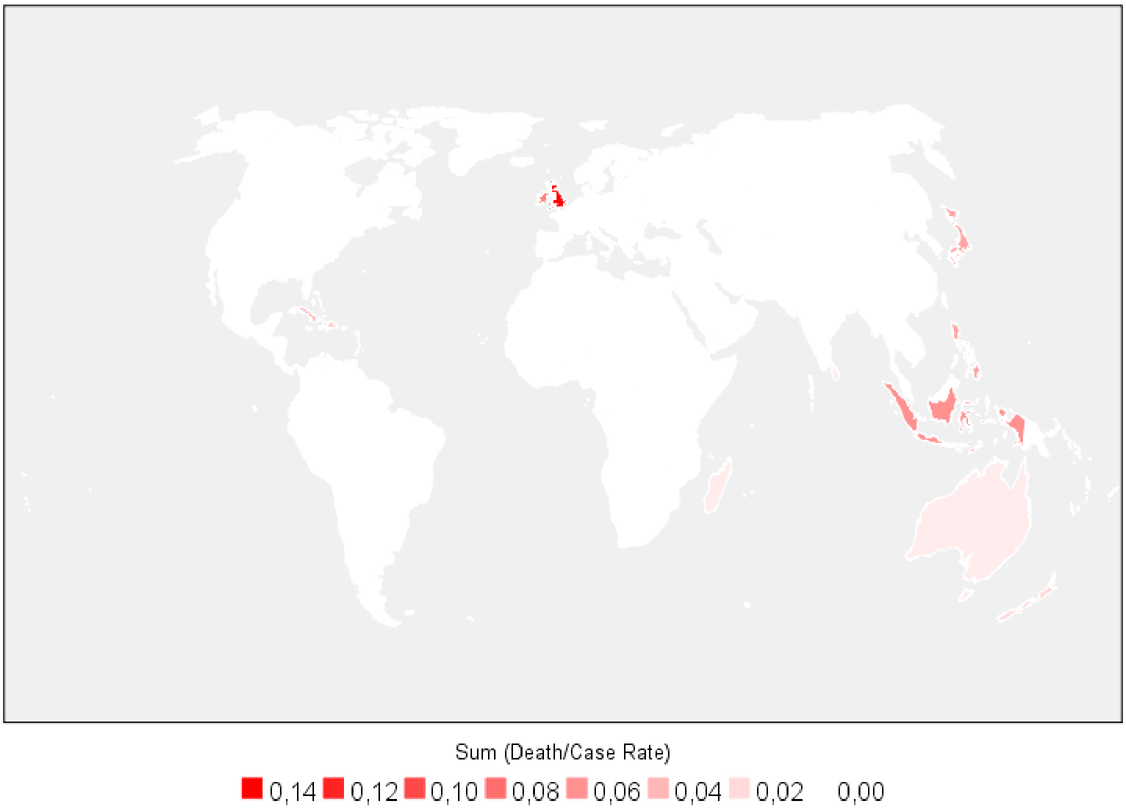
Among the island countries, the first case occurs in Japan on January 14, 2020, and the last case on the Comoros Islands on May 1, 2020. When you look at the history of cases in many countries, it is clear that there have been no cases for a long time. There were no cases in Kitts and Nevis as of 21.04.2020, in Dominica as of 11.04.2020, in Papua New Guinea as of 23.04.2020, in the Faroe Islands as of 24.04.2020 and no deaths occurred in any of these countries.

Figure 2. The Death/Case Rate According To the Countries



The above chart shows no cases, no deaths, and countries with a death/case rate of 0 are not shown. Among the 56 islands, there were no cases in 11 countries, and England ranked first (at .14) in the rate of death/case. Bahrain is the lowest country in the death/case rate (.0017). England, which is the first in the case/death rate, is in the fourth place (.18) in 65+ population.

Figure 3. The Density of Countries According To the Death/Case Rate in the World Map



Looking at the intensity of death/case rate as above figure, although the island density is high in the Far East countries, the death/case rates are quite low.

Table 2. Correlation Analysis among the Variables

Variables		Population	Death/Case Rate	Case/Population Rate	65+ population
Population	r	1,000	.269	.099	.046
	p	.	.078	.472	.740
	N		44	55	55
Death/Case Rate	r		1,000	-.009	.324*
	p		.	.953	.032
	N			44	44
Case/Population Rate	r			1,000	.222
	p			.	.104
	N				55
65+ population population	r				1,000
	p				.

p=Significant Value
r= Correlation Coefficient

Spearman correlation analysis was used to reveal the correlation among variables (Table 2). Analysis results show that there is a positive, significant correlation between the death/case rate and 65+ population (r= .332) (p<0.05) and between the death/case rate and the population (r= .295) (p<0.05).

