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ICOMEP Special Issue
"National and Global Health Policies during and post-Pandemic Period"

The aim of this special issue is to compile papers investigating the local and global health policies during and after the COVID-19 period.

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From the Editors

Similar to epidemics such as Ebola and Sars, which had global and regional effects, the Covid-19 pandemic was recognized by chaos and panic due to the ignorance of how to fight with it. Amid panic and bewilderment, the disease quickly spread throughout the world. The fact that the source of the epidemic could not be determined early, the speed of spread of the disease and its unpredictable effects caused to worsen the disease rapidly. If the necessary quarantine measures had been taken strictly when the pandemic was first detected and the mobility of people in China had been restricted quickly, perhaps the global impact of the epidemic would not have been so severe. It is often stated that the reason why Italy suffered heavy from the pandemic in the first months of the pandemic, is that the Chinese workers employed in the textile and fashion industry brought the disease to Italy, especially with their periodic travels to their homeland. It is revealed that more than 30 million people have been diagnosed with the disease in 2020 alone, and more than 1 million deaths from the Covid-19 virus have been recorded. In 2021, the number of cases increased by more than 15 times and reached to 468 million infected people and the number of deaths due to the corona virus sharply increased to 6.07 million all over the world. By these data, the Covid-19 pandemic has caused much greater devastating effects than major environmental disasters and terrorist attacks.

The failure to take joint proactive measures that bring rapid, strong and international consensus in the early periods of the pandemic turned the pandemic to a humanitarian crisis. Political frictions between countries, the inability of some countries to understand the severity of the epidemic, the inadequate macroeconomic performance and health infrastructure of local economies, and even the economic and political competition between countries caused lack of control and faster spread of the pandemic. Unfortunately, the long-standing financial fragility of developing economies, lack of coordination, indecisive and inconsistent policies on combat strategies, as well as delays in vaccination processes have almost prepared the environment for the aggressive spread of the virus. In these countries, there have been problems in many sectors. Especially health and education services, economic support and vaccination programs have been quite inadequate, and individuals have been infected with the disease many times since effective protection techniques could not be applied.

Therefore, the number of people who lost their lives due to the Covid-19 pandemic and number of infected people with respect to the population were much higher in these countries.

Editörlerden

Kendisinden önce küresel ve bölgesel etkileri olan Ebola ve Sars gibi salgınlara benzer şekilde Covid-19 pandemisi de tüm dünya tarafından önce kaos ve nasıl mücadele edileceğini bilmezliğin getirdiği bir kargaşa ve panik ile karşılandı. Panik ve şaşkınlığın arasında hastalık hızla tüm dünyaya yayıldı. Salgının kaynağının baştan tespit edilememesi, hastalığın yayılma sürati ve etkilerinin öngörülememesi hastalığın etkilerinin hızla kötüleşmesine yol açtı. Pandemi ilk görüldüğünde gerekli karantina tedbirleri katı şekilde alınabilseydi ve Çin'de insanların mobilitesi hızlı şekilde kısıtlanabilseydi belki salgının küresel etkisi bu denli ağır olmayacaktı. Pandeminin başladığı ilk aylarda İtalya'nın salgından dolayı ağır kayıplar vermesinin sebebinin, özellikle tekstil ve moda sektöründe çalışan Çinlilerin ülkelerine yıllık izin gerekçesiyle yaptıkları seyahatlerle hastalığı İtalya'ya getirmeleri olduğu sıklıkla dillendirilmektedir. Resmi açıklamalara göre, sadece 2020 yılında 30 milyondan fazla insanda hastalık tespit edilmiş ve 1 milyondan fazla Covid-19 virüsü kaynaklı ölüm kayda geçirilmiştir. 2021 yılında ise vaka sayısı 15 kattan fazla artarak 468 milyon kişiye ve salgına bağlı ölüm sayısı 6.07 milyona yükselmiştir. Salgın ortaya koyduğu etkileri dolayısıyla büyük çevre felaketlerinin ve terörist saldırıların sebep olduğundan çok daha büyük küresel zararlara yol açmıştır.

Hızlı, güçlü ve uluslararası uzlaşı gerektiren ortak proaktif tedbirlerin kısa sürede alınamaması salgının maalesef bir insanlık krizine dönüşmesine yol açmıştır. Bu gecikmenin nedenleri arasında ülkeler arası politik sürtüşmeler, kimi ülkelerin salgının ciddiyetini yeterince anlayamaması, yerel ekonomilerin salgınla mücadele için makroekonomik güce ve etkin sağlık altyapısına sahip olmaması ve hatta pandemi üzerinden sürdürülen ülkeler arası ekonomik ve siyasi rekabet önemli yer tutmaktadır. Maalesef ki gelişmekte olan ekonomilerin zaten uzun süreden beri devam eden finansal kırılganlıkları, koordinasyon yetersizlikleri, mücadele stratejileri konusunda kararsız ve tutarsız politikalar yanında aşı uygulamalarında yaşanan gecikmeler salgının agresif şekilde yayılmasına adeta ortam hazırlamıştır. Bu ülkelerde başta sağlık ve eğitim hizmetleri olmak üzere birçok alanda sorunlar yaşanmış, ekonomik destek ve aşılama programlarında oldukça yetersiz kalınmış, yeterli korunma teknikleri uygulanamadığından bireyler defalarca kez hastalığa yakalanmıştır. Bu nedenle salgın dolayısıyla ve salgına bağlı komplikasyonlarla yaşamını yitiren insan sayıları bu ülkelerde nüfusa oranla çok daha yüksek olmuştur. Ancak, başta bazı Afrika ülkeleri olmak üzere kimi gelişmekte olan ülkeler vaka ve ölüm sayılarını

Nevertheless, some developing countries, especially some African countries, made false statements that the number of cases and deaths were lower than they actually were, and this misinformation caused the disease to spread more rapidly in those regions.

Addressing the pandemic, whose effects will continue for many years, only with its medical dimension will lead to the ineffectiveness of the policies to be put forward to solve this complex global problem. By keeping these in mind, at the online ICOMEP (International Conference of Management, Economy and Policy) with the theme of *"Covid-19 Pandemic with its Economic and Social Dimensions"* which was held on 16-17 October 2021, the Covid-19 pandemic was analyzed in different perspectives such as health management, economy, finance, vaccination and environmental effects. The best papers were entitled to be published in Konuralp Medical Journal's ICOMEP Special Issue with the theme *"National and Global Health Policies during and after the Pandemic Period"* after blind reviewing processes. In the papers published in the special issue, different aspects of the outbreak, from the competence of e-government performance during the Covid-19 pandemic to the performance of health services provided to the elderly, from the effects of the quarantine precautions on the environment to the vaccine economy, were handled with a sensitive scientific perspective and important policy recommendations were provided for the post-pandemic period. We hope that reseacrhers, bureaucrats and policy makers from the relevant field will benefit from the Special Issue, which will make an important contribution to the literature.

We owe a debt of a gratitude to the rector of Düzce University, Prof. Dr. Nigar Demircan Çakar, Vice Rectors Prof. Dr. Idris Şahin and Prof. Dr. Mehmet Akif Öncü, Assist. Prof. Dr. Zerrin Gamsızkan, the chief editor of Konuralp Medical Journal for their precious contributions in the publication process of our Special Issue. We also send our special thanks to our local and international authors who shared their valuable papers to be published in our special issue.

This special issue is dedicated to the health workers we lost due to the pandemic. We will never forget their superhuman effort to save the humanity.

gerçekte olduğundan daha düşük seviyelerde olduğu yolunda açıklamalar yapmışlar ve bu yanlış bilgilendirme ile hastalığın daha süratle yayılmasına yol açmışlardır.

Etkileri uzun yıllar devam edecek olan pandeminin sadece tıbbi boyutu ile ele alınması bu girift küresel sorunun çözümünde ortaya konacak politikaların nakıs kalmasına yol açacaktır. Bu farkındalıkla, 16-17 Ekim 2021 tarihleri arasında çevrimiçi olarak gerçekleştirilen *"Ekonomik ve Sosyal boyutları ile Covid-19 Pandemisi"* temalı ICOMEP (Uluslararası Yönetim, Ekonomi ve Siyaset Kongresi) kongresinde Covid-19 pandemisi tıp dışında sağlık yönetimi başta olmak üzere, ekonomi, finans, siyaset, aşı ve çevre gibi farklı alanlarda çok sayıda değerli bilimsel tebliğ ile ele alınmıştır. Bu eserler arasında yüksek bilimsel kaliteye sahip olan çalışmalar, kör hakem değerlendirmeleri sonucunda Konuralp Medical Journal'un *"National and Global Health Policies during and after the Pandemic Period"* konulu ICOMEP Özel Sayısı'nda yayınlanmaya hak kazanmıştır. Özel sayıda yayınlanan eserlerde Covid-19 pandemisinde e-devlet uygulamalarının yetkinliğinden salgında yaşlılara sunulan sağlık hizmetlerinin performansına, salgının çevre üzerindeki etkilerinden aşı ekonomisine kadar salgının çok farklı yönleri hassas bilimsel bir bakış açısı ile ele alınmış ve pandemi sonrası döneme ilişkin önemli politika önerilerinde bulunulmuştur. Literatüre önemli bir katkı sağlayacak bu Özel Sayı'dan başta bilim insanları olmak üzere, ilgili alandan bürokratlar ve politika yapıcıların da istifade etmelerini ümit ediyoruz.

Bu değerli eserin gerçekleşmesinde kıymetli katkılarını esirgemeyen başta Düzce Üniversitesi Rektörü Prof. Dr. Nigar Demircan Çakar hocamıza, Rektör Yardımcılarımız Prof. Dr. İdris Şahin ve Prof. Dr. Mehmet Akif Öncü hocalarımıza, Konuralp Medical Journal Dergisi'nin Baş Editörü Dr. Öğr. Üyesi Zerrin Gamsızkan hocamıza ve elbette gerek yurt içi ve gerekse yurt dışından özel sayımıza kıymetli eserleri ile katkı sağlayan değerli yazarlarımıza şükranlarımızı arz ederiz.

Bu eser, salgın dolayısıyla ebedi aleme irtihal eden ve asla unutmayacağımız değerli sağlık çalışanlarına ve salgında kaybettiğimiz sevdiklerimize ithaftır.

Prof. Dr. Ayfer Gedikli
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INVITED REVIEW

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The Wealth of Nations during the Pandemic: The Vaccine Equity

ABSTRACT

Aggressive global dissemination of the coronavirus indicated the urgency of the development of vaccines at an unprecedented rate and scale. The limited production and short supply of vaccines which were reserved mostly for the advanced economies were the greatest problems of 2021. For emerging economies, this timeline will stretch to late 2022 or early 2023. As a part of systematic immunization programs, the development, licensing, and implementation of the vaccines against the Covid-19 virus started to address health service inequalities among countries. While on one hand vaccination is regarded to be one of the most cost-effective interventions in public health during the pandemic, on the other hand, the introduction and sustainable supply of vaccines needed to be supported and ensured by decision-makers and governments. Due to the weak economic conditions of developing countries, they could not provide enough financial and health support to their citizens during this period. However, since the global GDP loss from not inoculating all countries is higher than the cost of manufacturing and distributing vaccines globally, there has been a growing demand to international cooperation to have global vaccination without omitting any countries.

This paper focuses on the economic and social costs and benefits of vaccinations during the Covid-19 pandemic period in advanced, middle, and low-income countries. Accordingly, macroeconomic and social impacts of vaccination will be discussed and some policy suggestions will be put forth to get more benefits from the vaccination both for economic and health outcomes.

Keywords: Covid-19 Pandemic, Vaccine, Developing Countries.

Pandemi Döneminde Milletlerin Zenginliği: Aşı Eşitliği

ÖZET

Amaç: Koronavirüsün küresel ölçekte agresif bir şekilde yayılması, salgını kontrol altına almaya yönelik aşıların geliştirilmesinin aciliyetini ortaya koymuştur. Çoğunlukla gelişmiş ekonomiler için ayrılan sınırlı üretim ve aşı yetersizliği, 2021 yılının önemli bir kürsel sorunlarıydı. Gelişmekte olan ekonomiler için aşılanma takviminin 2022'nin sonlarına, hatta 2023'ün ilk aylarına kadar uzaması beklenmektedir. Bağışıklığı artırmaya yönelik uygulamaya konan programların bir parçası olarak, aşı geliştirme, lisanslama ve aşıların uygulanması, ülkeler arasındaki sağlık hizmeti kalite farkı, aşı eşitsizliğinin derinliğini ortaya koymuştur. Aşılama, bir yönüyle pandemide halk sağlığının korunmasında en düşük maliyetli stratejilerden biri olarak kabul edilirken, diğer yönüyle aşıların tanıtımı ve sürdürülebilir tedarikinin karar vericiler ve hükümetler tarafından desteklenmesi ve sağlanması gerekmektedir. Gelişmekte olan ülkelerin zayıf ekonomik koşulları nedeniyle bu süreçte vatandaşlarına yeterli finansal ve sağlık desteği sağlayamamışlardır. Bununla birlikte, tüm ülkelerde aşılama yapamamaktan kaynaklanan küresel hasıla kaybı, aşıları küresel olarak üretme ve dağıtma maliyetinden daha yüksek olacaktır. Bu nedenle, hiçbir ülkeyi atlamadan küresel aşılamaya yönelik uluslararası işbirliğinin arttırılması hayati öneme haizdir.

Bu makale, yüksek, orta ve düşük gelirli ülkelerde Covid-19 pandemi döneminde aşılamanın ekonomik ve sosyal faydalarına odaklanmaktadır. Aşı eşitsizliğinin sadece sağlık boyutu ile değil, asinine küresel etkinliğini de önemli ölçüde zedeleyecek bir sorun olduğundan hareketle, aşılamanın makroekonomik ve sosyal etkileri tartışılacak ve aşıdan hem ekonomik hem de sağlık açısından daha fazla fayda sağlanması için bazı politika önerileri ortaya konulacaktır.

Anahtar Kelimeler: Covid-19 Pandemisi, Aşı, Gelişmekte Olan Ülkeler.

INTRODUCTION

The Covid-19 pandemic has created a devastating uncertainty shock – larger than the 2008 financial crisis and more similar in magnitude to the 1929 Great Depression. All of the countries were caught unprepared and unsuccessful to prevent the fast spread of the virus. The cost was very high. All countries had to experience not only uncertainties such as infectiousness, the lethality of the virus, prevalence, and the availability of antibody tests but also the financial panic due to shutdowns and economic contractions accompanying the infections and deaths. The medical authorities, bureaucrats and policymakers had just lockdown policies in their hands. It is surely beyond doubt that this policy was unsustainable. Thus, one year after the outbreak, the policymakers had to give a critical decision about turning back to normal lives. It was inevitable to initiate the economic activities for both economic and health needs. To continue health support to society, governments needed to have funds. Due to quarantine precautions, governments had to deprive themselves of the tax revenues which were the greatest sources of all public services including health services. The policymakers were actually between the two fires. There were great lockdowns, lack of government revenues, and economic constraints that will probably result in a great economic crisis on one side, and a growing spread and having more infected people due to initiating economic activities on the other side. To get rid of this vicious circle, vaccination was the best way to get out of the pandemic.

Many studies indicated that public health can provide a remarkable boost to economic growth which can create additional resources to invest in health. No doubt that healthy people tend to work more productive on job creation and technological progress, save more, and attract more investment to contribute to capital accumulation. Although health authorities only consider direct health benefits, economy authorities consider medical cost savings and care-related productivity gains. Moreover, in the long-term many social and economic outcomes such as decreasing fertility, macroeconomic stability, and improving educational performance are expected outcomes of immunization programs (1, 2).

Since wearing masks, good ventilation indoors, physically distancing and long-lasting curfews will not be enough to overcome the pandemic, equitable access to safe and effective vaccines is crucial to fight the coronavirus outbreak. They are expected to change the duration and lethality of the pandemic. Some of the international pharmaceutical companies initiated research to develop vaccines in the early days of the pandemic. However, it is to vaccinate every individual all over the world, not to just develop vaccines and keep them just for one's our benefit. Unless all nations receive vaccines and rollout to protect their population, the pandemic is not over (3).

WHO (6) expresses that *"No one is safe unless everyone is safe. Vaccine doses must be shared globally and immediately".* Nevertheless, poor countries are very vulnerable in getting equal vaccines. Although majority of the population of developed countries have been vaccinated, new variants of concern create new risks of infection not only unvaccinated people but also the people of vaccinated countries. Thus, vaccine equity will accelerate the end of the outbreak.

Providing sufficient healthcare services, economic support, and supplying enough vaccine are mostly related to the macroeconomic stability of local economies. Unfortunately, the pandemic hit the developing countries more than the developed ones not only through lack of the healthcare services but also vulnerable macroeconomic conditions (4, 5).

This paper is built on three key premises: First, we will explain a theoretical framework that underlines the economic and health benefits of vaccination. In this vein, the importance of vaccination and making the vaccine globally available will be expressed. Also, the role of vaccination in promoting population health and economic performance will be analyzed. This is necessary for not only health and moral issues but also for economic reasons since there may be a great economic cost in the absence of global vaccinations. Second, by benefiting global and country-specific data we will express the magnitude of these benefits. We will conclude with policy implications and policy recommendations for vaccination policies that are necessary for robust health and economic well-being.

Economic Effects of Vaccination: The prevention of outbreaks, diseases, and death by vaccines has been accepted as one of the most applicable health services. Particularly global commitments among the governments are necessary for pandemics since vaccination should be accepted as a fundamental human right (2). Hence, investing in immunization programs in advanced and developing countries increased in recent years. This interest led to more expenditure on immunization. Thus, microeconomic justifications and evaluations that compare the economic cost of implementing a vaccine program against the health and economic benefit of vaccination are necessary to convince national and multinational stakeholders. The fact is that vaccine reduces disease, death, disability, and inequity globally. Immunization programs improve the primary care infrastructure, decrease mortality in

childhood, and empower the workforce. The economic performance of workers can be better through lower morbidity, and mortality. Besides, since vaccination increases life expectancy, people can work and live longer and healthier which contributes the prosperity. However, especially in low-income countries, infectious diseases are still one of the greatest reasons for death. This shows that health inequalities are highly related to economic growth differences. Although disease control, elimination, and eradication can save both lives and billions of dollars, the allocation of vaccination is always limited in low-income countries (8).

Besides, the full benefit of vaccination is not only preventing disease but also has social and economic outcomes. Many theoretical and empirical studies in the literature indicated that health is one of the major drivers of economic performance and economic growth (8, 9, 10, 11, 12). Improving health quality may bring a positive impact on economic outcomes and social well-being. In their study, Ozawa et al. (10) included 73 low and middle-income countries to analyze the economic impact of vaccination during the period 2001-2020. The researchers concluded that vaccination could prevent more than 20 million deaths and saved approximately $350 billion in the cost of diseases. The prevention of death resulted in lifelong productivity gains of $330 billion. Vaccination also provided an $820 billion save in treatment costs.

European Council recognized the vaccination as an effective tool in public health (13). The effective tool stands for a cost-effective, safe, efficient, and evidence-based vaccination system. The positive effects of vaccination are both public health and economic terms. Reducing healthcare costs, reducing labor hours and productivity losses, and contributing to social and economic wellbeing are some of the positive effects of vaccines. As an example, if workers live longer and can work a long period of time, there may be higher productivity with longer working hours, higher social inclusion, and lower health costs. Besides, it is a critical decision to prefer either concentrating on keeping people healthy or waiting to treat people until they become sick. Actually, this is a very critical decision and dilemma that governments and national budget holders confront to allocate the limited financial resources as efficiently as possible for the public's benefit. Many pieces of research showed that keeping people healthy is more economical than treating them when they get ill. Thus, prevention is one of the most effective ways of keeping people living healthier and increasing their productivity. Occasionally, preventive health care programs are vulnerable to budget cuts since their expected benefits are not immediately identifiable. Instead, policymakers prefer to dedicate the funds to short-term programs which do not consider future public health or productivity gains. Therefore, modern healthcare policies need to change the focus from illness management to healthcare management through cost-effective preventive interventions (14). Actually, elimination of the costs can be collected under five categories (10): (i) elimination of treatment costs; (ii) elimination of transportation costs of seeking care; (iii) elimination of loss of care-providers economic output; (iv) elimination of losses of productivity because of premature death; and (v) elimination of loss of survivors' productivity because of disability and handicaps. Thus, in the economic evaluations of vaccination, cost-effectiveness analysis had the priority. In this evaluation, health is compared with its financial costs, i.e. placing a monetary value on life. Besides, presenting and sustained use of a newly introduced vaccine needs to be supported by policymakers, health, and economy bureaucrats who have full knowledge of the economic and health benefits of the vaccine to convince the public (10).

Traditionally, evaluation of health economics used to consider just the health services sector. However, many diseases such as cholera or the Covid-19 pandemic may affect many sectors such as transportation, tourism, and manufacturing. The countries with high outbreak effects may benefit from vaccination to get a substantial effect on demand, supply, production, investment, and trade (15, 11). In their study, Krigia et al. (15) investigated 12.5018 cases of cholera notified to WHO by countries of the African Region in 2005. The real total economic loss was US$64.2 million, assuming a regional life expectancy of 73 years. The 203,564 cases of cholera notified in 2006 led to a total economic loss of US$156 million. The 110,837 cases of cholera notified in 2007 resulted in an economic loss of US$72.7 million, for 73 years of life expectancy.

In Table-1, alongside the health benefits, economic and other social benefits of vaccination are categorized.

Table 1. Economic and Social Benefits of Vaccination

Benefits	Description	Outcome measures
Benefits of vaccination to individuals • Health quality gains • Health care cost savings	Reduction in mortality and morbidity Reduction in the direct cost of health care from the public sector and private individuals	No more cases or deaths due to diseases The cost saved by a health care provider as well as less health care costs by individuals
Productivity benefits • Productivity gain due to care • Productivity gains due to health quality • Productivity gain due to non-utility capabilities	Reduction in loss of working days due to caring for the sick patient Reduction in loss of working days due to sickness of worker or death of the patient. Increasing lifetime productivity due to improved capabilities	Higher level of productivity Friction costs, potential lifetime earnings, opportunity to have more education, cognitive outcomes
Health system improvement externalities	Health improvement in an unvaccinated society due to improved immunity, eradication, and reduced antibiotic usage	Indirect vaccine protection, the prevalence of antibiotic resistance, the future cost of the disease is reduced
Equity	Equal distribution of health services and outcomes	Distribution of health outcomes
Financial sustainability	Improving financial sustainability due to higher synergy with other health care programs	Financial security and benefit
Household security	Improving financial security will bring the lower risk of catastrophic expenditure	Financial security and comfort
Valuing a healthier life and having a longer life expectancy	Long-term benefits of vaccination through eliminating vaccine-preventable disease	A productive, safer, and healthier society
Mitigating the severity of disease	When vaccinated people are caught in the outbreak, the disease generally has milder effects than in non-vaccinated patients	Mitigating the harmful effects of disease and having healthier individuals
Herd protection	The vaccine reduces disease among unimmunized individuals through herd protection. Herd protection of the unvaccinated occurs when enough proportion of the group is immune	Mitigating the spread of an infectious agent by reducing the amount and duration of pathogen shedding by vaccines to provide a healthier community
Safe travel and mobility	Global air/rail/road traveling increases the risk of exposure to infectious diseases. Travelers transmit outbreak, as has been observed in the case of the Covid-19 pandemic	Mitigating the dissemination of infection
Epidemic prevention savings	Benefits through saved costs of prevention of epidemic	Improving cost-effectiveness
Positive externalities for the community (health and economic outcomes)	Vaccinating whole society	Securing public health and controlling contagious effects. More vaccinated people, healthier workers, more cost-effective economic activities
Behavioral improvement	Vaccination brings not only physical health improvement but also psychological wellbeing	Since vaccination improves physical and mental health, individuals can invest in education, social interaction, and other personal improvement strategies
Risk aversion	Reducing spread risk	Less certainty for the future, gain on welfare
Other economic indicators • Changes in household behavior • Public sector budget effect • Short-term macroeconomic effect • Long-term macroeconomic effect	Economic improvement because of changes in household preferences such as consumption/saving, better quality child care Change in an individual's net transfer to the national budget over his lifetime Changes to national income and production due to short-term exogenous shocks to the economy Changes to national income and production due to long-term changes to drives such as foreign direct investment and labor supply	Productivity increase, female worker participation, household investment, child dependence ratio More investment Improvement in GDP per capita, change in sectoral output Higher GDP per capita

Source: (1, 8, 16, and modified by the authors)

The Economic Effects of Covid-19 Pandemic: Pandemic period impacted all countries. However, the developing countries were affected more than the others due to their vulnerable economic and social conditions. In Figure-1, the economic growth performances of the countries groups with different economic performances are illustrated.

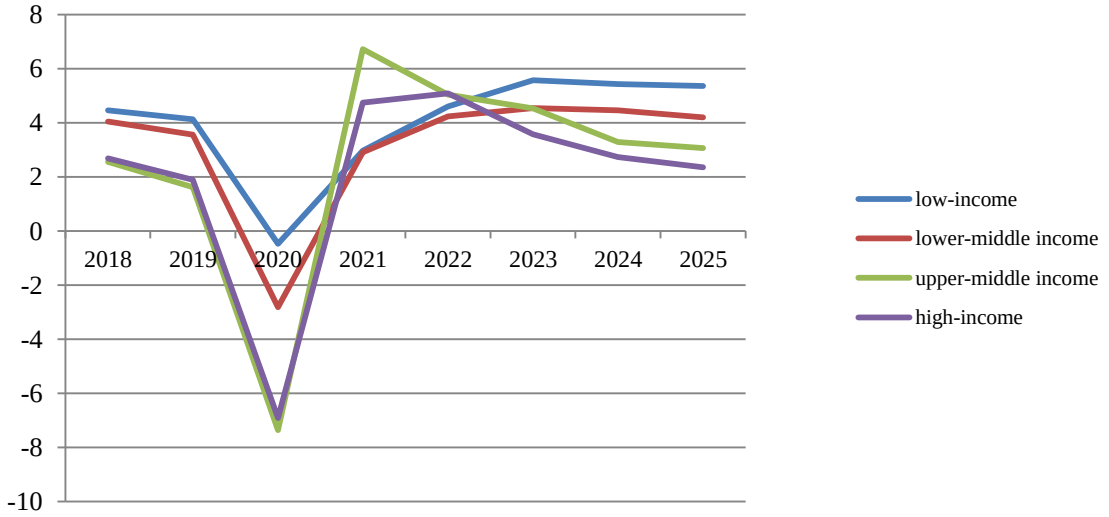

Figure 1. GDP growth performance of developed and developing countries
Source (17); *countries are classified as low-income (26 countries), lower-middle income (48 countries), upper-middle income (50 countries), and high-income countries (62 countries) based on World Bank classification. *2022-2025 are forcasted.

According to the figure-1, high-income and upper-middle income countries have more economic downturns and negative GDP growth rates. However, low-income countries and lower-middle income countries have been affected more than the former ones. Low-income countries have limited resources to allocate during the economic shutdown periods. Thus, they could not support their population neither through healthcare nor economic supports.

The reasons behind these differences can be classified as follows (18, 19, 20):

i. Developing countries have the lower fiscal capacity
ii. Developing countries have younger populations
iii. There are more informal sectors than well-defined social security and insurance facilities in developing countries
iv. Developing countries have weak healthcare capacity
v. More person-to-person contact both at work and at home in developing countries

Governments in developing and developed countries reacted differently during the Covid-19 pandemic lockdowns. As millions of workers had to stay home during this period, the governments of developed countries sent not only regular social insurance payments but also direct transfers which were more than 10% of GDP in those countries. Advanced economies could provide these supports to their citizens by providing a public good and market transfer. They trusted their strong macroeconomic conditions and their ability to raise tax revenues. In response to the deep recession, while advanced economies engaged in fiscal transfer programs, emerging economies could have very limited fiscal space due to chronic macroeconomic problems. In fact, many developing countries such as Argentina, Lebanon, and Ecuador have defaulted on their sovereign debt (21). Therefore, developing countries could not mimic the advanced countries due to the lack of fiscal capacity to provide transfers to most-affected segments of their societies for a long period. Developing countries are lack of ability to enforce tax payments and have limited tax revenues. Furthermore, they have a huge informal sector that is hard to tax. The lack of tax revenue causes the lack of quality health services. Besides, low-skilled workers from informal sectors are actually the desperate ones who do not have any social support or insurance (19). Hence, they need to spend their savings during the lockdowns. Miserable economic and social conditions urged them to perform marginal tasks that hardly generate adequate income. The inability to raise taxes in these countries also leads to limited borrowing which in turn reduces the ability to make payments to furloughed employees. In those countries, the share of the younger generation is higher and those people are not offered enough job opportunities as well as a lower fiscal capacity to cover the needs of those unemployed people. Moreover, there is a large proportion of the informal sector in those countries that caused the more dramatic economic conditions in these countries. Besides, due to crowded households and intergenerational dwellings, there is more probability of transmission among the household members. Therefore, there

was not enough care for lockdown precautions during the quarantine period in developing countries (22, 23, 19). Since low-income countries have a younger population, the mortality risk due to the Covid-19 virus is lower. On the contrary, the mortality risk in developed countries increases sharply due to aging societies. Many studies indicated that the Covid-19 virus has dramatically greater morality risks to elderly people, in particular those over the age of 65 (24, 25). In their study on Latin America and Caribbean countries, Pagés et al. (20) indicated that the mortality rate among those infected aged between 70 and 79 (5.1%) is thirty times greater than for that infected aged between 40 and 49.

What is more, the limited infrastructure in their health systems brings low-income countries in a more disadvantageous position. Those countries are less capable to absorb the increasing number of infected patients by their current health service performance. Furthermore, since the economic welfare level is lower in these countries, the poor individuals have to accept higher risks to earn a living than richer people who may access social welfare systems and enjoy savings during lockdown periods. Besides, workers in low-income countries are either self-employed or in the informal sector where employees are dependent on daily wages to look after their families. If there is no social security and insurance, the cost of lockdowns may have more impact on family budgets. The poor may face deprivation or even hunger. In the absence of such social protections, the poor households need to violate the lockdown precautions to continue to earn a living, mostly in informal economic activities, causing the continued spread of the virus (19).

There is no doubt that the outbreak caused great challenges for local economies. To control the spread of the pandemic, countries had to initiate mitigation strategies such as social distance, quarantine precautions, and economic shutdowns. Although these precautions were expected to control the highly contagious disease, they also resulted in deep contractions in economic activities. Furthermore, the pandemic caused long-lasting uncertainties. The actual capacity of healthcare services to meet the excessive needs, production of effective and economic vaccines, the time needed to develop safety, the duration and effectiveness of social distancing, the duration of economic shutdowns, if the temporary government interventions and supports will continue, the impact on the business environment and the factors that affect the economic activities over the medium and long period are some of the uncertainties still the global economy could not answer yet (26). With all these uncertainties, the economic impacts of the Covid-19 pandemic are illustrated in figure-2.

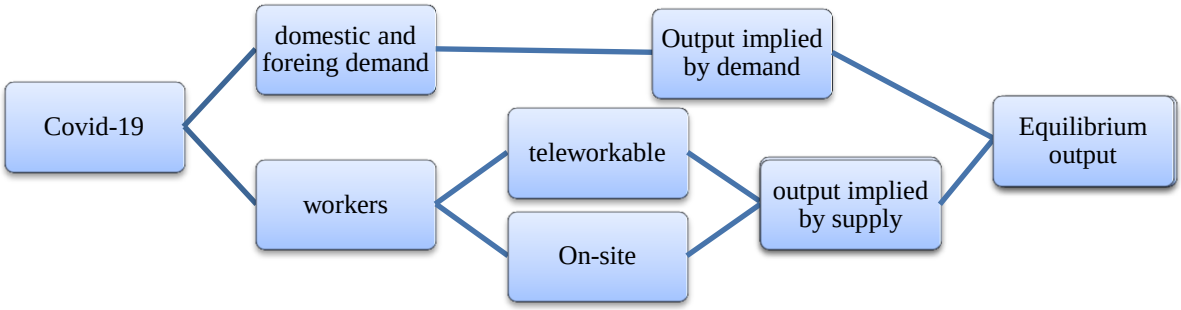

Figure 2. The economic impacts of the Covid-19 pandemic.
Source: (7)

According to the figure-2, the Covid-19 pandemic first impacted the domestic and foreign demand substantially that directly impacted the production of commodities. Lack of demand and supply affected both number of employees within the companies and their working conditions. To decrease the virus transmission risk, teleworking conditions were preferred in suitable sectors. Quarantine precautions also altered the consumers' preferences. During the pandemic period, people mostly preferred food, beverage, and electronic devices. The reasons behind this preference are long-lasting quarantine periods that impacted social activities and lack of income due to job losses (7).

Current Situation of Covid-19 Vaccination: World Health Organization (WHO) (6) expressed that unless there is enough dose sharing and boost supply in low-income countries, Covid-19 vaccine inequality may have a long-lasting negative impact on recovery in all countries. The spread of the virus among the unvaccinated people may also threaten the vaccinated people, i.e. citizens of developed countries and it would be even harder and more costly to overcome the virus. With current situation, developing countries could not vaccinate all their workers and most of their at-risk population may not reach their pre-Covid-19 levels before 2024. Furthermore, variants of the virus such as Delta and Omicron urge governments to reinstate strict health measures again. These precautions bring even more negative impacts on social and economic conditions, particularly for the

most vulnerable and marginalized individuals. Hence, a well-designed vaccination policy will reduce mortality, protect the health system, reduce outbreak burden, and lower the risk to set strict measures. Tedros Adhanom Ghebreyesus, Director-General of the WHO confirmed the vaccine inequality and stated that *"Vaccine inequity is the world's biggest obstacle to ending this pandemic and recovering from Covid-19. Economically, epidemiologically and morally, it is in all countries' best interest to use the latest available data to make lifesaving vaccines available to all".* New Global Dashboard on Covid-19 Vaccine Equity revealed that low-income countries need $38 billion to their GDP for 2021 if they had the same vaccination rates as high-income countries. It was also added that global economic recovery may have a greater risk if vaccines are not equally manufactured and implemented. To confirm this policy, UNDP Administrator Achim Steiner stated that *"In some low- and middle-income countries, less than 1% of the population is vaccinated. It's time for collective action – this will provide governments, policymakers, and international organizations with unique insights to accelerate the global delivery of vaccines and mitigate the devastating socio-economic impacts of the pandemic."*. Thus, to have a global economic recovery, it may be a wise policy to share vaccine doses with developing countries quickly. Removing barriers to vaccine manufacturing and financial support will engage sustainable access to doses with reasonable prices in these countries. In this vein, the Global Action Plan for Healthy Lives and Well-being for All (SDG3 GAP), which aims to improve collaboration across the multilateral system to support an equitable and resilient recovery from the pandemic and drive progress toward the health-related SDGs is expected to be a good global strategy to fight with the pandemic (27).

World Bank supported the vaccination efforts as well. The initial Global Covid-19 Response Program for the pandemic was initiated on April 2, 2020, with $6 billion (the program was also called the Covid-19 Strategic Preparedness and Response Program, SPRP). The program could reach 100 countries with emergency operations to prevent, detect and respond to the coronavirus pandemic. The program also aimed to strengthen the systems for public health preparedness. After the acceptance of the need for vaccines, the World Bank approved an additional fund of $12 billion for developing countries to finance the acquisition and distribution of the vaccines. In the mid-2021, for vaccine financing, $20 billion were provided by the World Bank (28). World Bank also declared that 192,1 million doses were delivered to 49 countries in 2021, and 64,6 million doses were delivered to these countries in Q1 of 2022. United Nations (UN) also provides financial support to the least developed countries. UN declared that $23 billion in 2021 has been spent to fight with coronavirus spread in these countries an increase from $16 billion in 2020. Indeed, the least developed countries have been more disadvantageous during this period compared with middle and upper-middle-income developing countries. Despite 14% of the world population has been living in these countries, only 1,2% of global coronavirus vaccine doses have been applied in these countries. Unfortunately, just 3,1% of the total population could receive at least one dose of vaccine. Even some of them have just begun receiving vaccines (29). According to Our World in Data (30), 61,4% of the world population has received at least one dose of a Covid-19 vaccine. However, just 10% of people living in low-income countries have been shut at least once by the date 06 February 2022. Figure-3 illustrates the total number of people vaccinated against Covid-19 virus (fully or partially) in selected developed and developing countries. According to Figure-3, while UAE vaccinated almost all its population, Nigeria could vaccine just 4,53% of total population. Another low-income country Ethiopia had a low performance with 17,78% (fully vaccinated). The world average full vaccinated people was recorded as 58,24%.

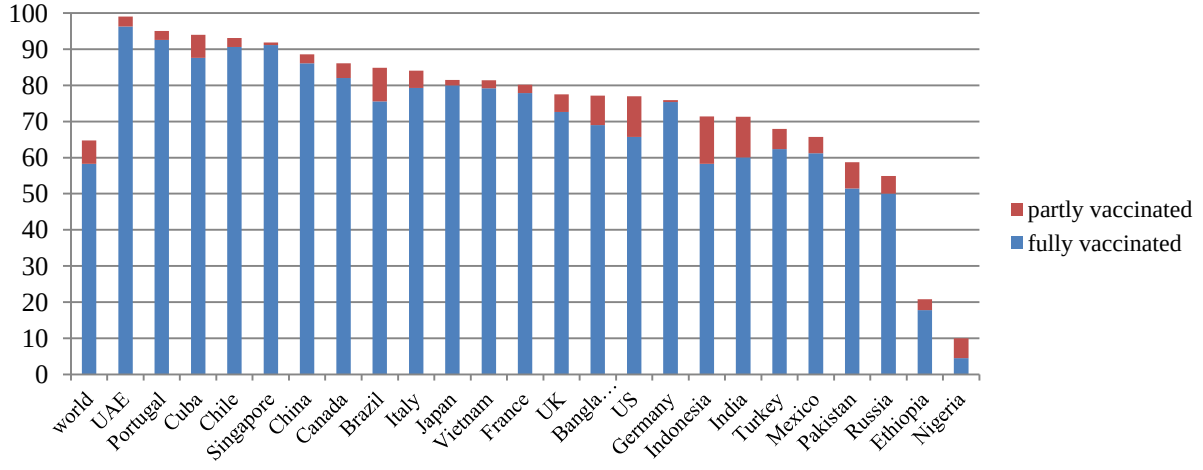

Figure 3. Percentage of People Vaccinated Against Covid-19 (07 April 2022) Source: (30)

As shown in Figure-3, there are still some challenges to vaccine access and delivering it to all countries, particularly the less developed ones. Furthermore, delays in vaccination worsen the inequalities both within and between countries and deepen poverty. World Bank (31) declared that poverty will continue to rise during the pandemic and an additional 150 million people are expected to live in extreme poverty due to the prevailing outbreak. According to the World Bank (31), the pandemic also caused a contraction in global GDP per capita. Accordingly, the least developed countries located in Sub-Saharan Africa would be one of the most affected regions with an addition of almost 40 million people to be pushed into extreme poverty. Due to the shutdowns in economies, many companies went bankruptcy and hence, there has been a sharp decline in labor incomes.

Equal Shot to Global Recovery: To stop the transmission of the virus globally, every individual should have equal right to get vaccine. Therefore, obstacles should be overcome. Basic challenges confronted by developing countries during the vaccination period are barriers to the availability of the vaccine, cost and production of the vaccine, and infrastructural problems (32, 33).

1. *Availability of vaccines:*

Advanced economies could purchase a high proportion of available vaccine doses that is sufficient to vaccinate their entire population. On the contrary, developing economies could not guarantee to get enough vaccine doses for their entire citizens. Furthermore, while rich countries tried to reserve vaccines more than their populations, developing countries could not even start to vaccinate their citizens. The reason is not only because developed countries purchased the greatest share of it but also because low-middle income developing countries and least developed countries do not have enough financial power to purchase. In 2020 and 2021, the supply of vaccines was far from satisfying the excessive demand towards it. There were around 12,5 billion doses were pledged to deliver by vaccine producers in 2021 (31). Although the bulk of the adult population in developed countries will be vaccinated by mid-2022 and middle-income citizens will be finished by the end of 2022, poor countries' timelines will stretch to 2024. In other words, mass immunization will take more time in these countries.

2. *The economic and political power of countries*

The rich countries including the UK, the US, most of the European countries, Russia, and China immunized their population before the rest of the world. Since Russia and China could develop their own vaccines, they could provide immunization faster than the other developing countries. The fact is that rich countries have administered 100 times as many coronavirus vaccines as poorer economies. Developing countries and poorer ones need to wait at the back of the queue. With all these efforts, mass immunization will be completed by the late-2022. Those countries that will not have vaccinated 60% of their population by mid-2022 will face GDP losses of approximately US$2.3trn by 2025 (34).

3. *Cost of vaccine*

Although some pharmaceutical companies offer lower vaccine prices for developing countries (or even without any profit during the pandemic), many developing countries still cannot afford to buy enough vaccines. To support the least developed countries and the countries with great budgetary problems, some pharmaceutical companies have set lower vaccine prices or planned to sell without profit for the duration of the pandemic. However, the cost of vaccine rollout is more than the price of the product and most of the developing economies may have difficulty in financing the additional expenditures such as transport, delivery and distribution costs, extra payments for healthcare workers during the coronavirus-induced recession period that depleted fiscal resources with high budget deficits. And also, although vaccine producer companies can modify their products, immunization campaigns should be repeated for the next shots if necessary.

4. *Barriers to domestic production*

Although some of the developing countries have the capacity to manufacture vaccines, intellectual property rights and the reluctance of the vaccine producer companies to transfer their technologies remain barriers to building local production capacity. This leads to waiting for the rich countries to satisfy their needs first.

5. *Infrastructural challenges*

Developing countries with poor infrastructure and insufficient healthcare workers are disadvantageous in vaccinating their citizens. Since they cannot produce and apply the vaccine, in many poor countries, the rollout of vaccines will not be finalized before 2023.

6. *Vaccine diplomacy and the effect on international relations*

Pfizer (US)-BioNTech (Germany), Moderna (US), and AstraZeneca-Oxford University (UK) are the most preferred Covid-19 vaccines all over the world. Not only the producer companies but also their countries have the power on sharing and distributing vaccines. Chinese and Russian vaccines were also rolled out both domestically and to emerging countries such as Turkey and Egypt via diplomatic bilateral deals. China and Russia benefited from vaccine diplomacy to bolster their global status through vaccine support to needy countries. Both countries use coronavirus shots as a bargaining chip to advance their national interests. For example, Italy accused the EU of being slow in supporting and providing aid over the pandemic. Italy's ambassador to the EU said that "*No EU country has responded to the European*

Commission's call for aid to be sent to us. Only China unilaterally offered assistance. This is not a good sign for European solidarity at all". While Germany and France imposed limits on the export of protective medical equipment, China offered to sell all necessary equipment. Health diplomacy turned to vaccine diplomacy in a short time. Italy and Serbia declared to have more economic and trade relations with China after China's support to these countries during the pandemic crisis. In this context, developing countries need to follow wise and balanced diplomatic relations with these countries while dealing with huge economic and healthcare problems in their countries.

Once these challenges are overcome, there will be a greater opportunity to have equity in vaccinating all nations. To have an equal vaccination strategy in both developed and developing countries, the following policies can be suggested to the policy-makers (33, 35):

1. The inequality gaps within and between countries should be taken into account. The fact is that recovery will be faster and resilience to new waves will be sounder if vaccines are rolled out equitably to both developed and developing countries, including the poorest and most vulnerable ones.
2. During the vaccination period, the support should be both funds provided to developing countries and ensuring transparency on bilateral contracts and through dose sharing.
3. R&D investments in vaccines and production capacity are concentrated in a few developed countries. Thus, those countries have priority in vaccination and international trade processes. A global consensus for equitable access is strongly needed to provide a fair supply of the vaccine.
4. In every country, there may be unique challenges in vaccine access for the population. In addition to income inequalities, there may be gender or ethnic inequality to reach the vaccine. Besides, there have been growing unti-vaccination movements that negatively affect vaccination efficiency all over the world. Well-organized cooperation between the vaccine provider and demander countries, these challenges can be overcome.
5. Strengthening the health of developed nations is not enough to have a global immunization. Thus, development outcomes for vulnerable populations will provide indirect benefits for the whole world.
6. Strengthening the cooperation with local civil society organizations and NGOs will provide to reach every individual in the society easily.
7. Since countries are not hidden islands, the international trade and economic interdependencies of economies, devastating effects of the pandemic can only be mitigated through international coordination to ensure equitable access to vaccines and tests.
8. Developed countries should speed up the distribution of vaccines globally by eliminating the potential for supply and demand shocks in third countries to result in aggravating the spread of the virus.
9. Some vaccines require storage at temperatures ranging from -60 to -80 degrees Celsius. Distribution and storage of vaccines may be difficult for least developed countries. The advanced economies and vaccine producer companies may support these countries in providing cold storage equipment (36).

CONCLUSION

The Covid-19 pandemic has created a devastating shock that is larger than the financial crisis of 2008-2009 and the Great Depression of 1929-1933. Due to the vulnerable macroeconomic conditions of developing countries, they are deeply impacted by the pandemic crisis. These countries have larger informal sectors that cannot provide enough social coverage to the workers, weaker healthcare services, and lower fiscal capacity. Due to the lack of resilience and poor financial support to workers by the governments of the developing countries, they had to continue working even during the lockdown periods. This led to both a great economic loss and the increasing spread of the virus through workers in developing countries.

On the contrary, developed countries initiated financial and social support for their population during quarantine periods. Pensions and financial transfers kept the people safe. Meanwhile, they also concentrated on vaccine programs. While the developed countries initiated economic support and vaccine programs, low-income and developing countries had to wait in the queue for the developed countries.

However, global immunization can be provided by vaccinating every individual in the world. In other words, vaccinating whole country is not enough since there will be international trade and international transportation. New variants of the coronavirus and global movement of the people bring the necessity to vaccine everybody to get rid of the spread of the virus.

Hence, equal vaccination is a must for global safety. Policymakers in developed countries should adopt more coherent strategies on the scale and speed of vaccination programs. This includes both financial and health service support, sharing vaccines, as well as multilateral cooperation among the countries. Otherwise, there will be insufficient global immunization which may cause ongoing health security threats and long-lasting vulnerability among the developing countries. The global recovery can be threatened through developing countries by lack of vaccination, poor healthcare services, and falling far behind in the integration with the global economy.

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RESEARCH ARTICLE

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Stock Market Reaction to Covid-19 Vaccination Rate: International Study

ABSTRACT

Objective: In this study, the relationship between the Covid-19 vaccination rates in different countries and the performance of stock market indices were examined. The study aims to supply further evidence for policymakers to promote vaccination programs.

Methods: In the study, stock market performances and Covid-19 vaccination data of a total of 49 countries in the MSCI indices were used. Countries are sorted and grouped according to the date they reached the 10%, 50%, and 75% vaccination rates. Afterward, t-tests were used to determine whether there was a difference between the stock market returns of the countries in different groups according to their vaccination performances.

Results: This research shows that countries with rapid Covid-19 vaccination have lower volatility and higher performance in the stock markets. It has been determined that the stock market performances are higher in the countries which reached the 10% and 50% vaccination level of the population earlier. No statistically significant relationship was found between reaching the 75% vaccination level and the stock market performance. The first quartile of countries that completed 10% vaccination earlier have %9.7 higher stock market performance on average between 31.12.2020-28.05.2021 than the countries in the last quartile. Research results are also robust when tested separately for developed and emerging markets.

Conclusions: The results of the study show that vaccination has a positive contribution to financial markets. It is thought that the findings obtained in the research provide important information for investors and policymakers.

Keywords: Covid-19, Vaccination, Stock Markets Indices, Returns of Stocks.

Borsanın Covid-19 Aşı Oranına Tepkisi: Uluslararası Çalışma

ÖZET

Amaç: Bu çalışmada, farklı ülkelerdeki Covid-19 aşılama oranları ile borsa endekslerinin performansı arasındaki ilişki incelenmiştir. Çalışmanın amacı, politika yapıcılara aşılama programlarını teşvik etmek için daha fazla kanıt sağlamaktır.

Gereç ve Yöntem: Çalışmada MSCI endekslerinde yer alan toplam 49 ülkenin borsa performansları ve Covid-19 aşı verileri kullanılmıştır. Ülkeler %10, %50 ve %75 aşılama oranlarına ulaştıkları tarihe göre sıralanmış ve gruplandırılmıştır. Daha sonra farklı gruplardaki ülkelerin hisse senedi getirileri arasında aşılama performanslarına göre farklılık olup olmadığını belirlemek için t testleri kullanılmıştır.

Bulgular: Bu araştırma, Covid-19 aşılama sürecini daha hızlı yöneten ülkelerin borsalarının daha düşük oynaklığa ve daha yüksek performansa sahip olduklarını göstermektedir. Nüfusları %10 ve %50 aşılanma düzeyine daha erken ulaşan ülkelerde borsa performanslarının diğer ülkelere göre daha yüksek olduğu tespit edilmiştir. %75 aşılama düzeyine ulaşmak ile borsa performansı arasında bir ilişki bulunamamıştır. %10 aşılamayı daha erken tamamlayan ilk %25'lik dilime giren ülkelerin, son %25'lik dilimdeki ülkelere göre 31.12.2020-28.05.2021 tarihleri arasında ortalama %9,7 daha yüksek borsa performansına sahip oldukları tespit edilmiştir. Araştırma sonuçları, gelişmiş ve gelişmekte olan ülkeler için ayrı ayrı test edildiğinde de istatistiksel olarak anlamlı ve geçerlidir.

Sonuç: Çalışmanın sonuçları, aşılamanın hisse senedi piyasalarına olumlu katkısı olduğunu göstermektedir. Araştırmada elde edilen bulguların yatırımcılar ve politika yapıcılar için önemli bilgiler sağladığı düşünülmektedir.

Anahtar Kelimeler: Covid-19, Aşılama, Borsa Endeksleri, Hisse Senedi Getirileri.

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INTRODUCTION

Covid-19 was first detected in Wuhan, China on December 12, 2019. The disease was then reported to the World Health Organization as a mysterious respiratory disease, with its appearance in different people on December 31, 2020. This disease was initially perceived as a regional epidemic. After the virus was seen in the USA and Europe in January 2021, the size of the epidemic grew in a few weeks, and it became an important agenda item that the whole world followed carefully. On the rapid spread of the epidemic and death news from various countries, the World Health Organization (WHO) declared the Covid-19 pandemic on March 11, 2020 (1). This news led to a sharp contraction in economic activity in the world and high price volatilities in financial markets in a short period. These developments disrupted the production and supply chain in economically important countries such as China and the USA and directly or indirectly affected all world economies (2). The rapid spread of Covid-19 has created a contagion effect in the financial markets (3). While examining the effects and economic consequences of the pandemic, some authors used the term "Coronanomics" (4; 5), while some authors preferred to use the term "Black Swan" (6, 7) The concept of "Black Swan", which was first mentioned by Taleb (8), has become frequently used in the literature for events that have unexpected and significant effects on the stock markets. Although it is difficult to predict the long-term effects and precise results of the Covid 19 pandemic, it is possible to examine the impact and depth of the shocks that occurred. Some studies have tried to explain the shocks caused by the Covid-19 pandemic by comparing it with the 2008 crisis, while some authors have tried to explain it by comparing it with other epidemics, financial crises, wars, and terrorist incidents (9; 10; 11; 12; 13). On the other hand, some studies have discussed the effects of Covid-19 in terms of behavioral finance using conceptual foundations such as herd behavior, investor sensitivity, and investor psychology (14; 15; 16; 17; 18).

The Covid-19 pandemic spread all over the world, starting from China, causing a decline in stock markets' performances and an increase in market volatility all over the world. Looking at the USA, it is seen that the market volatility experienced in 2020 is similar to the volatility experienced in the 2008 crisis, 1929 crisis, and 1987. The stock market volatility experienced in the first half of 2020 in the USA is more than the volatility caused by the Great Depression and the Spanish Flu pandemic (12). The reason behind the greater impact of Covid-19 compared to other pandemics is the growth and development of international investments and trade. The increase in market volatility has been valid not only for the USA but also for many countries around the world (3; 19). This effect was not the same in all countries, for example, Yiu and Tsang (20) stated that in Asean5 countries (Philippines, Malaysia, Thailand, Indonesia, and Singapore) Covid-19 had a smaller impact than the global financial crisis in terms of both returns and volatility.

With the increase in Covid 19 cases, the pressure on the health care systems of all countries continues. The burden placed on the health system also creates stress for other sectors. In particular, government policies that are implemented to control Covid-19 cases increase uncertainty, anxiety and generally have negative effects on economic activity. It is known that the best way to reduce the burden on the health system is the vaccination. Vaccines with proven effectiveness in the disease have been found and new vaccine studies are continuing. With the availability of vaccines, the reopening of businesses and the vaccination programs of countries supported the performance in the stock markets from the beginning of 2021. With the initiation and acceleration of the vaccination program in the USA, the stress of the health system has decreased, consumer confidence has increased, and a positive atmosphere has been created in the financial markets (21). The arrival of the first coronavirus vaccines in early 2021 and the rapid start of vaccination programs in some countries have been the hope for recovery in the financial markets. Vaccinations not only reduce the load in health care systems but also improve economic activity. Millions of people invest in the stock market around the world, and financial stability is of great importance for savers. In addition, stock prices are also a leading indicator in determining the impact of certain economic events on the economy. In this study, to supply further evidence for policymakers to promote the vaccination programs, the relation between the vaccinated percentage of the population and stock market performances in different countries has been investigated.

Literature: With the emergence of COVID-19, many researchers have investigated the effects of the pandemic on the economy and financial markets (12; 14; 22; 23; 24; 25). The transformation of Covid-19 into a pandemic has had a rare impact on financial markets (26). This effect has been exacerbated by the restrictions and closures implemented to reduce the stress of the health system (22). Numerous studies have been conducted showing that the number of cases and deaths has a negative effect on the stock market performances (14). Some studies have shown that stock markets are significantly adversely affected by Covid-19 and are more sensitive to an increase in the number of infections rather than the number of deaths (14; 26). The negative effect of the increase in the number of deaths on the stock markets is more pronounced than the positive effect

of the recovered cases (27). Besides, India and Pakistan stock markets have achieved positive returns during the pandemic (28). A significant number of studies have investigated the relationship between Covid-19 and market volatility (29; 30). The relationship between stock returns and stock volatility became stronger during the Covid-19 pandemic process (31).

While some of the studies in the literature have examined the effects of Covid-19 in a particular country, some have tried to reveal the similarities and differences between countries by examining the effects of Covid-19 in different countries. Qudah and Houcine (32) investigated the impact of Covid-19 on stock returns in 6 regions (Africa, America, Eastern Mediterranean, Europe, Southeast Asia, and Western Pacific) classified by the World Health Organization (WHO). They reveal that the stock markets in the Western Pacific region have more negative abnormal returns than other regions, and all regions have experienced a decline between the 26th and 35th days after the first case was confirmed. Barut and Kaygın (33) investigated the existence of a relationship between stock market indices and the number of cases in 11 countries with the highest number of cases as of April 2020. They found that there is an interaction between the number of Covid-19 cases and the stock market indices of Turkey, Italy, Spain, the Netherlands, and China, on the other hand, there is no relationship with the stock market indices of Germany, France, Belgium, England, Switzerland, and the USA. Okorie and Lin investigated the contagion effect of Covid-19 on stock market returns and volatility in 32 countries most affected by the pandemic (3). They found that Covid-19 had a contagion effect on both returns and volatility, but this relationship disappeared over time. On the other hand, they also showed that the contagion effect is more pronounced in countries with a high number of cases than in countries with a low number of cases. In the study of Chaudhary et al. (29), the effect of Covid-19 on the return and volatility of the stock market indices of the 10 countries with the highest GDP was investigated. It has been found that in the 6-month period after the virus first appeared, negative average returns occurred in the stock markets of the countries examined, and volatility was higher than normal times, even though there was a recovery in the second quarter. Ashraf examined the relationship between the number of cases and deaths and stock market indices in 64 countries. According to the results, market reactions are stronger on average 40 to 60 days after the detection of the first case; and provided evidence that markets are more sensitive to an increase in the number of cases than to an increase in the number of deaths (14).

The Covid-19 vaccination process has also been one of the subjects of academic studies. Chan et al., (34) investigated the effects of clinical trial stages of Covid-19 vaccines on global stock markets. They showed that it caused a positive and significant abnormal stock market return of around 8% on the first day of the trials. In particular, the positive effect of the start of the trials in the 3rd phase was higher and the vaccine candidates developed by the USA and China caused a more significant effect. Khalfaoui et al. (21) investigated the effects of daily case numbers, deaths, and vaccination numbers on the S&P 500 index. They revealed that the increase in vaccination has a strong and positive effect on the S&P 500 returns. Rouatbi et al. (35), in their study investigating the relationship between vaccination and stock market volatility of 66 developed and developing countries, found that mass vaccination significantly reduced stock market volatility. They also revealed that the effect of vaccines on stock market volatility is stronger in developed countries than in developing countries. Ngwakwe (36) examined the performance of 5 global stock market indices (Dow Jones, Shanghai, S&P, FTSE, and Euronext) covering the 7 months before the vaccine's arrival and the 7 months after the vaccination. In the study, pre-vaccination and vaccination periods were compared with the T-tests. It was determined that the arrival of the vaccine had a positive effect on the stock markets compared to the pre-vaccine period, and there was an increase between 7% and 20% in the stock markets returns with the arrival of the vaccine. Cong Nguyen To et al., (37), in their study, investigated the effect of vaccination rate on stock market indices of 15 developed and 19 developing countries. They revealed that mass vaccination reduces the volatility of stock markets in both developed and developing countries. They also emphasized that this effect is stronger in developed countries than in developing countries.

MATERIAL AND METHODS

The aim of this study is to examine the relationship between stock market returns and volatilities of countries with high or low Covid-19 vaccination rates. For this purpose, the index returns (38) in the MSCI developed and emerging markets indices were compared with the vaccination rates in these countries. Data on the indices were obtained from investing.com, and Covid-19 vaccination rates were obtained from https://data.europa.eu/, the official data site of the European Union. The index returns cover the period between 31.12.2020 (the date when the first vaccination data can be accessed) and 28.09.2021 (when the most up-to-date data available during the research). The number of developing countries included in the research is 26, and the number of developed countries is 23. Countries are sorted and grouped according to the date they reached the 10%, 50% and 75% vaccination rate. Afterwards, t tests were used to determine whether there was a difference between the stock market returns of the countries in different groups in different periods.

RESULTS

The countries included in the MSCI index, their level of economic development, and the dates when 10%, 50% and 75% of the population were vaccinated in each country are shown in Table 1.

Table 1. Countries Included in the MSCI Index, Level of Economic Development, Vaccination Dates of 10%, 50% and 75% of the Population

Development Level	Countries	10% Vaccination	50% Vaccination	75% Vaccination
Emerging	Argentina	11.04.2021	22.07.2021	N/A
Developed	Australia	23.05.2021	4.09.2021	N/A
Developed	Austria	17.03.2021	21.06.2021	N/A
Developed	Belgium	24.03.2021	15.06.2021	N/A
Emerging	Brazil	13.04.2021	4.08.2021	N/A
Developed	Canada	25.03.2021	22.05.2021	17.09.2021
Emerging	Chile	15.02.2021	20.05.2021	31.08.2021
Emerging	China	10.06.2021	26.08.2021	6.09.2021
Emerging	Colombia	22.05.2021	23.09.2021	N/A
Emerging	Czechia	24.03.2021	15.07.2021	N/A
Developed	Denmark	17.03.2021	17.06.2021	22.08.2021
Emerging	Egypt	27.09.2021	N/A	N/A
Developed	Finland	12.03.2021	12.06.2021	9.10.2021
Developed	France	23.03.2021	28.06.2021	9.10.2021
Developed	Germany	25.03.2021	17.06.2021	N/A
Emerging	Greece	26.03.2021	9.07.2021	N/A
Developed	Hong Kong	20.04.2021	17.08.2021	N/A
Emerging	Hungary	6.03.2021	19.05.2021	N/A
Emerging	India	14.05.2021	18.10.2021	N/A
Emerging	Indonesia	29.06.2021	N/A	N/A
Developed	Ireland	19.03.2021	22.06.2021	10.09.2021
Developed	Israel	31.12.2020	22.02.2021	N/A
Developed	Italy	25.03.2021	15.06.2021	1.10.2021
Developed	Japan	31.05.2021	16.08.2021	14.10.2021
Emerging	South Korea	28.05.2021	21.08.2021	27.09.2021
Emerging	Malaysia	14.06.2021	10.08.2021	6.10.2021
Emerging	Mexico	5.05.2021	4.10.2021	N/A
Developed	Netherlands	28.03.2021	20.06.2021	10.10.2021
Developed	New Zealand	7.06.2021	3.09.2021	25.10.2021
Developed	Norway	24.03.2021	1.07.2021	21.09.2021
Emerging	Pakistan	30.07.2021	N/A	N/A
Emerging	Peru	9.06.2021	2.10.2021	N/A
Emerging	Philippines	26.07.2021	N/A	N/A
Emerging	Poland	26.03.2021	18.08.2021	N/A
Developed	Portugal	25.03.2021	24.06.2021	14.08.2021
Emerging	Qatar	29.04.2021	1.06.2021	13.08.2021
Emerging	Russia	18.05.2021	N/A	N/A
Emerging	Saudi Arabia	27.06.2021	12.07.2021	N/A
Developed	Singapore	22.03.2021	21.06.2021	11.08.2021
Emerging	South Africa	2.08.2021	N/A	N/A
Developed	Spain	29.03.2021	21.06.2021	17.08.2021
Developed	Sweden	21.03.2021	4.07.2021	N/A
Developed	Switzerland	26.03.2021	30.06.2021	N/A
Emerging	Taiwan	4.07.2021	24.09.2021	N/A
Emerging	Thailand	30.06.2021	11.10.2021	N/A
Emerging	Turkey	30.03.2021	11.08.2021	N/A
Emerging	United Arab Emirates	23.02.2021	20.04.2021	13.07.2021
Developed	United Kingdom	25.01.2021	29.04.2021	N/A
Developed	United States	10.02.2021	1.06.2021	N/A

Resource: MSCI index and https://data.europa.eu/ prepared by the author

The 49 countries within the scope of the study were divided into 4 different quartiles according to the dates of reaching 10% and 50% vaccination rates of their populations.

Since the number of countries with a vaccination rate of 75% is low, countries are classified into two groups for analyzes made at this level. The dates of achieving 10% vaccination rate of different quartiles are shown in Table 2. The first 12 countries in the first quartile reached 10% vaccination level on 22.03.2021 and the last 13 countries on 27.09.2021.

Table 2. Quartiles of Countries Ranked by Date of Reaching the Vaccination Rate of 10% of the Population

Quartile	10% Vaccination Reach Date of all countries in the quartile	Countries
1st Quartile	22.03.2021	Israel, United Kingdom, United States, Chile, United Arab Emirates, Hungary, Finland, Denmark, Austria, Ireland, Sweden, Singapore
2nd Quartile	29.03.2021	France, Belgium, Norway, Czechia, Canada, Italy, Germany, Portugal, Switzerland, Greece, Poland, Netherlands
3rd Quartile	28.05.2021	Spain, Turkey, Argentina, Brazil, Hong Kong, Qatar, Mexico, India, Russia, Colombia, Australia, South Korea
4th Quartile	27.09.2021	Japan, New Zealand, Peru, China, Malaysia, Saudi Arabia, Indonesia, Thailand, Taiwan, Philippines, Pakistan, South Africa, Egypt

In Table 3 stock market performances of different quartiles, described in Table 2, have been shown. Periods have been determined according to completion of 10% vaccination in different country quartiles. The number 1 group includes the 12 countries that fall into the 25% quintile with the fastest access to vaccination; group 4 includes 13 countries that fall into the last 25% quintile. Whether there is a difference in the average stock market index performances of these country groups was measured with the t test. When Table 3 is examined, it is seen that the average return of the 1st Group was 7.6% in the first period, while the average return of the 4th Group was 2.4%. In all periods, it is seen that the average returns of the countries, that completed 10% vaccination faster, are higher than the other countries and the results are statistically significant.

Table 3. t-test Showing the Performance Differences of Stock Market Indices of Countries Ranked by Date of Vaccination of 10% of the Population

Panel A- 1 vs. 4	**31.12.2020-22.03.2021**	**31.12.2020-29.03.2021**	**31.12.2020-28.05.2021**	**31.12.2020-27.09.2021**
1- Average Return	7.6%	8.5%	12.7%	18.4%
4- Average Return	2.4%	2.8%	3.0%	3.9%
1- Variance	0.2%	0.2%	0.4%	0.7%
4- Variance	0.4%	0.4%	0.8%	1.1%
Probability	0.036	0.022	0.005	0.001
t stat.	2.420	2.701	3.551	4.576
Panel B- 1+2 vs. 3+4	**31.12.2020-22.03.2021**	**31.12.2020-29.03.2021**	**31.12.2020-28.05.2021**	**31.12.2020-27.09.2021**
1+2- Average Return	6.5%	7.5%	12.6%	17.8%
3+4- Average Return	1.5%	1.7%	4.6%	7.2%
1+2- Variance	0.2%	0.2%	0.3%	0.6%
3+4- Variance	0.3%	0.3%	0.8%	2.0%
Probability	0.002	0.000	0.000	0.002
t stat.	4.282	5.068	5.291	4.080

In Figure 1, the vaccination rate and stock market returns in 49 countries included in the MSCI indices are presented. It is seen that the index returns of the countries with high vaccination rates are above the average in all 4 periods covered in the research.

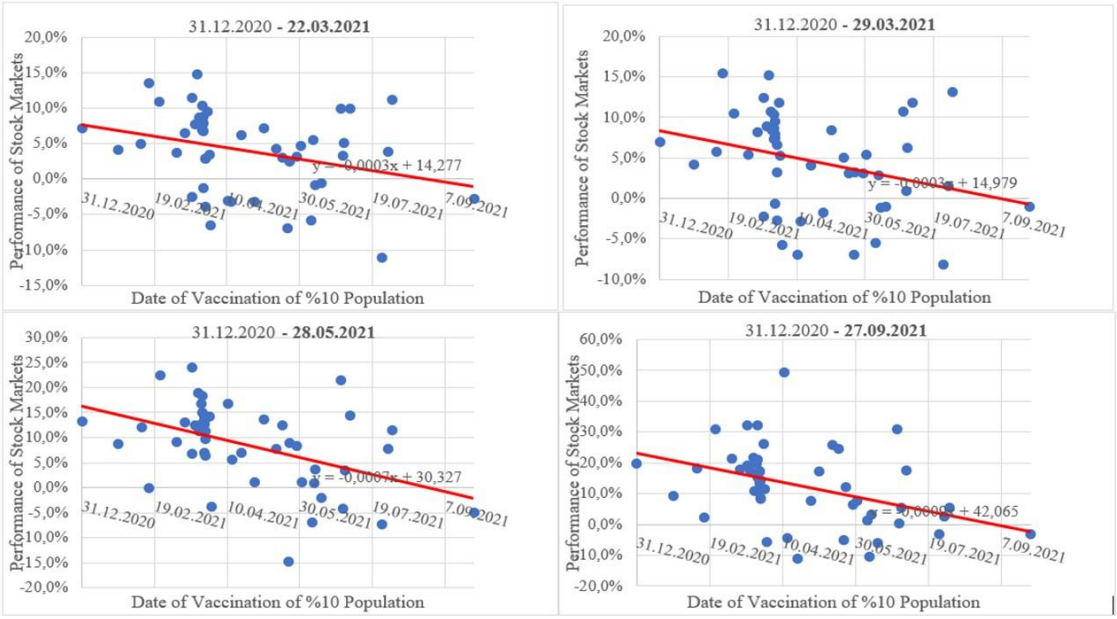

Figure 1. The Relation Between Vaccination Rate and Performance of Stock Market Indices in Each Country Listed in MSCI Developed and Emerging Markets

In the second stage, countries were divided into 4 different quartiles according to the dates of their population reaching 50% vaccination rates. The country quartiles created are shown in Table 4. Indonesia, Philippines, Pakistan, South Africa, Egypt, which are among the countries in the 4th group, have not yet reached the 50% vaccination rate at the time of the research. These countries are also included in Group 4.

Table 4. Quartiles of Countries by Date of Reaching the Vaccination Rate of 50% of the Population

Quartile	50% Vaccination Reach Date of all countries in the quartile	Countries
1st Quartile	17.06.2021	Israel, United Arab Emirates, United Kingdom, Hungary, Chile, Canada, United States, Qatar, Finland, Belgium, Italy, Denmark
2nd Quartile	09.07.2021	Germany, Netherlands, Austria, Singapore, Spain, Ireland, Portugal, France, Switzerland, Norway, Sweden, Greece
3rd Quartile	03.09.2021	Saudi Arabia, Czechia, Argentina, Brazil, Malaysia, Turkey, Japan, Hong Kong, Poland, South Korea, China, New Zealand
4th Quartile	28.10.2021*	Australia, Colombia, Taiwan, Peru, Mexico, Thailand, India, Russia, Indonesia, Philippines, Pakistan, South Africa, Egypt

* For the 4th group, because of 10% vaccination has not been completed yet, 28.10.2021 has been used which is the most recent date for which data are available.

Similar to the results in Table 3, it is seen in Table 5 that the stock market performances of the countries that manage the vaccination process quickly are higher than the other countries. The results are statistically significant.

Table 5. t Test Showing the Performance Differences of Stock Market Indices of Countries Ranked by Date of Vaccination of 50% of the Population

Panel A- 1 vs. 4	**31.12.2020-17.06.2021**	**31.12.2020-09.07.2021**	**31.12.2020-03.09.2021**	**31.12.2020-25.10.2021**
1- Average Return	12.5%	12.6%	17.9%	19.4%
4- Average Return	4.5%	4.1%	7.2%	10.7%
1- Variance	0.4%	0.4%	0.5%	0.8%
4- Variance	1.1%	0.9%	1.3%	1.2%
Probability	0.031	0.017	0.012	0.040
t stat.	2.501	2.870	3.070	2.363
Panel B- 1+2 vs. 3+4	**31.12.2020-17.06.2021**	**31.12.2020-09.07.2021**	**31.12.2020-03.09.2021**	**31.12.2020-25.10.2021**
1+2- Average Return	13.8%	13.2%	18.0%	19.4%
3+4- Average Return	6.4%	5.5%	9.1%	12.1%
1+2- Variance	0.3%	0.3%	0.5%	0.7%
3+4- Variance	1.2%	1.1%	1.9%	3.4%
Probability	0.005	0.002	0.007	0.084
t stat.	3.560	4.098	3.366	1.916

In the third stage, it was analyzed how the stock market performances of the countries that reached the 75% vaccination rate differ from other countries. In this context, considering the number of countries reaching the 75% vaccination level, 49 countries included in the study were divided into 2 different groups. The countries that reached the 75% vaccination level (Group 1) and the countries that did not reach this level as of the date of the research (Group 2) are presented in Table 6.

Table 6. Country Groups Established by Level of Achieving 75% Vaccination Rate

Group	50% Vaccination Reach Date of all countries in the quartile	Countries
1st Group	28.10.2021	United Arab Emirates, Singapore, Qatar, Portugal, Spain, Denmark, Chile, China, Ireland, Canada, Norway, South Korea, Italy, Malaysia, Finland, France, Netherlands, Japan, New Zealand
2nd Group	-	Israel, United Kingdom, Hungary, United States, Belgium, Germany, Austria, Switzerland, Sweden, Greece, Saudi Arabia, Czechia, Argentina, Brazil, Turkey, Hong Kong, Poland, Australia, Colombia, Taiwan, Peru, Mexico, Thailand, India, Russia, Indonesia, Philippines, Pakistan, South Africa, Egypt

The comparison of the stock market performances of the 1st group countries that have completed 75% vaccination and the 2nd group countries that have not reached this level yet is presented in Table 7. According to the results obtained at this stage, there is no statistically significant difference between the countries that have completed 75% vaccination and those that have not yet completed it, in terms of stock market performances.

Table 7. t Test Showing the Performance Differences of Stock Market Indices of Countries That Completed 75% Vaccination

	31.12.2020-25.10.2021
1 (Completed %75 Vaccination) Average Return	14.2%
2 (Not completed) Average Return	16.6%
1- Variance	1.2%
2- Variance	2.8%
Probability	0.601
t stat.	0.541

Developed countries have both progressed faster in the vaccination and have superior financial capabilities when fighting the covid-19 pandemic. Therefore, there are also differences in the performance of stock markets arising from the development level of countries. To refine this effect and test the robustness of the results, countries were divided into developed and developing countries. Afterwards, the countries in each group were divided into two different groups according to the dates of reaching the 10% vaccination level. Each sub-group has same number of countries which are ranked by the vaccination date of 10% of the population. In this way, regardless of the level of development, the effect of vaccination on stock markets could be determined. According to the results presented in Table 8, the rate of vaccination is effective in the performance of stock markets separately in developed and emerging markets.

Table 8. t Test Showing the Performance Differences of Stock Market Indices of Countries Ranked by Date of Vaccination of 10% of the Population for Developing and Developed Countries Separately

31.12.2020-28.05.2021	Developed Markets	Emerging Markets
1- (Completed 10% vaccination earlier) Average Return	13.8%	12.5%
2- (Completed 10% vaccination later) Average Return	6.4%	4.5%
1- Variance	0.3%	0.4%
2- Variance	1.2%	1.1%
Probability	0.005	0.031
t stat.	3.560	2.501

DISCUSSION AND CONCLUSION

In this study, it is aimed to examine the relationship between the Covid-19 vaccination rate and stock market index returns. The data set of the research consists of the returns of the stock market indices included in the MSCI developed markets and emerging markets indices between 31.12.2020 - 28.09.2021 and the vaccination rates in these countries. 49 countries, consisting of 23 developed and 26 developing countries, were divided into 4 different groups according to the dates of reaching 10% and 50% vaccination rates of their populations, and 2 groups according to the status of reaching 75% vaccination rates.

It has been determined that the stock market performances of the countries that reach the 10% and 50% vaccination level of the population earlier are higher than the other countries. No relationship was found between reaching the 75% vaccination level and the stock market performance. Research results are also robust when tested separately for developed and emerging markets.

As a result of the study, it can be said that two main inferences were reached. First, similar to Chan et al., (34), Khalfaoui (21) and Ngwakwe (36), it was found that stock market returns increase as the vaccination rate increases. Secondly, similar to Rouatbi et al. (35) and Cong Nguyen To et al., (37), it has been observed that the volatility in the stock markets of countries with low vaccination

rates is high. In addition, research results are robust in both developed and emerging countries. Vaccination has contributed to stock performance and financial stability, regardless of countries' development and their ability to fight the pandemic.

In summary, research findings show that countries with rapid Covid-19 vaccination have lower volatility and higher performance in the stock markets. The results of the study show that vaccination has a positive contribution to financial markets. It is thought that the findings obtained in the research provide important information for investors and policy makers. The study is limited to the countries included in the MSCI indices between 31.12.2020 - 28.10.2021. For future studies, it may be suggested to researchers to analyze the relationship between stock market returns of different sectors and vaccination rates.

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RESEARCH ARTICLE

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Testing Health Expenditure Convergence in 21 OECD Countries by Using Nonlinear Unit Root Tests

ABSTRACT

Objective: The purpose of this study is to analyze the stochastic time series behaviour of health expenditure in the 21 OECD countries between 1975 and 2019 using a variety of state-of-the-art (cutting-edge) unit root tests.

Methods: In this study, the linear ADF unit root test and eight relevant nonlinear unit root tests are used to empirically estimate whether the 21 OECD countries' health expenditure data show convergence.

Results: The empirical findings are in support the stationarity of health expenditure in 20 of the 21 OECD countries.

Conclusions: Health convergence hypothesis is confirmed in most OECD countries, indicating that health expenditure shocks have solely temporary effects on country-level health expenditure. The empirical study provides significant policy implications. The empirical part of the study indicated that policy measures chosen by the policymakers cannot be made without considering possible nonlinearities in health expenditure data. More investment in the policy proposals stated in the conclusion section in the low regime years, as well as the continuation of current ones in the high regime periods, have been determined to offer appropriate conditions for health spending convergence. Furthermore, it has been determined that structural changes outside of the regime have resulted in a change in health expenditure convergence in countries such as Japan and South Korea. It is essential to invest in these countries while taking into account the periods of structural change.

Keywords: Health Expenditure Convergence, OECD Countries, Nonlinear Unit Root Tests.

Doğrusal Olmayan Birim Kök Testleri Kullanılarak 21 OECD Ülkesinde Sağlık Harcamaları Yakınsamasının Test Edilmesi

ÖZET

Amaç: Bu çalışma, 1975 ve 2019 yılları için 21 OECD ülkesinde sağlık harcamalarının stokastik zaman serisi davranışını bir dizi güncel birim kök testi kullanarak analiz etmeyi amaçlamaktadır.

Gereç ve Yöntem: Bu çalışmada, 21 OECD ülkesinin sağlık harcaması verilerinin bu ülkelerin sağlık harcamaları arasında bir yakınsama olup olmadığını ampirik olarak test etmek için doğrusal ADF birim kök testi ve sekiz ilgili doğrusal olmayan birim kök testi kullanılmıştır.

Bulgular: Ampirik bulgular, 21 OECD ülkesinin 20'sinde sağlık harcamalarının durağanlığını desteklemektedir.

Sonuç: OECD ülkelerinin çoğunda sağlık yakınsama hipotezi doğrulanmış olup, sağlık harcamaları şoklarının ülke düzeyinde sağlık harcamaları üzerinde yalnızca geçici etkileri olduğunu göstermektedir. Bu ampirik çalışma çok önemli politika sonuçları sunmaktadır. Politika otoritelerinin alacağı politika tedbirlerinin sağlık harcamaları verisindeki olası doğrusal olmayanlığı göz ardı edilerek yapılamayacağı çalışmanın ampirik kısmında teyit edilmiştir. Sonuç kısmında sıralanan politika önerilerine alt rejim dönemlerinde daha fazla yatırım yapılması ve yüksek rejim dönemlerde ise var olanın sürdürülmesinin sağlık harcamaları yakınsaması için yeter koşul sağladığı belirlenmiştir. Bunun yanı sıra Japonya ve Güney Kore gibi ülkelerde rejimden bağımsız yapısal değişimlerin sağlık harcamaları yakınsamasında da değişim yarattığı belirlenmiştir. Bu tarz ülkelerde yapısal değişimler gözetilerek yatırımların yapılması önem arz etmektedir.

Anahtar Kelimeler: Sağlık Harcamaları Yakınsaması; OECD Ülkeleri; Doğrusal Olmayan Birim Kök Testleri.

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INTRODUCTION

Health is an important component of people's and societies' well-being and standard of living. It can be seen that the United Nations Sustainable Development Goals aim to ensure a healthy and quality life for people of all ages. In this regard, countries' health expenditures are critical for the development of healthier and more productive structures. Consequently, global health expenditures increased between 2000 and 2019, with 2019 expenditures accounting for 9.8% of global GDP (1). When the distribution of countries' health expenditures is analysed, however, an unequal structure emerges. High-income countries, for example, accounted for an estimated 80% of global health expenditures (1).

According to OECD's definition, the level of health expenditure per capita and how it changes over time reveal that it is influenced by a wide range of demographic, social, and economic factors as well as the health systems's financing and organizational arrangements (3). In this context, the weight of countries on medical technologies, aging rates in society, and diseases exposed to different lifestyles can cause disparities in health expenditures (for detailed information, see (4-6)).

Convergence occurs when countries with a lower per capita GDP catch up with countries with higher per capita GDP, and the convergence approach is mainly used in the empirically measuring differences in health expenditure between countries. Even if this process is generally dealt with in terms of income, health expenditures between countries may also converge. As health expenditure increases, so may the integration of health-care markets, the improvement of working conditions in the health-care sector, and the expansion of medical research, insurance coverage, and health-care technologies (3). The resulting demands from all this may lead to a convergence of health expenditures across countries. This study compares time series to examine the convergence in per capita health expenditures for 21 OECD countries between 1975 and 2019.

The OECD country group, which we discussed in the study, has more regular data than other country groups and is longer, allowing unit root tests of the sample to produce better results. In addition to these good qualities, it is believed that this confusion can be reduced by testing this group with more advanced nonlinear tests, as the OECD country group has received more attention in the literature, with mixed results. We compare the health expenditure-convergence data generation processes using different nonlinear unit root tests.

There are two main economic reasons for the nonlinear nature of health expenditure data. First, state-dependent nonlinear structures can be found in nearly all economic variables. Granger and Teräsvirta, for example, claim that modeling economic growth due to the business cycle increases forecast accuracy (7). Furthermore, it is said that the stickiness of wages and other issues will last longer in recession periods than in economic expansion periods, and the persistency of the autoregressive parameter is greater in recession periods. As a result of this case, the lower and upper regime parameters are asymmetrical. During periods of high growth, economic expenditures will increase health expenditures. Similarly, it is natural for expenditures to fall during economic recessions. In this sense, such a pattern in health expenditures is the most natural outcome. Another nonlinearity mentioned in Perron's study is structural breaks, which cause changes in the long-term mean and trends of economic variables as a result of economic crises, wars, and similar events (8). A time-varying structure is also formed as a result of the structural break. In the empirical part, it was discovered that the health expenditure data contains both state-dependent and time-dependent nonlinearity, and thus tests that take into account both structures are successful in capturing stationarity. In this regard, it has been documented in the literature that the solution to the mixed evidence for OECD countries is to use the hybrid nonlinear model.

The empirical study has important policy implications. The empirical part of the study confirmed that policy measures to be taken by policymakers cannot be made by ignoring potential nonlinearities in health expenditure data. It has been determined that increased investment in the policy proposals listed in the conclusion section during low regime periods and continuation of existing ones during high regime periods provide adequate conditions for health expenditure convergence. Furthermore, it has been determined that structural changes independent of the regime have resulted in a shift in health expenditure convergence in countries such as Japan and South Korea. It is essential to invest in such countries while keeping structural changes in mind.

The rest of the study will provide a, a short brief literature review will be given in the second section, an explanation of part, the methods used in the study's methods in the will be explained in the third section, empirical analysis in the will be done in the fourth section, and a conclusion in the final section.

LITERATURE REVIEW

There is a significant amount of literature on the convergence of health expenditures, there have been few studies that use unit root tests in recent years. In light of the importance of the subject discussed in this study, studies dealing with the convergence of health expenditures in OECD countries with a nonlinear unit root test focus have been tried to be summarized in Table 1.

Table 1. Convergence of Health Expenditures Studies Using Unit Root Tests

Author	Country Group and Period	The Econometric Technique used	Findings	Policy Recommendation
Albulescu (9)	6 OECD Countries (1972-2019)	Bound unit root tests	It can be observed that the convergence process between countries is weak, and the heterogeneity of health systems is emphasized.	Effective strategies and efforts towards an integrated system of health education and research are necessary to achieve convergence.
Kızılkaya and Dag (10)	17 OECD Countries (1975-2019)	Fourier unit root test	It is concluded that the convergence hypothesis is valid in most of the countries.	In countries where the convergence hypothesis is not valid, policies that support convergence through continuous improvement of health services are needed.
Akarsu, Cafri and Bidirdi (11)	18 OECD (1979-2016)	Nonlinear unit root tests	This articles' findings show that total and public health expenditures per capita differ but converge in private health expenditures.	In order to increase the efficiency of these health expenditures, preventive health policies that take care of primary health care services and reduce risk factors should be introduced.
Lee and Tieslau (12)	20 OECD Countries (1971-2015)	LM unit root tests	There is evidence in favor of convergence among selected country groups.	-
Albulescu, Oros and Tiwari (13)	6 OECD Countries (1980-2012)	Bound unit root tests	It is seen that there is no significant convergence in terms of the ratio of health expenditures to GDP.	Policies should be implemented to eliminate the diversity and complexity of national health systems.
Nghiem and Connelly (14)	21 OECD Countries (1975-2014)	Phillips & Sul's approach (15)	The results expose no evidence of convergence in health expenditures among OECD countries.	Microeconomic initiatives
Payne, Anderson, Lee and Cho (3)	19 OECD Countries (1972-2008)	LM and RALS-LM unit root tests	Most OECD countries have convergence in per capita health expenditure.	Integration of the health market, improving working and insurance conditions, and disseminating health care technologies and products should be ensured.
Pekkurnaz (16)	22 OECD (1980-2012)	Nonlinear asymmetric heterogeneous panel unit root test	Although the results do not support strong convergence for all countries, it seems most appropriate to consider the asymmetry in the convergence analysis in health expenditures.	Achieving a more effective and efficient health system by improving the quality of health systems can pave the way for convergence.
Lau, Fung and Pugalis (17)	14 OECD (1970-2008)	Non-linear time series and panel tests	It is concluded that there is no convergence in per capita health expenditures for most countries.	Health policy reforms and laws concerning health services need to be reconsidered.
Aslan (18)	19 OECD (1970-2005)	Panel data unit root tests	Health expenditures do not converge between countries.	In order to achieve convergence, differences in health expenditure inequalities between countries need to be reduced.
Narayan (6)	6 OECD (1960-2000)	LM and IPS unit root tests	The health expenditures of the countries converge to the health expenditures of the USA.	It should be aimed to increase the efficiency of the health system.

ECONOMETRIC METHODOLOGY

In this study, the problem of convergence of health expenditure data of 21 OECD countries has been empirically examined. For this purpose, the ADF unit root test and eight related nonlinear unit root tests were used. Nonlinear unit root tests are classified as time-dependent nonlinearity, situational nonlinearity, and hybrid nonlinearity. Both types of nonlinearities of DGP simultaneously are called "hybrid unit root tests."

As we describe, we used the LNV, FFFFF, CEO, EG, KSS, AESTAR, OY, CL, and OEHa, b tests. OEH test proposed by Omay et al. is the most comprehensive among the unit root tests mentioned (19). Since the OEH test covers all other tests, we will only include the explanation of the OHS test. We will describe all other tests from the tests here.

$$y_t = \phi(t) + u_t \quad (1)$$

$\phi(t)$ is the deterministic nonlinear trend function and u_t is the deviation from the trend. A logistics transition function and a Fourier function

Omay, Emirmahmutoglu and Hasanov, OEH test; The OEH test is the most comprehensive unit root test used in this study. This test, being the LNV-Sollis type test, is a hybrid test that covers both nonlinearities (20). The OEH test uses the following equation to model gradual structural breaks:

are used to model the deterministic nonlinear trend function of Equation (1). The following three logistic smooth transition equations are used:

$$y_t = \alpha_1 + \alpha_2 S_t(\gamma, \tau) + \varepsilon_t \quad (2a)$$
$$y_t = \alpha_1 + \beta_1 t + \alpha_2 S_t(\gamma, \tau) + \varepsilon_t \quad (2b)$$
$$y_t = \alpha_1 + \beta_1 t + \alpha_2 S_t(\gamma, \tau) + \beta_2 t S_t(\gamma, \tau) + \varepsilon_t \quad (2c)$$

where t = 1,2,....,T; ε_t is a zero mean process; and $S_t(\gamma, \tau)$ is the logistic smooth transition function with a sample size of T:

$$S_t(\gamma, \tau) = [1 + exp\{-\gamma(t - \tau T)\}]^{-1} \quad (3)$$

$S_t(\gamma, \tau)$ is a continuous function and allows the transition between two different regimes having the extreme values as 0 and 1. The parameters γ and τ denote the speed of transition and location between two regimes, respectively. Since the value of $S_t(\gamma, \tau)$ depends on the value of the parameter, the transition between two regimes is very slow for small values of γ whereas the transition between the regimes becomes almost instantaneous at time $t = \tau T$ for very large values of γ. When $\gamma = 0$, then $S_t(\gamma, \tau) = 0.5$ for all values of t. Therefore, in Equation (2a), y_t is stationary around a mean that changes from α_1 to $\alpha_1 + \alpha_2$ Equation (2b) allows for a fixed slope term where the intercept term changes from α_1 to $\alpha_1 + \alpha_2$. In Equation (2c), in addition to the similar changes in the intercept, the slope changes from β_1 to $\beta_1 + \beta_2$ at the same time (Leybourne et al. (21)).

The logistic smooth transition function given in Equation (3) is able to capture only one gradual structural break. Therefore, the OEH test utilizes the following Fourier function to capture multiple structural breaks:

$$\phi(t) = \alpha_0 + \delta t + \sum_{k=1}^{n} a_k \sin\left(\frac{2\pi k t}{T}\right) + \sum_{k=1}^{n} b_k \cos\left(\frac{2\pi k t}{T}\right) u_t \quad ; N\frac{T}{2} \quad (4)$$

N represents the number of cumulative frequencies contained in the approximation while k is the selected frequency in the approximation process. a_i and b_i are the measurements for the amplitude and displacement of the sinusoidal components of the deterministic function. As stated in Omay et al. (22), under some circumstances, the Fourier series with an appropriate lag order in Equation (4) might approximate any function with unknown numbers of breaks of unknown forms. However, under the assumption of $a_i = b_i = 0$ for all *i*, the Fourier function becomes a linear model without a structural break. If Equation (4) allows for a structural break, the min frequency component must be at least one. As a result, the rejecting the null of $a_i = b_i = 0$, implies a structural break in the series.