Table 3. The Analysis of Simple Linear Regression

Dependent variable	Independent variable	R	R^2	Adj.R^2	B	Coefficients Standard error	Beta (β)	t	F	p
The death/case rate	**Constant**				**.009**	**.011**		**.856**		
	65+ population	.302	.091	.070	.002	.001	.302	2,053	4,214	.046
	Constant				**.026**	**.006**		**4,728**		
	Total population	.258	.066	.044	1,965	.000	.258	1,728	2,985	.091

Regression analysis was used to reveal the effect of 65+ population and the total population on the death/case rate (Table 3). The analysis results show that the model which was created for the effect of the 65 aged + population on the death/case rate is statistically significant (F=4.905; p<.05). It was seen that 65+ population has a positive effect on the death/case rate (β=0.302). In the model, the correlation coefficient of 65+ population to explain the death/case rate is 0.302. The effect of explaining the death/case rate is 9.1%. In terms of the total population, there is no statistical significance. In this context, population does not affect the death/case rate.

3.DISCUSSION AND CONCLUSION

It is a fact that the rules of isolation have changed our social life (Erdoğan Tarakçı *et al*., 2021; Baş & Demirkıran, 2020; Bayrakçı, 2020). It is a fact that the rules of isolation have changed our social life. This change in our social life has spread to all areas of our lives. People have had to change many of their habits. One of them is that the geographical area they live in is more isolated from people and in a more secluded place.

Case isolation and contact tracking are widespread intervention methods used to control infectious diseases (He, 2020; Demirkıran *et al*., 2021). It is also known to have been adopted in Black Death Disease, which did not have a valid treatment method or vaccine in the middle of the century (Yan *et al.,* 2007).

Studies associated with the SARS outbreak highlight the widespread importance of decent isolation of symptomatic patients in controlling an outbreak (Chowella *et al.,* 2003; Fraser *et al.,* 2003). With the timely isolation of patients who have become symptomatic not only in SARS but also in epidemics of Ebola virus, which pose grand threats to global health security, effective contact monitoring is critical to limit spreading (Olu *et al.* 2016).

As in other pandemics, it is clear that contact monitoring and isolation are significant in the COVID-19 pandemic process. The population of countries may be the main determining criterion in the increase in the number of cases. As a matter of fact, in our study, there are countries with a high population (such as Indonesia, Japan) and countries with a very low population (such as Tuvalu, Nauru, Palau) among the island countries. Despite the high population density of some countries, the low mortality/case rate may indicate how successful countries are in their contact monitoring and isolation measures. Singapore is the third country among these successful countries, reporting COVID-19 cases in the world (Lu *et al.,* 2020) and which ranks 12th in terms of population in the island countries, taking border measures with contact detection and contact monitoring, introducing fire and health screening to passengers arriving at land, air and sea control points, predicting and introducing travel restrictions that it may be risky to certain mainland countries (Lee *et al.,* 2020). As of 01.06.2020, it can be said that in the pandemic, where the mortality rate is 6.1% in the world (WHO, 2020), Singapore is successful with one (0.1 ‰) death/case rate. Increased education (especially health personnel) and infectious infrastructure and improved preparations on a national basis have contributed to the achievement of this success after the 2003 acute respiratory syndrome (SARS) epidemic (Chan *et al.,* 2020). In Singapore, it has become mandatory to report suspected and confirmed COVID-19 cases to the Ministry of Health, and this demonstrates the importance of contact monitoring and isolation in the fight against the epidemic (Wei *et al.,* 2020).

Japan, which shown as another accomplished country, brought its citizens back from Wuhan at the beginning of the COVID-19 epidemic and launched border control arrangements. On the other hand, Japan has given priority to the restriction policy to prevent people from gathering and socializing. On April 7, 2020, the government introduced social removal measures, instructed residents to avoid unnecessary trips, and issued a 1-month "state of emergency" order that allowed them to close businesses and facilities. Besides, the widespread use of face masks and a widespread greeting tradition rather than a handshake also played a role in slowing down the COVID-19 spread in Japan (Lu *et al.,* 2020).

Although it has the highest rate among the Bahrain island countries in the case/population rate, it has the lowest proportion in the population above 65 years of age. Bahrain is the minimum country in the rate of death/incident, and it can be said that the underlying reason is the country with the lowest population over 65 years of age. It can be said that the reason why Britain is in the first place in the rate of death/case rate is the high population over 65. As a matter of fact, in the analyzes conducted in our study, it was found that there was a significant relationship between the population above 65 years of age and the mortality/case rate (r =. 332) and at the same time, it was concluded that the population above 65 years of age had a positive effect on the mortality/case rate. This analysis confirms the study result ($\beta = 0.307$).

In general terms, island countries are listed at the end in terms of death/incidence rate. Studies have shown that countries that are independent from the mainland and use the distinctive feature of their geographical features in contact monitoring and isolation have reduced or stopped the transmission rate of COVID-19 with the measures they have taken. In this respect, it can be said that island countries are more advantageous than mainland countries.

Restrictions of the Study

The study is limited to countries bordering the mainland.

Declarations

Availability of data and material

The datasets generated during and/or analysed during the current study are available from the corresponding author on.

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Conflict of Interest

No conflict.

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