The OEH test also utilizes an asymmetric exponential smooth transition autoregressive (AESTAR) model to capture the nonlinear asymmetric adjustment process as in Sollis (20). The AESTAR model considers both a logistic function and an exponential function as follows:

$$\Delta u_t = G_t(\theta_1, u_{t-1})\{F_t(\theta_2, u_{t-1})\rho_1 + (1 - F_t(\theta_2, u_{t-1}))\rho_2\}u_{t-1} + \epsilon_t \quad (5)$$

$$G_t(\theta_1, u_{t-1}) = 1 - \exp(-\theta_1(u_{t-1}^2)) \qquad \theta_1 > 0 \quad (6)$$

$$F_t(\theta_2, u_{t-1}) = [1 + \exp(-\theta_2(u_{t-1}))\ ]^{-1} \qquad \theta_2 > 0 \quad (7)$$

where $\epsilon_t \sim iid(0, \sigma^2)$.

As u_t is a zero mean variable, $F_t(\theta_2, u_{t-1})$, the logistic transition function for two regimes is determined by the positive and negative deviations from the equilibrium of u_t (i.e. the sign of disequilibrium) $G_t(\theta_1, u_{t-1})$, the U-shaped symmetric exponential transition function, ranged from 0 and 1 determines the small and large deviations from the equilibrium in absolute terms.

The AESTAR function implies a globally stationary process. The globally stationarity of AESTAR function requires $\theta_1 > 0$, $\rho_1 < 0$ and $\rho_2 < 0$ as stated in Sollis (20). If $\rho_1 \neq \rho_2$ is the case, the adjustment process captures not only sign but also size adjustment to the equilibrium. On the other hand, if $\rho_1 = \rho_2$ is the case, the adjustment to the equilibrium becomes a symmetric exponential smooth transition autoregressive (ESTAR) process.

The null hypothesis of a linear unit root can be tested against the alternative hypothesis of a globally stationary AESTAR process. The hypotheses are as follows;

$$H_0 = \theta_1 = 0 \quad (8)$$

$$H_1 = \theta_1 > 0 \quad (9)$$

Nevertheless, due to the existence of unidentified nuisance parameters under the null, testing the null hypothesis directly is not suitable. Hence, Kapetanios et al. and Sollis suggest rearranging the transition functions by using a first order Taylor approximation and the model is follows (23,20):

$$\Delta u_t = \varphi_1 u_{t-1}^3 + \varphi_2 u_{t-1}^4 + \omega_t \quad (10)$$

Equation (5) assumes a serially uncorrelated error term. After the rearrangement above, the null hypothesis in Equation (8) takes the form of $H_0: \varphi_1 = \varphi_2 = 0$. In order to allow for serial correlation, the regression equation is augmented as follows:

$$\Delta u_t = G_t(\theta_1, u_{t-1})\{F_t(\theta_2, u_{t-1})\rho_1 + (1 - F_t(\theta_2, u_{t-1}))\rho_2\}u_{t-1} + \sum_{j=1}^{p} \delta_j \Delta u_{t-j}\, \epsilon_t \quad (11)$$

where $\epsilon_t \sim iid(0, \sigma^2)$. Therefore, the following auxiliary regression is used to test the null hypothesis $H_0: \varphi_1 = \varphi_2 = 0$:

$$\Delta u_t = \varphi_1 u_{t-1}^3 + \varphi_2 u_{t-1}^4 + \textstyle\sum_{j=1}^{p} \delta_j \Delta u_{t-j} + \vartheta_t \quad (12)$$

The testing procedure of the OEH test consists of two steps. As a first step, one estimates the preferred component form the Equations (2)-(4) and obtain residuals, $\hat{u}_t$. In the second step, one uses the residuals and estimate the regression in Equation (12) by OLS and testing the null hypothesis by using F test. For the case of logistic trend functions, nonlinear least squares (NLS) can be used for estimating the deterministic trend. By using OLS, the coefficients of Fourier series can be estimated for the frequency, k. k is determined by the estimation of the trend function in the range of $1 \leq k \leq k_{max}$ and chosen the one with having the smallest sum of squared residuals.

OEH suggests two test statistics as F_{LBAE} and F_{FSAE}. F_{LBAE} is the test statistics for modelling the gradual break by using logistic transition functions given in the Equations (2a) - (2c). F_{FSAE} is the test statistics of the case of modelling breaks by using the Fourier series given in Equation (4).

The Omay test is proposed by the fractional estimation of the kt integer frequency in equation 4 (24). After estimating Equation 4 with fractional frequency, the ADF test is applied to the remaining series $\tau_{DF\_\tau}^{fr}$.

The CEO (2017) test uses exponential smooth transition instead of the logistics function of the OHE 1 test. The Omay test applies the ADF test to the remaining series after the nonlinear trend estimation (24).

$$F_t(\gamma,\tau) = 1 - exp[-\gamma(t-\tau)^2] \quad ,\gamma > 0 \tag{13}$$

In CEO test, after de-trending the nonlinear trend from the series, the remaining residuals are used in ADF test for smooth temporary structural break unit root test. The t statistics of the test are labelled as $\tilde{s}_{\alpha}, \tilde{s}_{\alpha(\beta)}$ and $\tilde{s}_{\alpha\beta}$ for the models used, respectively.

The EG test uses the indicator function instead of the smooth logistic transition in Equation (7). The TAR type unit root test can be classified as a state-dependent nonlinear unit root test.

The KSS test is a state-dependent non-linear unit root test that uses ESTAR as a transition function. It considers Equation (2a)-(2c) and uses the exponential transition function given in Equation (6). The KSS test enables the symmetrical adjustment to be modeled towards equilibrium (Kapetanios et al. (23)).

The other important state dependent nonlinear unit root test is Sollis test (20).[1] Sollis uses the Equations (5)-(7). Sollis is an extension of KSS test and suggests testing the asymmetric state dependent nonlinearity with intercept and trend deterministic terms in its alternative hypothesis. Sollis has allowed that test can cover the sign and size of the adjustment towards equilibrium at the same time by employing the AESTAR function which uses LSTR and ESTAR function together (20). OY[2] test is one of the first hybrid tests which use the LNV and KSS tests together. OY test depend on the Equations (2a)-(2c) and applies the transition function given in Equation (3) for smooth structural break or nonlinear trend. After de-trending the nonlinear trend from the series, the residuals are used in KSS test. In this test, the null of linear unit root can be tested against nonlinear and stationary around smoothly changing trend and intercept (Omay and Yildirim, (25)).

EMPIRICAL ANALYSIS

This study compares time series to examine the convergence in per capita health expenditures for 21 OECD countries between 1975 and 2019. As we used a time series version of the unit root tests, first, we will give summary statistics.

Table 2. Summary Statistics

	Mean	Var	Min	Max	Median
Australia	2188.98	2245283.08	374.28	4919.24	1537.00
Austria	2575.06	3091851.54	386.50	5705.10	2083.04
Belgium	2371.14	2708351.86	334.85	5458.40	1668.27
Canada	2568.51	2432718.63	487.35	5370.44	1984.33
Denmark	2470.76	2501558.36	508.06	5477.57	1712.49
Finland	2022.57	1954966.72	285.36	4558.54	1349.42
Germany	2840.50	3171773.76	532.48	6518.00	2345.67
Iceland	2290.19	1659924.05	358.57	4540.76	1807.99
Ireland	2111.29	2856423.12	251.84	5083.21	1128.83
Japan	2026.35	2121482.90	283.20	4691.46	1414.91
Korea	996.28	965482.15	31.48	3406.26	515.61
Netherlands	2640.73	3172195.44	452.20	5739.20	1746.06
New Zealand	1804.24	1511543.68	404.54	4211.85	1306.06
Norway	2808.83	4424520.52	327.21	6744.62	1767.05
Portugal	1411.86	1107148.70	149.39	3347.43	1008.24
Spain	1556.26	1265291.83	185.28	3600.28	1124.88
Sweden	2456.38	2591641.60	501.20	5551.94	2456.38
Switzerland	3328.44	4375425.83	584.20	7138.06	2622.54
Turkey	458.25	165716.46	37.81	1266.93	196.97
UK	1899.96	2119982.41	225.09	4500.14	1092.41
US	4731.13	10933121.37	560.75	10948.48	3586.72

[1] See, Sollis (20) for details.

[2] See Omay and Yildirim (17) for details.

We followed the Canarella et al. study and performed preliminary structural break and nonlinearity tests to investigate the a priori existence of 8 nonlinear unit root tests that we will perform throughout the study (26). We also tried to explain the meanings of the tests we carried by mentioning the economic relationships that led to these tests.

Economically, two main reasons can explain the nonlinear nature of health expenditure data. First, state-dependent nonlinear structures appear in almost all economic variables. For example, Granger and Teräsvirta state that modeling economic growth due to the business cycle increases forecast accuracy (7). In addition, it is said that the stickiness of wages and other issues will last longer in recession periods than in economic expansion periods, and the persistency of the autoregressive parameter is greater in recession periods. This case causes the lower and upper regime parameters to be asymmetrical. Economic expenditures will increase health expenditures in periods of high growth. Likewise, it is natural that expenditures tend to decrease during economic recession periods. In this sense, it is the most natural result for health expenditures to follow such a pattern. Another nonlinearity is the structural breaks mentioned in Perron's study (8). These structural breaks cause changes in the long-term mean and trends of economic variables due to economic crises, wars, and similar events. The structural break also causes the formation of a time-varying structure. The time-varying structure of the time series variable influences both its deterministic and autoregressive components. The Trig test structure proposed by Beckers Enders and Hurn was primarily used to test these two different types of structures (27). In determining the stochastic structure of the data, Canarella et al. have been used (26):

We will conduct preliminary tests to determine the processes for generating health expenditure convergence data. We conducted the following tests in the direction of Canarella et al. (26).

1. Use the linearity test developed by Luukkonen, Saikkonen, and Teräsvirta to determine whether the data is state-dependent, time-varying nonlinear, or both (28).
2. Determine whether the nonlinear trend is logistic (LSTR), exponential (ESTR), integer frequency Fourier (IFFF), or fractional frequency (FFFF) Fourier if the data is time-dependent,

Becker, Enders, and Lee Trig-test and Luukkonen, Saikkonen and Teräsvirta tests are used for these purposes (29, 28).

Table 3. Time varying and Structural Break Tests (Trig, Logistic and Exponential break tests)

Country	Logistic Smooth Transition Test			ESTT Test	Fourier		Test Result
	Model A	Model B	Model C	Model A	Intercept	Intercept &Trend	
Australia	206.951	14.507	126.060	151.580	82.067	96.938	LSTT Model A
Austria	19.020	54.085	99.834	103.361	48.935	38.112	ESTT Model A
Belgium	23.572	5.479	14.639	31.440	11.867	9.523	ESTT Model A
Canada	1773.332	1015.482	780.004	34.551	467.740	561.389	LSTT Model A
Denmark	2269.745	410.685	1631.248	115.982	997.835	1044.400	LSTT Model A
Finland	76.890	30.199	89.801	65.599	87.088	74.206	LSTT Model C
Germany	1027.997	241.669	1050.955	52.111	723.547	483.623	LSTT Model C
Iceland	265.419	50.468	195.817	77.651	269.593	206.660	LSTT Model A
Ireland	1088.174	684.262	455.426	44.255	227.922	686.930	LSTT Model A
Japan	45.714	15.794	44.930	57.830	82.698	66.170	Fourier Intercept
Korea	4909.650	5833.574	3842.821	124.367	2279.207	3523.441	LSTT Model B
Netherlands	195.041	137.057	374.976	129.299	88.472	218.018	LSTT Model C
New Zea.	325.454	19.382	153.730	291.060	64.474	93.967	LSTT Model A
Norway	620.235	299.013	276.777	37.288	238.332	230.636	LSTT Model A
Portugal	1025.889	117.019	557.051	106.494	564.246	543.585	LSTT Model A
Spain	1317.423	648.623	434.235	55.498	368.124	391.102	LSTT Model A
Sweden	888.055	821.483	563.541	108.933	544.746	722.673	LSTT Model A
Switzerland	1767.073	797.560	608.984	37.499	355.575	1418.244	LSTT Model A
Turkey	1300.312	724.856	502.488	33.083	530.958	515.008	LSTT Model A
UK	1880.664	717.758	1519.872	39.957	409.000	382.669	LSTT Model A
US	31.865	17.750	164.188	87.934	141.953	102.385	LSTT Model C

Table 4. Linearity (Nonlinearity test - LM3E) Lukonnen et al. (28)

Country	LM F test	Lag Selected	OverAllTest Result
Australia	0.411	1	TV Time Varying
Austria	8.345	7	State Dependent TV
Belgium	3.936	5	State Dependent TV
Canada	5.152	1	State Dependent TV
Denmark	2.447	1	TV
Finland	8.010	2	State Dependent TV
Germany	0.168	1	TV
Iceland	5.307	10	State Dependent TV
Ireland	4.483	7	State Dependent TV
Japan	2.512	3	TV
Korea	3.185	5	State Dependent TV
Netherlands	1.252	1	TV
New Zealand	0.206	1	TV
Norway	1.939	1	TV
Portugal	2.015	5	TV
Spain	4.902	2	State Dependent TV
Sweden	4.600	1	State Dependent TV
Switzerland	1.977	1	TV
Turkey	1.807	1	TV
UK	1.643	1	TV
US	3.187	1	State Dependent TV

With these specific tests, our study confirmed the existence of nonlinear structures. We found a structural break in all of the data and state-dependent nonlinear structure in some data of the data. Since these specific tests are related to the unit root tests we use, they have also ensured that the unit root tests we use are approved at the concurrently. We do not have the opportunity to test the nature of nonlinearity using BDS or other general nonlinearity tests. We accept the general hypothesis that the data is nonlinear with the BDS test, but we cannot determine which specific type of functional structure it is. Moreover, the results of the test show that using a hybrid test, such as logistic smooth transition trend with exponential smooth transition state-dependent structures, namely the OY test, will fit better with the health expenditure data structure (25).

As shown in Table 1, the heath convergence hypothesis was provided by hybrid tests which are consistent with the Table 2 and Table 3 test results. The first finding from these results is that the health expenditure data cannot be explained by either a state-dependent or a time-dependent structure. In other words, health expenditure data do not contain singular dynamics that we can call time-dependent or state-dependent in the data generating process. However, as we said above, it is a hybrid; that is, it contains both structures simultaneously. In this sense, policymakers should carry out the policy-making process by paying attention to the structural breaks that occur over time and the cycles that develop within the business cycle while doing health expenditures. The health expenditure convergence hypothesis was explicitly provided in Australia, Austria, Canada, Denmark, Finland, Germany, Iceland, Ireland, Japan, Korea, Netherlands, Spain, Switzerland, New Zealand, and Norway, Portugal, Sweden, Turkey, UK, and US. Belgium appears to be the only country not provided by this group. In addition, it is seen that health convergence is achieved only with time-dependent tests in Japan and Korea where the Japanese data found to be best described with Fourier intercept case.

Table 5. Results of Time Series Unit Root Tests[3]

–Time Series Tests– 1975-2019	KSS Test (KSS) Model : Intercept Only (23)		KSS Test(2003) (KSS) Model : Intercept and Trend (23)		LNV Test Model A (21)		LNV Test Model B (21)		LNV Test Model C (21)		Omay Test (FFFFF) Model : Intercept Only (24)		Omay Test(2015) (FFFFF) Model : Int&Trend (24)		SOR Test (LSTR-Fourier-ADF) Model A (30)		SOR Test (LSTR-Fourier-ADF) Model B (30)		SOR Test (LSTR-Fourier-ADF) Model C (30)	
	lag	t value	lag	t value	lag	t value	lag	t value	lag	t value	lag	t value	lag	t value	lag	t value	lag	t value	lag	t value
Australia	14	0.314	15	0.516	14	-1.417	5	-1.533	14	0.918	6	-1.474	7	-1.136	4	-2.884	4	-5.189**	7	-3.219
Austria	13	0.212	14	1.541	7	-3.868	7	-5.290**	7	-6.652	9	-1.049	7	-2.712	7	-3.410	14	-1.303	7	-2.776
Belgium	8	0.292	9	-0.219	7	-2.285	6	-2.593	7	-1.767	6	-1.881	7	-2.197	7	-3.361	7	-3.270	7	-3.352
Canada	5	-1.407	6	-0.335	5	-4.074*	7	-2.615	7	-4.305	6	-2.339	3	-2.732	4	-4.629**	5	-3.131	5	-3.150
Denmark	5	-1.075	5	-3.019**	5	-3.279	4	-0.453	3	-3.365	3	-2.679	7	-1.452	6	-4.407*	5	-3.148	4	-3.491
Finland	4	0.540	5	0.938	3	-3.234	5	-1.839	4	-1.582	4	-1.306	4	-1.558	3	-4.645**	3	-3.544	3	-3.741
Germany	3	-1.712	4	-1.940	7	-2.196	3	-0.226	3	-2.971	3	-3.619*	3	-3.538*	3	-4.265*	7	-3.548	7	-5.510**
Iceland	14	-2.875***	14	-0.400	14	-3.023	14	-3.871	7	-0.980	14	-2.702	14	-2.493	7	-2.878	14	-3.247	14	-2.516
Ireland	14	1.898	15	1.221	7	-4.421**	7	-6.266***	7	-6.323***	14	-1.017	7	-2.526	7	-4.478*	7	-2.862	7	-3.076
Japan	5	0.365	6	0.334	4	-4.081*	5	-1.693	5	-0.987	3	-2.472	4	-1.592	4	-4.020	4	-4.703*	4	-5.053*
Korea	13	0.909	14	-0.198	6	-1.665	14	-3.628	14	-3.725	6	-2.820	7	-3.701*	6	-2.644	7	-3.401	7	-3.281
Netherlands	3	-1.266	4	-1.324	3	-1.932	3	-2.736	4	-1.547	3	-3.311	3	-2.351	3	-2.619	4	-5.570***	7	-3.770
New Zealand	14	0.336	15	-1.994	14	-0.089	14	-3.046	7	-2.274	14	-0.726	14	-2.487	14	-1.422	14	-2.293	14	-1.132
Norway	6	1.687	7	1.575	14	-2.591	3	-3.779	5	-2.776	3	-3.237	3	-2.137	14	-1.989	3	-4.541*	14	-3.181
Portugal	13	0.382	14	0.266	7	-2.527	7	-1.276	7	-1.597	3	-1.672	14	-2.042	7	-2.466	7	-2.890	7	-3.374
Spain	3	0.820	15	3.319**	3	-3.543	5	-1.765	3	-1.996	14	-2.705	14	-4.576***	14	-3.436	14	-3.116	14	-2.150
Sweden	3	-1.578	5	-2.860*	3	-2.436	3	-2.081	3	-2.182	14	2.279	3	-2.412	4	-2.500	3	-4.487*	3	-4.464
Switzerland	14	-2.478**	15	-1.791	7	-2.892	3	-4.595	2	-1.260	10	-1.181	3	-2.537	7	-3.400	14	-1.325	7	-3.335
Turkey	4	1.629	5	0.338	14	-1.288	14	-1.145	14	-1.386	14	-1.069	14	-0.902	14	-1.253	3	-4.726*	14	-1.810
UK	3	1.338	4	1.005	4	-2.525	4	-2.226	3	-3.015	3	-1.347	5	-1.814	7	-3.107	3	-4.031	7	-3.525
US	3	-0.047	6	1.483	5	-2.539	5	-1.458	7	-1.371	3	-1.960	3	-1.815	3	-2.393	4	-4.126	3	-3.691

[3] Note*, ** and *** are representing the 10%, 5% and 1% significance level, respectively. ADF test, available upon request

Table 6. Results of Time Series Unit Root Tests (Continue)[4]

–Time Series Tests– 1975-2019	CEO Model A: Corakci et. al. Test (31)		CEO Model B: Corakci et. al Test (31)		CEO Model C Corakci et.al. Test (31)		OY Test (LNV-KSS) Model A (25)		OY Test (LNV-KSS) Model B (25)		OY Test (LNV-KSS) Model C (25)		OEH Test (FKSS) Model : Intercept Only (18)		OEH Test (FKSS) Model : Intercept and Trend (19)		OSH Model A (32)		OSH Model B (32)		OSH Model C (32)	
	lag	t value	lag	t value	lag	t value	lag	t value	lag	t value	lag	t value	lag	t value	lag	t value	lag	t value	lag	t value	lag	t value
Australia	7	-1.043	7	-1.096	7	-1.085	3	-2.593	6	-2.183	7	-4.164	4	-3.567	14	-0.548	14	-0.120	7	-0.064	7	-0.081
Austria	4	-1.725	14	-0.782	14	-0.765	7	-4.275**	7	-5.487***	14	-0.248	13	-1.480	13	-0.154	7	-0.998	7	-2.417	3	-3.575
Belgium	7	-2.241	7	-2.264	7	-1.447	7	-3.568*	7	-3.611	7	-3.449	7	-1.851	7	-1.346	7	-1.900	6	-3.584	7	-3.481
Canada	7	-0.688	7	-3.207	7	-2.142	7	-3.554*	7	-2.319	7	-5.272**	5	1.260	4	-2.419	5	-2.066	6	-2.460	5	-2.159
Denmark	14	-2.282	6	-1.451	6	-1.447	3	-3.147	4	-0.267	4	-1.704	5	0.215	5	-3.933	5	-3.771*	3	-3.332	3	-3.331
Finland	4	-1.212	5	-1.464	14	-1.068	4	-2.750	6	-3.169	4	-4.378*	3	-4.786	4	-2.692	3	-3.687*	4	-2.690	4	-2.706
Germany	14	-1.008	3	-0.872	3	-0.922	3	-6.255***	3	0.201	3	-4.386*	9	-2.196	3	-4.593	3	-4.856***	3	-6.903***	3	-6.677***
Iceland	14	-0.664	14	-2.747	14	-2.735	14	-4.540**	14	-4.675**	7	-2.246	14	-2.185	13	-2.002	7	-2.386	14	-2.130	14	-2.165
Ireland	5	-1.541	7	-0.125	7	-0.173	14	-2.144	7	-6.540***	7	-6.526***	14	-1.329	13	-2.195	7	-3.920*	7	-3.824	7	-3.411
Japan	7	-1.293	5	-0.955	5	-0.957	14	-3.720*	5	-3.577	3	-3.107	13	0.375	5	-1.137	14	-2.237	5	-2.267	5	-0.817
Korea	7	-0.711	7	-0.512	7	-0.507	6	-3.599*	14	-2.338	14	-2.438	7	0.942	6	-2.038	7	-1.759	7	-3.760	7	-3.787*
Netherlands	3	-1.908	3	-2.923	3	-2.928	3	-4.397**	3	-5.960***	4	-2.820	5	-3.312	3	-4.641	3	-3.008	3	-4.906**	3	-5.542***
New Zealand	14	-1.978	14	-1.736	14	-1.721	14	-2.647	14	-4.000*	7	-4.372*	14	-0.227	13	-4.158	14	-0.689	7	0.219	7	0.238
Norway	3	-1.916	3	-3.598	3	-3.615	7	-1.530	4	-3.077	6	-4.137	8	-1.591	6	-3.208	14	-2.056	6	-4.086*	6	-4.021*
Portugal	7	-1.453	7	-1.030	7	-1.024	4	-0.354	7	-3.274	14	-2.892	13	1.045	11	-4.805	14	0.214	3	-2.972	3	-2.991
Spain	14	-1.044	14	-2.125	14	-2.100	4	-3.239	4	-3.558	3	-2.374	3	0.433	14	-3.282	14	-2.789	14	-4.241**	14	-4.314**
Sweden	7	-1.160	14	1.094	14	1.090	3	-1.734	3	-2.384	3	-2.525	3	0.119	14	-4.184	3	-1.438	3	-2.841	3	-2.867
Switzerland	3	-0.697	3	-1.682	3	-1.667	7	-2.236	3	-4.902**	5	-1.905	13	1.105	3	-1.897	14	-3.685*	4	-2.504	7	-2.564
Turkey	7	-0.994	4	-1.81	7	-1.459	14	-2.962	14	-1.395	14	-1.435	3	-3.098	14	-7.295*	14	-6.670***	14	-2.539	14	-1.893
UK	7	-0.969	3	-2.548	3	-2.534	7	-1.070	4	-2.197	3	-1.900	3	-1.355	7	-7.521*	7	-5.378***	3	-2.523	3	-1.813
US	7	-1.254	4	-2.271	4	-2.289	7	-2.984	5	-5.346***	7	-2.198	3	-2.848	3	-3.149	5	-3.450	7	-2.871	7	-2.833

[4] Note*, ** and *** are representing the 10%, 5% and 1% significance level, respectively. ADF test, available upon request.

CONCLUDING REMARKS

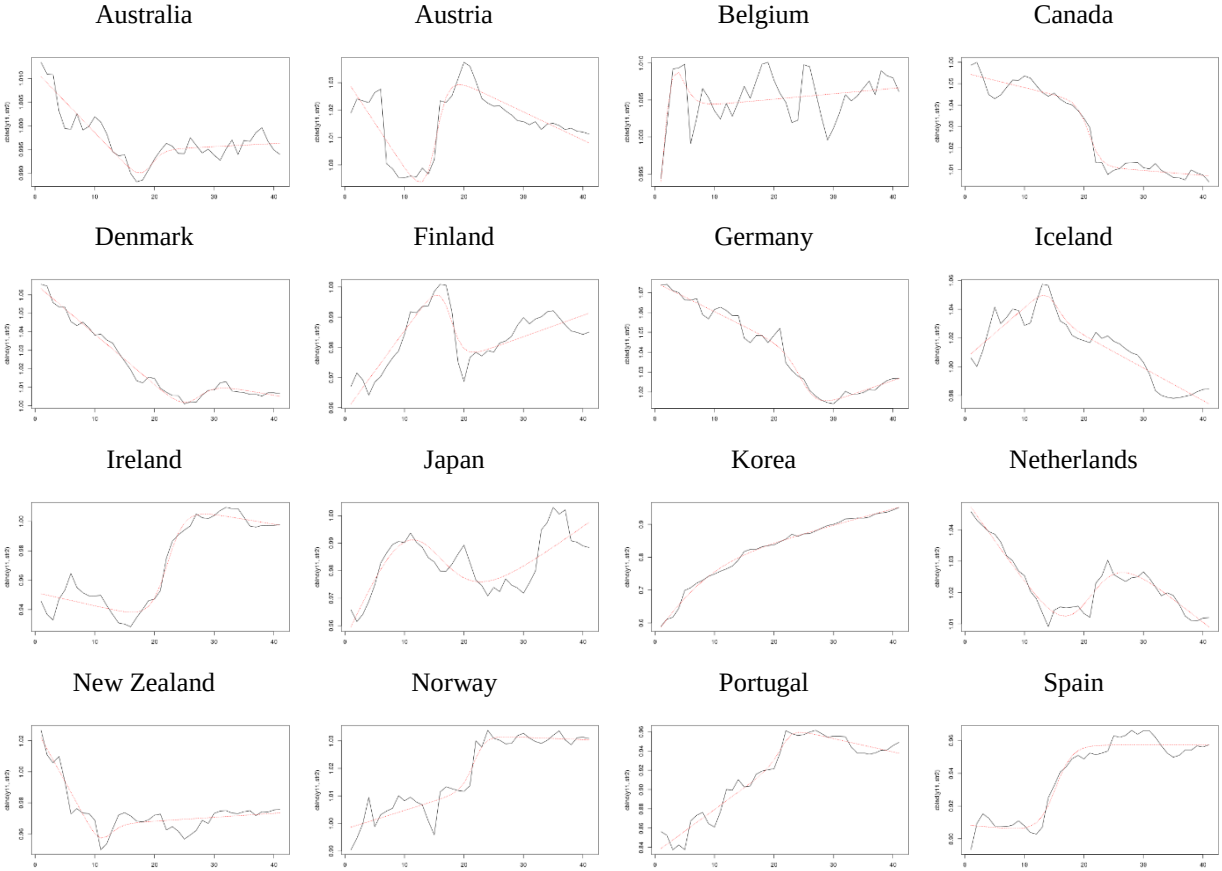
Various policy recommendations have previously been presented in the literature. The general principle upon which these policy recommendations are based is that if countries' health expenditures do not converge, their implementation will result in convergence. The following recommendations are made in this regard.

1. To improve the efficiency of these health expenditures, preventive health policies that focus on primary health care services and risk factors should be implemented.
2. Policies should be put in place to reduce the diversity and complexity of nations.
3. It is necessary to ensure the integration of the health market, the improvement of working and insurance conditions, and the dissemination of health care technologies and products.
4. Improving the quality of health systems can pave the way for a more effective and efficient health system, laying the foundation for convergence.
5. Health policy reforms and laws governing health care services must be revisited.
6. In order to achieve convergence, disparities in health expenditure between countries must be reduced.
7. It should aim to improve the health-care system's efficiency.

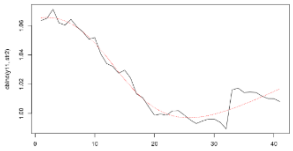
It is also critical to consider what the unit root test results for the policy recommendations listed above suggest. To improve the efficiency of health expenditures, we must first understand of the functional structure of health expenditures. The nonlinear unit root tests used in this study successfully identified the data generation processes of health expenditures. As a result, the types of structures exhibited by health expenditures exhibit by country were tested using state-dependent, time-varying, and hybrid tests. According to the findings of these tests, health expenditure convergence is provided with a structural break in Japan and Korea. As a result, it has been determined that these two countries' expenditure patterns are suitable for convergence until the next break or the economic phenomenon which leads to a break in health expenditure series of that country. Furthermore, with the exception of Belgium, convergence has been achieved when considering the real business cycle and structural break. This case demonstrates that at least prior to Covid 19 Pandemic, 20 of 21 OECD countries made the right decisions in terms of health policies and effectiveness. Due to pandemic conditions, we did not include post-2019 study. In this regard, after gathering the necessary data, it is useful to investigate how their performance under pandemic conditions is affected..

APPENDIX

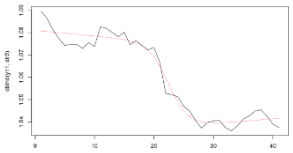
LNV Test (1998) Model C



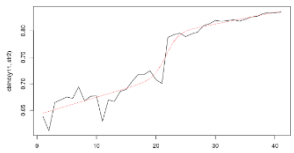
Sweden



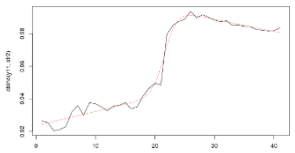
Switzerland



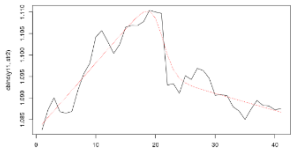
Turkey



United Kingdom

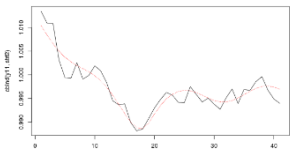


United States

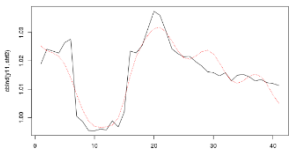


SOR Test (LSTR-Fourier-ADF) Model C

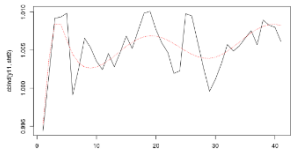
Australia



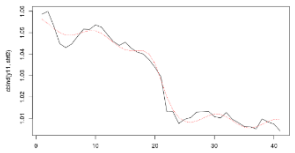
Austria



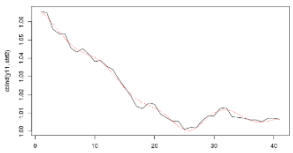
Belgium



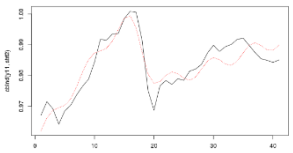
Canada



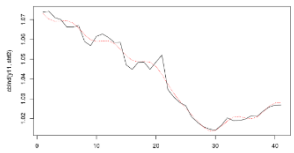
Denmark



Finland



Germany



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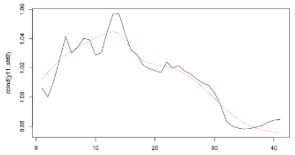

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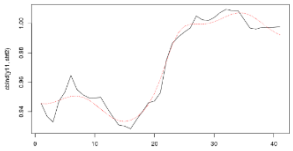

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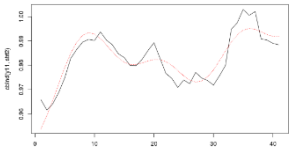

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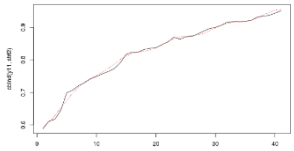

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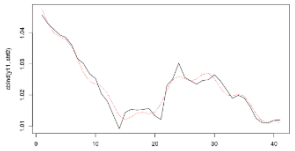

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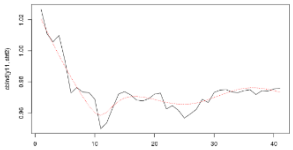

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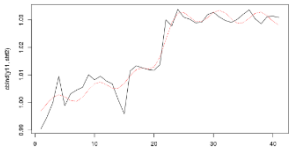

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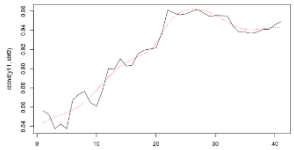

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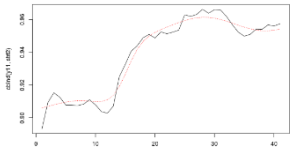

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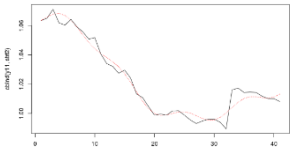

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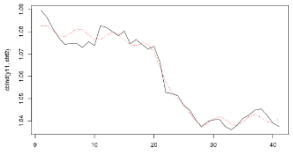

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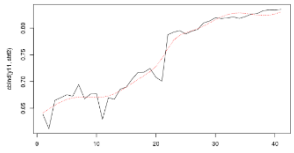

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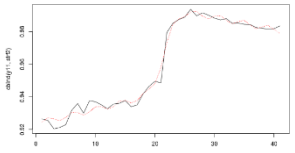

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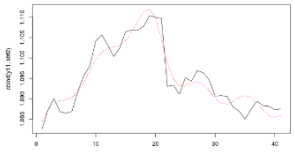

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RESEARCH ARTICLE

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Analyzing COVID-19 Post-Pandemic Recovery Process in Azores Archipelago

ABSTRACT
Objective: The Small Islands Developing States (SIDS) are specific regions that mainly depend on tourism industry and sector. The pandemic of COVID-19 has strongly affected the tourism management in these areas. In this study, we aim to design and test recovery strategies to represent practical solutions based on the concept of risk perception as a significant issue in the intention and attitude of tourists toward behavior.
Methods: In this regard, we use the theory of planned behavior (TPB) to provide an accurate simulation and evaluation to develop a model including four distinct strategies: social distancing, tax reduction policy, travel bubble, and joint strategy.
Results: The outcomes indicate that the most efficient way to alter tourism behavior intention and attitude is the travel bubble strategy.
Conclusions: Remarkable reduction in tourism arrival could be an advantage to use existing opportunities toward sustainable development plans in the Azores Archipelago as the chosen case study in this study.

Keywords: Sustainable Development, Tourism Management, Tourism Recovery Strategy, Small Islands Developing States, System Dynamics, Planned Behavior'.

Azor Takımadalarında COVID-19 Pandemi Sonrası İyileşme Sürecinin Analizi

ÖZET
Amaç: Gelişmekte Olan Küçük Ada Devletleri (SIDS), esas olarak turizm endüstrisine ve sektörüne bağlı olan belirli bölgelerdir. COVID-19 pandemisi bu alanlarda turizm yönetimini güçlü bir şekilde etkilemiştir. Bu çalışmada, turistlerin davranışa yönelik niyet ve tutumlarında önemli bir konu olan risk algısı kavramına dayalı pratik çözümleri temsil edecek kurtarma stratejilerini tasarlamayı ve test etmeyi amaçlıyoruz.
Gereç ve Yöntem: Bu bağlamda, dört farklı stratejiyi içeren bir model geliştirmek için doğru bir simülasyon ve değerlendirme sağlamak için planlı davranış teorisini (TPB) kullandık; sosyal mesafe, vergi indirim politikası, seyahat balonu ve ortak strateji.
Bulgular: Sonuçlar, turizm davranışı niyetini ve tutumunu değiştirmenin en etkili yolunun seyahat balonu stratejisi olduğunu göstermektedir.
Sonuç: Turizm gelişindeki kayda değer azalma, bu çalışmada seçilen örnek olay olarak Azor Takımadaları'ndaki sürdürülebilir kalkınma planlarına yönelik mevcut fırsatları kullanmak için bir avantaj olabilir.

Anahtar Kelimeler: Sürdürülebilir Kalkınma, Turizm Yönetimi, Turizm Kurtarma Stratejisi, Küçük Adalar Gelişmekte Olan Devletler, Sistem Dinamikleri, Planlı Davranış.

INTRODUCTION

Small Island Developing States (SIDS) are a distinct group of 38 UN Member States and 20 Non-UN Members or Associate Members of United Nations regional commissions that face unique socio-economic and environmental vulnerabilities and have specific characteristics. They also face a host of challenges including small scale, remote location, inaccessibility, limited resources, and the risk of confronting global environmental challenges socio-economic issues (1).

The COVID-19 viral pandemic is an unprecedented global phenomenon that is also a highly personal experience with wide-ranging and deep effects (2). In this regard, International travel has not been affected as much in decades as by the COVID-19 pandemic. This results largely from the increasingly strict travel restrictions imposed since January, 2020. Countries around the world started by imposing bans or 14-day self-isolation periods for travelers from certain countries with high COVID-19 infection rates (3).

Later, these bans were extended to other countries like Portugal and Spain. By 28 April, all global destinations had introduced travel restrictions. At the same time, 45% of all travel destinations have completely or partially closed the border, and 30% of destinations have suspended most international flights (3). Consequently, an average of 22% fall in international tourist arrivals has been resulted during the first quarter of 2020 based on the latest data from the United Nation World Tourism Organization (UNWTO) shows. According to the United Nations specialized agency, the crisis has led to an annual decline of between 60% and 80% when compared with 2019 rates. This issue has placed millions of livelihoods at risk and threatens to roll back progress made in advancing the Sustainable Development Goals (SDGs) (4).

As we mentioned, the measures put in place to contain the spread of the pandemic have taken a heavy toll on the tourism sector. The SIDS are especially dependent on the tourism sector according to their fragile economy and specific circumstances. The Azores Archipelago located in the middle of the northern hemisphere of the Atlantic Ocean, tourism contributed an estimated 59% to its GDP in 2019 as well as indirectly and directly hired 69% of the workforce (WTTC 2019). Overall, travel and tourism in SIDS is worth an average of $48 billion per year. According to UNCTAD, a decline in tourism receipts by 25% will result in a $7.4 billion or 7.3% fall in GDP. The drop could be significantly greater in some of the SIDS, reaching almost 9% in the Azores Archipelago (5). As a result, it is essential for these islands to respond quickly to the epidemic catastrophe by considering the tourism trends and dynamics during this unsettled period in order to figure out how to recover from the impact of pandemic toward a better post-pandemic period in the SIDSs based on their specific features (6).

Although numerous studies have been conducted on the impact of crises on tourism and tourist trends, the epidemics have been limited to a specific geographical area, which practically affected a particular geographic area for a limited period. Whereas an epidemic in this scale, affecting tourism markets and tourism destinations significantly, has occurred for the first time. However, nature, the unprecedented circumstances, and the impacts of the COVID-19 demonstrate signs that this crisis is not only different, but it can have profound and long-term structural and transformational changes to tourism as a socio-economic activity (7). The impact of crises can be devastating for the tourism sector in SIDSs due to being highly reliant on tourism receipts. Furthermore, managing the recovery following a tourism crisis is likely to be impaired by the state of fragility associated with these regions (8).

In this regard, risk has been considered as the main priority attention and a key factor in the comprehensive tourism planning to investigate tourist behavior and dynamics in SIDS areas. On this matter, risk perception consists of a set of subjective principles and personal verdicts regarding uncertain circumstances that might lead to risks. In tourism planning, risk efficiently depends on natural disasters, accidents and epidemics that would result in various aspects of risk such as social, economic, demographic, psychological, and healthy risk phenomenon (9).

Destination management defines a process that involves coordinated actions aimed to control the economic, socio-cultural and environmental dimensions of a specific tourism territory. In this way, one of the efficient methods in destination management is simulation approaches. System dynamics (SD) has been considered as a beneficial technique developed on computer-based simulation tool that could be used in analyzing the trends and dynamics of tourism system interactions over a specific period (10).

While COVID-19 is a new pandemic and dynamic characteristics and related interaction all over the world are different from the past pandemics, the past is not a good predictor for the future. As a result, other prediction methods such as time series forecast techniques and neural network models are extremely dependent on historical data and previous dynamics so they will perform poorly when conditions are unstable and the structure of the data could change dramatically and frequently (11,12).

This study aims to use the risk perception based on the theory of planned behavior (TPB) as the main method to investigate the tourism trends and dynamics during the COVID-19 pandemic and post-pandemic period. To attain this purpose, we

introduce a SD simulation model specifically suggested for SIDS areas to understand the impact of pandemic on the destination management to recognize the upcoming post-pandemic period in Azores Archipelago. The achievement of a comprehensive insight in the post-pandemic period, the proposed model in this study consists of five sub-model based on a research that has used it for Maldives as a SIDS (4). These five sub-models represent the social, economic and environmental sectors of the destination management. At the end, four strategies are proposed to support the decision-making system for tourism recovery process in post-pandemic period. The main contribution of this study is to consider Azores Archipelago as a specific case study due to its particular characteristics and features to evaluate the tourism dynamics during the COVID-19 pandemic for precise preparation toward suitable recovery strategies for tourism recovery in post-pandemic period.

As long as the COVID-19 outbreak has a strong impact on tourism management, the investigation of pandemic in specific periods and consideration of tourist rate along with number of active cases and vaccination level is essential in medical and socio-economic issues of any region. While tourism sector forms the main section of GDP and economic aspects in islands, designing and implementing new strategies for reduction of active cases rate and tourism recovery will lead to develop tourist's behavior intention and attitude in travel dynamics. Furthermore, the proposed approaches and strategies could effectively contribute in achieving proper situation of COVID-19 outbreak (13).

In this regard, the main motivation of this study is to propose a framework that will result in a desirable post-pandemic period, specifically in tourism management. This study includes a multi-discipline framework consists of tourism management concepts, system dynamics, medical statistics and solutions, and finally strategic recovery procedure in post-pandemic period in tourism sector. The results derived from this research could be efficiently used in small islands developing states, specifically in the field of tourism planning. Therefore, the main contribution of this study is to develop both tourism and health issues in post-pandemic period of COVID-19.

Risk Perception in Tourism Management: Theory of planned behavior (TPB) suggests that behavior is determined by intentions, attitudes (beliefs about a behavior), and subjective norms (beliefs about others' attitudes toward a specific behavior) (14). It could be used to investigate the tourist tendencies and intentions in decision-making process in the context of destination management. In this regard, attitude toward the behavior, subjective norm and perceived behavior control are the three dimensions that TPB considers during the tourism decision-making process (15).

The relationship between risk perception and TPB for evaluation of tourism management, behavior analysis and proposed strategies has been determined. In this respect, it is simply understood that perceived risk will lead to a remarkable impact on tourism management by affecting tourist's tendency negatively toward a particular destination (16). Furthermore, in an interactive relationship, affective risk perception and subjective norms are respectively influenced by tourist's attitudes and cognitive risk perceptions in a positive way (17).

According to risk perception concept and proposed notions, the TPB with risk perception could be clarified as illustrated in Figure 1.

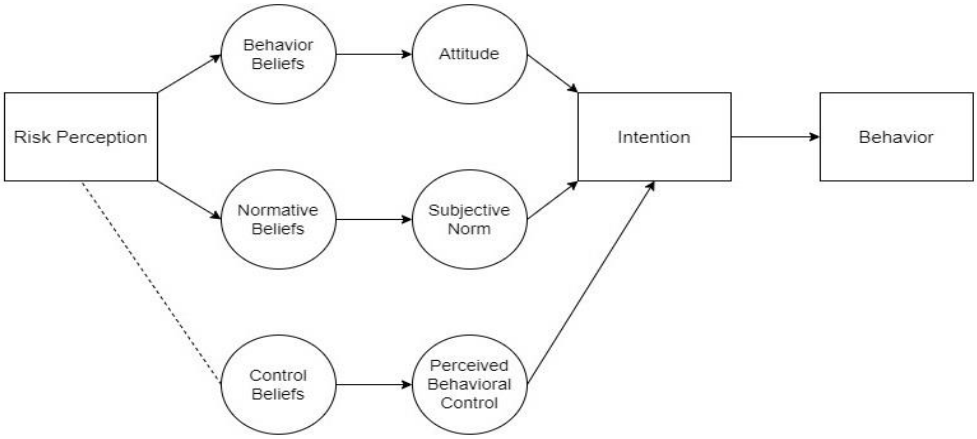

Figure 1. TPB with risk perception (4)

Recent studies show that TPB provides an efficient framework to evaluate the three proposed dimensions along with key factors in tourism management such as tourist attitude and behaviors in a particular region. As we discussed, all three pillars of TPB have a direct and positive impact on tourist intention. In this regard, subjective norm, perceived behavior control, and attitude

competently affect the tourist behavior intention in a descending way (18,19).

Risk perceptions plays a central role in forming health behaviors. Neither theories of heath. In fact, risk perception is principal to most health-specific behavioral analysis including the health belief model, protection motivation theory, and the extended parallel process model (20). In the same way, the self-regulation prototypical strategy consists of numerous hypotheses that are quite significant to risk perception (21). In this regard, many general behavioral theories are frequently applied to health behaviors such as the theory of planned behavior (22), and subjective expected utility theory (23). These general theories suggest that the possibility and extent of potential results including medical purposes and non-health costs and benefits form behavior, but the studies conducting various tests and analysis to these theories evaluate the expected probability and extent of potential health-specific harms such as risk perceptions on the condition that the contributors in experimental studies discuss them (24).

Even if the main stream of experiential studies has noted affirmative relations between risk perceptions and behavioral intentions, as many theories recommend, specific researches report that the different impact dimensions have been found for risk perceptions tend to be substantial but limited (25). In a review of latest studies conducted based on the health belief models, the effect size for the relationship of perceived probability to intention control and severity of health behavioral control due to COVID-19 instructions and guidelines. The range of the effect size points to various groups of health behaviors and research designs (26). Furthermore, most of the studies in this behavioral and intention analysis have used attitude as the outcome variable along with socio-economic factors for the post-pandemic period (27).

The main reason of chosen method could be summarized in this matter that in this context, several lifecycle proceedings have been used to clarify modifications in travel behavior analysis, often as a type of explanatory variable. Such modeling behavior, conversely, is challenging on behalf of behavioral resolutions over the life course, since a life event itself is actually a part of people's decisions and travelling based on pandemic criteria (28).

Travel behavior study necessities the investigation of not only travel behavior itself but also the impacts of travel behavior on based on upcoming situation and represent suitable solution to improve the impacts. In this regard, research on the COVID-19 post-pandemic period has attracted increasing attention in the field of not only medical science but also other disciplines of engineering, management, urban planning and health studies. Collected regular practice of the travel behavior and the occasioning tourism attitude along with effective strategies to improve the current circumstances will carry out substantial impacts on tourism sector (29).

Nevertheless, no study to see the sights of this issue can be found in literature. To fill this research gap, this study has made an opening effort to discover the perspectives of travel behavior and tourism plans in post-pandemic period based on pandemic statistics in Azores Archipelago as a critical case of study.

Sustainable Development in Tourism Management: Tourism management consists of a complex socio-economic ecosystem with various qualitative and quantitative components and aspects affected by a tremendous number of impacts. The interactive relationship between these components and aspects are nonlinear (30). Predicting models such as time series rely on the basis of this assumption that the past including historical data and previous dynamics is a suitable tool as an estimator of the future (31). As opposed to, the simulation tool could efficiently manage the uncertainty in a complex context due to the fact that it concentrates on the interactive relationships among components. As these relationships includes factors and variables that organize the system intention and behavior. In this way, the main task that system has to carry out could be explained based on SD theory (32).

SD has been implemented in various sub-fields of tourism management, such as accommodation (33,34), natural attractions (35,36), and tourism operations (37). In the last decade, this method has been widely applied to destination management (38). This research area includes tourism attractions and pertaining services and issues along with the interests of inhabitant and different aspects that affect stakeholder’s attitude. In this regard, it is essential to understand the way that system's constituent parts interrelate and influence each other in socio-economic issues in tourism management. As a result, the SD could efficiently provide a comprehensive framework to deal with challenges regarding post-pandemic period and explore and represent productive solutions (39,40).

SD approaches provide tourism management and planning with alternative variables and visualization techniques to renew existing strategies for enhancing evaluation and execution process. Moreover, SD could develop several models that directly include a wide range of stakeholders. In this way, SD enriched with strategic scenario planning form a powerful implement for handling unexpected phenomenon in real world such as COVID-19 pandemic. It also has the potential ability to consider uncertainty in tourism planning and destination studies. The outcomes could efficiently contribute in sustainable development

concerns including socio-economic and environmental challenges and issues (41).

In a few words, recent studies show that SD model development could be considered as a practical way to evaluate tourism management. It also has the ability to explain system thinking, determine future dynamic, and enable planners and policy-makers to implement new strategies. As the COVID-19 pandemic period is ending and in order to properly prepare for post-pandemic, by mean of feedback loops used in SD and combined with risk perception, it provides us with a comprehensive understating of tourism intentions and behaviors for suitable supporter and recovery of tourism management that has been negatively influenced in last two years.

Theoretical Literature Review: The possible impacts of devastating happenings on hospitality and tourism have increased in both extent and rate of recurrence due to increasing rate in the hyper-mobility of tourism industry and reciprocally connected situation of the worldwide economy (42). In the context of COVID-19, the increasingly disaster-prone world and specifically, the tourism planners have to design and implement a comprehensive framework for understanding and employing disaster management strategies for a proper post-pandemic period (43).

The world has faced an increasing thoughtfulness and attentiveness for disasters in the tourism industry and sector since the beginning of the 21st century. In this regard, COVID-19 has been considered as the most significant disaster in the century that causes an emergent circumstance including sudden devastating events, both absolutely predictable and avoidable ones, disturbing enterprises, challenging their operative routine, arrangement, and persistence (44).

Many theories derived from different disciplines have been used in the field of disaster management literature. In this regard, the overall literature is mostly centered to the engineer-medical based theories. On the other hand, from the perspective of tourism management, most studies are conducted based on management-oriented theories (45). For instance, an adopted approach has been designed and implemented on the basis of the crisis management theory highlighting the competent diffusion of evidence and statement among several stakeholders (46). Furthermore, a collaborative planning has been applied to investigate tourist’s attitude, significant issues, and existing complications of travel in COVID-19 pandemic and post-pandemic period based on socio-economic theories (47).

Theory of planned behavior provides us with effective opportunities to reach applicable models that represent a wide range of beliefs from psychological to medical impacts on critical planning and policy-making along with considering variety and diversity in socio-economic and demographic issues (48). On this matter, several tourism management contexts including socio-economic, medical, environmental, and cultural aspects have been developed by mean of multifaceted adaptive coordination concepts to predict the tourism industry situation in the post-pandemic period (49). In a similar way, an integrated and comprehensive understanding of emergent disaster management in tourism context has been developed based on the chaos theory. This appreciative approach adopts the previous statistical data to address the complexity and extent of the nature of the existing phenomenon rolling in tourism sector and dynamics (50, 51).

A number of studies in the literature have represented numerous solutions for disaster conditions that deal with them in several phases. With the emphasis on particularities of the tourism and destination industry, a generic framework has been commonly approved to examine and improve tourism disaster management strategies. This framework groups the three main modules in tourism disaster management including parts of disaster procedure, features of disaster management reactions, and key elements of the disaster management strategies (52).

The Azores Archipelago in Brief: The Azores Archipelago is part of the Macaronesia Region - along with the archipelagos of Madeira, Cape Verde, and Canary. The Archipelago, inserted in the North Atlantic, comprises nine islands and a total surface area of around 2,300 km2, corresponding to approximately more than 2.5% of the Portuguese territory (more than 92,000 km2). Their geographical proximity groups the Archipelago Islands in Eastern, Central, and Western (53).

The three biggest islands are São Miguel, Pico, and Terceira - and they represent approximately 68.5% of the total area and about 85% of the Azores population. Population densities per km2 fluctuate between 184 inhabitants on the biggest island and 27 inhabitants on the smallest island. Amongst the 19 municipalities in the Azores, the largest is Ponta Delgada's isle of São Miguel. Contrarily, the smallest is Vila do Corvo on Corvo's island, which registers a variation in population density in 230 inhabitants per km2 (54).

Generally, the landscape of the Azores is marked by a strong orography, where the high altitude is associated with the hardy relief. The different islands' maximum altitude ranges between 405 m in Graciosa and 2,351 m in Pico, the highest point in Portugal. The islands' landscape is usually overwhelmed by the magnificent lagoons that occupy the abatement craters of extinct volcanoes (55).

MATERIAL AND METHODS

Model Development: The proposed model in this study implements Azores Archipelago tourism industry statistics since 2019 before the

COVID-19 pandemic including historical data to understand tourist intentions and behavior trends. Additionally, the impact of pandemic on the tourism management could be evaluated. As a result, tourism behavior intention and tourist arrival are two performance variable in the proposed model. Goods, services tax of tourism sector, generated wastes of tourists and resident's population rate are other variable used in this study for further considerations of socio-economic and environmental circumstances toward better understanding of pandemic impact in the Azores region (56). To sum up, the proposed model in this study consists of five sub-models including tourist arrival and economy, tourism resort scheme, residents and population, waste and pollution, and health care.

Tourists dynamics in Azores Archipelago between 2019 and 2021.

Major Islands	2019	Change (2019-2020)	2020	Change (2019-2020)	2021	Change (2019-2021)	Total
Santa Maria	16456	-60%	6426	25%	8041	-51%	30923
São Miguel	624093	-71%	177557	45%	258430	-58%	1060080
Terceira	143545	-66%	47661	43%	68320	-52%	259526
Graciosa	7946	-59%	3257	59%	5195	-34%	16398
São Jorge	23416	-60%	9428	83%	17246	-26%	50090
Pico	57647	-68%	18374	87%	34439	-40%	110460
Faial	79524	-73%	21062	107%	43694	-45%	144280
Flores	17955	-54%	8228	68%	13858	-23%	40041
Corvo	1212	-26%	899	38%	1240	2%	3351
Total	**971794**	**-70%**	**292892**	**53%**	**450463**	**-53%**	**1715149**

Source: Azores Regional Statistical Service (www.srea.azores.gov.pt)

Gross domestic production (GDP) trends in Azores Archipelago between 2019 and 2021

Year / Quarter	2019 Q1	2019 Q2	2019 Q3	2019 Q4	2020 Q1	2020 Q2	2020 Q3	2020 Q4	2021 Q1	2021 Q2	2021 Q3
GDP per capita	17900	18100	18300	18600	17400	15900	15400	15700	15500	16400	17100
GDP growth rate for preceding quarter (%)	2.3	1.1	1.2	1.1	-6.5	-8.6	-3.1	1.9	-1.2	5.8	4.2
GDP growth rate for corresponding quarter (%)	6.2	3.3	4.5	7.3	-2.8	-12.1	-15.8	-15.6	-10.9	3.1	8.9
Tourism contribution to GDP growth rate (%) for preceding quarter	1.3	0.7	0.8	0.7	-2.8	-3.6	-1.8	-1.1	-0.5	2.3	3.3
Tourism contribution to GDP growth rate (%) for corresponding quarter	10.8	16.4	20.2	9.5	-26.7	-15.1	-11.3	-5.9	-4.1	9.4	11.3
Tourism contribution to GDP (%)	41.3	41.7	42.6	42.9	13.4	4.1	1.8	1.6	5.3	13.7	19.8

Source: Trading Economics – Azores GDP growth rates (https://tradingeconomics.com/portugal/gdp-growth)

Tourist Arrival and Economy: Tourist arrival and tourism economy of Azores Archipelago include the overall tourists visit the area and tourism revenue gained from tourism industry. Consequently, the major contribution and course of tourists are calculated by the number of individuals that travel to the area and remain there for more than two days. As we implement TPB to evaluate tourist behavior and intentions in pandemic, it is essential to consider the numerical tourist arrival in that period due to the vital impact of tourist rates on behavior and intention. But then again, the tourist behavior and intention is efficiently affected by attitude, subjective norm and perceived behavior control that form the risk perception in this study (57).

Resorts proportion, pollution indices, and finally, the risk perception determine the attitude of tourist behavior. Resorts proportion consists of affluence of regional tourism resources. Pollution and waste have been always considered as a significant indicator of tourism environmental impact assessment (58). More than 10% of waste in Azores Archipelago is not cleanly handled and could be one of the main reasons of pollution regarding tourism industry. Number of active cases in tourism management and occupied rate of hospital capacity are two other impacts that seriously affects the risk perception in attitude of tourist behavior (59).

Subjective norm as the other factor in risk perception could be determined by word of mouth (WoM). Based on Azores Archipelago tourist examination, WoM along with social media are two major sources to access tourism information regarding the area. it is also worth to mention that more than 96% of the tourists visited Azores Islands have announced that they would recommend this region to others for travel (60,61). This matter shows that WoM is a considerable and

effective topic in subjective norm measurements. Furthermore, risk perception could affect the subjective norm in a positive way (62).

The perceived behavior control includes three main variables in the proposed SD model: leisure time, consuming rate, and security level index. Travel time is another critical aspect in attitude of tourist behavior. The longer travel time gets; the more complicated attitude of tourism behavior would be due to limitations in leisure time based on quarantine regulation of the COVID-19 for international tourism management. Consuming rate relies on determining the affordability in a particular region. This parameter is usually measured by various economic variable along with demand and supply balance. Furthermore, the affordability in Azores is changing due to the seasons. We could expect more rate of tourists visiting the area in some months that would results in increasing the local to regional prices such as accommodation and transportation. The security level index consists of perception and control of tourists for a safe travel and visit. It efficiently affects the tourism tendencies in a particular area due to behavioral control over travel safety. By mean of tourist arrival measurements, the proposed model could simulate the economic issues such as goods and service tax and expenses from tourism sector to determine the economic benefits (63).

Tourism Resort Scheme: The tourism resort system relies on the advancement in both quantitative and qualitative parameters of bed capacity utilization and availability in a particular tourism region. The rate of available resorts brings more abundancy of regional tourism resources and a remarkable enhancement in attitudes toward an area for visit. Moreover, resort rate could be used in tourism planning such as accommodation and capacity. Increasing rate in resort system leads to higher number in occupancy and more revenue that could be actively used in resort development as well (64).

The actual ratio between required and available accommodation capacity utilization is used in the proposed model and simulation. In general, the resort beds capacity could be taken into account by mean of SD model. According to this assumption, the required beds could be determined based on the average number of visitors in a particular period. In this way, the stated ratio between required and available beds is used to calculate supply and demand balance in tourism resort system and accommodation (65).

Residents and Population: The dynamics in residents and population growth provide us with effective insights deal with better understanding in the tourism impact on regional employment rate and migration trends. The resort regarding the tourism management could result in significant employment opportunities (29). As providing more jobs directly increases rate of immigration, population growth and security level and conversely, reduces indices such as crime rate, thereby, it has a strong positive impact on attitude of a particular area and tourism behavior intention. As a result, it enhances the rate of tourism arrival as an efficient feedback loop (66).

Waste and Pollution: The amount of waste and pollution in Azores Archipelago depends on the dynamics in generation of solid waste and discarding procedure. This index shows the impact of tourism industry on the environment at local to regional scales based on waste and pollution generating rate. Particularly, solid waste and pollution could be considered in two sections including generated by the local residents and the tourists. In agreement with the data regarding the region, the Azores Archipelago generate more than 200,000 tons of solid waste per year, almost 2 kg per person in each day (67). In order to make the measurements simple, the proposed model in this study implements the average waste weight by the of distribution of the population in the region. In Azores, more that 90% of the solid waste is disposed on the garbage disposal place while about 7% of the solid waste is not properly handled (68). The SD model implements pollution index to calculate the environmental degradation emerged by the solid waste. In this way, the waste and pollution impact on the attitude of tourist's behavior and further effects of tourist behavior intention as a feedback loop could be considered.

Health Care: Health care mainly focuses on the active cases of COVID-19 among the tourists visit the region and occupied the hospital beds. This issue aims to evaluate the ability of a particular region to control outbreak of the COVID-19 based on health care system and related facilities. The number of active COVID-19 cases rests on the flow of increasing or decreasing rate and recovery rate in the region. This issue extremely depends on the number of tourist arrival and social distancing policies (69).

An agent-based model recently represented is concerned about the adoption of social distancing regulation could limit the contagious transmission. While the rate of active cases is the best basis to deal with the pandemic situation, the configuration of the mentioned model is suitable method to determine tourist's risk perception of a particular region (70). Furthermore, the average rate of hospitalization and the occupancy rate of hospital bed are other accurate indicators to determine the total number of hospitalization. These two variables directly affect the risk perception of the destination in tourist's attitude and tourism behavior intention as an effective feedback loop (71).

Strategy Design: The proposed model simulates the historical data regarding tourism trends and dynamics in Azores Archipelago from 2019 to 2021. This period includes before pandemic, pandemic and post-pandemic of

COVID-19. In this study, we propose four strategies toward a proper recovery procedure in tourism management in post pandemic period. The first one consists of implementation of particular social distancing rules and guidelines for the resorts that aim to identify and handle active cases of COVID-19 in the study area. according to this strategy, resorts capacity is reduced. In this regard, the proposed strategy considers a remarkable reduction in the rate of available beds per resorts and employees in any resort sector. Second strategy relies on leading price promotion by mean of tax reduction in goods and services from tourism sectors. Price promotion could be considered as one of the impressive impacts in tourism management. Tax reduction policy has been always implemented to attract more tourists to visit destinations. During the pandemic, this policy was widely used to support economy recovery (19). Third strategy focuses on making bilateral travel bubbles and regional agreements that allow inbound tourists from certain countries. This issue demands a COVID-19 test before traveling to shorten self-isolation period. As a result, this will be a significant progress in tourist intention. Travel bubble could be arranged between two specific state or country as a great recovery for tourism industry and economy (72,73). In order to achieve this strategy, it is essential to implement a diminutive quarantine policy. Besides, the perceived security level of a particular area has to be improved. The last strategy deals with a set of combined previous strategies including social distancing strategy, tax reducing policy, and travel bubble arrangement. The main aim of this strategy is to address the possibility of combining various policies to achieve a proper solution regarding post pandemic recovery in tourism management.

RESULTS

Base Scenario: The outcomes derived from the first strategy indicate that there has been an increasing number in tourist's rate visiting Azores until the beginning of 2020. When pandemic of COVID-19 started in January 2020, the number of tourists has been faced a significant reduction and this trend continued until the execution of inclusive travel limitations in the area. Although the rate of tourists visiting Azores has started to increase during the post-pandemic period, it is still a remarkable amount lower that before pandemic. In comparison with 2019 rate, the average number of tourists from 2020 to 2021 has faced a declined rate of 53 %. Furthermore, according to the seasonal circumstances of the region, the proposed model predicts that the rate of tourists will be increased in the fourth quarter of 2021 and specifically, in the first quarter of 2022. The decline in the rate of visitors mainly depends on the dynamics in tourist behavior intention. More specifically, while the risk perception is increasing due to COVID-19 pandemic, travel intention has been reduced consequently. As we discussed, the risk perception is an effective impact in the subjective norms & attitude towards behavior. The notation of existing active cases in a particular region cause positive attitude toward travelling change to a specific tendency of conservative tourism behavior. In a similar way, social pressure has an undeniable impact on travel intentions and plan to fulfill the social norms.

Social Distancing Rules: The outcomes of this strategy could not directly attract visitors. Hence, it could handle the rate of COVID-19 active cases. While we observe a drop in the rate of employees in resorts, job opportunities rate increases. This issues will result in some socio-economic impacts that have a strong effect on destination image and positive attitude of tourists on the security level of the area. In this regard, this policy would lead to a reduced rate compared with the previous strategy.

Tax Reduction Policy: The results of this scenario illustrate that it is reasonably an effective strategy. The implementation of this strategy has led to a remarkable increasing trend in tourist arrival, specifically compared with the base scenario. The dynamics in tourist behavior are caused by the growing positive trend in tourism behavioral intention. Price promotion will result in increasing rate of risk perceived behavior control due to increasing trends in tourism payment capacity. Nevertheless, growing number of tourists follows a cross transmission between inhabitants and international tourists as well. In this way, the rate of active cases among tourist's upsurges based on this strategy. In this case, the risk perception is still at a high rate. As a result, we could not expect that the rate of tourist will reach the level of before pandemic. On the other hand, lower tax strategy will drop the regional income from the tourism sector, although it attracts more tourists to a particular destination. According to this issue, this strategy is not as useful as the others in local to regional economy recovery.

Travel Bubble: This strategy has the ability to improve tourist behavior intention in two distinct phases. At first step, shorter quarantine policy will enhance tourist perceived behavior control because it saves the actual travel time for tourists and convenience them to travel to less limited places with more leisure time. Moreover, achievement of a travel bubble increases the perceived security level of a particular destination. Agreement between countries all over the world is a supportive way to express a mutual trust. In this way, tourist perceived control over the behavior has been improved and tourist attitudes toward the destination have become more efficient. These developments form a remarkable increase in the rate of tourist arrival.

Joint Strategy: Proposed strategy considered all other scenarios would not make a significant difference in development of attracting

visitors to Azores. While tax reduction and tourism bubble strategies can efficiently increase number of visitors, the implementation of social distancing strategy reduces tourism accommodation capacity and availability. As a result, there will be a meaningful balance in the supply and demand function and reduce tourism behavioral intention. Consequently, the proposed combined strategy could not provide a proper support for tourism recovery.

COVID-19 Statistics in Azores Archipelago: In order to achieve accurate outcomes regarding the proposed strategies of implemented approach in this study, we represent the rate of active cases and vaccinated individuals in the Azores Archipelago to be considered as a helpful hand in discussion and conclusion section of this study. To bring a proper recovery plan for post-pandemic period, a large share of the region should be protected against the COVID-19 outbreak. The following diagrams indicate the number active cases and received COVID-19 vaccination that are counted at least as a double doses.

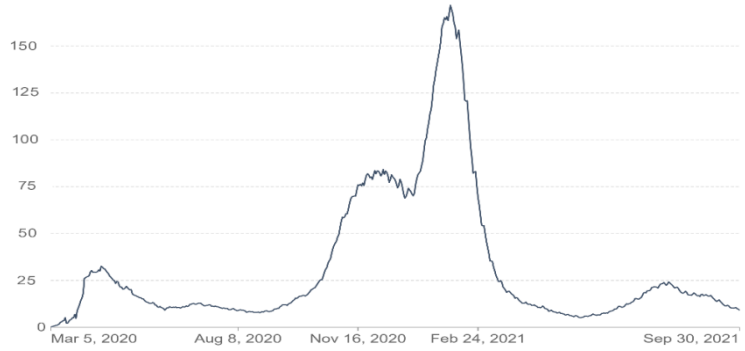

Figure 2. Number of active cases in Azores Archipelago (Source: www.worldometers.info)

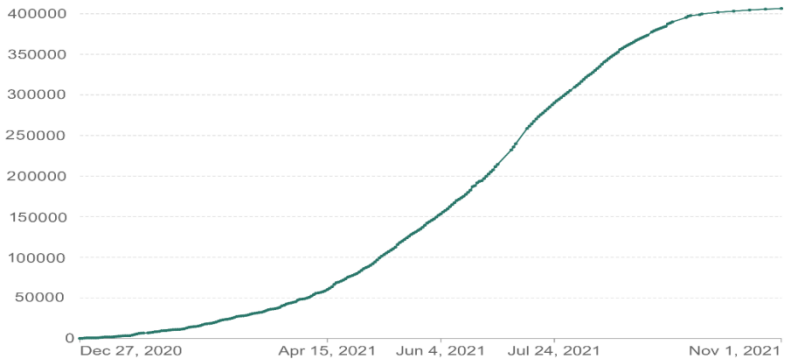

Figure 3: COVID-19 vaccination rate in Azores Archipelago (Source: www.worldometers.info)

COVID-19 Statistics Analysis: The outcomes of this study by comparing proposed recovery strategies and rate of COVID-19 active cases and vaccination show that over 76 per cent of the undertakers of the research are willing to received vaccination. Vaccination intention and hesitancy rates have also been stable over time (74). Early in the vaccination process, vaccination intentions negatively impacted travel intentions, suggesting that individuals who are willing to get the vaccine postponed their travels in the short term, while individuals who do not plan to get the vaccine may not have changed their travel plans as travel restrictions were eased. However, this negative impact disappeared later as the number of vaccinated individuals significantly increased, closing the gap between the two groups. Findings also suggest that sociodemographic factors such as generational age, gender, marital status, education, region, race, religion, occupation influence the COVID-1 vaccination intention and vaccine hesitancy.

Risk perceptions are central to many health behavior theories. However, the relationship between risk perceptions and behavior, muddied by instances of inappropriate assessment and analysis, often looks weak.

DISCUSSION and CONCLUSION

The rate of tourism estimated based on the four proposed strategies indicates that the best way to alter tourist behavior intention is travel bubble strategy. After that, tax reduction has been proved as the most effective one. Whereas, social distancing strategy and joint strategy are not as efficient as the first two. Though the simulation results based on all four scenarios and strategies indicate that the proposed policy of tourism recovery is a long way to be accurately

implemented. Moreover, the dynamics in the intention travel behavior based on four proposed strategies are consistent with tourist arrival rate.

The reduction in the tourist rate opens new opportunities for any region to recover the environmental damages. Since January 2020, tourist rate has faced a sharp drop in Azores Archipelago based on simulation results. After two years and during the post-pandemic period, this rate has not been reached the level before pandemic. This issue could be a positive impact on environmental conservation strategies in the region. Furthermore, recovery process for tourism management could take place in a more sustainable way based on sustainable development plans of the region.

The global and unexpected impacts of the COVID-19 is undeniable. As we discussed, existing prediction models and solutions based on historical data and previous patterns are not capable in being implemented to simulate these impacts and upcoming trends. In this regard, we proposed a model based on SD to evaluate tourism dynamics in the support of recovery process in the Azores Archipelago. This simulation technique could efficiently contribute in tourism management affected by pandemic period, specifically in the rate of tourists and visitors. Furthermore, it provides practical insights and solutions including socio-economic and environmental aspects. In four distinct strategies. The results could be used to provide a comprehensive understanding of tourist intentions and attitudes toward behavior. Considering the risk perception in the TPB proved that proper controlling in pandemic at a local destination will reduce the tourist risk perception, although it may negatively affect tourist intention.

Tourism industry and management have been completely affected by the COVID-19 pandemic and confronting significant challenges and concerns. As the SIDS economy and other social and demographic aspects precisely depends on the tourism markets and tourism destinations, these regions are influenced more than any other area. In this regard, a comprehensive understanding of tourism attitudes and tendencies during the pandemic and post-pandemic period is the first step to represent efficient solutions for this phenomenon. Therefore, risk perception along with extended TPB theories and methods could be considered as a capable tool to study the tourism behavior attitudes. In order to support the regional tourism recovery decision-making system, the assessment of the COVID-19 impact is being done by a SD model proposed in this study. This model provides integrated framework including accurate historical data from a holistic perspective and to support the policy-making procedure in the post-pandemic period toward a proper one.

We have considered the Azores Archipelago as the case study of SIDS and the proposed SD model let us design and test four distinct scenarios for tourism recovery. The outcomes proved that the best way to handle tourism behavior intention dynamics in the area is the travel bubble strategy. Besides, it is worth to mention that the declined observed in tourism arrival could be a remarkable opportunity for any destination, particularly for the Azores region, to rebuild damaged environmental landscapes.

The main limitation that we faced in this research is the inaccessibility and insufficiency of accurate practical data regarding the Azores Archipelago. This issue has been led to some subjective defects. As a result, various variables have not been taken into account in this study to achieve a precise representation and evaluation of the simulation for the destination upgrading and recovery in the post-pandemic. Such parameters and aspects just like the improvement of guest houses on inhabited islands. Although some of these parameters would increase accommodation prices, but on the other hand, they may convey a tremendous amount of income to the regional community. Furthermore, due to insufficient data collection regarding the Azores, we could not take some parameters such as the impact of vaccinated rate on the tourist behavior intention and attitude. This topic could be considered for prospective and upcoming studies to propose new scenarios for a better post-pandemic recovery and preparation.

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RESEARCH ARTICLE

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Impact Assessment on Maintenance of Essential Reproductive, Maternal, Newborn, Child, Adolescent Health and Nutrition Services in the Context of COVID-19: Insight from North-Central Nigeria

ABSTRACT

Objective: In the context of COVID-19 in North Central Nigeria, a qualitative interview study was conducted to assess the impact on the maintenance of essential sexual, reproductive, maternal newborn, child, adolescent healthy plus nutrition serves (RMNCAH+N).

Methods: This proposition aligns with the global crusade of the United Nations Sustainable development goals (UNSDGs 2.3.8) that highlights good nutrition (zero hunger) access to quality healthy and sustainable economic growth path. To this end, a field survey design was done qualitatively. Key informant interviews (KIIs) and focus group discussions (FGDs) were used in the qualitative analysis, which was based on typical interview schedules. During the study period, a total of 258 people from six different communities participated in the KII and FGD interviews.

Results: Key study findings outline eight major master essential concepts, such as healthcare workers reporting a variety of tough emotions and psychological issues. These included insufficient medical equipment's, dissatisfaction with members of the public who did not observe social distancing norms, concerns about protecting their loved ones from infection, increased workload, and changing working conditions, insufficient personal protective equipment kits (PPE), and a sense that their frontline work was being undermined.

Conclusions: There was also a significant increase in gender-based violence. Further policy suggestions are outlined in the concluding section.

Keywords: SDGs, Good Nutrition, COVID-19. RMNCAH+N Services, Mental Health, North Central Nigeria.

COVID-19 Bağlamında Temel Üreme, Anne, Yenidoğan, Çocuk, Ergen Sağlığı ve Beslenme Hizmetlerinin Sürdürülmesine İlişkin Etki Değerlendirmesi: Kuzey-Orta Nijerya'dan İçgörü

ÖZET

Amaç: Kuzey Orta Nijerya'da COVID-19 bağlamında, temel cinsel, üreme, anne yenidoğan, çocuk, ergen sağlıklı artı beslenme hizmetlerinin (RMNCAH+N) sürdürülmesi üzerindeki etkiyi değerlendirmek için nitel bir görüşme çalışması yapılmıştır.

Gereç ve Yöntem: Bu önerme, kaliteli sağlıklı ve sürdürülebilir ekonomik büyüme yoluna iyi beslenme (sıfır açlık) erişimi vurgulayan Birleşmiş Milletler Sürdürülebilir kalkınma hedeflerinin (UNSDGs 2.3.8) küresel mücadelesi ile uyumludur. Bu amaçla niteliksel olarak bir alan araştırması tasarımı yapılmıştır. Tipik görüşme programlarına dayanan nitel analizde temel bilgi kaynağı görüşmeleri (KII'ler) ve odak grup tartışmaları (FGD'ler) kullanılmıştır. Çalışma süresi boyunca, KII ve FGD görüşmelerine altı farklı topluluktan toplam 258 kişi katılmıştır.

Bulgular: Temel çalışma bulguları, çeşitli zorlu duyguları ve psikolojik sorunları bildiren sağlık çalışanları gibi sekiz ana temel temel kavramı özetlemektedir. Bunlar arasında tıbbi ekipmanın yetersiz olması, sosyal mesafe kurallarına uymayan halkın memnuniyetsizliği, sevdiklerini enfeksiyondan koruma endişesi, artan iş yükü ve değişen çalışma koşulları, yetersiz kişisel koruyucu ekipman kitleri (KKD) ve sağlık sorunlarına karşı duyulan güvensizlik sayılabilir. ön saflardaki çalışmaları baltalanıyordu.

Sonuç: Cinsiyete dayalı şiddette de önemli bir artış oldu. Diğer politika önerileri sonuç bölümünde özetlenmiştir.

Anahtar Kelimeler: İyi Beslenme, COVID-19, RMNCAH+N Hizmetleri, Akıl Sağlığı, Kuzey Orta Nijerya.

INTRODUCTION

The tragedy of Coronavirus disease (COVID-19) struck humanity in late 2019, causing significant disruption worldwide. The World Health Organization declared this crisis a global pandemic in March 2020. (1). As of May 4th, 2021, over 154 million cases of COVID-19 had been reported globally, with 3.22 million confirmed deaths and more than 1 billion vaccines administered so far, while cumulative cases for 47 affected countries in Africa were reported to be over 3 million cases (World Health Organization, COVID-19 4th May global situation reports). Due to the rapid spread of this virus, governments reacted quickly, prioritizing human safety even at the expense of their economies, with actions such as movement restrictions, social distancing, and border closures to reduce mortality and morbidity (2).

The crisis brought on by the Coronavirus disease has wreaked havoc on the global healthcare system as well as the economy. The rapid rise in COVID-19 cases has presented the health care system with both direct and indirect mortality from preventable and treatable illnesses. This pattern has also been observed in previous pandemic outbreaks; the indirect impacts appear to outweigh the pandemic itself (3). During the Ebola epidemic in 2013-2016, mortality rates increased due to healthcare system Unpreparedness, which were driven by underlying diseases such as measles, malaria, HIV/AIDS, and tuberculosis (4). The crisis readiness capability of a healthcare system determines its ability to provide adequate and effective care. As the World Health Organization emphasizes, in an emergency crisis such as a health crisis, well-organized and effective public health guidance preparation should be maintained to support public trust or demonstrate the capacity to provide adequate care and manage infection risk in health facilities and communities while reducing direct mortality, preventing panic, and indirect mortality.

The Federal Government of Nigeria, in collaboration with the Federal Ministry of Health and the National Center for Disease Control (NCDC), implemented measures to control virus spread with a focus on citizens' well-being and the socioeconomic disruptions caused by the outbreak. These restrictions include social isolation, foreign and domestic travel restrictions, airline suspensions, lockdowns of non-essential operations, and school closures. NCDC guidelines recommend that all healthcare providers maintain a high index of suspicion for COVID-19 when treating outpatients by taking comprehensive medical histories and administering a routine COVID-19 exam to all health staff (5).

Every Woman, Every Child (EWEC), the Global Strategy for Women's, Children's, and Adolescents' Health and Development, aims to achieve the SDGs for women's, children's, and adolescents' health and development because progress is impossible without health and well-being (6, 7). The 2030 sustainability goals plan has been altered. Because of the fast-moving nature of the COVID-19 pandemic and its consequences, such as a lack of medical equipment, healthcare professionals, and psychosocial effects, as well as strict restrictions (8). To improve the health of women and children and address unmet community needs for sexual and reproductive health, as well as maternal, newborn, child, and adolescent health (SR/MNCAH), countries where the Sustainable Development Goals (SDGs) lag the most must accelerate progress (9). Governments have established certain special health facilities for preventive and control measures. These measures can differ based on the designated position of each facility, but they all seek to limit the pandemic's spread and to improve health outcomes. These measures include case management of COVID-19, continuing provision of routine essential health services, preventing patients from acquiring COVID19 while in (out) of the facility, and sharing COVID-19 information as part of the risk communication plan in conjunction with the central response system and communities are some of the interventions in place(10,11).

The COVID-19 pandemic has had significant, multifaceted, and ongoing negative indirect effects on the provision of sexual, reproductive, maternal, and newborn health care (12). Lockdowns preventing patients and workers from accessing health facilities, resource shortages, and the reassignment of healthcare personnel and equipment to COVID-19 units have all been documented around the world. Many of these have led to the unwarranted deferral of evidence-based and supportive measures, such as the routine separation of newborns from COVID-19 positive mothers, lack of breastfeeding support, denial of abortion treatment, and suspension of reproductive cancer screening or campaign activities (13). These negative impacts of the crisis have been identified across a broad range of health systems and income levels, highlighting an overarching lack of prioritization, attention, and support for these critical areas of health SR/MNCAH, which has been worsened by a global pandemic. The World Health Organization (WHO) discovered that the population, efforts, and medical supply have evolved to respond to emergencies. This trend was repeatedly seen in past pandemic and epidemic situations, often resulting in the neglect of basic and essential health care services. Individuals with health issues not associated with the pandemic have difficulty accessing health care services, leading to a spike in the indirect mortality rate. Emergencies in public health reveal that the effect of an epidemic on reproductive, maternal, and child health, gender-based violence, mental health, and nutrition often

goes unnoticed because the effects are often the indirect result of unprepared, strained health care systems, interruptions in care, and redirected priorities rather than the direct result of the infection (6, 14). If routine health care is disrupted and nutrition services are limited as a result of unavoidable crises, health system failure, or government and health care unpreparedness for pandemics, the increase in infant and maternal deaths will be devastating. Statistical models predicted a decline in the overall health of reproductive, maternal, and newborn health care, as well as severe mortality outcomes, in the early stages of the COVID-19 pandemic (15). A reduction in coverage of vital maternal health interventions of 9.8–51.9 % would result in an 8.3–38.6% increase in maternal mortality and a 98–44.7% increase in under-5 child deaths per month (14, 15). Rural communities are frequently depleted and deserted in this aspect of the topic. However, few literature studies in low-income countries focus on this aspect of the study. This study aim to fill that gap. By utilizing first-hand accounts experience from individuals, to highlight the challenges that healthcare emergencies pose, as well as propose strategies for preparedness and response to healthcare crises.

The key concern is how the following have been maintained in small rural communities of Africa using Nigeria as a backdrop during the pandemic crises "Essential Reproductive, Maternal, Newborn, Child and Adolescent Health plus Nutrition services". This research aimed to evaluate the continuity of vital SRMNCAH+N services and mental health amid COVID-19.

Literature Review: The Millennium Development Goals were established primarily for developing countries to eradicate poverty and stop HIV/AIDS from spreading. However, in 2015, the United Nations Member States reassessed these targets to achieve a more substantial result (16). The 2030 Agenda for Sustainable Development, which essentially consists of the 17 Sustainable Development Goals, was an immediate call to action in both developed and developing countries. These goals, notably sexual, reproductive, maternal, nutrition, and newborn health, should be prioritized by all governments in the current COVID-19 pandemic crisis to accomplish sustainable development goals.

These are among the 16 basic health services divided into four categories defined by the World Health Organization (WHO) as indices of a country's coverage levels and equity, with the goal of reducing maternal, infant, and child mortality, malnutrition, and stillbirths. The goal focuses on the most significant outcomes, highlighting interventions and preventive measures, and recognizing the importance of providing a continuum of care from adolescent girls, women, or mothers to infants. (17, 18).

Covid-19 is still causing panic and havoc in the following systems around the world: healthcare, economic, social, agricultural, and transportation. Most citizens in developing countries are shifting their focus away from the COVID-19 crisis and toward the threat that the crisis poses to the food supply, children's health, reproduction, health, adolescent health, and maternal health. The majority of the consequences of this crisis are visible among informal sector workers in developing countries, primarily in Africa (19). According to a World Health Organization regional report released on May 5th, 3,288,840 COVID-19 cases were reported in Africa. As Africans continue to battle the spread of communicable viruses, little to no attention is paid to the crisis's impact on the general public (2).

In the healthcare profession, crisis preparedness is critical. What is the capacity of the community health workers at the facilities, and how well equipped are they for SRMNCAH+N Services during healthcare emergencies? A study by Tran et al. (20) found a significant lack of integration with national health-care systems. In order to expedite the Millennium Development Goals in terms of SRMNCAH+N, the study identified 31 significant packages to promote community health worker training, particularly during healthcare crises. The purpose of the training package was to increase the ability of community health workers, allowing governments and partners to undertake a coordinated response. Hemm et al. (21) research validated this, and Akhanemhe et al. (22) study reinforced it. Since health is wealth, Alhassan et al. (23) emphasize the function of telehealth and its importance during communicable disease emergencies and the sustainability of African economies. Wong et al. (24) conducted research during COVID-19 that employed an epidemiological approach to assessing the global demand for telehealth services, focusing on the 50 most-affected countries. The study discovered a spike in demand for telehealth services in all 50 countries, emphasizing the need to expand telehealth capabilities both before and after the pandemic healthcare crisis. Mukiibi (19) investigates the state of food security in Africa during COVID-19 and finds that prices are skyrocketing and food is in short supply due to a variety of factors, including difficulties in cross-border trade as many countries continue to close their borders to prevent the virus from spreading, resulting in malnutrition and economic crisis. The situation is worsening and becoming more apparent in urban areas as it spreads to rural communities, causing increased morbidity, especially among those who have already been affected by social, health, and environmental injustices as a result of climate change and land grabbing.

The indirect mortality effects of a crisis in the context of a vulnerable, unprepared health

system may be as significant as the direct mortality effects of the crisis itself. Courtney et al. (25) stated that our nation is unprepared to deal with large-scale, healthcare crisis that would necessitate the employment of the healthcare system as a critical response component (i.e., beyond local emergency medical services for triage, basic care, and transport). After the September 11, 2001 bioterrorism popularly known as 9/11 and the 2001 anthrax letters, Courtney et al. (25) evidently discover that before these unprecedented health emergencies, the need to strengthen healthcare preparedness is paramount worldwide. Meanwhile According to Sochas et al (26) research investigation from the Ebola virus outbreak in Western Africa from 2013 to 2016 demonstrated the detrimental, indirect effects that such crises can have on sexual and reproductive health, Limited care due to healthcare crises and fear of seeking treatment during the outbreak contributed to an estimated 3,600 maternal deaths, neonatal deaths, and stillbirths. According to Parpia et al. (27) a 50% reduction in health-care utilization in Sierra Leone would have resulted in 2800 additional deaths from malaria, HIV/AIDS, diabetes and tuberculosis, according to an analysis of data from Sierra Leone's Health Management Information System, that number approaches the number of deaths directly caused by the Ebola virus in the country. Furthermore, Sochas et al (26) stated that many people are likely to have died from indirect effects of Ebola due to a lack of access to health care throughout the outbreak. Because of the Sierra Leone health system's pre-existing, chronic lack of preparedness, patients and some health professionals were understandably concerned about contracting the disease during the outbreak. Furthermore, health-care resources were diverted to deal with the issue, including screening and managing suspected and confirmed cases, as well as managing an increasing number of infected patients (28). Gerberding et al. (29) define the health-care system's response and preparedness as a collective effort of public health and law enforcement agencies that signals the need for large-scale intervention to protect thousands of public at risk. Kruk et al. (30) build on this definition, healthcare preparedness is the ability to effectively respond to a crisis while maintaining core functions resulting into preventing indirect effect of the crisis. Michau et al. (31). discuss ways to improve reproductive, maternal, and child health, gender-based violence, mental health, and nutrition by understanding how, why, and how to prepare and respond to crises. This research is similar to Zhou et al. (32) research, which focuses on how to prepare for healthcare crises and respond to mental health, child, and nutrition health. Given the emphasis on conscious perception, the Michau et al. and Zhou et al. definitions are the most applicable to the goals of this study (31, 32).

MATERIAL AND METHODS

Methodology: The research employed a qualitative method, deploying in-depth individual key informant interviews (KII) and focus group discussions (FGDs), which were audio-recorded and transcribed verbatim. Interpretative Phenomenological Analysis (IPA) approach analysis was used for coding (33). An Interpretive information-gathering approach was used to examine the experience of how reproductive, maternal, newborn, child, and adolescent health plus nutrition (RMNCAH + N) services with mental health have been sustained among randomly selected local government communities within Kaduna state in north-western Nigeria since the start of the Covid-19 pandemic. This approach was chosen for this study because it involved the interpretation of the meaning and the deep examination of lived experiences, which reflected the authors' exploratory attitude to the COVID-19 crisis involving RMNCAH+N services. Individual experience is prioritized in IPA, which gives a ‘voice' to the lived experiences of a clinical population (34).

Study Setting and Context: Nigeria has a three-tier political system, with a democratically elected federal government at the national level, state governments in the 36 states, and the Federal Capital Territory, all of which are divided into local government areas (LGAs) governed by local government authorities. The local government authority oversees the establishment, operation, and provision of Primary Health Centre services in Nigeria, which is overseen by the National Primary Health Care Development Agency (NPHCDA) (35-37). The experiences of people living in rural northern Nigeria are the focus of this study. Two factors influenced the selection of rural northern villages. To begin with, numerous researches have revealed that maternal health treatments are of poor quality (38, 39). It also contains functional primary and secondary health care facilities.

Participants and Procedure: This qualitative study features an interpretative Phenomenological Analysis (IPA) approach (23). (N = 258) participants from Kaduna state's randomly selected six Local Government Areas (Chikun, Birnin Gwari, Ikara, Makarfi, and Kaura Local Government Area) who were healthcare workers (HCW), traditional birth attendance (TBA), traditional head leader (THL), adolescent/youth, and pregnant women in the previous 8-10 months (see Table 3).

The following criteria are used to select communities: The community must have a government-owned health facility that is also registered with the National District Health Information Software (DHIS). must have registered data on the National DHIS for the previous three months and, most importantly, must have provided SRMNCH+N services. Communities situated in

areas with security issues are among the exclusion criteria.

The key informants were selected based on their status and/or location in the state's local LGAs, as well as their knowledge and experience with the state's LGAs.

The focus group discussion (FGD) groups had ten participants each, with the female focus groups consisting of women who had been pregnant in the previous 8-10 months, and the adolescent/youth focus groups consisting of individuals aged 18-24 years. All of the above inclusion criteria were used to recruit participants.

Ethical Considerations: Participation was entirely voluntary, and traditional and community leaders were informed about the study. Participants' written and verbal consent was obtained prior to the start of their interview days. Any identifying information was removed from the data prior to processing. This ensured privacy and anonymity.

Data Collection: To collect information and data from the LGA communities, health care workers (HCW), Traditional Birth Attendance (TBA), traditional head leaders (THL), adolescents, and pregnant women were interviewed using a combination of structured and unstructured techniques (Semi-structured interview), one-to-one key informant interviews (KII), and Focus Group Discussions (FGDs) with Standard In-depth guidelines. (See Table 3).

Duration: Data collection took place over the course of two months, from February to April 2021, with each person receiving a minimum of two hours of focus group discussion with a 20-minute break in between, as well as one hour of key informant interviews.

For this qualitative IPA study, we used six LGAs with eighteen (18) KII participants for this qualitative IPA study. Individuals were employed to offer in-depth experience of the impact of COVID-19 on RMNCAH+N (Table 2). In addition, four focus group discussions (FGDs) with ten individuals each were organized in each of the six LGAs, resulting in a total of twenty-four (24) Focus Group Discussions (n = 240) participants (Table 1). All interviews were conducted in two languages, Hausa and English, depending on the literacy of the participants.

Table 1. FGDs Community-based Demographic Characteristics

FGDs Participant		
2 FGDs (20 participants)	women that were pregnant in the past 8-10 months	Age range: 25-49 years.
2 FGDs (20 participants)	Adolescent (male and female)	Age range: 18-24 years
	Total	
6 Community	24 FGDs (240 participants)	

Table 2. KII Community-based Demographic Characteristics

KII Participant	
KII (1 participant)	Traditional Birth Attendance (TBA)
KII (1 participant)	Traditional head leader (THL)
KII (1 participant)	Experience Health care worker (HCW)
Total	
6 Community	3 KII (18 participants)

Table 3. Community participant (6)

key informant interviews (KII)	18
Focus Group Discussions (FGDs)	240
Total	258

Data Analysis: The IPA method was used in this study as a qualitative research strategy. This method was chosen for this study because it involved the interpretation of a thorough evaluation of lived experiences. These methods reveal the authors' exploratory perspective toward the COVID-19 issue involving RMNCAH+N services. Individual experience is emphasized in IPA, which offers a "voice" to a clinical population's lived experiences.

We followed the guidelines set forth by Smith et al. (33) for the examination of shared experiences. Individual participation in data analysis was emphasized by the writers, who used the unique characteristics of individual cases and the experiences of a focus group to develop major themes.

Each interview was double-checked by the entire panel of interviewers. All of the interviewers listened to the voice recordings and compared them to the transcribed text, and the tapes from each group were transcribed verbatim. The analysis was carried out by the first and second authors, while the last authors independently evaluated a sample of transcripts. To ensure accuracy, the THL, HCW, and TBA were given transcripted interviews. Before being approved by all of the authors, all of the coding were double-checked for accuracy by the third and last writers, who double-checked both the coding and the interpretation.

Significant themes were captured through participant statements, which were then analyzed using Willig (40) steps to generate a detailed main finding of the community RMNCAH+N services experiences throughout the pandemic. (See Fig. 1)

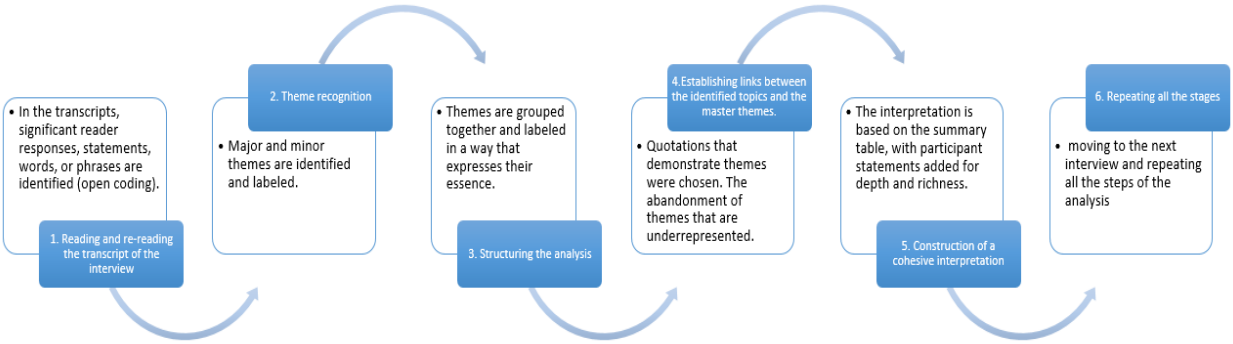

Figure 1. The Methodology followed for Interpretative Phenomenological Analysis (Activity& Actions)

Following the IPA technique step by step, we identified topics and themes that struck us as important to the experiences of participants throughout the transcript and in the question-focused files. Themes were generated by combining codes that were similar or followed a pattern. Virtual meetings with research team members were used during the study and after fieldwork to compare codes and categories and re-categorize the study's interpretation. Six HCW key informant participants from the six communities were presented with the study's findings, and all agreed on the eight major results conclusions.

RESULTS

258 people from six different communities participated in the KII and FGD interviews (see Table 3). The eight major master essential concepts discussed in this essay are summarized in Table 4. The samples chosen for this article highlight the most intriguing or insightful findings and capture the essence of each issue/theme.

Table 4. Master key Themes identified in the study

1. Sources of COVID-19 information healthcare workers and community Members
2. Current availability of Infection Prevention, Control measures, Personal Protective Equipment (PPE), guidelines and protocols for COVID-19 response in community and from health facilities.
3. Availability of human resources for the response to COVID-19.
4. Psychosocial impact of the pandemic on health care workers (HCWs).
5. Effect of the pandemic on RMNCAH+N service provision and service uptake
6. The pandemic's gendered impact and the pandemic's impact on gender-based violence.
7. Immediate effect of the pandemic on health care financing for RMNCAH+N Service delivery.
8. Source of Assistance

1. Themes 1.Sources of COVID-19 information for healthcare workers and community members.
- The COVID-19 pandemic is well-known and well-understood by the majority of healthcare workers and community members (90%)
- Most state primary health care staff and local government workers get their COVID-19 knowledge from the internet, radio, television, Zoom meetings, and WhatsApp community platforms.
- However, some respondents still doubt the existence of the virus and count it as false political news.

2. Themes 2. The current availability of infection prevention, control measures, personal protective equipment (PPEs), guidelines, and protocols for COVID-19 response in the community and in health facilities.
- The government provides PPEs, especially nose masks, for health care workers in facilities and few communities but was never sufficient.
- Two of the six community KIIs were of a different opinion, believing that their community had a large supply of PPEs provided by the government in partnership with a member of the House of Representatives from their community.

3. Themes 3. Availability of human resources for the response to COVID-19.
- An adequate number of human resources were made available across the LGAs for the response to COVID-19.
- Since the outbreak of the pandemic, a significant number of people have volunteered to help.

4. Themes 4. Psychosocial impact of the pandemic on health care workers.
- All the HCW respondents acknowledged that mental strain and stress, among others, were the major psychosocial impact of the pandemic crisis.
- Health-care workers reported a variety of tough emotions and psychological issues, including dissatisfaction with members of the public who did not observe social distancing norms, concerns about protecting their loved ones from infection, increased workload and changing working conditions, insufficient PPE, and a sense that their frontline work was being undermined.

5.Themes 5. Effect of the pandemic on RMNCAH+N service provision and service uptake.
- The majority of responders stated that the pandemic had a significant impact on the provision of RMNCAH+N services, and that many HCWs were absent from work due to the lockdown and fear of COVID-19 contact with patients.
- The respondents reported that due to the scarcity of PPEs, there was a significantly low turnout in Antenatal Clinic visits and treatment uptake by other community members.
- Nursing mothers and adolescents experience the greatest increase in psychological stress.
- Only a few people were reported to have access to RMNCAH+N services, but service providers had major challenges due to a scarcity of goods and resources, especially during the lockdown's peak.
- The fear of becoming infected during visits to health facilities resulted in an 80% decrease in hospital visits.
- Significant Increase in malnutrition among children and mothers, reported by traditional Birth Attendance and traditional head leaders KIIs

6. Themes 6. The pandemic's gendered impact and the pandemic's impact on gender-based violence.
- The lockdown had the greatest effect on women and children, according to respondents, because many of them were unable to reach hospitals, marketplaces, and other areas where they might provide for their families and socialize.
- There was a significant increase in occurrences of gender-based abuse as a result of the lockdown's idleness. The majority of the victims of this violence and harassment were women and children.

7. Themes 7. The immediate effect of the pandemic on healthcare financing for RMNCAH+N service delivery.
- Almost all responders acknowledged a considerable drop in financing for RMNCAH+N services as a result of funds being diverted to adequately address/tackle the pandemic.
- The cost of health care services has increased and some people have to pay for services privately.

8. Themes 8. Assistance.
- Some of the respondents attested to receiving government aid in the form of food, commodities such as salt, soap, toiletries, and personal protective equipment (PPEs), although there was significant inequality in distribution.

Others received assistance from family and friends, religious centers, cooperative organizations, and other sources.

DISCUSSION

The impact of the COVID-19 pandemic on RMNCAH+N services in the north-central small rural communities of Nigeria, Kaduna state LGAs, was researched using in-depth -qualitative interviews with 258 key informants, interviews, and focus group discussions. Eight major themes were identified and recommendations or solutions for better preparation and response to future emergencies affecting health systems and disrupting health service delivery, or for the resurgence of COVID-19, are provided below.

There is a need to accelerate development in countries where the Sustainable Development Goals (SDGs) are lagging to improve the health of women and children and address unmet community needs for reproductive health, as well as maternal, newborn, child, and adolescent health (RMNCAH+N). Nigeria, as a developing lower-middle-income country, must work hard to meet the 17 Sustainable Development Goals (SDGs) associated with the RMNCAH+N service. Alhassan et al. (2) revealed in their study that 15% of the government's expenditure was to be allocated to the health sector to attain this goal, but by 2013, only five countries had accomplished this target, namely Botswana, Rwanda, Zambia, Madagascar, and Togo. Nigeria, as a country, has failed to live up to expectations. According to our findings, due to a variety of factors listed in Table 4, there has been a significant drop in RMNCAH+N service provision and low service uptake. It is therefore recommended that the following programs should be considered, especially for developing countries and the LGAs in Nigeria.

First, the development and promotion of anti-violence awareness campaigns and COVID-19 awareness. According to our findings, this reveals that many FGDs shy away from such discussions, and the reason was later confirmed by KIIs, revealing the high level of domestic violence, especially during the COVID-19 restrictions. Violence against women and children is being criticized all across the world, with a broad consensus that violence must be prevented, especially in Africa. We realized that it was crucial to go beyond working with individuals. Michau (41) described how community-awareness campaign have resulted in reductions in gender-based violence around the world, particularly in low- and middle-income countries. As a result, the technique of community mobilization, Raising Voices, should be utilized in the LGAs and periodic involvement with various sectors (e.g. religious leaders, police, health care providers, local government officials) should be encouraged. Six guiding concepts derived from Michau et al., (31) study should be applied in conjunction with a training process for community activists to inform and structure the process of making programming more effective, systematic, and comprehensive. The "Raising Voices" program is now used in over 50 countries worldwide. The program will work to address the root causes of these issues, such as gender inequality, low access to education for girls, and child marriage, as part of its mission to end

gender violence and address maternal, newborn, and child mortality and morbidity. This will hasten progress toward the achievement of the 2015-2030 Sustainable Development Goals (SDGs) 4, 5, and 16 while serving as a solution to theme 6.

Secondly, an introduction to "digital health". Similarly, when it comes to physicians and community health workers, 80 percent of our interviewees refuse to visit the hospital, even at a severe stage of illness, out of fear of being infected during visits to health facilities. The ability of the health care system to deliver adequate and effective care depends on the capacity of its preparedness for crises. As a result, due to the evolving nature of the Coronavirus, services such as digital health, also known as telehealth (tele-consultancy, tele-mental, and tele-pharmacy) and the CHWs training package should be considered. This will help in accelerating the Sustainable Development Goals (SDGs) 3, 9, and 11 and be aimed at thorough preparedness for any future health crises. This will allow healthcare practitioners to give services in concert with the current condition of the pandemic, lowering COVID-19 direct and indirect mortality worldwide as well as reflecting an interest in strengthening the capacity of CHWs. Policymakers should organize and classify training resource materials for Community Health Workers (CHWs) in RMNCAH+N. Overall, WHO and partner programs have developed a large number of mapping training resource packages for CHWs on various components of RMNCAH+N. UNAIDS, UNFPA, UNICEF, UN Women, and the World Bank collaborate as the H4+ to promote the health of women and children (see the WHO/Department of Maternal, Newborn, Child, and Adolescent Health website or contact mncah@who.int).

CONCLUSION

In accordance with global expectations for good healthcare (SDG-3) and sustainable development amidst a global pandemic, which resonates with the position of the Woman, Every Child Global Strategy for Women's, Children's, and Adolescents' Health (EWEC Global Strategy) strives to achieve the sustainable development goals of women's, children's, and adolescents' health and development because progress is impossible without health and well-being. Most developed countries have implemented digital health care because the traditional face-to-face patient-physician care model has had to be re-examined in many countries due to the pandemic. Digital care and new models of care have been rapidly deployed to meet these challenges and reduce indirect mortality. As a recommendation to find a solution to themes 4, 5, and 7 as well as to accelerate the Sustainable Development Goals (SDGs) 3, 9, and 11, we recommend that governments implement the most important of these technology domains, telehealth, and telemedicine, in all LGAs. The promise of telehealth will increase the availability of expertise and access to care, including data-driven disease surveillance, screening, triage, diagnosis, and monitoring, thereby increasing the geographical coverage of health systems. Alhassan et al. (23) identified telehealth as a panacea for managing the three stages of a health crisis (pre, during, and post-crisis). Other research studies (42-44) also support the telehealth era. The study's findings can be used as a guide to embracing the new era of telehealth, its benefits, and how to overcome any barriers to it in rural communities.

Finally, theme 8 demonstrates significant inequality in all government aid distributions among LGAs, which contradicts the goal of Sustainable Development Goal (SDG) 10, which specifically calls for the reduction of inequality within and between countries. Many countries have made major progress in overcoming inequality within the public (44).

This study's key study finding outlines unpreparedness and poor response to health crisis, healthcare workers reported a variety of tough emotions and psychological issues. These included dissatisfaction with members of the public who did not observe social distancing norms; concerns about protecting their loved ones from infection; increased workload and changing working conditions; insufficient personal protective equipment kits (PPE); and a sense that their frontline work was being undermined. The result also shows that history, politics, existing relationships (for example, between healthcare institutions and with public health and emergency management agencies), hazards, geography, and culture all play a role in developing and operating the best healthcare preparedness in each community.

Limitations

Although our research yielded several interesting results, it was not without limitations, including the following: Meeting the traditional birth attendant and the traditional head leader was a major challenge.

- Using the Global Positioning System, the majority of the LGAs were difficult to locate (GPS).
- Almost half of the initially chosen communities were located in security challenged areas and some were difficult to access. Getting a replacement community for the nullified ones was very tedious.
- There are difficulties in obtaining information about some topics that are considered shameful and sensitive, such as family planning and sex.
- Most FGD groups avoid answering questions about gender-based violence.

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RESEARCH ARTICLE

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Bibliometric Analysis of Studies on Mental Health Status of Health Workers During Covid 19 Outbreak: Inputs for Health Policy and Human Resources Management

ABSTRACT

Objective: The purpose of this research is to reveal the mental problems experienced by healthcare professionals during the Covid 19 Pandemic. It is also intended to provide inputs for health policies and human resource management.

Methods: The research was carried out with the bibliometric analysis method. Within the scope of the research, 4043 articles published in the Web of Science Core Collection database between 2020 and 2021 were examined.

Results: It was found that the articles examined within the scope of the research were published in 1329 sources (journals, books, etc.), the citation rate per article was 9.97, the number of articles with a single author was 200, and the ratio of articles with a single author to all articles was 0.049. In addition, as a result of the research, the most important effects of the Covid 19 Pandemic on the mental health of healthcare workers; anxiety, depression, stress, insomnia and burnout.

Conclusions: In order to reduce or eliminate the negative mental problems experienced by health workers, providing expert support in certain matters such as increasing the psychological resilience of health workers, improving working conditions, improving communication with each other and managers, coping with stress, managing anxiety, etc. is required. In addition, carrying out activities that support morale and motivation will help reduce the negative effects experienced. Improving the mental health of health workers will have a positive effect on the health system and will ensure the correct implementation of human resources policies.

Keywords: COVID-19, Pandemic, Health Professional, Mental Health, Health Policies, Human Resources Management, Bibliometric Analysis.

Covid 19 Salgını Sırasında Sağlık Çalışanlarının Mental Sağlık Durumlarına İlişkin Çalışmaların Bibliyometrik Analizi: Sağlık Politikası ve İnsan Kaynakları Yönetimi İçin Girdiler

ÖZET

Amaç: Bu araştırmanın amacı, sağlık çalışanlarının Covid 19 Pandemisi sırasında yaşadıkları mental sorunların ortaya konulmasıdır. Ayrıca sağlık politikaları ve insan kaynakları yönetimi için girdiler sağlanması amaçlanmaktadır.

Gereç ve Yöntem: Araştırma bibliyometrik analiz yöntemi ile gerçekleştirilmiştir. Araştırma kapsamında Web of Science Core Collection veri tabanında 2020 ile 2021 yıllarında yayınlanan 4043 makale incelenmiştir.

Bulgular: Araştırma kapsamında incelenen makalelerin 1329 kaynakta yayınlandığı (dergi, kitap vb.), makale başına atıf oranının 9,97 olduğu, tek yazarlı makale sayısının 200, tek yazarlı makalelerin tüm makalelere oranı 0.049 olduğu bulunmuştur. Ayrıca araştırma sonucunda, Covid 19 Pandemisinin sağlık çalışanlarının mental sağlığına olan en önemli etkilerinin; *kaygı, depresyon, stres, uykusuzluk, tükenmişlik* olduğu belirlenmiştir.

Sonuç: Sağlık çalışanlarının yaşadığı olumsuz mental sorunların azaltılması ya da ortadan kaldırılması için sağlık çalışanlarının psikolojik dayanıklılıklarının arttırılması, çalışma koşullarının iyileştirilmesi, birbirleri ve yöneticilerle olan iletişimlerinin geliştirilmesi, stresle başa çıkma, kaygıyı yönetme vb. konularında uzman desteğinin sağlanması gerekmektedir. Ayrıca moral ve motivasyonu destekleyici etkinliklerin yapılması yaşanan olumsuz etkilerin azaltılmasına fayda sağlayacaktır. Sağlık çalışanlarının mental sağlığının iyileştirilmesi sağlık sisteminin üzerinde olumlu etki yaratarak insan kaynakları politikalarının doğru bir şekilde uygulanmasını sağlayacaktır.

Anahtar Kelimeler: COVID-19, Pandemi, Sağlık Çalışanı, Ruh Sağlığı, Sağlık Politikaları, İnsan Kaynakları Yönetimi, Bibliyometrik Analiz.

INTRODUCTION

The Covid-19 virus, which spread all over the world shortly after it started in China, had significant effects on healthcare workers. As healthcare professionals take an active role in stopping the spread of the pandemic and in the recovery of patients, they had to make changes in both their working conditions and their social lives. Since health systems were caught unprepared for the Pandemic, health workers should be prepared to use gloves, masks, glasses, aprons, etc., which they will use in the fight against the virus, especially in the early stages of the Pandemic. They had difficulties in obtaining materials, which caused their stress levels to increase. The fact that health workers could not go home due to the fear of infecting their families and friends during the fight against the pandemic caused significant changes in their living conditions and consequently increased stress levels. However, the stigma of health workers with the fear of infecting the virus by the society has been quite devastating on them.

In this study, which was carried out in order to determine the effects of the Covid 19 Pandemic on the mental health of healthcare workers and to make implications for health policies and human resources management, a literature review was first made. Afterwards, information about the method of the research was given. In the Findings section, the findings obtained from the research are explained. Finally, the research findings were evaluated in the conclusion part.

LITERATURE REVIEW

Covid 19 Pandemic: COVID-19 was first detected in Wuhan, China. On 31 December 2019, China informed the World Health Organization (WHO) about pneumonia cases of unknown cause and rapid spread. It was defined by WHO on 7 January 2020 as a new type of "CoV" that has not been detected in humans before. COVID-19 was first detected outside of China on 13 January 2020 in Thailand. Afterward, many countries, such as Japan and South Korea, reported cases to WHO. The first COVID-19 case in Turkey was detected on March 11, 2020 (1).

After the COVID-19 Epidemic began to spread all over the world, countries had to take many measures such as social distance, quarantine and isolation to prevent further spread. Many problems such as changes in the living conditions of individuals, the restriction of their freedom with calls to stay at home, not being able to meet with their loved ones, uncertainties and unknowns have caused an increase in the anxiety levels of individuals (2).

Effects of Pandemic on Mental Health of Healthcare Professionals: In the pandemic process, which affects the society socioeconomically and spiritually, not only the sick people/society but also the healthcare professionals are affected physically and psychosocially by the process, as they are members of the society and work at the front line under high risk (3). Health workers are the ones who have the closest contact with infected people in epidemics. Health workers who play an active role in the fight against the epidemic have a high risk of disease transmission. For this reason, the mental health of health personnel working in intensive care and emergency services is severely affected (4).

When the literature on the effects of the pandemic on the mental health of healthcare professionals is reviewed, it is seen that many studies have been carried out in literature. For example, Lai et al. (5), found in their study that symptoms of depression (50.4%), anxiety (44.6%), insomnia (34.0%) and distress (71.5%) is a significant proportion in healthcare professionals. Nurses, women, frontline workers, and those in Wuhan also reported experiencing more severe symptoms of depression, anxiety, insomnia, and distress. Chew et al. (6) found that 48 (5.3%) of the healthcare professionals had moderate to very severe depression, 79 (8.7%) had moderate to severe anxiety, 20 (2.2%) had moderate to severe depression. They stated that they were severely depressed. Li et al. (7) showed that the indirect traumatization scores of frontline nurses were significantly lower than non-frontline nurses. Interestingly, the general population's indirect traumatization scores were significantly higher than those of frontline nurses. According to the findings of a meta-analysis study conducted by Luo et al. (8), common risk factors for the effects of the coronavirus on psychological health include being a woman, being a nurse, having a low socioeconomic status, high risk of contracting COVID-19, and social isolation-having adequate medical resources, up-to-date and accurate information, and taking precautions are also protective factors. Also, Zhang et al. (9) found that medical health workers have higher insomnia, anxiety, depression, and obsessive-compulsive symptoms than other health workers. Besides that, they determined the most common risk factors for those mental health disorders are living in rural areas, being a woman, and being at risk of contact with COVID-19 patients.

MATERIAL AND METHODS

There are five main stages in a typical bibliometric analysis that are shown in Figure 1.

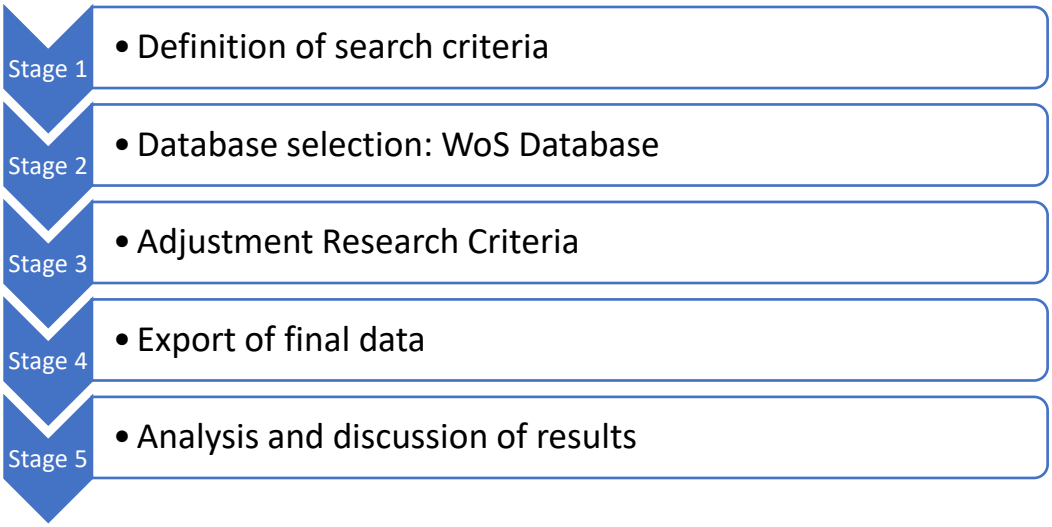

Figure 1. Principal stages in a typical bibliometric research. Source: Öztürk (2021) (10)

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Search Strategy and Source of Bibliometric Data: The articles constituting the data set of the study were obtained from the Web of Science Core Collection database. The search strategy is used as following:

TS= ("COVID-19" OR "coronavirus disease 2019" OR "2019-nCov" OR "2019 novel coronavirus" OR "SARS-CoV-2" OR "Severe acute respiratory syndrome coronavirus 2" OR "novel coronavirus disease 19" OR "novel coronavirus disease-19" OR "SARS2" OR "SARS-2" OR "COVID-2019" OR "COVID19") Refined by: DOCUMENT TYPES: (ARTICLE OR REVIEW) AND LANGUAGES: (ENGLISH) AND PUBLICATION YEARS: (2022 OR 2021 OR 2020) AND TOPIC: (“mental” OR “psychological” OR "psychiatry" or "psychiatric" OR “emotional” OR “stress” "stressed" OR "stressful" OR “anxiety” OR "anxious" OR “depression” OR "depressed" OR “depressive” OR “depress” OR “anger” OR "angry" OR “loneliness” OR “lonely” OR “burnout” OR “insomnia” OR “fear” OR “worry” OR “frustration” OR "posttraumatic stress disorder" OR "post-traumatic stress" OR "posttraumatic stress" OR “PTSD”) AND TOPIC: (“employee*” OR “worker*” OR “physician*” OR “nurse*” OR “medical stuff” OR “hospital stuff”) AND [excluding] PUBLICATION YEARS: (2022) AND [excluding] WEB OF SCIENCE INDEX: (WOS.AHCI OR WOS.ISTP OR WOS.ISSHP OR WOS.BSCI) AND [excluding] DOCUMENT TYPES: (PROCEEDINGS PAPER OR RETRACTED PUBLICATION OR DATA PAPER)

Timespan: All years. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI.

In line with the given search strategy, 4043 articles were accessed and these articles were downloaded in plain text format. This file was used as raw data in analyzing process

Bibliometric Analysis: Bibliometric analysis of the article was made using the R 4.0.3 package program. The units and types of analysis performed are shown in Table 1.

Table 1. Analysis unit and sub-components (analysis type) used in the study

Data set	**Main Information About Data** **Annual Average Number of Citations Per Article** **Three -Fields Plot**
Sources	Most Relevant Sources Bradford's Law
Authors	Most Relevant Authors Author Effect Corresponding Author’s Country Science Production of Countries Most Cited Countries
Documents	Most Global Cited Documents Most Local Cited Documents Tree Map
Conceptual Structure	Thematic Evolution Map Co-occurrence network Factorial Analysis
Intellectual Structure	Co-citation Network
Social Structure	Collaboration Network Country Collaboration Map

The software used for the bibliometric analysis within the scope of the study is "biblioshiny", which is an R-based library and the web-based interface of "bibliometrix" (11,12). Bibliometrix is an open-source software, has the features of flexibility, rapid upgrade and integration with other statistical R packages. Therefore, it is very useful in an ever-changing science discipline such as bibliometrics (13). Bibliometrix includes all basic bibliometric analysis methods, but is especially used for science mapping (14). It was decided to use the software in question in the analysis of the raw data obtained within the scope of the study, since it is user-friendly and the body of information required for an article can be constructed more easily when the analysis stages are followed.

RESULTS

The basic information of the articles is shown in Table 2. When Table 2 is examined, it is seen that 4043 articles analyzed in the study cover the years 2020 and 2021. There are 1329 sources (journals, books, etc.) in which these articles are published. The citation rate per article is 9.97. The number of single-authored articles is 200, and the ratio of single-authored articles to all articles is 0.049. Alongside of the authors' collaboration index is 5.26, this rate is quite high. That collaboration index shows that the field is a suitable field for different authors to work together.

Dataset

Table 2. Main ınformation about data

Description	Results
MAIN INFORMATION ABOUT DATA	
Timespan	2020:2021
Sources (Journals, Books, etc)	1329
Documents	4043
Average years from publication	0,321
Average citations per documents	9,97
Average citations per year per doc	6,454
References	97809
DOCUMENT TYPES	
article	3193
article; early access	452
review	370
review; early access	28
DOCUMENT CONTENTS	
Keywords Plus (ID)	2682
Author's Keywords (DE)	6228
AUTHORS	
Authors	20395
Author Appearances	24913
Authors of single-authored documents	194
Authors of multi-authored documents	20201
AUTHORS COLLABORATION	
Single-authored documents	200
Documents per Author	0,198
Authors per Document	5,04
Co-Authors per Documents	6,16
Collaboration Index	5,26

We observe the publication process started in 2020 (1145 article) and peaked in 2021 (2418 article). The Annual growth rate increased by 111.18% and the average number of citations per article which was 29.42 in 2020, decreased to 2.54 in 2021.

Table 3. Annual Average Number of Citations Per Article

Year	N	MeanTCperArt	MeanTCperYear	CitableYears
2020	1145	29,42445415	29,42445415	1
2021	2418	2,543837883		0

A three-field plot built upon a Sankey diagram depicting the connections from cited references to authors and themes is displayed in Figure 2. The authors in the middle part of the figure have expanded the concepts on the right by referring to the references on the left. Apart from

Covid 19, it is seen that main concepts such as anxiety, depression, stress, insomnia, burnout, resilience, etc. come to the fore along with mental health. Zhang I, Li Y and Wang Y are the authors who feed these concepts the most. The references that these authors refer to the most while feeding these concepts can be observed as lai jb 2000, spitzer rl 2006, wup 2009, Kang lj 2020.

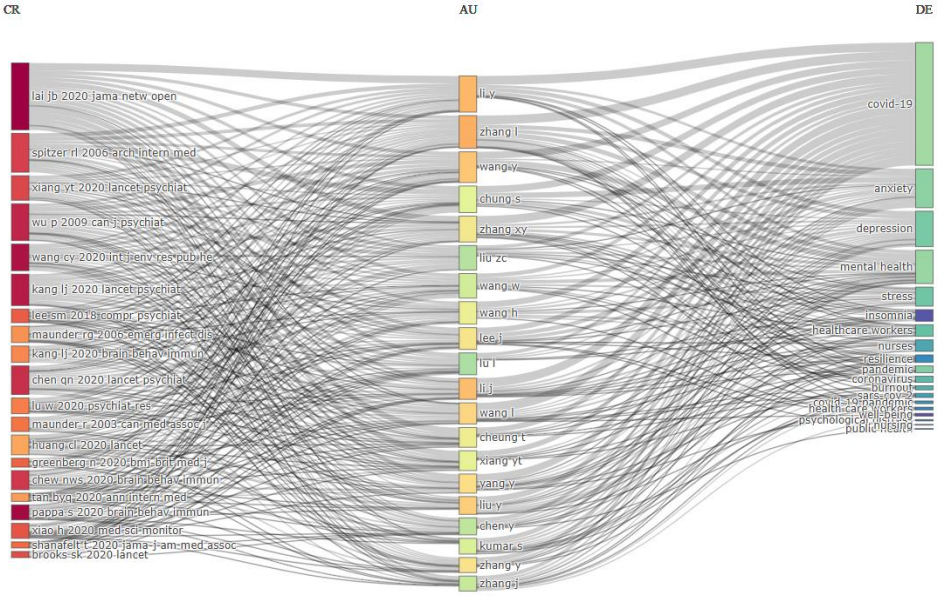
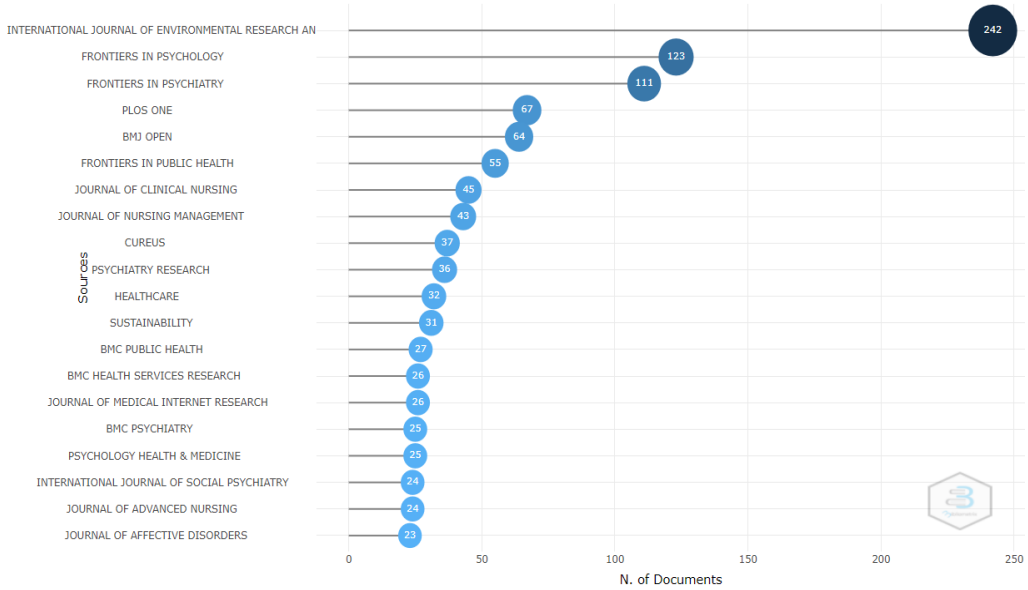


Figure 2. Three-field plot showing the network between authors (middle), cited references (left) and themes (right)

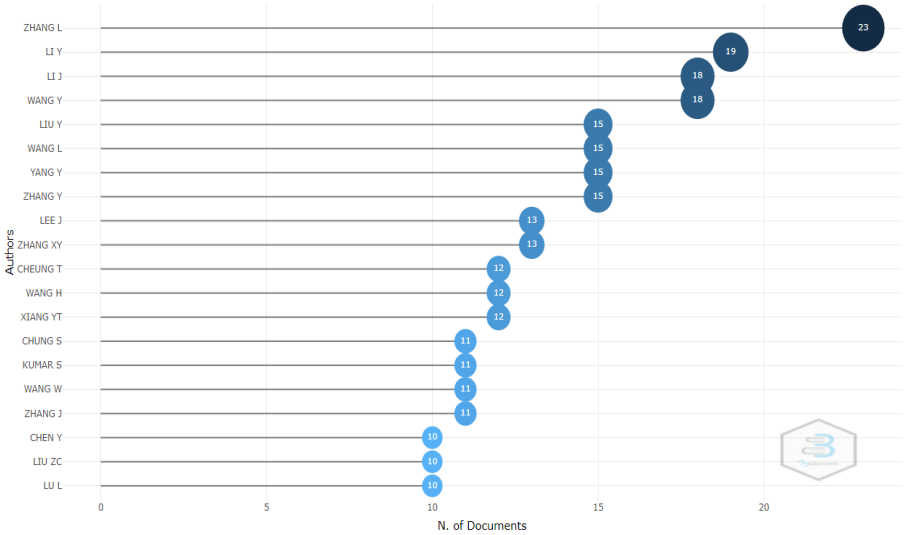
Sources: The top 20 most relevant resources are as shown in Graph 1. The journal that publishes the most articles on the subject is International Journal of Environmental Research and Public Health, and 242 articles on the subject have been published in the journal 22% of the articles published in the first 20 journals.



Graph 1. Most relevant sources

According to the Bradford's Law, a small number of journals in a particular subject area cover a significant portion of the total articles in a given area, while an increasing number of journals publish fewer articles in that area (15). When the sources are sorted in descending order according to the number of publications, the sources can be classified into three groups, each of which covers one-third of the publications. The first group formed as a result of this classification is the core resources (16). Therefore 33 journals can be seen in the Zone1 as core resources.

Authors: After the sources, the most relevant authors were analyzed. Graph 2, which is the most relevant authors are shown in proves that Zhang L. is the most contributed to the field with 23 articles.



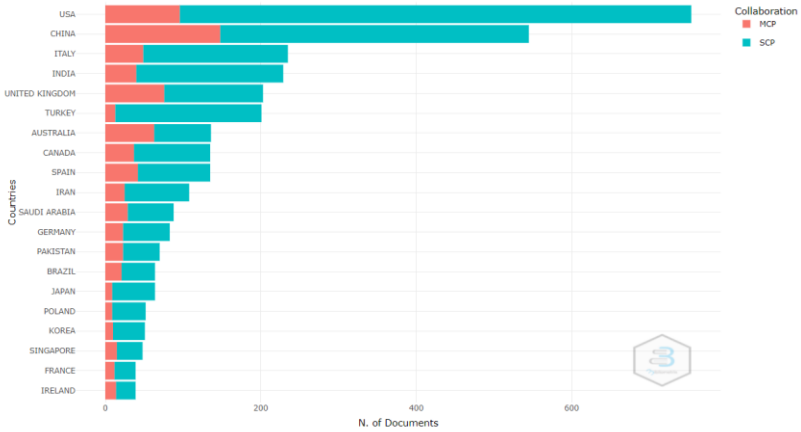
Graph 2. Most relevant authors

h, g and m index values of the authors and the total number of citations are analyzed in Table 4. It is seen that the authors with the highest index values are Wang Y (h index: 9), Zhang L with (g index: 18) and again Wang Y (m index: 4.5).

Table 4. Author Effect

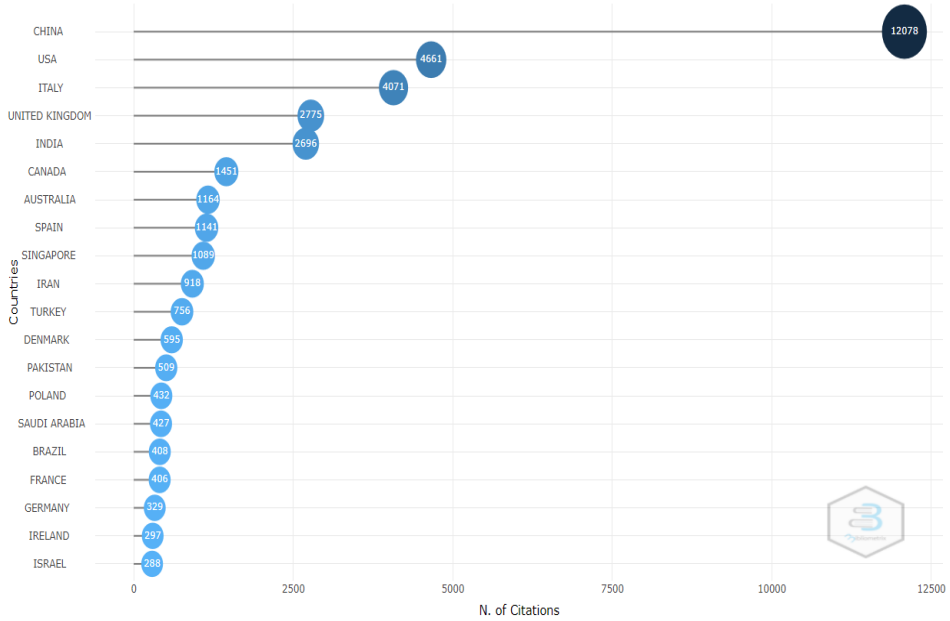
Element	h_index	g_index	m_index	TC	NP	PY_start
WANG Y	9	15	4,5	3436	15	2020
YANG Y	8	14	4	549	14	2020
LIU ZC	7	8	3,5	3143	8	2020
ZHANG L	7	18	3,5	580	18	2020
BARELLO S	6	7	3	279	7	2020
CAI ZX	6	7	3	2807	7	2020
GRAFFIGNA G	6	6	3	278	6	2020
LU L	6	7		203	7	
SHI L	6	6		214	6	
WANG GH	6	6	3	2591	6	2020

Graph 3 depicts Corresponding Author's Country. After examining them together, it is seen that USA, China, Italy, India and UK are the first 5 countries respectively and Turkey comes 6th in ranks. But MCP (Multiple Country Production) and SCP (Multiple Country Production) ratios are important here. If we realign countries by their MCP ratios, the first five countries would be like Australia (0,4632), United Kingdom (0,3744), Ireland (0,3590), Saudi Arabia (0,3295), Pakistan (0,3286). Authors from these countries in the field would be interpreted as the most inclined to international cooperation. And the last three countries whose authors are the least inclined to make international cooperation would be like Japan (0,1406), USA (0,1273) and Turkey (0,0647).



Graph 3. Corresponding author's country

When Graph 4 is analyzed, it is seen that China is the most cited country with 12078 citations, almost three times more than the USA, which is in the second place. From this point of view, it can be stated that it will be beneficial for those concerned to follow China in the studies conducted on the subject or in the decisions taken by policy makers. On the other hand, in the analysis of the countries' science production in Figure 3, it is noteworthy that the USA (with 3024 articles) publishes approximately 30% more than China (with 2343 articles).



Graph 4. Most cited countries

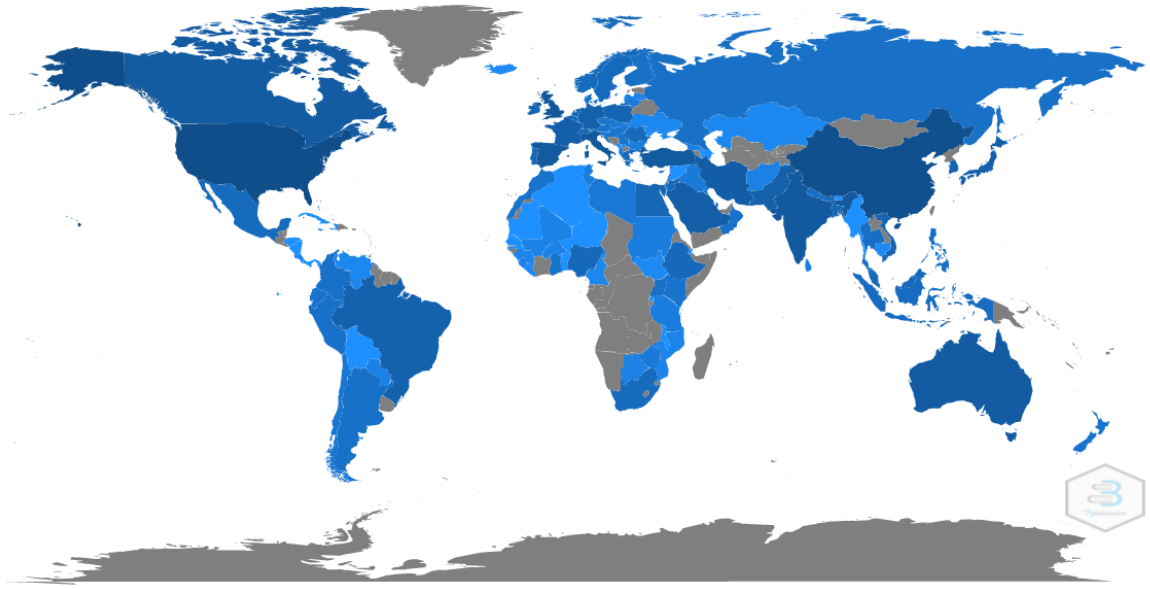
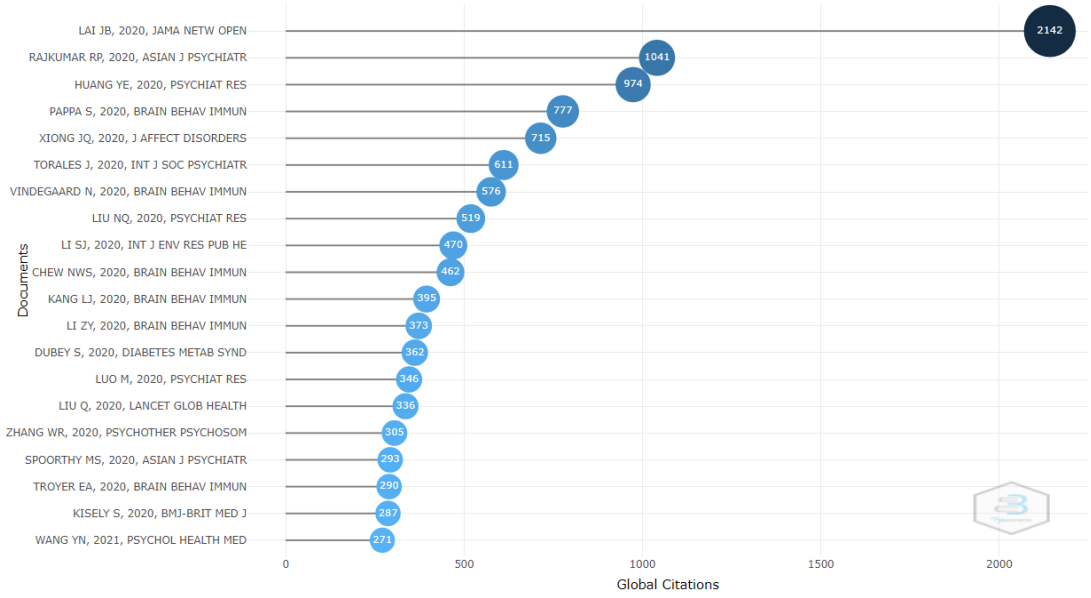
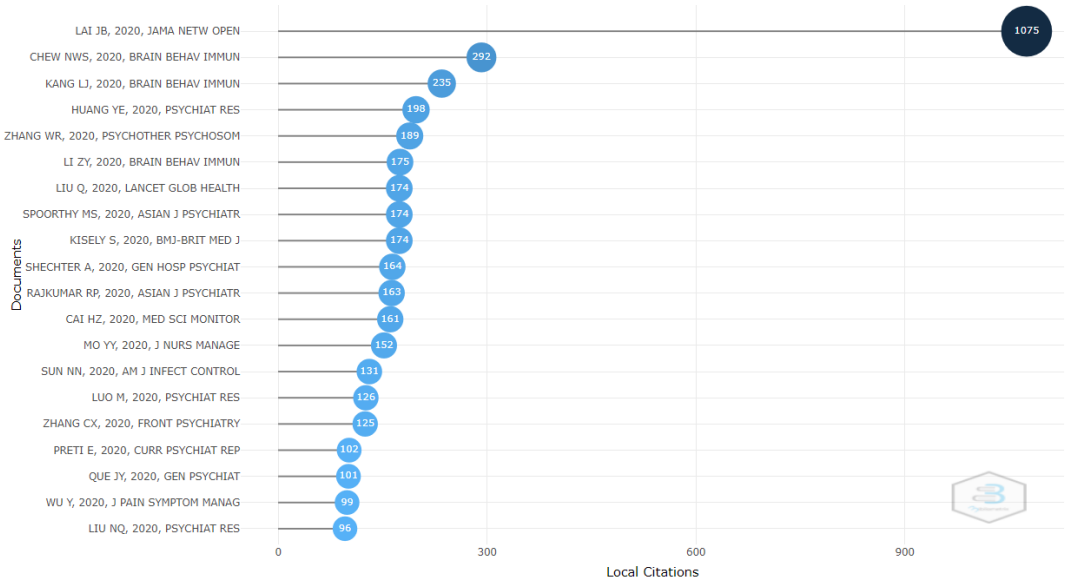


Figure 3. Country scientific production

Documents: The most cited documents at global and local level are gien in Graph 5 and Graph 6, respectively. It is seen that the Lai JB 2000 study received 2142 citations globally which is more than twofold of the second study and 1075 citations locally which is mor than 3,5 times of the second study.



Graph 5. Most global cited documents



Graph 6. Most local cited documents

Conceptual Structure: The thematic evolution of the field showed the main changes in the Keywords Plus is presented in Figure 4. It is seen that the generalized anxiety disorder theme is the most studied among the motor themes with highest centrality and impact. It is noteworthy that sleep quality is studied as a niche theme. This situation can be interpreted in the context of anxiety disorder impairing sleep quality. Post-traumatic stress disorder, depression anxiety stress themes can be interpreted as a trend that has been the subject of new analyzes compared to the previous year, considering the long-term consequences of Covid-19 outbreak on the mental health of healthcare professionals. In the lower right part of the thematic map, there are themes with a high degree of centrality but with a low degree of intensity. In other words, it can be said that although they are in the center of the field, there are themes that are likely to become motor themes when more publications are made.

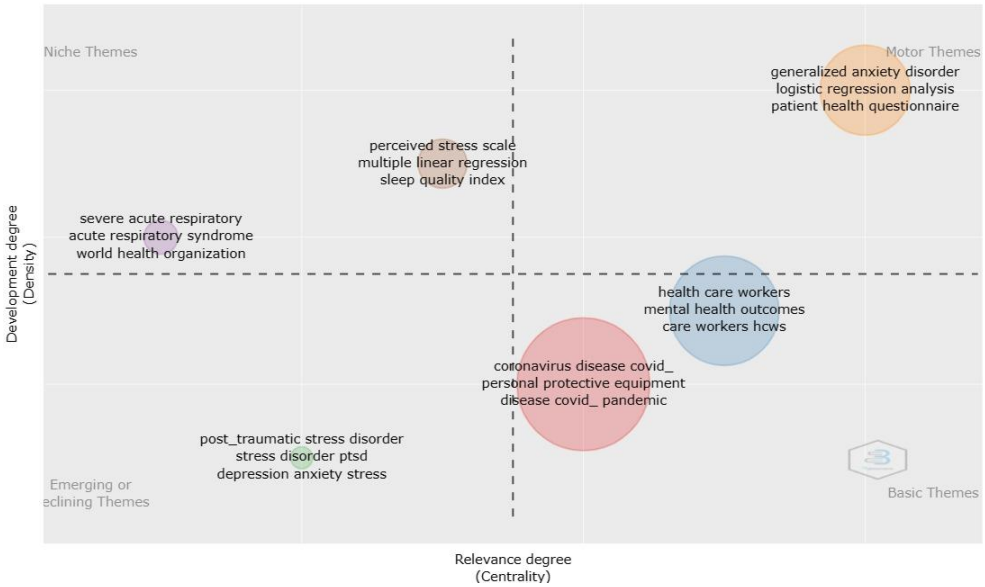


Figure 4. Thematic evolution map (keywords plus)

Figure 5 depicts the co-occurrence network by Keywords Plus. The purpose of co-occurrence network analysis is to access the relations of items based on the number of documents in which they occur together. According to analysis, it is seen that the words are gathered under three main cluster. Blue cluster which is the biggest one can be characterized as mental health during Covid 19 outbreak, green cluster, depression and anxiety and red cluster stress and impact.

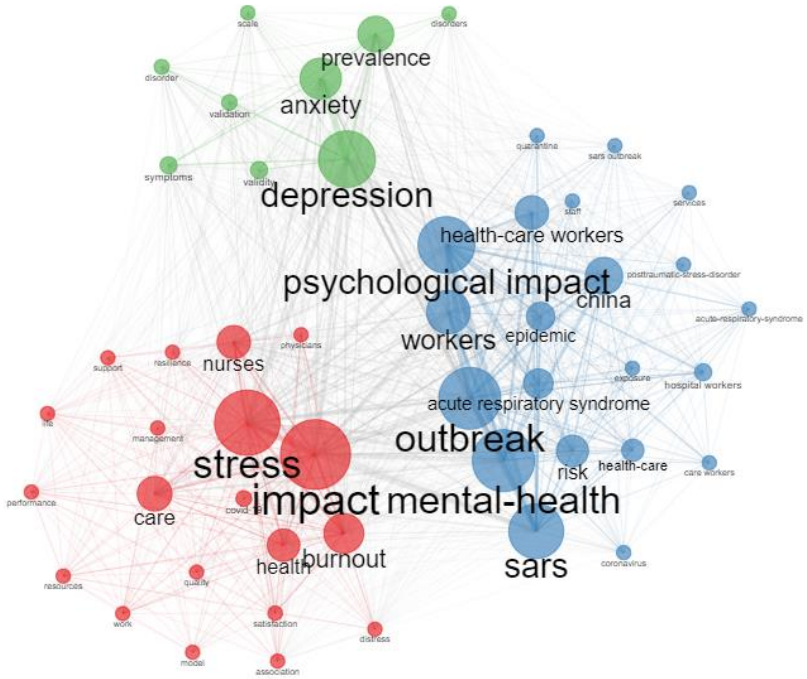


Figure 5. Co-occurrence network (keyword plus) analysis

Conceptual structural map, given in Figure 6, depicts four different compositions shown in blue, red, green and purple colors. It is obtained by examining the abstracts of the articles by Multiple Correspondence Analysis (MCA). Green cluster corresponds to research aspects of mental health. It also can be entitled as measurement theme of mental health. The purple one is stress and anxiety, an independent and weak theme. In the red cluster, it can be stated that there are more studies that precede the Covid 19 outbreak. It can be stated that the blue cluster, which examines the mental health of healthcare professionals especially in the context of supporting, is a theme of providing support to reduce the effects of the Covid 19 outbreak on the mental health of healthcare professionals.

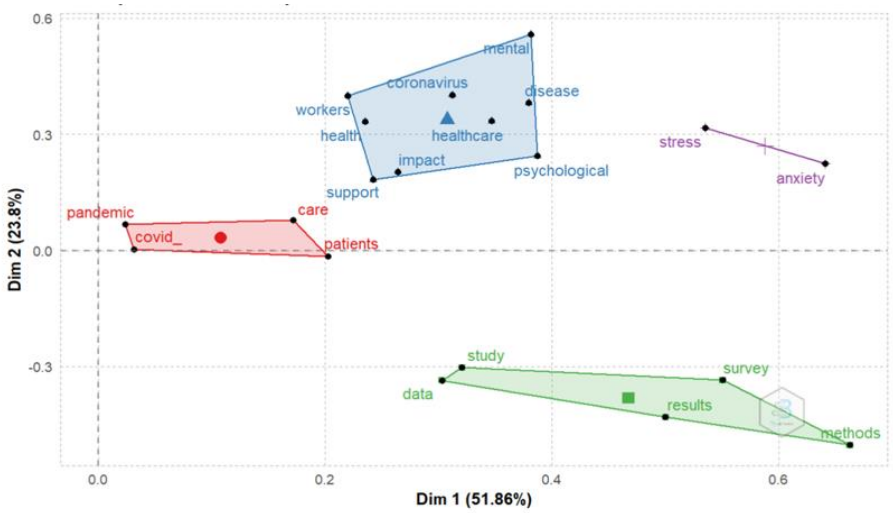


Figure 6. Factorial analysis (conceptual structural map, method: MCA)

Social Structure: Figure 7 depicts the collaboration network of authors. The red cluster is the densest at the point of cooperation. Because it is seen that there is more interaction between them. Then the blue cluster, and the green cluster can be seen as the most cooperating clusters in themselves.

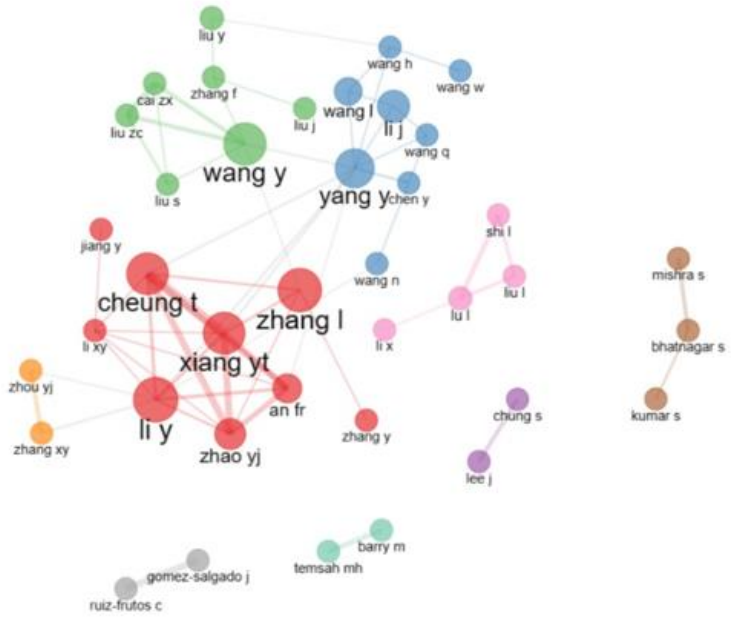


Figure 7. Collaboration network

DISCUSSION AND CONCLUSIONS

The bibliometric analysis method was used in this study, which was carried out with the aim of determining the effects of the Covid 19 Pandemic on the mental health of healthcare workers and making inferences for health policies and human resources management. Within the scope of the research, 4043 articles published in the Web of Science Core Collection database between 2020 and 2021 were examined.

According to the Sankey diagram, which shows the links from the references to the authors and themes, it is seen that apart from Covid 19, main concepts such as *anxiety*, *depression*, *stress*, *insomnia*, *burnout*, *resilience*, along with mental health, come to the fore. This finding is similar to the studies in the literature. Lai et al. (5) found symptoms of depression, anxiety, insomnia, and distress in a significant proportion of healthcare professionals. Chew et al. (6) found that health care workers experienced moderate to very severe depression, moderate to severe anxiety, moderate to severe depression and Mo (17), determined that nurses struggling with COVID-19 are generally under stress.

According to the findings obtained from the research, it was seen that the author most relevant to the research topic was Zhang L. The author has 23 articles that contribute to the field. Others of the 5 most relevant authors are Li Y., Li J., Wang Y., and Liu Y. According to the results obtained from the research, China is the most cited country. It is

seen that China is the country that receives almost three times more citations than the USA, which is in second place. In this case, it can be said that it would be beneficial to follow the publications originating from China in the studies conducted on the subject or in the decisions taken by policymakers. However, it is remarkable that the USA publishes about 30% more than China regarding scienctific production.

When the most frequently used keywords by the authors regarding the mental health status of healthcare professionals in the context of Covid 19 are examined; it is seen that these are mental health anxiety, pandemic depression, stress, health workers, coronavirus, burnout, resilience, health workers, psychological distress, public health, nursing, pandemic insomnia and well-being. This result shows us that healthcare professionals have the most problems in these matters during the Pandemic period. Health policymakers and managers need to develop solutions for these issues. The measures to be taken in this regard will contribute to less anxiety of health workers.

According to the results of the research, when the thematic evolution of the field is examined, it is seen that the theme of generalized anxiety disorder is the most studied among the motor themes with the highest centrality and impact. It is noteworthy that sleep quality is studied as a niche theme. This situation can be interpreted in the context of anxiety disorder that impairs sleep quality. The themes of post-traumatic stress disorder, depression anxiety, and stress can be interpreted as a trend that is subject to new analyzes compared to the previous year, considering the long-term consequences of the Covid-19 outbreak on the mental health of healthcare professionals.

As a result of the the research conducted, it can be said that the most important effects of the Covid 19 Pandemic on the mental health of healthcare workers are *anxiety, depression, stress, insomnia, burnout*. In order to reduce or eliminate the negative mental problems experienced by health workers, providing expert support in certain matters such as increasing the psychological resilience of health workers, improving working conditions, improving communication with each other and managers, coping with stress, managing anxiety, etc. is required. In addition, carrying out activities that support morale and motivation will help reduce the negative effects experienced. Improving the mental health of health workers will have a positive effect on the health system and will ensure the correct implementation of human resources policies.

The main limitation of the study is that only the Web of Science Core Collection database is used as the database from which raw data is downloaded. Only studies written in English and defined as articles and reviews were included in the analysis, and only these records were evaluated in the citation analysis. In addition, some limitations arising from bibliometric analysis can be mentioned in the study. Data were visualized to the extent allowed by the R 4.0.3 software, and no outputs could be obtained from the analyzes in which the program gave an error.

Conflict of Interest: None
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Ethics Statement: None

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RESEARCH ARTICLE

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The Increase in the Social Utility of the Geriatric Population Gained From the Human Health Workers during the Pandemic

ABSTRACT

Objective: It was intended to analyze the change in social utility loss in 2020 when the pandemic showed its first shock, caused by the inter-provincial distribution of health personnel of the elderly compared to 2019 and other indicators based on this (rate of social utility, SHW, IHW, SHW/IHW per thousand elderly people).

Methods: The method used in the study is the Atkinson inequality index. The data used in the application are for 2019 and 2020 at the NUTS-3 level. Health personnel data were compiled from SSI and data for the elderly population were compiled from TSI.

Results: The Atkinson inequality index varied between 0.414 and 0.302 in 2019. The index value fell between 0.292 and 0.206 in 2020. Depending on the index values, while the rate of social utility varied between 69.8% to 58.6% in 2019, it increased to vary between 79.4% to 70.8% in 2020. The rate of social utility loss, on the other hand, while being varied from 41.4% to 30.2% in 2019, decreased to being varied between 20.6% to 29.2% in 2020.

Conclusions: The findings show that there is a significant improvement in the social utility of the elderly from the human health workers. This serves as evidence to the situation which shows that the health policies implemented during the pandemic period, unlike many other countries, supported the access of the elderly to health services.

Keywords: Pandemic, Turkish Health Politics, Geriatrics, Public Health, Social Politics, Interregional Inequality.

Pandemide Geriatrik Nüfusun Sağlık Çalışanlarından Sağladığı Sosyal Faydada Yaşanan Artış

ÖZET

Amaç: Pandeminin ilk şok etkisini gösterdiği 2020 yılında, yaşlıların sağlık personelinin iller arası dağılımından kaynaklanan sosyal fayda kayıplarında 2019'a göre yaşanan değişimi ve buna dayalı olan diğer göstergeleri (sosyal fayda oranı, SHW, IHW, bin yaşlı başına düşen , SHW ve IHW) analiz etmek amaçlandı.

Gereç ve Yöntem: Çalışmada kullanılan yöntem, Atkinson eşitsizlik endeksidir. Uygulamada kullanılan verileri İBBS-3 düzeyinde 2019 ve 2020 yılları içindir. Sağlık personeli verileri SGK'dan, yaşlı yaş gruplarındaki nüfus için veriler TÜİK'ten derlenmiştir.

Bulgular: Atkinson eşitsizlik endeksi 2019'da 0,414 ile 0,302 arasında gerçekleşti. Endeks değeri 2020'deyse 0,292 ile 0,206 arasına geriledi. Endeks değerlerine bağlı olarak 2019'da sosyal fayda oranı 69,8% ile 58,6% arasındayken, 2020'de 79,4% ile 70,8% arasına yükseldi. Bu değişim rate of socail utility için yaklaşık ¼'lük artışa işaret eder. Sosyal fayda kaybıysa 2019'da 41,4% ile 30,2% arasındayken, 2020'de 20,6% ile 29,2% arasına geriledi. Bu değişim sosyal fayda kaybı oranında yaklaşık ortalama 1/3'lük gerilemeye işaret eder.

Sonuç: Elde edilen bulgular, insan sağlığı hizmetlerinde çalışanlardan yaşlıların sağladığı sosyal faydada ciddi iyileşmenin olduğunu gösteriyor. Bu durum pandemi sürecinde uygulanan sağlık politikalarının, diğer pek çok ülkenin aksine yaşlıların sağlık hizmet erişimini destekleyici yönde olduğuna bir kanıt özelliğindedir.

Anahtar Kelimeler: Pandemi, Türk sağlık politikası, geriatri, kamu sağlığı, sosyal politika, bölgelerarası eşitsizlik.

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INTRODUCTION

On March 11, 2020, WHO declared entrance to a global pandemic period caused by the Covid-19 virus. With the declaration of the global pandemic, long-term quarantines, still ongoing social isolation and social distance measures were taken almost all over the world faster and more simultaneously than ever before. The population segment most devastatingly affected by this difficult process is undoubtedly the elderly population. The main reason why the elderly people are affected is that they are the age group most severely and fatally affected by Covid-19.

According to the calculation of Diderichsen (1), mortality rates in those aged 65+ increased by 2.9% in Sweden between January and June 2020, compared to the 2015-2019 average, while it increased by 7.3% in England and Spain. Haklai et al (2) presented evidence from Israel that the excess mortality between March and November 2020 compared to the 2017-2019 average differed significantly only in the elderly, while the excess mortality rate in the elderly aged 65-74 and 74-75 was 7.5% more and, in the elderly, aged 85 and over this rate was 8% more. According to the Centers for Disease Control and Prevention's statistics (3), the death rate from Covid-19 in the USA by November 2021 is 65 times higher in the 65-74 age group, 150 times higher in the 75-84 age group and 340 times higher in the 85+ age group compared to the 18-29 age group. In India, 76.7% of deaths due to Covid-19 were in the age group of 50 years and older (4).

Barnett-Howell et al (5) pointed out that the pandemic affects developed countries and underdeveloped countries differently, social distance measures increase welfare in developed countries where the elderly population is dense, while it decreases welfare in underdeveloped countries where the young population is dense. In addition, in the simulation study, he found that more than 1.5% of the population would die in developed countries such as the UK and the USA if social distancing was not practiced, while in underdeveloped countries there would be little change.

The pandemic did not only lead to an increase in the death rate of the elderly due to Covid-19. At the same time, there was a significant increase in deaths due to causes other than Covid-19. In a survey conducted by Heid et al (6) between March and May 2020 in the USA with subjects that had an average age of 70.3, more than half of the elderly subjects reported that they canceled their doctor appointments, and almost half reported that they canceled at least 1 medical operation. The increase in deaths due to reasons other than Covid-19 in the elderly, whose medical care service decreased, is also a natural result of this. Li et al (7) compared the Corona pandemic with the 2009 influenza pandemic and showed a significant increase in comorbidities in cardiovascular diseases/hypertension and diabetes, which mostly affect the elderly. Shiels et al (8) find out that, between March and August 2020, Diabetes, Alzheimer's and heart diseases rank first in additional deaths besides the Covid-19 related deaths. Banerjee et al (9), in their analysis based on hospital data in England, Italy and China, found that Covid-19 causes an increase in excess deaths from cardiovascular diseases. He attributed the excessive mortality increases to the delay of service delivery for cardiovascular diseases. While Burlacu et al (10) points out that the dilemma of Covid-19 or comorbidity in elderly deaths will be very much questioned in the future, he argues that the majority of patients may have died due to lack of access to medical facilities. There are many studies that even now provide evidence for the dominance of deaths caused by comorbidity accompanying Covid-19 (11-16).

Seligman et al (17) found that deaths from Covid-19 increased among the poor, those with low education, and disadvantaged groups in the USA. He attributed this disproportionate increase to the inadequacy of public health measures. He pointed out that the access of health services to disadvantaged groups should be eased. The fact that the death rate due to Covid-19 in the USA is 2 times higher for Latino seniors than for White seniors over the age of 65, and 3 times higher for African-American seniors supports this result (18). Since the elderly are at the highest risk of death, the most disadvantaged group in Covid-19 was elderly people.

Coccia (19), in his study comparing 155 countries, found that as per capita health expenditures and public health expenditures increased, the death rate of the elderly due to Covid-19 decreased. There is also evidence from Turkey showing that the increase in health expenditures and the number of health personnel leads to a decrease in deaths and a prolongation of life expectancy (20-23). It has also been determined that the increase in the number of health personnel in Turkey has an increasing effect on the elderly life expectancy and population share (24). What this means is that healthcare delivery on a global scale reduces the risk of death. However, Grund et al (25) pointed out that the geriatric rehabilitation capacities of the elderly infected with Covid-19 are shrinking despite the increase in the need for rehabilitation after the illness. In other words, the curative effect on the transfer of health expenditures to the elderly remains limited.

Interregional distribution inequality of health workers is accepted as a matter of access to health in the literature. The more balanced the distribution between regions, the more equitable the access to health services. Equality of interregional distribution is measured with inequality indices

such as Atkinson, Gini and Theil. Studies based on inequality indices support the lack of global harmony over time in improvement or worsening between countries. It is impossible to talk about a global improvement or deterioration, as the studies have reached fluxional findings according to the countries.

Gravelle and Sutton (26) found that there was stability in the regional distribution of General Practitioners in England between 1974-1995. Hann and Gravelle (27), again in England, showed deterioration from the mid-1980s to 2003. In the UK, which could not pass the test, especially for the elderly, in the Covid-19 pandemic, it was observed that the interregional balance of health service provision deteriorated as it came to the present day. There is a process of deterioration in Japan, as in England. Toyabe (28) found that there was a deterioration in the interregional distribution of health workers, which examined the years between 1996 and 2006, in Japan after 2004. Matsumoto et al (29) found that inequality in the interregional distribution of obstetrics/gynecology increased between 1996 and 2016 in Japan.

There are also examples of inequitable development in underdeveloped countries. Goudarzi et al (30) found that the interregional distribution of health personnel became unequal between 2006 and 2011 in Iran. Sotodeh Manesh (31) found that the distribution of nurses and specialists in eastern Iran changed evenly between 2013 and 2018, while there was an inequality among general practitioners. Khammarnia et al (32) calculated that the most unequal distribution of health workers in Iran in 2020 is in urban health workers and nurses, and the most balanced distribution is in midwives. Woldemichel et al (33) found that the inequality between districts according to the population of health personnel in Ethiopia is high, except for one province. Zehnati (34) concluded that there was a deterioration in the interregional distribution of physicians in Algeria between 1998 and 2017.

There are also fewer studies where the calculated inequality coefficients show that interregional inequality is decreasing. Çalışkan (35) determined that there was a significant improvement in the distribution of health personnel between provinces in Turkey between the years 1965 and 2007. Theodorakis et al (36) showed an equitable development in the distribution of general practitioners by population among 36 regions in Albania between 2000 and 2004. Russo (37) concluded that there was an egalitarian change in the distribution of primary care physicians between regions in Brazil between 2012 and 2016. Roj (38) detected an equitable trend in most specialties between 2010 and 2017 in the interregional distribution of physicians by specialty in Poland.

In the literature focusing on determining the interregional balance in access to health services, there is almost no study focusing on the elderly. The two preliminary studies are the two studies of Çiftçi (39-40). However, neither of these studies focus on temporal trend or comparing two time sections. So, this study aims to make a unique contribution to the literature by presenting a comparison of the interregional distribution balance in accessing health services, which stand out with the pandemic, especially among the elderly before and during the pandemic. The social utility of elderly people from two different groups of health workers in 2019 and 2020 was calculated and compared using the Atkinson interregional inequality index based on the "NUTS3" in 81 provinces of Turkey.

MATERIAL AND METHODS

Data: The application carried out within the scope of the study was carried out with secondary data. Geriatric population data by age and gender were compiled from TSI, and data on health personnel under 4-1/a were compiled from SSI. Data are based on NUTS 3 for 2019 and 2020. The Human Health Workers consists of employees in three sub-activity lines: 1) Hospital services employees, 2) Practice activities related to medicine and dentistry, 3) General application activities of physicians. The majority of the employees are contracted civil servants and permanent public workers from the public sector. It also includes the majority of the additional staff increase in 2020.

Contracted civil servants constitute a significant part of the newly hired public workers. In recent years, most of the assistant health personnel such as nurses working in various public institutions such as university hospitals are commenced to work in this status. The number of these workers increased from 550 thousand to 812 thousand between 2019-2020. Financing problems experienced by private sector health institutions led to serious sectoral problems in 2020. Some institutions among private sector organizations even made requests to temporarily transfer their institutions to the public. In summary, this increase was due to the recruitment of health personnel other than newly recruited doctors to the sector.

Limitation: The most up-to-date health personnel data is available for 2019 in NUTS-3. It is currently impossible to compare the pre-pandemic period with the pandemic period using the data of the Ministry of Health.

Method: The Atkinson regional inequality index method was used. The index derived from Gini, different from and superior to Gini and other indexes, provides the opportunity to measure the loss of social utility for society according to the deviation from the state of full equality. Hereunder, according to the loss of social utility caused by the inequality in the inter-regional distribution, it is possible to measure the intangible existence numerically.

The Atkinson inequality index is one of the inequality indices that has been widely used since 1970. The inequality index takes a value between 0 and 1. If the index is 0, there is absolute balanced distribution, if the index is 1, there is absolute inequality. Many studies are showing that the Atkinson index, which is derived from Gini, is superior to and more sensitive than Gini (41-43). The most important advantage of the Atkinson index is that it gives the social utility and the loss of social utility ratios according to the index value. For example, if the Atkinson index is 0.2, the loss of social utility is 20% because it deviates 20% from the absolute utility. In that case, the distributed mass gains 80% utility from the distributed.

The original calculation method created by Atkinson (44) for the index is like this:

$$I = 1 - \left[\sum_i \left(\frac{y_i}{\mu}\right)^{1-\varepsilon} \quad f(y_i)\right]^{\frac{1}{1-\varepsilon}} \qquad [1]$$

In Equation 1, y represents income, μ represents average income and ε represents the level of sensitivity to income transfers in different income brackets. The computational transformation to measure interregional inequality is like this:

$$A_{(\Omega)} = 1 - \left[\frac{G_i}{G} \times \sum_{i=1}^{n} \frac{W_i/G_i}{\bar{W}/\bar{G}}\right]^{\frac{1}{1-\Omega}} \; eğer\ \Omega \neq 1 \qquad [2]$$

In Equation 2; The $A_{(\Omega)}$ represents Atkinson interregional inequality index, Ω represents the sensitivity coefficient; W_i, represents the number of the human health workers in the province of I and G_i, represents the number of the elderly population in province I. $\bar{W}$ is the unweighted provincial average found by dividing the total number of human health workers in Turkey by 81. $\bar{G}$ is the unweighted provincial average found by dividing the number of all elderly people in Turkey by 81.

After the Atkinson index is calculated, the rates of social utility and loss of social utility are calculated as in Equations 3 and 4.

$$rate\ of\ social\ utility = \%\left[(1 - A_{(\Omega)}) \times 100\right] \qquad [3]$$

$$rate\ of\ loosing\ for\ social\ utility = \%\ (A_{(\Omega)} \times 100) \qquad [4]$$

In addition, the amount of sensible (SHW) or the amount of insensible human health workers (IHW) can also be calculated with the Atkinson index as in Equations 5 and 6.

$$SHW = \sum \mathrm{W} \times A_{(\Omega)} \qquad [5]$$

$$IHW = \sum \mathrm{W} \times\ (A_{(\Omega)} \times 100) \qquad [6]$$

Even SHW or IHW per thousand elderly people can be calculated as in Equations 7 and 8.

$$SHW\ per\ thousand\ elderly\ people = \left(SHW/\sum \mathrm{G}\right) \times 1000 \qquad [7]$$

$$IHW\ per\ thousand\ elderly\ people = \left(IHW/\sum \mathrm{G}\right) \times 1000 \qquad [8]$$

RESULT

The findings are reported collectively in three tables. In the first table, Atkinson inequality indexes, rate of social utility and rate of social utility loss were calculated, as 2019 and 2020, according to the total population of women, men, and seven different elderly age groups. In the second table, the number of (in) sensible human health workers by the elderly age groups were calculated. In the last table, the number of (in) sensible human health workers per thousand elderly people were calculated for each of the elderly age groups.

The Atkinson inequality index reached a maximum of 0.414, a minimum of 0.302 and an arithmetic mean of 0.352 in 2019. The index value decreased to a maximum of 0.292, a minimum of 0.206 and an average of 0.253 in 2020. Depending on the index values, while in 2019 the rate of social utility was a maximum of 69.8%, a minimum of 58.6% and an arithmetic average of 64.8%, in 2020 it increased to a maximum of 79.4%, a minimum of 70.8% and an average of 74.7%. This change represents an increase of approximately ¼ for the rate of social utility. While the rate of social utility loss was a maximum of 41.4%, a minimum of 30.2% and an arithmetic average of 35.2% in 2019, it declined to a maximum of 20.6%, a minimum of 29.2% and an average of 25.3% in 2020. Loss of

social utility decreased between the years of 2019 and 2020 for a maximum of 10.7%, a minimum of 8.6%, and the average decline was 9.9%. This change indicates an average of 1/3 regression in the loss of social utility (See. Table 1).

Table 1. Social Utility for Geriatrics Population from the Human Health Workers and Province [Under Article 4-1/a of Act 5510] 2019, 2020

Age, sex		Atkinson Index		Social Utility, %		Loss of Social Utility, %	
		2019	2020	2019	2020	2019	2020
65-69	Total	0,308	0,213	69,2	78,7	30,8	21,3
	Male	0,315	0,220	68,5	78,0	31,5	22,0
	Female	0,302	0,206	69,8	79,4	30,2	20,6
70-74	Total	0,329	0,232	67,1	76,8	32,9	23,2
	Male	0,336	0,239	66,4	76,1	33,6	23,9
	Female	0,325	0,226	67,5	77,4	32,5	22,6
75-79	Total	0,354	0,254	64,6	74,6	35,4	25,4
	Male	0,361	0,261	63,9	73,9	36,1	26,1
	Female	0,350	0,249	65,0	75,1	35,0	24,9
80-84	Total	0,372	0,268	62,8	73,2	37,2	26,8
	Male	0,388	0,285	61,2	71,5	38,8	28,5
	Female	0,363	0,260	63,7	74,0	36,3	26,0
85-89	Total	0,389	0,281	61,1	71,9	38,9	28,1
	Male	0,414	0,307	58,6	69,3	41,4	30,7
	Female	0,376	0,269	62,4	73,1	37,6	26,9
90+	Total	0,358	0,272	64,2	72,8	35,8	27,2
	Male	0,381	0,292	61,9	70,8	38,1	29,2
	Female	0,360	0,274	64,0	72,6	36,0	27,4
65+	Total	0,333	0,234	66,7	76,6	33,3	23,4
	Male	0,340	0,241	66,0	75,9	34,0	24,1
	Female	0,328	0,228	67,2	77,2	32,8	22,8

While the number of sensible people of the human health workers [Under Article 4-1/a of Act 5510] by elderly population (SHW) increased very sharply between 2019-20, the increase in the non-sensible part (IHW) was very limited. According to elderly age groups, the proportional increase in SHW in 2020 compared to 2019 ranged between a maximum of 74.8% and a minimum of 67.5%. However, this proportional range is stuck between a maximum of 13.4% and a minimum of 0.8% for IHW. This finding supports that the egalitarian distribution in 2020 compared to 2019 has been realized to a very serious extent.

The employment of additional personnel was made according to the provinces' missing personnel locations, thus reducing the imbalance between the provinces in this regard. By elderly age groups, SHW stood at a maximum of 383,682 and a minimum of 322,110 people in 2019, compared to a maximum of 644,758 and a minimum of 562,910 people in 2020. IHW, on the other hand, was between a maximum of 227,751 and a minimum of 166,180 people in 2019, while it was between a maximum of 249,360 and a minimum of 167,512 people in 2020 (See Table 2).

Table 2. (In)sensible People of the Human Health Workers and Province [Under Article 4-1/a of Act 5510] by Geriatrics Population

Age, sex		2019		2020		Difference	
		SHW	IHW	SHW	IHW	SHW	IHW
65-69	Total	380.317	169.544	639.446	172.824	259.130	3.279
	Male	376.472	173.389	633.315	178.955	256.844	5.565
	Female	383.681	166.180	644.758	167.512	261.077	1.332
70-74	Total	368.889	180.972	624.202	188.068	255.313	7.096
	Male	365.355	184.506	617.767	194.503	252.412	9.997
	Female	371.390	178.471	628.855	183.415	257.465	4.944
75-79	Total	354.990	194.871	606.133	206.137	251.142	11.267
	Male	351.336	198.525	599.897	212.373	248.561	13.848
	Female	357.252	192.609	610.039	202.231	252.787	9.622
80-84	Total	345.283	204.578	594.178	218.092	248.895	13.514
	Male	336.547	213.314	580.792	231.478	244.244	18.165
	Female	350.166	199.695	601.417	210.853	251.251	11.158
85-89	Total	336.077	213.784	583.695	228.575	247.618	14.791
	Male	322.110	227.751	562.910	249.360	240.800	21.609
	Female	342.930	206.931	593.404	218.866	250.474	11.935
90+	Total	352.776	197.085	591.692	220.578	238.916	23.493
	Male	340.491	209.370	574.759	237.511	234.269	28.140
	Female	351.908	197.953	589.456	222.814	237.548	24.861
65+	Total	366.772	183.089	622.570	189.700	255.798	6.611
	Male	363.039	186.822	616.302	195.968	253.263	9.146
	Female	369.477	180.384	627.092	185.178	257.615	4.794

For SHW per thousand elderly people, the change of increase between 2019 and 2020 has reached dramatic levels. As the increase in the number of human health workers was too high to be compared with the increase in the number of the elderly population. In addition, a significant improvement was observed in the distribution of the human health workers among 81 provinces in 2020 compared to 2019. Thus, SHW increased surprisingly between 2019-2020. At this point, SHW per thousand elderly people increased rapidly in all elderly age groups. However, since the amount of population in elderly age groups differs from each other, it is necessary to focus on the change between 2019-2020 for each elderly age group. Thus, a healthier analysis can be conducted. For IHW per thousand elderly people, there was an overall decline in 2020 compared to 2019. The source of this decrease is the decrease experienced in the 65-74 age group, which constitutes the majority of the elderly population. There was a limited increase in the elderly population aged 75 and over. However, this increase has become insignificant considering the serious increase in the number of human health workers (See Table 3).

Table 3. (In)sensible People of the Human Health Workers per thousand elderly people and Province [Under Article 4-1/a of Act 5510] by Geriatrics Population

Age, sex		2019		2020		Differences	
		SHW	IHW	SHW	IHW	SHW	IHW
65-69	Total	139.7	62.3	217.6	58.8	77.9	-3.5
	Male	289.3	133.2	452.7	127.9	163.4	-5.3
	Female	270.0	116.9	418.8	108.8	148.8	-8.1
70-74	Total	182.9	89.7	292.8	88.2	109.9	-1.5
	Male	402.4	203.2	643.0	202.5	240.6	-0.8
	Female	334.9	160.9	537.0	156.6	202.2	-4.3
75-79	Total	271.3	148.9	447.2	152.1	175.9	3.1
	Male	626.6	354.1	1027.8	363.9	401.2	9.8
	Female	477.9	257.6	790.5	262.1	312.7	4.4
80-84	Total	422.2	250.2	689.9	253.2	267.7	3.1
	Male	1039.6	658.9	1709.4	681.3	669.8	22.4
	Female	708.8	404.2	1153.4	404.4	444.6	0.1
85-89	Total	675.7	429.8	1250.6	489.7	574.9	59.9
	Male	1669.5	1180.4	3170.8	1404.6	1501.3	224.2
	Female	1126.3	679.6	2051.8	756.8	925.5	77.1
90+	Total	1879.4	1050.0	2960.8	1103.8	1081.4	53.8
	Male	6719.2	4131.7	10818.4	4470.5	4099.2	338.8
	Female	2568.1	1444.6	4017.7	1518.7	1449.6	74.1
65+	Total	48.6	24.2	78.3	23.9	29.7	-0.4
	Male	108.8	56.0	175.4	55.8	66.6	-0.2
	Female	87.7	42.8	141.2	41.7	53.6	-1.1

DISCUSSION

The number of human health workers increased from 584,372 in 2019 to 859,929 in 2020. The personnel increase experienced in 2020, when the first shock effect of the pandemic was experienced, reached 275,557 people. The proportional equivalent of this increase compared to 2019 is 47.2%. On the other hand, female elderly population increased from 4,213,467 people to 4,439,663 people, male elderly population increased from 3,337,260 people to 3,513,892 people and the total elderly population increased from 7,550,727 people to 7,953,555 people. The proportional equivalent of this increase compared to 2019 is 5.37% for women, 5.29% for men and 5.34% for the total elderly population. In the elderly population, there was a decrease of 30,662 people in 2020 compared to 2019, only for women and men in the 85-89 age group. The proportional meaning of this decrease is that there is a 6.2% decrease in 2020 compared to 2019. There was a proportional increase between 8.3% and 3.2% in all age groups except the 85-89 age group. As can be understood from this, the proportional increase in the human health workers that was achieved in 2020, was much higher than the proportional increase experienced in the elderly population (etc. 45-46).

The findings support that there is a serious egalitarian improvement in the interregional distribution according to every age group without exception. This improvement can be achieved either by removing the human health workers from regions with excess employment or by recruiting new workers to regions with a shortage of workers. It seems that the second option has been realized in Turkey, and new human health worker recruitments have been distributed among the regions in a way that ensures the balance, causing an egalitarian improvement. In the severe conditions of the pandemic, the egalitarian transformation points to a significant success in public health planning. Because an important part of the human health workers are public workers. Especially during the pandemic period, the creation of additional employment in private sector health institutions could not be realized. The additional source of employment belongs to the public, mostly consisting of nurses, health technicians and

operators and other assistant human health workers. This segment was also implementing personnel who were fighting at the forefront during the pandemic.

In 2020, when the first devastating effects of the pandemic were experienced, the world could not pass the test regarding the provision of health services for the elderly. The world public opinion was deeply shaken by the news of the elderly who were left to die in nursing homes from developed Western countries, especially England. The convergence in the interregional distribution of the human health workers, which defines the convenience of the elderly in accessing health services in such an environment, and also shows the power of the health personnel to intervene appropriately to the elderly, points to the existence of an important success. Comparable preliminary studies from different countries regarding the pandemic could not be reached to make a comparison. However, there are various studies conducted in the pre-pandemic period considering the general population. However, the number of studies and countries in which egalitarian development that supports interregional convergence can be identified is extremely limited (35-38). Studies showing that there is more interregional divergence and exacerbation of the imbalance are dominant (26-34). In addition, there is a serious gap in the literature on studies that include interregional distribution according to the elderly people. The fact that they are the main victims of the pandemic could possibly increase interest in expanding literature on the elderly in the future.

CONCLUSION

The global pandemic, which has affected the world for the last two years, has caused radical changes in every field. Naturally, many innovations were encountered in the field of health. However, it should be debated how much additional effort countries put forward during the pandemic process for the elderly population, to whom the virus had the deadliest effect. While efforts were made to reduce the risk of transmission of the virus to the elderly with social distance and isolation decisions, on the one hand, there were serious increases in the effects that led to an increase in comorbidity. The dramatic end of the elderly, who were left to die in developed Western countries, will probably remain in memory for many years to come. In this study, the focus was to compare the balance in the distribution of the human health workers according to the distribution of the elderly population between regions in 2020, when the pandemic showed its first shock effect, compared to the previous year. Thus, it was aimed to reveal a part of the success or failure of the health policy for the elderly in Turkey during the pandemic period. The findings showed that the public health policy for the elderly and the health service planning made within the scope of health policy are highly affirmative. Reaching such evidence, even as part of health policy and planning, from a country with limited economic opportunities is extremely promising because there are not many positive examples in the pandemic period regarding the health services offered to the elderly from the rest of the world. This situation can be shown as evidence of the success in Turkey in terms of health policy and interregional health planning. By carrying out similar studies for different countries, a different dimension will be added to the comparison of countries' public health policies for the elderly. Thus, the position of countries in elderly health can be better understood. When the detection of inadequacies becomes easier, it will be possible to contribute to both the development of the literature and the development of effective public health policies that will solve the problems.

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RESEARCH ARTICLE

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Corporate Carbon Footprint Environmental Quality and Combating the Covid-19 Pandemic (US Example)

ABSTRACT

Objective: Developed countries with high use of fossil fuels in production can harm the environment by contributing more to the formation of greenhouse gases on a global scale. In this context, it has been emphasized that they have caused an increase in Covid-19 cases. Therefore, this study aims to provide policymakers with a different perspective on the fight against the virus.

Methods: This research covers the United States. The relationship between Coal Industry CO2 (CCO), Natural Gas Industry CO2 (NCO), Power Industry CO2 (ECO), Petroleum Industry CO2 (OCO), and Covid-19 cases (COV) is discussed. Monthly data for the period between 2019 and 2021 were used. The data were compiled from World Health Organization and Our World in Data web resources. In the analyses, the ARDL Boundary Test model was used to capture long-term and short-term causality relationships.

Results: In general, the results show that fossil energy sources such as coal, oil, electricity and natural gas used in industries play an important role in the increase of Covid-19 cases. Among these energy sources, coal is the one that causes the most damage. Coal is followed by oil, electricity and natural gas, respectively. Accordingly, a 1% change in the US economy due to coal used in production leads to a 1.03% change in Covid-19 cases. Similarly, the effect of oil on Covid-19 cases is 0.61%. The impact of industries using electrical energy based on fossil fuels in their production on Covid-19 cases is 0.26%. Natural gas proved to be the fossil fuel energy source with the least impact on Covid-19 cases with a change of 0.069%.

Conclusions: The findings revealed that the increase in fossil fuels used in industries during the relevant period negatively affected air quality and Covid-19 cases. The increase in the number of cases affects the health sector more than any other sector. If this data is associated with future energy sources used in industries (fossil fuels), it will contribute to the creation of public policies that promote a new generation of energy sources in production.

Keywords: COVİD-19 Pandemic, Corporate Carbon Footprint, Greenhouse Gas, USA, ARDL Bound Test.

Kurumsal Karbon Ayak İzi Çevre Kalitesi ve Covid-19 Salgını ile Mücadele (ABD Örneği)

ÖZET

Amaç: Üretimde fosil yakıt kullanımının yüksek olduğu gelişmiş ülkeler, global ölçekte sera gazı oluşumuna daha fazla katkı yaparak çevreye zarar verebilmektedir. Bu bağlamda Covid-19 vakalarında artışa neden oldukları vurgulanmak istenmiştir. Böylece virüsle mücadelede politika yapıcılara farklı bir bakış açısı sunulmak istenmiştir.

Gereç ve Yöntem: Bu araştırma Amerika Birleşik Devletleri'ni kapsamaktadır. Kömür Endüstrisi CO2 (CCO), Doğal Gaz Endüstrisi CO2 (NCO), Enerji Endüstrisi CO2 (ECO), Petrol Endüstrisi CO2 (OCO) ile Covid-19 vakaları (COV) arasındaki ilişki incelenmiştir. 2019-2021 dönemine ait aylık veriler kullanılmıştır. Veriler Dünya Sağlık Örgütü ve Our World in Data web sitelerinden derlenmiştir. Analizlerde uzun ve kısa dönem nedensellik ilişkilerini yakalamaya yarayan ARDL Sınır Testi modeli kullanılmıştır.

Bulgular: Genel olarak sonuçlar, endüstrilerde kullanılan kömür, petrol, elektrik ve doğal gaz gibi fosil enerji kaynaklarının Covid-19 vakalarının artışında önemli bir rol oynadığını göstermektedir. Bunlardan en fazla etkiye sebep olan kömürdür. Kömürü sırasıyla, petrol, elektrik ve doğal gaz takip etmektedir. Buna göre, ABD ekonomisinde üretimde kullanılan kömüre bağlı %1'lik bir değişim Covid-19 vakalarında % 1,03'lük değişime yol açmaktadır. Benzer şekilde petrolün Covid-19 vakaları üzerindeki etkisi % 0,61'dir. Üretiminde fosil yakıtlara bağlı elektrik enerjisi kullanan endüstrilerin Covid-19 vakalarına etkisi %0,26 düzeyindedir. Covid-19 vakalarında % 0,069'luk değişimle en az etkiye sahip olan fosil yakıt enerji kaynağı doğal gaz olduğu tespit edilmiştir.

Sonuç: Sonuç olarak, ilgili dönem boyunca endüstirlerde kullanılan fosil yakıtlardaki artşın hava kalitesini ve Covid-19 vakalarını olumsuz etkilediği yönündedir. Vaka sayısındaki artış diğer sektörlerden farklı olarak sağlık sektörünü daha fazla etkilemektedir. Bu veriler ilerleyen süreçte endüstrilerde kullanılan enerji kaynakları (fosil yakıtlar) ile ilişkilendirilirse, üretimde yeni model enerji kaynaklarını teşvik eden kamu politikaları oluşturulmasına katkı sağlayacaktır.

Anahtar Kelimeler: COVID-19 Salgını, Kurumsal Korbon Ayak İzi, Sera Gazı, ABD, ARDL Sınır Testi

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INTRODUCTION

The COVID-19 virus, which first appeared in Wuhan, China in 2019 and has affected the whole world, has led to a large number of cases and deaths. An active mobilization of the fight against the Corona virus has begun all over the world and a pandemic has been declared soon enough (1). The fight against the epidemic was previously carried out within the available possibilities. Later, the epidemic was controlled by developing different vaccination techniques. In addition, studies on drug treatment have been continued. Another method used to combat the epidemic is to study the causes of the disease and how the disease is transmitted. This method, which is also referred to as preventive studies is of as great importance as medical measures in the fight against the epidemic because of the fact that the solution of a problem is possible only by revealing the causes. More research is needed to better understand how the virus spreads, in which environments does it spread the most and why does it spread the most in these environments.

As The World Health Organization states, one of the most dangerous environments for the transmission of the Coronavirus is closed and stuffy environments. The fact that toxic gases produced by the use of fossil fuels have a greenhouse gas effect on the atmosphere causes the world to turn into a closed space in a global sense. In this regard, there is a high risk of developing chronic and infectious diseases, especially in people living in areas exposed to toxic gases.

Almost all of the rise in greenhouse gases in the atmosphere over the last 150 years has been caused by human activities (2). Most of these human-caused greenhouse gas emissions are CO2 gas formed by burning fossil fuels (3). CO2 concentrations in the atmosphere are naturally regulated by many processes that are part of the global carbon cycle. With greenhouse gas emissions, the ability of natural processes to absorb these emissions has decreased. This has led to a constant increase in greenhouse gas concentrations in the atmosphere. CO2 concentrations in the atmosphere have increased by about 40% since the mid-1800s (4).

One of the countries that contributes the most to the formation of the greenhouse effect with the global release of CO2 is the United States (5). The COVID-19 virus, which first appeared in China in 2019 and affected the whole world, has led to a large number of cases and deaths in the United States. As can be seen from Figure 1, the country with the highest cumulative number of cases and deaths in the world is the United States of America (6).

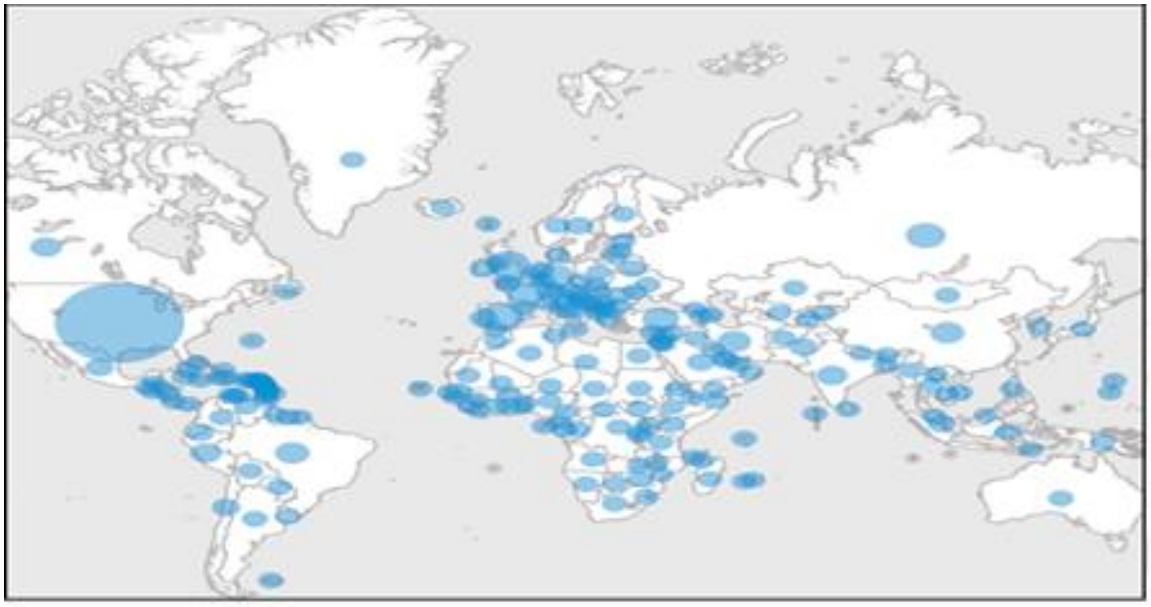


Figure 1. Covid-19 Cases - Cumulative Total (Global), World Health Organization

The uncontrolled spread of COVID-19 in the United States has had a profound economic impact. People's consuming habits have shifted as the number of cases has increased. Therefore, production has come to a standstill. On the one hand, unemployment has increased (7,8). On the other hand, there have been significant increases in market illiquidity and volatility (9). These disruptions in the USA which is arguably one of the most important economies in the world, have adversely affected financial markets in both developed and developing countries, creating major global economic and financial shock waves. (10) Cumulatively, 399 billion tons of CO2 is released into the atmosphere in the United States. This corresponds to 25% of CO2 emissions on a global scale (Figure 2). For these reasons, the United States has been preferred as the subject of research.

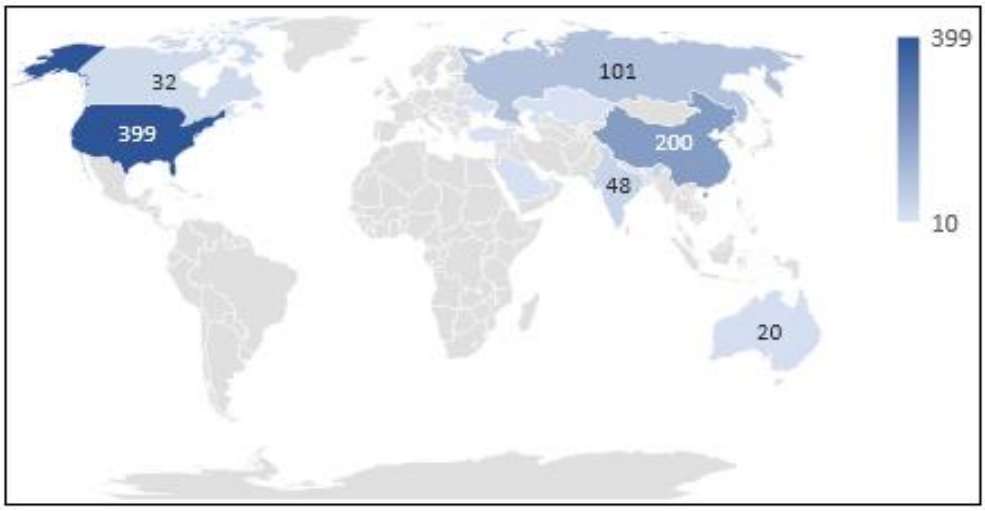


Figure 2. Who contributed most to the global CO2 Emissions?(43).

This research represents the empirical prediction of CO2 threshold levels linked to COVID-19 in the United States. Therefore, our empirical findings are the only ones that can significantly demonstrate the amount of CO2 concentration that can have a negative impact on COVID-19 cases. Previous studies, which are result-oriented studies, confirm the relationship between air pollution and Covid-19 cases. This study, unlike other studies, is an original study that deals with air pollution and Covid-19 cases in a causal dimension and on the basis of corporate activities in the United States. Thus, our intention was to present a different perspective to policy makers in the fight against the virus.

The rest of this article has been edited as follows: Chapter 2 gives a review of the literature. Chapter 3 describes the data and methodology used. Chapter 4 presents the empirical results. Chapter 5 demonstrates the interpretation and discussion of the results. Chapter 6 proposes conclusion statements and policy recommendations.

Literature on Corporate Carbon Footprint And Covid-19 Relationship: CO2 (26%) is defined as one of the most crucial components that create a greenhouse effect in the atmosphere (11). This connection between global temperatures, greenhouse gas concentrations and CO2 has been confirmed throughout history (12). Since the beginning of the Industrial Revolution in the middle of the 18th century, human activities have greatly increased the concentrations of greenhouse gases in the atmosphere. Therefore, the measured level of CO2 concentrations has increased significantly compared to pre-industrial levels. In the formation of greenhouse gases, solar radiation, some of which is reflected back to space, reaches the earth's atmosphere. The rest of the solar energy is absorbed by the land and oceans, warming the earth. Heat radiates from the earth into space. Some of this radiant heat is held by greenhouse gases in the atmosphere, keeping the earth warm enough to sustain life. Human activities such as burning fossil fuels, agriculture and land clearing are increasing the amount of greenhouse gases released into the atmosphere. Such human activities result in the trapping of extra heat and effects such as ocean acidification, which in turn raises the earth's temperature (13).

It has been stated by the World Health Organization that the COVID-19 virus can be transmitted more easily in indoor and airless environments. Indoor spaces are ideal for air-polluting particulate matter. Studies have shown that the risk of transmission of the Covid-19 virus is high in environments with a high concentration of particulate matter (14, 15). Similarly, studies showing that an increase in heat increases the risk of corona virus transmission have been conducted. (16) Found a significant relationship between the average temperature (°C) and the Covid-19 pandemic among the weather components in Indonesia. ($r = 0.392$; $p < .01$). (17) has found that COVİD-19 lethality reduced significantly at air temperatures between 40C and 120C and under relative humidity between 60% and 80%. The location of the United States in the 4-120C isotherm zone from February to March optimally coincided with the most affected geographic regions. (18) Investigated how parameters such as average temperature, precipitation, humidity, wind speed and solar radiation can affect the spread of COVID-19 in Iran. Accordingly, areas with low wind speed, humidity and solar radiation values are subject to a high rate of infection, which facilitates the survival of the virus. (19) When temperatures rise above 28.7 °C, there are more COVID-19-related deaths in Saudi Arabia.

As a result, given the current situation, increasing temperature and relative humidity increase the number of cases. (20) (SARS-COV) investigated the relationship between the survival of the coronavirus on environmental surfaces and the air temperature of survival. Accordingly, the virus

remains more on surfaces at 40 ° C compared to 20 ° C; at 20 ° C compared to 4 °C. (21) Average temperature, minimum temperature and air quality are significantly related to the COVID-19 pandemic. (22) Determined that at a relative humidity of 50%, droplets with an initial radius greater than about 50 µm quickly fall to the ground, while smaller, potentially virus-containing droplets shrink in size due to evaporation of water and remain in the air for minutes. (23) Found that in the Gulf States of the Middle East region, the correlation coefficient between temperature and daily cases is related to the increase in daily cases and deaths due to COVID-19.

EMPIRICAL ANALYSIS

Data and Methodology: This research comprises the United States. The relationship between Coal Industry CO2 (CCO), Natural Gas Industry CO2 (NCO), Power Industry CO2 (ECO), Petroleum Industry CO2 (OCO) and Covid-19 cases (COV) variables is discussed. Monthly data for the period between 2019 and 2021 were used. The data were compiled from World Health Organization and Our World in Data web resources. The ARDL Bound Test model and, for this purpose, Eviews-12 program were used for the analyses. The model we use in this study is as follows.

$$ln(COV_t) = \mu_1 + \mu_2 \ln(CCO_t) + \mu_3 ln(NCO_t) + \mu_3 ln(ECO_t) + \mu_3 ln(OCO_t) + \varepsilon_t \quad (1)$$

For time series analysis to be performed, the series must first be stationary. For this purpose, unit root test was performed. Econometrically significant relationships should be found between the variables. For this purpose, it is necessary to ensure the stasis condition of the series. The Augmented Dicky-Fuller (ADF) unit root test is the most commonly applied test. However, (24,25,26) have shown that the ADF test fails if there are structural breaks in the data set. Therefore, in addition to the ADF test, Philips-Perron (PP) test was also used in this study (27). The series were stabilized using both ADF and PP unit tests. For stationary testing, a non-trendy model analysis was performed (28).

$$\Delta y_t = \mu + \delta y_{t-1} + \sum_{j=1}^{p} \delta_i \Delta y_{t-j} + \varepsilon_t \quad (2)$$

When PP models do not have a delayed value of the dependent variable, the equation is set as follows;

$$\Delta y_t = \varphi y_{t-1} + \varepsilon_t{}^s \quad (3)$$

After the unit root test is performed, the ARDL boundary test is performed. ARDL consists of two stages in the boundary test approach (29). Firstly, the cointegration relationship between the variables included in the model is investigated by the uncontrolled error correction model (DECM). If a cointegration relationship is found between the variables, the second stage begins. The short-term and long-term coefficients of the model are estimated (30). In the ARDL approach, the variables must be fixed at a first-order maximum. Covid-19 cases were determined as a dependent variable. Coal Industry CO2 (CCO), Natural Gas Industry CO2 (NCO), Energy Industry CO2 (ECO) and Oil Industry CO2 (OCO) were determined as independent variables. The logarithm of the variables was taken. The reason for this is to bring the multiplication-shaped data to the way it is collected, in fact, to the linear format (31).

RESULT

Unit Root Tests: As shown in Table 1, the NCO and OCO series level and the first difference of the COV, CCO and ECO series was stable. That is, NCO and OCO series are I (0), and the COV, CCO and ECO series are I (1).

Table 1. Results of ADF and PP Unit Root Tests

Variables	ADF Test		PP Test	
	Level	First Difference	Level	First Difference
COV		-3.922217		-3.041442
CCO		-6.564742		-6.611678
NCO	-3.139925		-3,237754	
ECO		-3.267364		-3.117984
OCO	-3.496057		-3.524323	

Cointegration Test: First, it is investigated whether there is a cointegration relationship. For this; an unrestricted error correction model (UECM) is created. This model is adapted to our study as follows;

$$\Delta lnCOV_t = \mu_0 + \mu_1 t + \sum_{i=1}^{m} \mu_{2i} \Delta lnCOV_{t-i} + \sum_{i=0}^{m} \mu_{3i} \Delta lnCCO_{t-i} + \sum_{i=0}^{m} \mu_{4i} \Delta ECO_{t-i} + \sum_{i=0}^{m} \mu_{5i} \Delta NCO_{t-i} \sum_{i=0}^{m} \mu_{6i} \Delta OCO_{t-i} + \varepsilon_t \quad (4)$$

After the cointegration relationship is determined between the series, ARDL models are established to determine the long-term and short-term relationships. First, the number of delays is determined. In the UECM model, t refers to the time, m refers to the number of delays. Critical values such as Akaike, Schwarz and Hannan-Quinn are used to determine the number of delays. The lag length that provides the smallest critical value is determined as the lag length of the model. The VAR model has been instituted to find the delay length. It was found to be 2. Then, has been investigated whether there was an autocorrelation problem in the model. For this, LM test was performed. According to the test results, there were no autocorrelation problems. After determining the number of delays, the cointegration relationship between the series has been examined with the boundary test approach.

Table 2. ARDL (1,1,0,1,2) Boundary Test Results

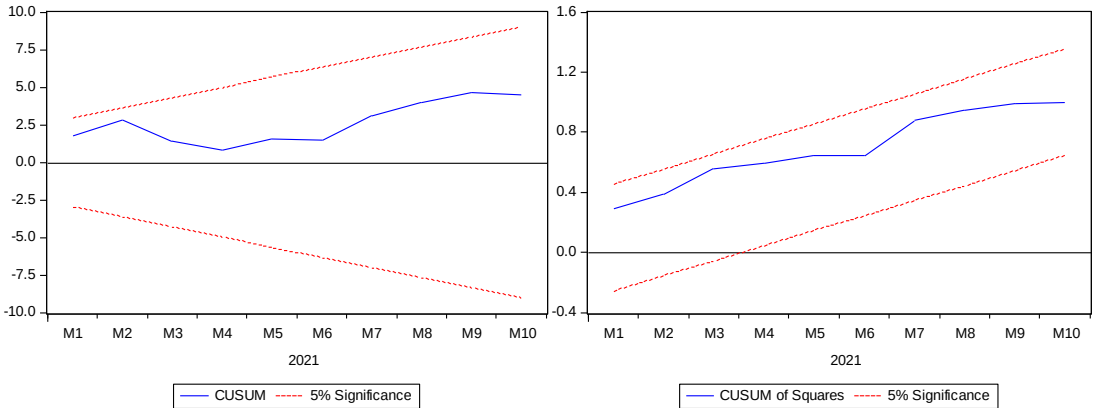
F Statistic	%5 critical values at significance level	
	Lower Limit	Upper Limit
20.30664	2.56	3.49

It belongs to critical values (32). As can be seen from the Table 2, the calculated F statistic exceeds the upper critical value. The existence of a cointegration relationship between the series is determined. Since a cointegration relationship was detected between the series, the ARDL model can be established to determine long-term and short-term relationships. Long-term coefficients of the independent variables can be calculated from this model after estimating the long-term ARDL model. The long-term estimation coefficients calculated within the framework of the long-term ARDL(1,1,0,1,2) model are shown in Table 3.

Table 3. ARDL(1,1,0,1,2) Diognastic Test Results

Test	Statistic	Prob.*
Breusch-Godfrey Autocorrelation	0.478703	0.6363
Breusch-Pagan-Godfrey Varying Variance	0.481885	0.8565
Ramsey RESET	3.249123	0.0927
Jarque-Bera Normality	3.642454	0.1618
Cusum	stable	
Cusumq	stable	

According to Table 3, there is no problem of varying variance, autocorrelation and specification in the model, and the error term is distributed normally. Cusum Test has been performed to test the accuracy of our model. If the Cusum and Cusumsq statistics are within critical limits (between two lines) at a 5% significance level, it signifies that the coefficients in the ARDL model are stable. H0 hypothesis is accepted (33). However, if the Cusum graphs are out of bounds, the H0 hypothesis is rejected. When Cusum and Cusumsq graphs are examined, it can be seen that there is no structural break of the series used in the analysis. According to this; Long-term coefficients calculated according to ARDL Limit Test are stable. Therefore, no artificial variables were used in the model.



Graph 1. CUSUM and CUSUMSQ tests for Parameter Stability

Long Term Relationship: The Wald test is used to test the existence of a long-term relationship between variables. The hypotheses of this test are as follows (34);

$$H_0 : \delta_1 = \delta_2 = \delta_3 = 0 \quad (5)$$

$$H_0 : \delta_1 \neq \delta_2 \neq \delta_3 \neq 0 \quad (6)$$

Long-term coefficients of the independent variables can be calculated from this model after estimating the long-term ARDL model (35). Long-term estimation coefficients calculated within the framework of long-term model are shown in Table 4.

Table 4. ARDL (1,1,0,1,2) Long-Run Coefficients

Variables	Dependent Variable: COV-19		
	Coefficient	**t-statistics**	**Probability**
CCO	1.030394	1.784897	0.0046
NCO	0.267990	0.067972	0.0028
ECO	0.069104	0.716937	0.0489
OCO	0.619996	1.825734	0.0476

From the coefficients in the table, we can determine which disease is most affected by Cov-19. Accordingly, the coefficient signs of all variables are variable since they are positive. We can say that variables have a positive effect on Cov-19 cases. Accordingly, a 1% change in CCO leads to a 1.03% change in COV cases. A 1% change in ECO leads to a 0.26% change in cases of COV. A 1% change in the NCO leads to a 0.069% change in cases of COV. We can say that a 1% change in OCO leads to a 0.61% change in COV cases.

Short Term Relationship: An error correction model based on ARDL is used to determine the short-term relationships between variables. Therefore, number (7) has been estimated. In the equality, $UECM\ t{-}1$ is the error correction term.

$$\Delta COV_t = c_0 + c_1 ECM_{t-1} + \sum_{i=1}^{m} c_{2i}\, \Delta CCO_{t-i} + \sum_{i=0}^{n} c_{3i}\, \Delta NCO_{t-i} + \sum_{i=0}^{p} c_{4i}\, \Delta ECO_{t-i} + \sum_{i=0}^{n} c_{3i}\, \Delta OCO_{t-i}\, \varepsilon_i \quad (7)$$

ADF probabilit value = 0.005 < 0.05 (small): H0 rejection, H1 accepted. (Phillips-Perron test statistic) Probability value = 0.0000 < 0.05 (small): H0 rejection, H1 Accepted. In this case, error terms are stationary.

Table 5. ARDL Cointegrating and Short-Term Relationship

	Coefficient	**Std. Error**	**t-Statistic**	**Prob.**
ECM (-1)	-1.015416	0.075111	1.633794	0.0000
dCCO	0.285947	0.175020	1.633794	0.0333
dNCO	-0.138071	0.070154	-1.968119	0.0474
dOCO	0.118215	0.128588	0.919329	0.0096
dECO(-1)	-0.638517	0.151250	-4.221609	0.0018

Here, the notation of the error correction coefficient should be minus, and the probability value should be significant. It is possible to see in the table that this condition is met. If there is a long-term deviation between the variables, the deviation finds the equilibrium again by 77% in the next period.

DISCUSSION

The United States is one of the countries that contributes the most to the formation of the greenhouse effect through global CO2 emissions. (36). This study identified greenhouse gases in the atmosphere as one of the main causes of the Covid-19 transmission rate. Thus, the goal was to determine which fossil fuels used in industrial production (Corporate Carbon Footprint) contributed the most to Covid-19 transmission.

Industrial production is noticeably more advanced in developed countries than in developing countries (37). For this reason, it has been emphasized that developed countries, especially those with a high use of fossil fuels in production, contribute more to the formation of greenhouse gases on a global scale and cause an increase in Covid-19 cases.

Based on this fact, a comparative analysis has been conducted between the Corporate Carbon Footprint and COVID-19 cases in the US, where industrial production is widespread. The findings revealed that the increase in fossil fuels used in industries during the relevant period adversely affected air quality and Covid-19 cases. If these data are linked to energy sources used in industries (fossil fuels), they will help to shape public policies the use of a new generation of energy sources in future production. It shows that fossil energy sources such as coal, oil, electricity and natural gas which are often used in industries play an important role in the increase of Covid-19 cases. Among these energy sources, coal is the one that causes the most damage.

Our findings are supported by some studies in the literature suggesting that coal causes the most air pollution among fossil fuels. In this context, the Energy and Clean Air Research Center (CREA), an independent research organization on the causes of air pollution and its effects on health, conducted a European study in 2021. According to this study. A %10 reduction in the level of particulate matter pollution has prevented an average of 11.000 deaths due to air pollution. The 37% decline in coal-fired electricity production had a significant impact on the emergence of this effect. In this study, coal has been shown to be the primary cause of NO2

pollution and particulate matter pollution in Europe (38). (39) Suggested that 60 percent of the deaths associated with coal-fired power plants in India could be attributed to direct emissions of emitted particulate matter. (40) Found that coal has the biggest percentage of air-polluting fossil fuels in China, and that the N2O emissions in question have significantly increased coronavirus cases. (41) Suggested that fossil fuels caused the greatest damage to the environment in this epidemic, and that coal was the fossil fuel that contributed the most to this damage. (42) Demonstrated that the main hypotheses about the mechanism by which fine particles induce pulmonary inflammation are related to the chemical properties of particles, such as acidity and transition metal ions, as well as the physical properties of ultrafine particulate matter. It has been stated that coal dust is one of the substances that has the most effect on the formation of these particles. (43) Showed that coal produces large amounts of air pollutants, including CO, SO, NOx, particulate matter (PM), and heavy metals during the combustion process.

Coal is followed by oil, electricity and natural gas, respectively. Accordingly, a 1% change in the US economy due to coal use in production leads to a 1.03% change in Covid-19 cases. Similarly, the effect of oil on Covid-19 cases is 0.61%. Industries that use electric energy based on fossil fuels in their production have a 0.26 percent impact on COVID-19 cases. It has been proved that the fossil fuel energy source with the least impact on COVID-19 cases, with a change of 0.069%, is natural gas. This result is supported by studies that identify natural gas as an environmentally friendly energy source among fossil fuels (44 ,45, 46). Unlike other sectors, the health sector has been hit the worst by the increase in Covid-19 cases. The sector's increased workload largely prohibits health professionals from being efficient in their professions, while a lack of adequate equipment or the usage of this equipment only for COVID-19 treatments also causes interruptions in the treatment processes of other diseases. In such a situation, the increase in the number of cases will collapse the health system, as it did in Italy, which was caught off guard in terms of medical equipment and labour when the epidemic struck (47). However, in countries like Germany, which have better health and management systems, the rise in the number of cases will be followed by an isolation and slowdown strategy to prevent the virus from spreading in the long term (48).

CONCLUSION

It is a well-known fact that increased greenhouse gas emissions in the atmosphere play an important role in spreading various diseases, especially COVID-19 (49, 50). The impact of poor air quality on Covid-19 morbidity and mortality will cause a considerable and unexpected additional cost (51).

Under certain conditions, mainly through so-called droplet "aerosol-forming procedures" (1), the COVID-19 virus can become an aerosol. Aerosols are droplet particles smaller than 5 micrometres that can hang in the air, especially in environments with poor air quality (52). In medical facilities where people are being treated for COVID-19, there is an increased risk of infection during medical procedures called aerosol-producing procedures. Therefore, health workers who perform these procedures or are present in the environments where they are performed should take special air protection measures, including the use of appropriate personal protective equipment such as respirators (53).

Policymakers need to conduct results-oriented studies to determine whether COVID-19 cases are related to greenhouse gas emissions generated in the atmosphere. The ecological and economic consequences of using fossil fuels in production and choosing new generation energy sources should be compared and measures should be taken accordingly.

In addition, high tax policies can be applied to reduce the use of fossil fuels in industrial production. Incentive policies such as the possibility of long and low-interest loans, tax exemption, land allocation and reducing bureaucratic activities at the installation stage should be established to encourage the use of renewable energy sources.

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REVIEW

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Equal Access to Vaccines within the Scope of the Health Policies Carried out in the COVID 19 Pandemic: A Financing Proposal

ABSTRACT

The COVID-19 virus, which caused a global pandemic in 2020, caused 248 million people to get sick and 5 million people to die in the last quarter of 2021. It has been stated that the way out of the global pandemic is to vaccinate 70% of the world's population, but vaccination levels have remained very low, especially in low and middle-income countries. $50 billion in funding to enable low- and middle-income countries (LMIC) access to the COVID-19vaccine and to accelerate vaccination, and rich countries' reluctance to share vaccines. Increasing the vaccine supply will provide an important solution in ensuring equal access to the vaccine. R&D investment expenditures in healthcare and biotechnology are expected to have an impact on increasing the supply of high-tech vaccines. In the process from the development of the vaccine to its production, biotechnology companies may encounter financing problems. In this context, venture capital may be a solution to the solution of the financing problem and to increase the vaccine supply. In this context, the global increase in venture capital investments, which is an important method of financing innovation, and the direct support of the public to companies producing vaccine technologies, either alone or through public-private partnerships, will make a significant contribution to increasing the vaccine supply, which is a major problem in accessing COVID-19 vaccines. In this context, ıt can be suggested that the state provides investment, screening and advice (guidance) services in the field of innovation by funding companies directly as venture capitalists or through public-private partnerships.

Keywords: Health Policy, COVID-19, Health Sector, Vaccination, R&D, Venture Capital.

COVID 19 Pandemisinde Yürütülen Sağlık Politikaları Kapsamında Aşıya Eşit Erişim: Bir Finansman Önerisi

ÖZET

2020 yılında küresel pandemiye neden olan COVID-19 virüsü 2021 yılının son çeyreğinde 248 milyon kişinin hastalığa yakalanmasına ve 5 milyon kişinin ise hayatına kaybetmesine neden olmuştur. Küresel pandemiden çıkışın yolu ise dünya nüfusunun %70'nin aşılanması olarak açıklanmış fakat özellikle düşük ve orta gelirli ülkelerde (LMIC) aşılanma düzeyleri çok düşük oranlarda kalmıştır. COVID-19 aşısına erişimlerinin sağlanması ve aşılamanın hızlandırılmasında için 50 milyar Dolarlık finansmana ihtiyaç duyması ve zengin ülkelerin aşı paylaşımında istekli davranmamaları, aşılamada finansman sorunun boyutunu arttırmaktadır. Aşıya eşit erişimin sağlanmasında ise aşı arzını arttırılması önemli bir çözüm sağlayabilecektir. İleri teknoloji ürünü olan aşı arzının arttırılmasında sağlık hizmetleri ve bioteknoloji alanındaki Ar-Ge yatırım harcamalarının etkileri olması beklenir. Aşının geliştirilmesinden, üretimine kadar olan süreçte bioteknoloji firmaları finansman sorunu ile karşılaşabilmektedir. Bu kapsamda girişim sermaye söz konusu finansman sorunu çözümü ve aşı arzının arttırılmasında bir çözüm olabilecektir. Bu kapsamda yeniliğin finansmanında önemli bir yöntem olan girişim sermeye yatırımlarının küresel ölçekte artması ve kamunun gerek tek başına gerek kamu özel ortaklılıkları ile aşı teknolojileri üreten şirketlere doğrudan destek sağlamsı COVID-19 aşılarına erişimde büyük bir sorun olan aşı arzının arttırılmasında önemli bir katkı sağlayabilecektir. Bu kapsamda devletin doğrudan girişim sermayedar olarak firmaları fonlaması yada kamu-özel sektör ortaklığı aracılığı ile yenilik alanında yatırım, tarama ve tavsiye (yönlendirme) hizmetini vermesi önerilebilir.

Anahtar Kelimeler: Sağlık Politikası, COVID-19, Aşılama, Sağlık Sektörü, Ar&Ge, Girişim Sermaye

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INTRODUCTION

The COVID-19 virus emerged in the last quarter of 2019 and spread all over the world in a short time (1). The World Health Organization (WHO) declared a global "pandemic" (a widespread epidemic that threatens many geographies) on March 11, 2020. During the pandemic, which is described as a crisis period, the most important weight in the fight against the epidemic was in the field of health policy implementation. Although the timing, scope and effect of the measures taken within the scope of health policies differ between countries, the health policies implemented during the pandemic process included similar precautions and measures. Despite these measures, the number of cases and deaths has increased. It has been explained that vaccination studies are the main element to prevent the disease from being a danger to humanity. In this context, 0n April 26, 2021, WHO Director-General Dr. Tedros Adhanom Ghebreyesus explained in his statement on the subject that the containment of the COVID-19 epidemic will be possible when fair access to vaccines is guaranteed for all countries and strong systems for distribution are established (2). In this context, the vaccine is the most effective weapon in the fight against the epidemic during the current pandemic period. On the other hand, it is included in the scope of primary protection to improve health at the personal or social level. Kaul and Medoza defined the fight against epidemics as a global public good (3). In addition, the United Nations has counted primary health care and the fight against communicable diseases as the ten main global public goods in the millennium. In this context, the nature of COVID-19 Vaccines as a global public good is discussed. At this point, the most important problem is international harmony in the production and supply of global public goods, in other words, the problem of financing, as in all global goods.

Overview of Health Policy Practices During The Covid 19 Pandemic: Pandemic periods require different policy implementations in times of crisis. Policymaking in times of crisis is different from a policy in ordinary times. This situation is also valid for health policies (4). For example, during the COVID-19 pandemic process, the role of the state has increased in the effective delivery of public services, especially in the health sector, in the introduction and control of mobility restrictions, in solving supply and production problems caused by the measures, in the implementation of social aid and incentive policies, and health policies(5). The number of cases and deaths is increasing around the world and the death rates due to COVID-19 vary greatly between countries (6). The process has shown that there are significant problems even in developed economies and health systems (7). It has been revealed how vulnerable public health systems are, and it has been determined that the system is more resistant to the pandemic in countries where critical health system elements are largely in public ownership (8). In this context, although the timing and scope of the measures to be taken in the fight against the pandemic differ in terms of health systems between countries, the health policy measures implemented can be summarized under four main groups. In the first group, there is compulsory use of masks, social distance rule, increasing test capacity, and establishment of a tracking system, which are applied to slow the spread of the epidemic. In the second group, there are measures such as restriction of domestic and international travel and cancellation of social activities. In the third group, there are measures such as the temporary closure of schools and workplaces and curfews, which put countries under economic pressure. Finally, there are "special" measures for the health system that countries take to maintain and improve the capacity of their health systems (9).

Although the policies followed by the countries in the fight against the epidemic are similar, countries interpret and implement these policies in their way. Despite the measures taken by countries in these four main areas, the number of cases and deaths has increased. Vaccination studies are of great importance to prevent the disease from being a danger to humanity For this reason, it becomes a necessity to increase drug, treatment method, vaccine and cost studies in this field (10).

Within the scope of these determinations, in solving the problem, COVAX, the vaccine pillar of the ACT Accelerator Initiative; Gavi and the Association for Epidemic Preparedness Innovations (CEPI) and WHO are working together. The initiative aims to accelerate the development and production of COVID-19 vaccines and ensure fair and equal access to the vaccine for every country in the world. The UN-supported COVAX initiative aimed to deliver 2 billion COVID-19 vaccines to a quarter of the world's poorest populations by the end of 2021, but as of October 2021, only 3.1% of the population in low-income countries had received a single dose (see Figure 1).

Despite the warning that the COVID-19 epidemic will not end completely if the inequality in vaccine distribution in the world is not eliminated, the important problems facing the COVAX initiative can be summarized as follows: Increasing vaccine nationalism as many countries impose export controls on vaccines as part of tightening export controls, need for more financial support for vaccination in poor countries, the fact that the COVAX initiative needs $50 billion in funding to enable low- and middle-income countries (LMIC) access to the COVID-19 vaccine and to accelerate vaccination, and rich countries' reluctance to share vaccines. These increase the severity of the financing problem in vaccination (2).

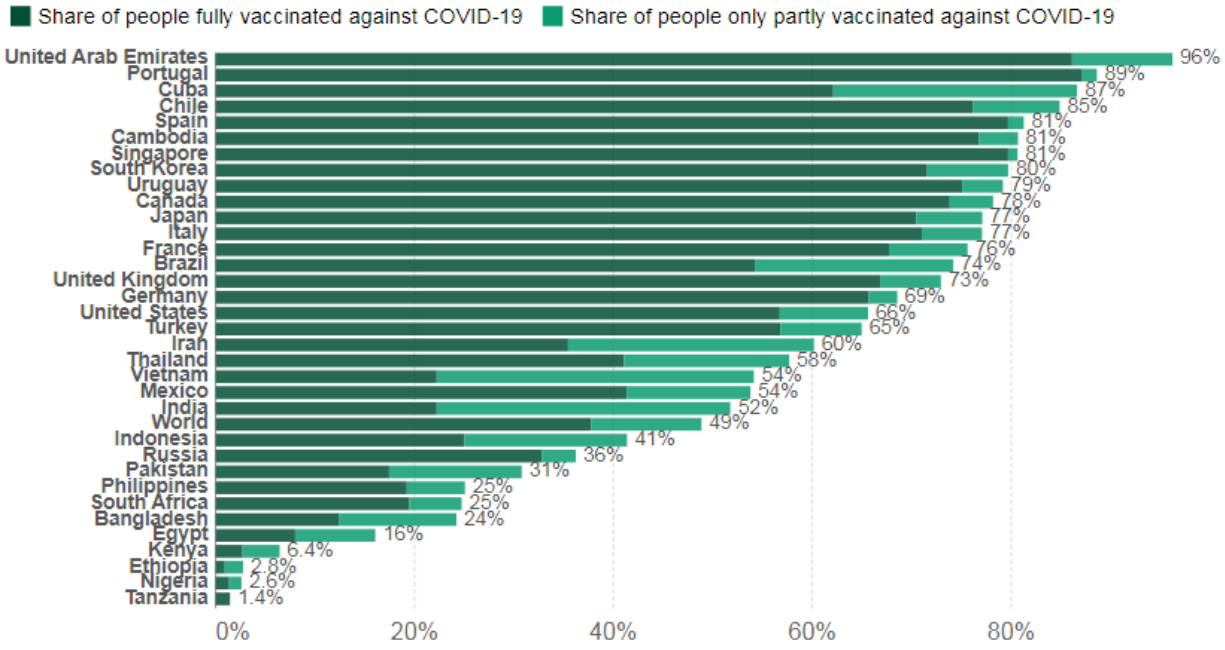

Figure 1. Vaccination rates against COVID-19; Source: (11)

In this context, the main recommendation for the COVAX initiative to reach its goals, to solve the supply problem in COVID-19 vaccines and to ensure equal access to the vaccine, was the proposal to abolish the intellectual property right to increase the production capacity of the vaccines developed against the coronavirus. Within the scope of the discussions on the Trade-Related Intellectual Property Agreement (TRIPS), the proposal, which faced resistance from the companies producing the vaccine, was inconclusive. Thus, equal access to vaccines has been interrupted in the global epidemic.

The development of vaccines and drugs, which are advanced technology products based on knowledge with high added value, is a commercial competitive economic activity carried out by the private sector in the world, mostly with its resources. New drugs and vaccines come under the protection of intellectual property rights for a limited time following the first application, while the manufacturer becomes a monopoly. In this way, the company that develops the drug is allowed to cover the cost of development and make a profit. However, unlike other fields of economic activity, health cannot be substituted. Vaccination programs, which are of great importance in the protection of public health, are included in the basic health policies of countries, and with this nature, it is necessary to establish a balance between commercial gain on the one hand and social benefit on the other(12).

In this context, while protecting the existing Intellectual property rights on COVID-19 vaccines, increasing the number of companies, organizations, institutions and even countries that produce vaccines is one of the main recommendations for increasing the supply capacity to ensure equal access to the vaccine. As with other innovative products, the vaccine includes a process whose input is a creative idea, followed by R&D and an output patent. In this context, R&D input in health services and biotechnology are expected to have effects on the patent output of COVID-19 vaccines. This situation makes it necessary to increase R&D investments in solving the supply problem in COVID-1919 vaccines. This requirement raises the issue of financing investments.

In the light of this information, the purpose of this study is to investigate the venture capital, which can be a solution to the financing problem in ensuring equal access to the COVID 19 vaccines, which is the main element of the fight against the pandemic.

The Relationship Between Increasing The Supply of Advanced Technology Product Vaccine and R&D: It has also been confirmed by many empirical studies that R&D expenditures contribute positively to patent applications, which were first used by Griliches (13) as an indicator of innovation (14,15). The increase in R&D expenditures (along with other changes) has brought with it the increase in patent applications, which is an output of the innovation process.

Table 1. Country breakdown of R&D expenditures

	R&D SPENDİNG					
	2020			2021		
	GDP PPP Bil. Dolar	R&D As %of GDP	GERD PPP Bil Dolar	GDP PPP Bil. Dolar	R&D As %of GDP	GERD PPP Bil. Dolar
China	29,010.7	1.98%	574.4	31,389.6	1.98%	621.5
United States	20,145.1	2.88	580.2	2789.7	2.88	598.7
Japan	5,174.2	3.5	181.1	5,210.4	2.84	182.36
Germany	4,283.5	2.84	121.65	4,408.5	2.84	127.25
India	9,991.1	0.86	85.92	0,870.3	0.86	93.48
South Korea	2,002.6	4.35	87.11	2,102.7	4.35	91.47
France	2,864.7	2.25	64.46	2,979.3	2.25	67.03
Russia	3,927.7	1.50	58.92	4,037.7	1.50	60.57
United Kingdom	2,876.7	1.73	49.77	2,983.1	1.73	51.61
Brazil	3,199.3	1.16	37.11	3,288.9	1.16	38.15

Source : (16) GERD- Gross Expenditure on research and development, Trillions of U.S. dollars, GDP- Gross Domestic, Trillions of U.S. dollars

The pandemic in the world has brought economic, social and political changes, and the need for innovation has arisen in all sectors and fields in the face of changing and diversifying needs. A reflection of this need has also manifested itself in the field of R&D. During the pandemic process, total R&D expenditures increased by 6.21% in 2020 compared to 2019, and it is estimated that it will increase by 10.5% in 2021. In the pandemic, the economic, social and political change and the increase in R&D investment expenditures in 2020 and 2021 differ, especially based on sectors and countries. (See Table 1). According to OECD Main Science and Technology Indicators, health sector R&D expenditures, which include vaccine and drug manufacturers, increased by 20% in 2019, when the COVID-19 pandemic began (17). As can be seen in Figure 2, the largest share of R&D expenditures was in the field of software computer services, technology hardware and electronic equipment in 2019-2020, while the second-largest share was in the field of Pharmaceuticals and biotechnology.

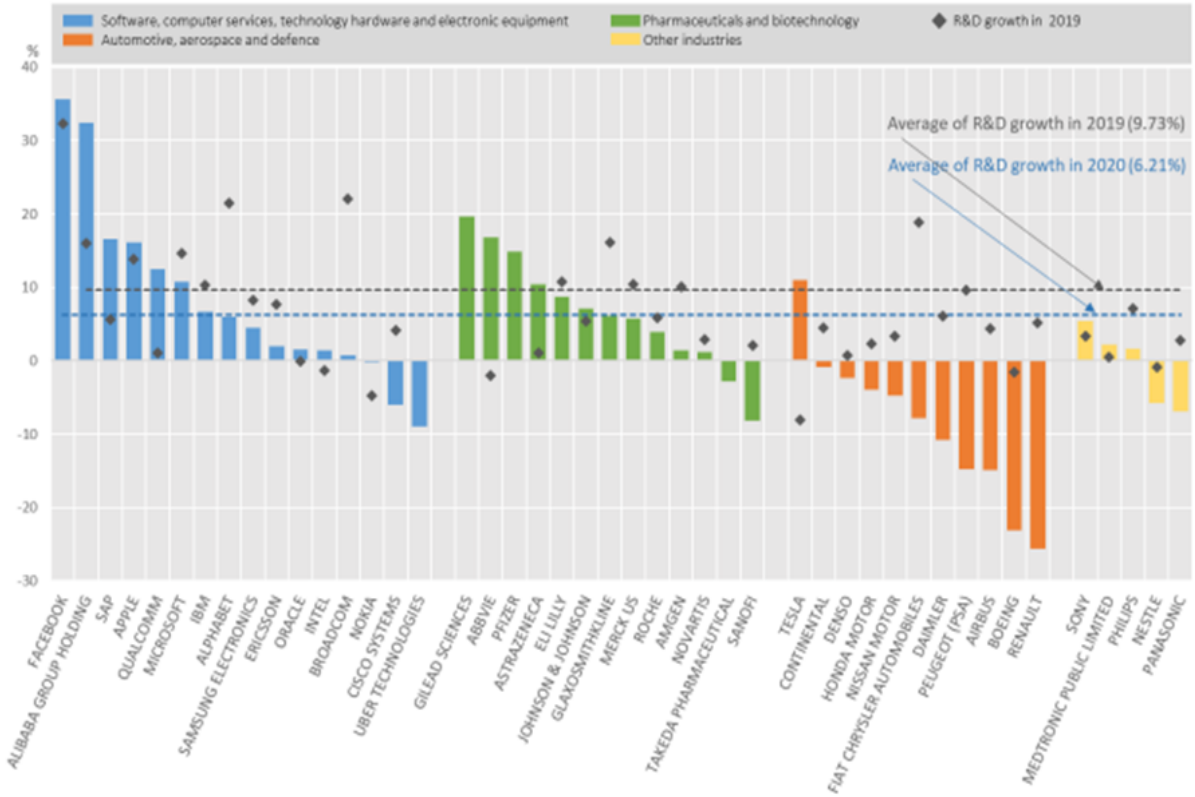

Figure 2. Reported nominal R&D expense growth in selected top R&D companies, 2020; Source: (17)

The urgent need to develop medical technologies to combat the COVID-19 pandemic has brought about an increase in R&D expenditures. On the other hand, according to the World Health Organization COVID-19 research and innovation report, the fight against the pandemic has brought together different institutions and organizations for research on a global scale, within the scope of global cooperation (18).(See Figure 3).

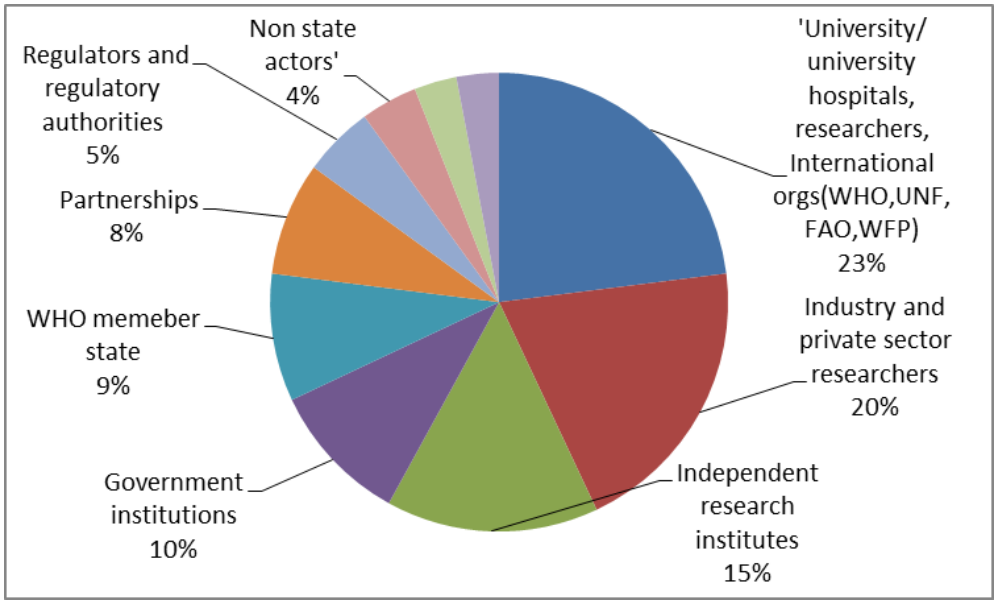

Figure 3. COVID-19 research and innovation collaboration; Source: (18)

Universities, the private sector, independent research institutes, and the public sector have undertaken an important share in the fight against the pandemic within the scope of this cooperation. In this context, it has revealed some differences with the traditional vaccine development process, such as the unprecedented speed and level of participation of the public sector at national and supranational levels.

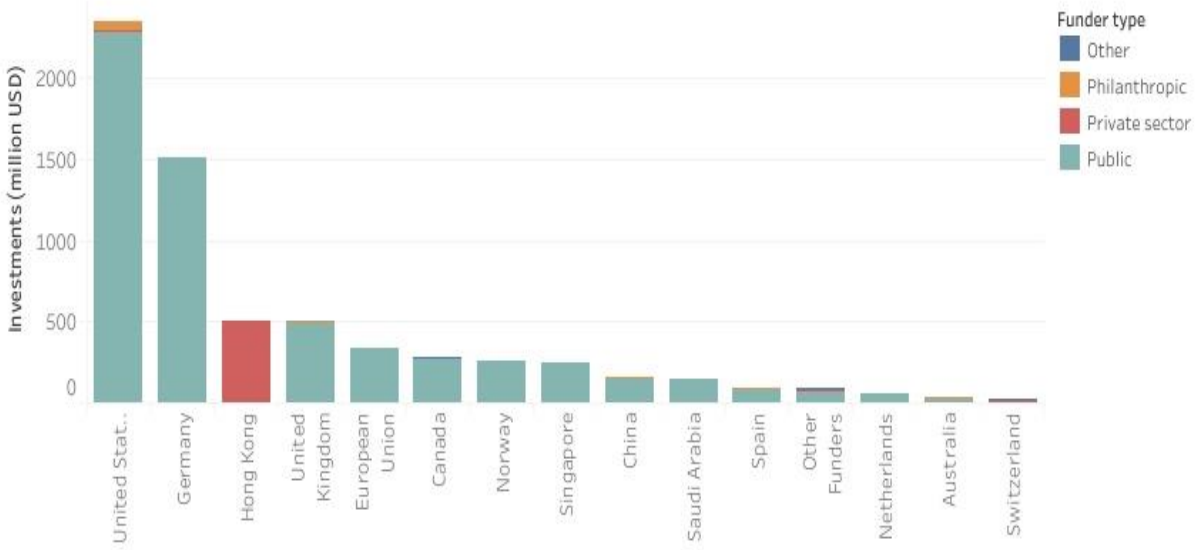

Figure 4. Source of COVID-19 vaccine R&D investments, by source country and funder type; Source: (19)

As can be seen in Figure 4, R&D expenditure levels of the public for the development of COVID-19 vaccines are observed based on different countries. The high social benefits and positive externalities of these expenditures are behind the significant share of the public's R&D expenditures for the development of COVID-19 vaccines. In the presence of positive externalities, public intervention is needed to produce the service at an effective output level, since the private sector produces without considering the social benefit. The lack of equal access to the COVID-19 vaccine confirms the theoretical assumption in practice. In this context, as seen in Figure 4, the US and Germany are by far the largest investors in public sector vaccine R&D, followed by a relatively small number of high-income countries and China. Public financing has a share of 90.69% with 6.6 billion USD in COVID-19 vaccine R&D investments.

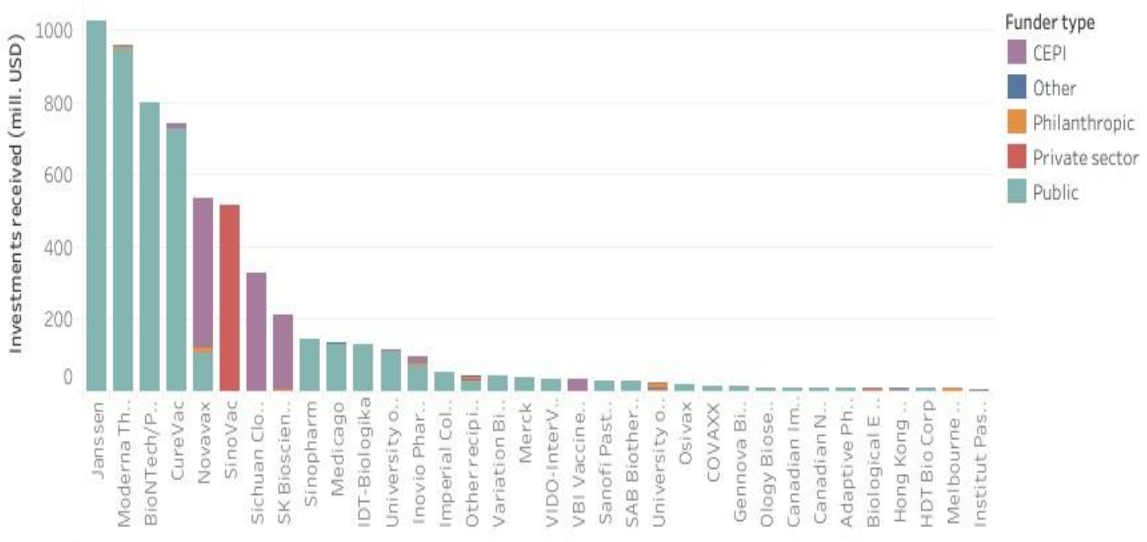

Figure 5. Main recipients of COVID-19 vaccine R&D investments, by funder type; Source: (19)

Looking at the direct investments made in R&D practitioners, it is seen that both European and US public institutions primarily invest in pharmaceutical companies from their own regions/countries (19). Vaccine development, typically by private companies, is financed either by large life-sciences firms themselves or through corporate partnerships. Public funding can be sought for expensive clinical trial phases that arise in the process. In the US, while public partnerships are directed through the Biomedical Advanced Research and Development Authority (20), EU-level funding is directed through the Innovative Medicines Initiative (21), a public-private partnership between the EU and the European Federation of Pharmaceutical Industries and Associations. (EFPIA). During the COVID-19 pandemic, the public sector and CEPI have invested more than $5.6 in the development of COVID-19 vaccines. 95% of investments in the development of COVID-19 vaccines have been made by research institutions and pharmaceutical companies. The companies that received the largest share from public R&D investments were Janssen, Moderna, Biontech and CureVac. These 4 big pharmaceutical companies have the largest share in world vaccine production and distribution with the different vaccine technologies they have developed as a result of significant R&D expenditures (see Figure 5). Despite the increase in R&D budgets and inter-agency cooperation, the COVID-19 vaccine supply has not reached the desired level today. Therefore, different approaches are needed in financing the research and innovation process, which is the basis of vaccine development. Despite the increase in R&D expenditures in the health sector in 2020-2021, the increase in expenditures remained below the need due to the fact that these expenditures are sunk costs, apart from the high social benefits and positive externality they contain. Sunk costs represent expenditures that cannot be recovered if the firm exits the market or terminates its activities (22). According to Stiglitz (23), most expenditures on R&D are sunk costs in nature. For this reason, R&D expenditures made in the field of biotechnology, by nature, remain below the social efficiency level, and diversity and increase in vaccine supply cannot be achieved. As a matter of fact, in May 2021, WHO announced that only low and middle-income countries (LMIC) needed $50 billion in financing to ensure access to the COVID-19 vaccine and to accelerate vaccination, (24), which shows that much larger budgets are needed for vaccine access globally.

In this context, venture capital can be both a public and market solution in financing the increase in vaccine supply, which is the main obstacle to equal access to vaccines globally.

Venture Capital in Financing Covid-19 Vaccines: In the mid-1940s, venture capital emerged in the USA as a form of investment financing that allows dynamic, creative, but financially incapable entrepreneurs to realize their investment ideas. The financing needs of companies that want to first invent products, in other words, create them and then put them on the market, are the subject of venture capital financing. Venture capital aims to provide the financing needs of entrepreneurs who have a bright idea and invention that can create a product that is needed in the market or develop an existing product, from the R&D stage to the launch of the product (25). Venture capitalist with surplus funds influences the innovative firm as an economic agent in three ways: 1) Contract (choice) 2) pre-investment screening 3) post-investment control and advice. Selection/Contract, screening and control stages are closely related to each other. With the selection, the venture capitalist will ensure the development of the innovation project that offers the highest profit in the field in which he/she specializes.

At the contract stage, the venture capitalist defines the management rights to determine the control and risks. After this stage, he/she plays a guiding role for the innovative company, with his/her control and advice. Control is especially important in terms of preventing the company from benefiting from the funds provided by venture capital from wasting or misusing the funds obtained. Advice, on the other hand, consists of administrative, as well as strategic and financial suggestions, especially in the stage of providing expert personnel, suppliers, and participants to the company (26). In this context, the most basic feature that distinguishes venture capital from other types of financing is that the venture capitalist not only provides capital to the firm but also directly takes part in the firm's activities (26). Thus, venture capitalists make it possible to finance innovation. In this context, the financing method in question is a method that can offer solutions for the production of vaccines and drugs, which are high value-added information-based advanced technology products. As a matter of fact, as of 2020, venture capital investments have followed an upward trend both in total and in the field of health technologies.

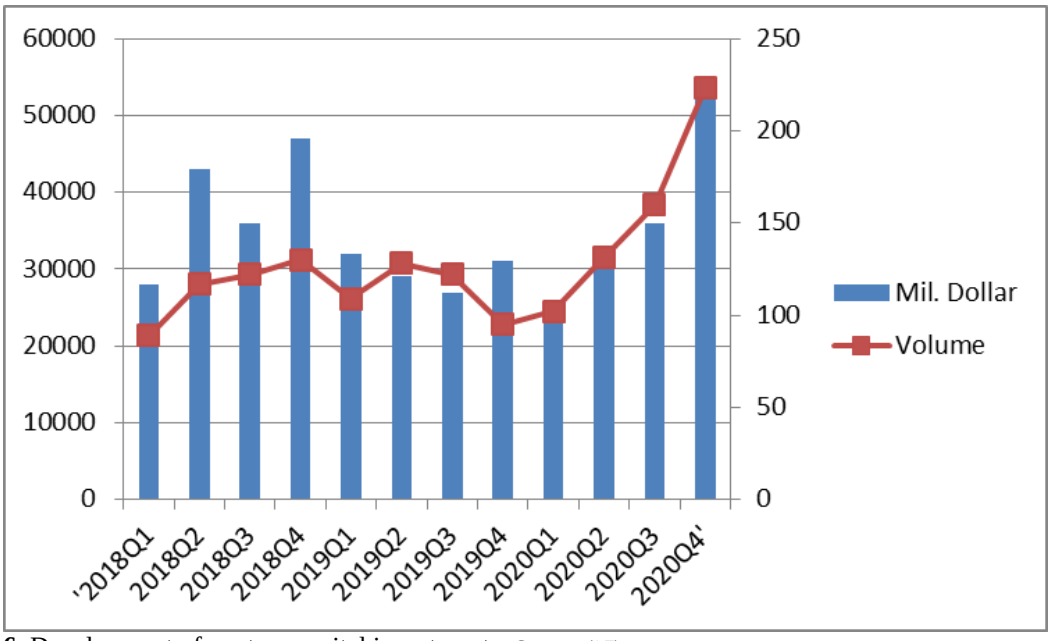

Figure 6. Development of venture capital investments; Source: (27)

As seen in Figure 6, despite the stagnation in the first quarter of 2020 due to the effect of the Pandemic, venture capital (VC) financing rose to a record level in the fourth quarter. In the fourth quarter of 2020, venture capital investments increased by 75.6% compared to the first quarter of the same year and by 52.0% compared to the 4th quarter of 2019.

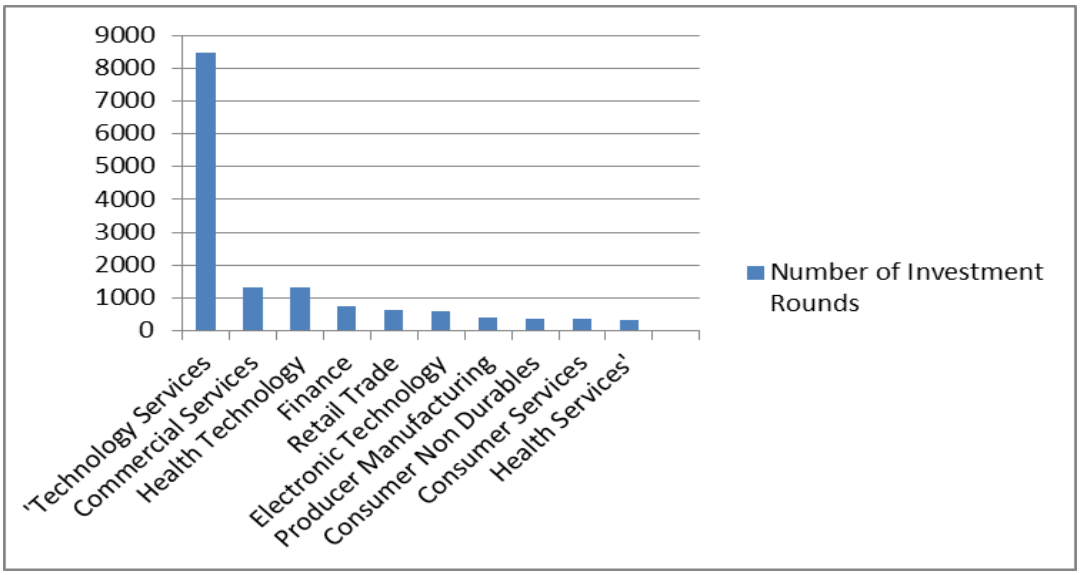

Figure 7. Venture capital investment by sector (2020); Source: (27)

Venture capital can be expressed as a long-term investment made by investors with surplus funds for the formation and operation of small and medium-sized enterprises with high growth potential. (28). In this financing model, which is based on the high return of high risk, the high-profit margin that will be provided in case the risk taken turns into success and the productivity increase resulting from the large sales volume constitute the benefit of the investors who provide financing by partnering with these companies. The high demand for COVID-19 vaccines and the resulting profit margin make this area attractive. In this context, as seen in Figure 7, the third sector with the highest share in venture capital investments in 2020 was health technology.

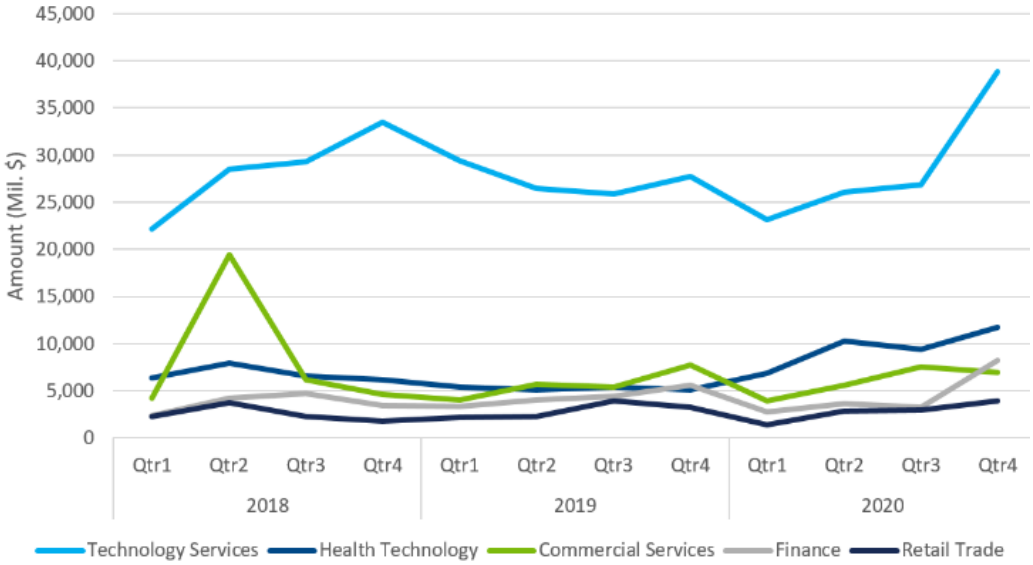

Figure 8. Sector growth; Source: (29)

Specifically, the amount of VC investment in the healthcare technology sector has nearly doubled from $6.2 billion in the fourth quarter of 2018 to $12.4 billion by the end of 2020, as shown in Figure 8. As of November 2020, an investment of 800 million dollars has been made for the production of COVID-19 drugs and treatments. Although venture capital investments in health technologies follow an upward trend, investments in this field lag far behind compared to technology services. Given that German venture capital firm MIG AG was among the early backers of COVID-19 vaccine developer BioNTech, and that Mynvax, a vaccine technology startup, is supported by an investment by venture capital firm Accel, and considering the success of the invested producers in the vaccine process, it is proven that increasing the said financing method in the field of health technologies will yield positive results.

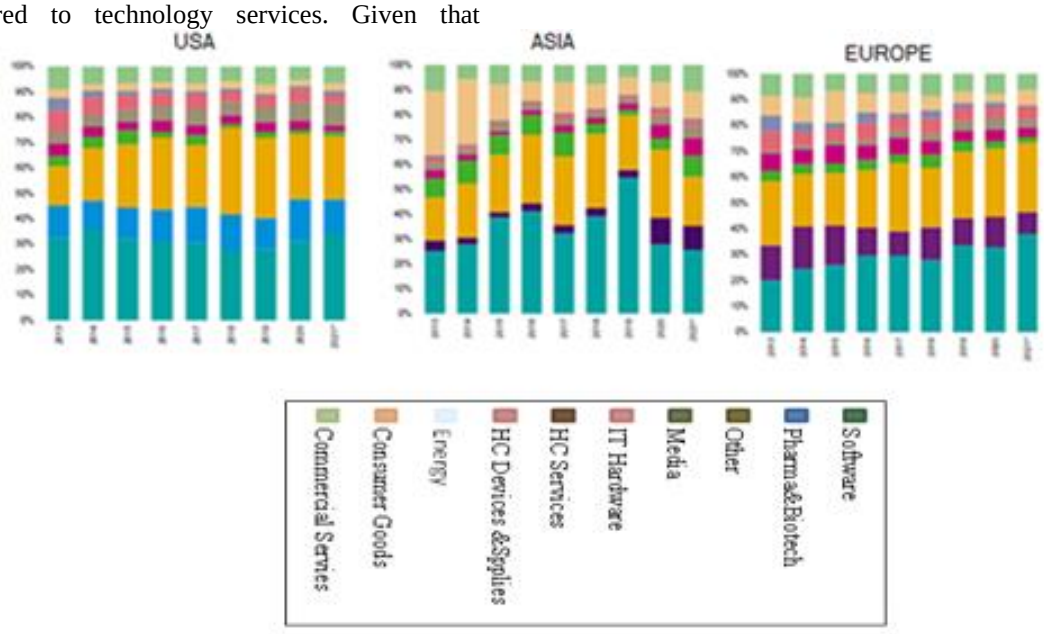

Figure 9. Venture financing of VC-backed companies by sector($B); Source: (29)

Supporting R&D activities and providing the necessary investment with venture capital in ensuring access to vaccines on a global scale may be a solution that will increase the vaccine supply. In this context, venture capital should support especially the biotechnology and pharmaceutical industries on a global scale. Globally, health technologies ranked 3rd in venture capital investments, while investments in biotechnology and pharmaceuticals took a significant share in the USA in 2020 and 2021. Despite the increases in 2020 and 2021 in Asia, where there is a great problem in accessing the vaccine, investments lagged far behind the USA. In Europe, the share of venture capital in the biotechnology and pharmaceutical sectors has decreased over the years, and in 2021 it fell far behind 2014 (See Figure 9). The low level of private-sector venture capital investments in biotechnology and pharmaceuticals raises public intervention in this area as a solution.

In this context, Lerner (30) emphasizes that the government's undertaking of venture capital activities provides an improvement in performance by creating additional scale for the sector, and raises the agenda that the public should support companies that produce innovative technology directly with public venture capital activities. In this context, it can be suggested that the state provides investment, screening and advice (guidance) services in the field of innovation by funding companies directly as venture capitalists or through public-private partnerships. Thus, with the public-private mixed venture capital model, financing will be provided to the innovation area that the private sector refrains from investing due to asymmetric information and capital requirements, and the waste of resources that can be claimed to occur due to public intervention will be prevented, as a result of minimal intervention in the market functioning. With the venture capital investments to be made within the scope of public or public-private partnership in the field of biotechnology and medicine, innovative technologies in the said field will be supported, and a solution to the problem of vaccine supply and equal access to vaccines will be found.

CONCLUSION

After the Spanish Flu epidemic caused by a deadly subtype of the H1N1 virus between 1918 and 1920, the world faced a new global epidemic at the beginning of 2020. As of November 2021, 248 million people worldwide had the disease that caused the epidemic, and 5 million people died due to the disease. The COVID-19 pandemic process has put health management systems into a great struggle in terms of risk and crisis management (31). In a statement made in May 2021, WHO stated that the pandemic can end when a minimum of 70 percent of vaccination is reached (18). Globally, the number of doses made so far has exceeded 6 billion 800 million, including those who have received a second dose of vaccine. However, according to Our World In Data, which compiles vaccine statistics daily, approximately 50 percent of the world's population has received at least one dose of vaccine (11). While one out of every two people in Europe and North America had the opportunity to be vaccinated, this number remained very low in Africa. In this context, UNICEF announced that there is a need for solutions to eliminate the obstacles related to the supply, production and distribution of COVID-19 vaccines worldwide (32). The United Nations (UN) national secretary stated that 11 billion doses of vaccine are needed to end the epidemic and that production should be doubled for equal distribution of the vaccine. Increasing the R&D investments made on vaccines, which is an innovative product, can provide a solution for increasing production (33). For this reason, different approaches are needed in the financing of the research and innovation process, which is the basis of vaccine development. Although R&D investment expenditures increased in the health sector in 2020-2021, this increase lagged behind other sectors. In this context, the global increase in venture capital investments, which is an important method of financing innovation, and the direct support of the public to companies producing vaccine technologies, either alone or through public-private partnerships, will make a significant contribution to increasing the vaccine supply, which is a major problem in accessing COVID-19 vaccines.

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REVIEW

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A Review on e-Government Portal's Services within Hospital Information System during Covid-19 Pandemic

ABSTRACT
The Covid-19 pandemic has initiated an important change that affects all economic and social life, especially in the field of health. First of all, pandemic restrictions have made it necessary to transform living habits. This change appears as digital transformation. Especially, decreases in physical mobility, distance obligations, reorganization of working environments have made the way and process of doing business more digital. At this point, innovative technologies and applications are saviors for information system management. In crisis management, the biggest disadvantages of today are that the world population has increased considerably and the interaction in the global system is high. However, the biggest advantage is that the technological possibilities can be developed in a way that contributes to the isolation. It is possible to manage hospital information management more quickly and effectively with new applications. Covid-19 pandemic has also shown the need of digital transformation in the short term, globally. This study aims to review hospital information system management and to give some sample implications based on e-services of e-Government Portal in Turkey. HIS has been used more effectively during the pandemic process. e-Government was observed as a digital tool accelerating processes such as document inquiry, application and information track in Turkey in the context of hospital information system management. It was observed that e-Government portal accelerated the process for the management of hospital information system in Turkey and e-Government portal provided several e-services for healthcare professionals and citizens during the Covid-19 pandemic.
Keywords: E-Government Portal, Hospital Information System, E-Service, Health Information Management, Covid-19 Pandemic.

Covid-19 Pandemi Sürecinde Hastane Bilgi Sistemi Açısından e-Devlet Portalı'nın Hizmetleri Üzerine Bir Derleme

ÖZET
Covid-19 pandemisi, başta sağlık alanı olmak üzere bütün ekonomik ve sosyal yaşamı etkileyen önemli bir değişimi başlatmıştır. Öncelikle pandemi kısıtlamaları yaşam alışkanlıklarının dönüşümünü zorunlu hale getirmiştir. Bu değişim, dijital dönüşüm olarak ortaya çıkmaktadır. Özellikle fiziksel mobilitenin azalması, mesafe zorunlulukları, çalışma ortamlarının yeniden düzenlenmesi, iş yapma şeklini ve sürecini daha dijital hale getirmiştir. Bu noktada, yenilikçi teknolojiler ve uygulamalar bilgi sistemi yönetimi için kurtarıcı niteliktedir. Kriz yönetiminde, günümüzde en büyük dezavantaj dünya nüfusunun oldukça artmış olması ve küresel sistemde etkileşimin fazla olmasıdır. Bunula birlikte en büyük avantajı ise teknolojik olanakların izolasyona katkı sağlayacak şekilde geliştirilebilmesidir. Hastane bilgi yönetiminin yeni uygulamalar ile daha hızlı ve etkin şekilde yönetilmesi mümkün olabilmektedir. Bu çalışma, hastane bilgi sistemi yönetimini incelemeyi ve Türkiye'deki e-Devlet Portalı e-hizmetlerine dayalı olarak bazı örnek uygulamalar vermeyi amaçlamaktadır. HIS pandemi sürecinde daha etkin kullanılmaya başlanmıştır. Türkiye'de e-Devlet portalı, hastane bilgi sistemi yönetimi açısından belge sorgulama, başvuru ve bilgi takibi gibi süreçleri hızlandıran dijital bir araç olarak gözlemlenmiştir. e-Devlet portalının Türkiye'de hastane bilgi sisteminin yönetim sürecini hızlandırdığı ve e-Devlet portalının Covid-19 pandemisi sürecinde sağlık çalışanları ve vatandaşlara çeşitli e-hizmetler sunduğu görülmüştür.
Anahtar Kelimeler: E-Devlet Portalı, Hastane Bilgi Sistemi, E-Hizmet, Sağlık Bilgi Yönetimi, Covid-19 Pandemisi.

INTRODUCTION

Covid-19 pandemic changed the everyday life with new normal standards globally. Recent researchers have pointed out that there is a rapid digital transformation among economic, social and environmental issues. For example, digital transformation in government and business models were accelerated during the Covid-19 (1); (2); (3); (4); (5). On the other side, remote education model (6); (7); (8); (9); (10) and remote work model (11); (12); (13); (14) adapted in many economies during the Covid-19 pandemic. This transformation has made health management more technology-based. Accordingly, Hospital Information Systems (HIS) have also developed faster in every country than in the past. This section contains information about HIS. Today like all areas of human life, the field of health is also undergoing a digital transformation process. In this process, applications such as e-health, telemedicine, hospital information systems are developing. In the World, any new parameters such as population growth, which increases income inequality, possible pandemics expected after the Covid-19 pandemic process and increase in mental health problems in a changing World make applications such as HIS necessary. These applications have many functions such as providing services to more patients, obtaining accurate data in pandemics, and reducing the workload of healthcare workers. Hospital information systems (HIS) can be defined as a regulated technology-based system for medical and administrative information that can be described as big data for hospitals (15); (16).While HIS organizes valuable data for hospitals, it enables statistics, projection and record tracking activities to be carried out more easily and systematically with the contribution of automation systems (17). This creates efficiency in hospital management.

Digital health-based tools such as HIS and e-health have provided productivity, with opportunities such as widespread information distribution, telemedicine opportunities for patients, and virtual meetings during the Covid-19 pandemic process (18). And telehealth, and digital care solutions, together with the HIS infrastructure, increased the efficiency of health services during the pandemic process (19). The Internet of Things IoT interconnects all computing, mechanical and digital technologies, including HIS. This technology has had a great impact on the monitoring of health services during the Covid-19 pandemic process (20). The use of virtual software and telemedicine offers promising potential in the fight against pandemics (21). So these technologies reduce the hospital burden in the pandemic process, and they also provide vital data for making predictions on the pandemic.

In general, initially adapting to HIS systems and obtaining appropriate medical records can create various difficulties for healthcare personnel and physicians. So sometimes electronic information systems in health care is a challenge for the doctors (22). But as systems become streamlined, they make it easier for doctors to keep track of medical records. Various studies have shown that healthcare professionals can get more efficiency and satisfaction levels from switching to HIS applications compared to manual registrations (23); (24). HIS ensures that health services are offered to the public more efficiently.

This study aims to review e-services of e-Government Portal in the context of hospital information system in Turkey. This review study includes five main parts. Firstly, introduction part gives the importance of hospital information system during the Covid-19 pandemic. Secondly, there is a part examining hospital information system management. This part also examined prior studies that investigated hospital information system management in the literature. Third part gives some sample implications of HIS service through e-Government Portal in Turkey. The fourth part is about strengths and weaknesses of HIS. Then, the last part gives a conclusion as a result of this review study. In the conclusion, this study provides a SWOT analysis for using HIS through e-Government Portal.

Hospital Information System Management: Health information systems, including HIS, are being adopted more and more among healthcare professionals as a patient-centered approach (25). Health information systems is the name given to the whole process of creating and sharing information and data in the field of medicine, and ultimately determining, selecting and developing the care and treatment of patients (26); (27). Develops the predictions of the health field on the future by combining health information systems, health system and statistical system (28).

Technological possibilities of each country on HIS are quite different from each other. HIS practices differ in public and private hospitals of countries. Integration with e-government in public hospitals can make these systems easier to implement. In many countries HIS is a part of e-government system. For example, in Turkey, e-nabız is integrated with e-government services (29). User satisfaction on HIS is also one of the important content in this field. “HIS is stated to lag behind business and industrial information systems in terms of IT use and implementation of quality standards for patient satisfaction”(24). However, e-health systems as mobile applications, wearable technologies and the Covid-19 pandemic process have made significant progress in the relationship of HIS user satisfaction. There are many factors that will affect HIS applications, such as technological factors, human factors, organizational factors (30). Artificial Intelligent (AL) also a component for HIS. For example, the smartwatch as an AI-enabled medical device so this is also a wearable technology (31). As part of medical healthcare in the Internet of Things

(IoT) affect citizen satisfaction (32). Many studies investigated HIS management with the practices of countries in this field as a case. Table 1 presents the main articles published with this approach.

Table 1. Some prior studies on Hospital Information System

Researchers	Methodology	The study
Patermann, et.a. (2020)	Qualitative research, Germany case	This study developed an approach over systems integrated with HIS. (33)
Salahuddin, et.al. (2020)	Qualitative research,	This study aims to develop a model for evaluating the safe use of a HIS from a sociotechnical standpoint. (34)
Motevali Haghighi and Torabi (2020)	Qualitative research	The study evaluates HIS risks; a fuzzy risk matrix is constructed. (35)
Salahuddin, et.al. (2020)	Qualitative research, Malaysia case	The study aims to investigate the behavior of health practitioners in adopting HIS practices. (36)
Carvalho, et.al. (2019)	Qualitative research	The study presents a proposal to measure HIS maturity with regard to data analytics. (37)
Khajouei, et.al. (2018)	Quantitative research,	The study evaluated causes and errors of communication to electronic health record.(38)
Gartner, et.al. (2018)	Quantitative research,	The study, creates a mathematical programming model in order to minimize the cognitive workload of doctors related to prescribing order sets.(39)
Nadri, et.al. (2018)	Qualitative research, Iranian case	This study includes a research on the use of HIS in hospital units.(40)
Haghighi and Torabi (2018)	Qualitative research,	This study proposed HISs in order to enhance their performance from a mixed sustainability-resilience view.(41)
Handayani, et.al. (2018)	Qualitative research,	This study is a literature review about the most important acceptance factors associated with HIS. (42)
Saluvan and Ozonoff (2018)	Qualitative research, Turkey case	The study aims to determine the usability of HIS functions and their perceived importance on quality and patient safety.(43)
Alipour et.al. (2017)	Quantitative research, Iranian case	This study aimed to assess the success or failure of HISs in public hospitals. (44)
Sahay and Walsham (2017)	Qualitative research, India case	The study includes the examination of the hospital information system over a public hospital.(45)
Wen, et.al. (2017)	Qualitative research, China case	The study aims to seek new potential strategies in information technologies to improve physician-nurse communication. (46)

Source: created by authors

Some Sample Implications of HIS through e-Government Portal: Covid-19 pandemic increased the need of digital health services and hospital information system. In this point, this study reviews e-services of e-Government Portal in Turkey to determine important hospital information system services during Covid-19 pandemic. In Turkey, users (citizens or individuals) use some public services via e-Government Portal when they access into the system by their personal password, e-signature, mobile signature, internet banking and ID card (TC-Republic of Turkey) (5); (47). Turkish e-Government Portal provides a specific point for citizens to access public services in Turkey. Currently (29th November 2021), there are 57.276.122 users, 6.161 e-services, 3.300 mobile services and 841 institutes.

There are several categories and sub-services under e-Government Portal and one of these categories is called as “health” (48). Health category aims to provide healthcare information and users can manage their medicine, appointment and clinical examination (49). Table 2 shows sub-services for health category in e-government portal.

When observing Table 3, it is seen that there are different institutions giving e-services for hospital information system.

These e-services mostly include inquiry service and application service for users.

Table 2. Health category and E-services based on e-Government Portal

Number of e-service	Institute	Sub-service
1	The Disaster and Emergency Management Authority (AFAD)	Volunteering Application and Follow-up
5	The Ministry of Family and Social Services	Alo 183 Social Support Application and Follow-up Preliminary Application for Institutional Care Requests of Disabled Persons in Need of Care Disabled Home Care Payment Information Inquiry Identity Card Application for the Disabled Free Travel Card Pre-Application
1	The Information and Communication Technologies Authority	Base Stations Measurement Information
1	General Directorate of Mineral Research and Exploration	Kidney and Bladder Stone Analysis Application and Follow-up Procedures
29	The Ministry of Health	Family Physician Information Inquiry Service Score Inquiry Doctor Knowledge Base Organ and Tissue Transplant List Inquiry Organ and Tissue Waiting List Inquiry Organ and Tissue Donation Inquiry and Cancellation Travel Health Vaccination Status Inquiry Seafarer Medical Report Inquiry Inquiry about Vaccination at School Age e-Signed Birth Reports Inquiry Public Hospitals Additional Payment E-Payroll (EKOBS) Service TITCK Electronic Document Management System Document Verification Medication Reports Inquiry e-Signed Psychotechnical Evaluation Reports Inquiry Rest Reports Inquiry e-Signed Athlete Reports Inquiry e-Signed Driver Reports Inquiry e-Signed Driver Reports Inquiry Medical Equipment Reports Inquiry e-Signed Adult Disability Health Board Reports Inquiry e-Signed Child Special Needs Reports Inquiry Personal Health Information Form Driver Behavior Development Training Exam Result Inquiry e-Signed Status Reports Single Physician Health Reports Inquiry TITCK Citizen Petition Application HES Code Generation and Listing HES Code Inquiry Mass HES Code Inquiry e-Signed TSK Health Board Reports HES Code Permission Settings
2	The Insurance Information and Monitoring Center	Health Insurance Policy Information Inquiry (Real Person) Compulsory Liability Insurance for Medical Malpractice (Physician Professional Liability Insurance)
12	Social Security Institution	Insurance Practices General Health Insurance Registration and Premium Debt Inquiry 4B Insured (5510 SK headmen, self-employed and self-employed) 4/B-2020 Postponement Scope List (Covid-19) General Health Insurance Applications 4A/4B/4C Medication Duration Inquiry 4A/4B/4C Inspection Contribution Inquiry Tooth Prosthesis Right Inquiry Physician Information Getting a Corporate Physician Password Medical Market Inquiry Medula Optical Glass and Frame Information Inquiry Health Aid Request and Commitment SPAS Exploitation Inquiry (Health Provision Activation System) Treatment Information Inquiry

Source: adapted from (49)

Table 3. Ministry of Health and Sub-Services

	Sub-services
Ministry of Health	Changing Family Physician
	Pharmacist Placement System (EYS)
	E-Pulse Personal Health System
	Pharmaceutical Track and Trace System (ITS) Management Portal
	Central Physician Appointment System (MHRS)
	What Have I App
	Common Entry Point
	Prioritization Application System
	Prescription App
	Ministry of Health Registration and Registration Information System
	Ministry of Health Personnel Tracking System
	TITCK (Turkish Medicines and Medical Devices Agency) Electronic Application System (EBS)
	TITCK (Turkish Medicines and Medical Devices Agency) Electronic Application System (EBS) Registration
	Product Tracking System
	Product Tracking System Application Entry

Source: adapted from (50)

Table 3 shows e-services belonged to the Ministry of Health in e-Government portal. According to e-services providing by the Ministry of Health, it can be said that most of e-services includes track service and application service.

The importance of e-Government Portal has been seen during the Covid-19 pandemic. To keep providing public services during the pandemic, e-Government Portal improved its system. Ministry of Health classifies some e-services based on e-Government Portal as below (51):

• Family Physician Information Inquiry
• e-Nabız Personal Health System
• Changing Family Physician
• Seaman Health Report Inquiry
• e-Signed Child Special Needs Reports Inquiry
• Medication Reports Inquiry
• e-Signed Birth Reports Inquiry
• Rest Reports Inquiry
• e-Signed Status Notifies Health Board Reports Inquiry
• Personal Health Information Form
• e-Signed Status Reports Single Physician Health Reports Inquiry
• Central Physician Appointment System
• e-Signed Adult Disability Health Board Reports Inquiry
• Inquiry about Vaccination at School Age
• Inquiry on e-Signed Psychotechnical Evaluation Reports
• Organ and Tissue Donation Inquiry and Cancellation
• e-Signed Athlete Reports Inquiry
• Organ and Tissue Waiting List Inquiry
• e-Signed Driver Reports Inquiry
• Organ and Tissue Transplant List Inquiry
• e-Signed TSK (Turkish Armed Forces) Health Board Reports Inquiry
• Travel Health Vaccination Status Inquiry
• Driver Behavior Development Training Exam Result Inquiry
• Medical Equipment Reports Inquiry
• TITCK Citizen Petition Application
• HES Code Generation and Listing
• HES Code Inquiry
• TITCK Citizen Petition Application

Turkey's digital face, e-Government Gateway, received record attention from citizens in 2020. The e-Government Gateway, which enables many transactions to be made digitally, especially during the Covid-19 pandemic period, has become an area where citizens can perform their transactions quickly and safely. Both the ease of access to the service and the availability of many needed services increased awareness and interest in the e-Government Gateway in this period. Mr. Koc (The Head of the Digital Transformation Office) determined that the importance of support services, stated that many public services were digitized in 2020, while citizens used the e-Government Gateway intensively and effectively. In addition, Mr. Koc stated that there are important services regarding health at the e-Government Gateway. Especially during the Covid-19 pandemic, the implementation of the HES Code was of great importance. During this period, the "HES Code Generation and Listing" service, which allowed individuals to securely share with institutions and individuals whether there was any risk in terms of the Coronavirus (Covid-19) disease, was also among the most used services over the e-Government Gateway. In terms of public health, e-government portal moved the "Travel Permit" applications, which must be obtained from the governorship for citizens over the age of 65, to the e-Government Gateway (52).

The numbers also has proven that e-Government portal helps citizens as providing many kinds of e-services during the Covid-19 pandemic. Digital services continue to be used effectively in the fight against the Covid-19 pandemic. e-Government portal service usage numbers; In March, April and May of 2020, it doubled compared to the previous year. While 278 thousand entries were made in the first three months of 2019; In 2020, 631 thousand

entries were reached. The increase in the e-Government portal, which includes more than 5000 services, has a large share in the fact that the services needed by the citizens are opened and the services are easily accessible. During this period, the e-Government portal also implemented services that provide solutions for the needs of our citizens. Among the services opened during the pandemic process, the most used ones are; pandemic social support preliminary application, travel permit application, 4/B 2020 postponement scope list (Covid-19), HES code generation and listing, bank inquiry services with deposit / participation funds (53).

Vaccination status can be inquired through e-Government portal. The HES code, which is used to securely share whether there is any risk in terms of COVID-19, was generated 66 million 254 thousand 113 times over e-Government and HES Mobile. During the epidemic, citizens can also restructure their premium debts to SSI via e-Government. Accordingly, the number of applications made via e-Government portal has reached 243,258. After the support applications made by citizens through e-Government portal within the scope of the Social Protection Shield during the epidemic, support payments were made to 2 million 56 thousand 442 people (54).

Strengths and Weaknesses of Hospital Information System Management: The Covid-19 pandemic has accelerated the development of the HIS process. Although each country has different applications, e-health and HIS have become components of health management around the world today. For example, in studies on Africa, the lack of national strategies on HIS has been mentioned. In the study, the lack of national health strategies in the HIS process in African countries was expressed as a threat (55).

Ismail et al. (2010) mentioned in their study that the need for technically trained personnel for HIS is a threat to human resource management of the hospitals (56). Chaulagai et al. (2005) with a similar approach, mentioned some weaknesses in the progress of the health sector in terms of information systems, system thinking and teamwork aspects (57). Rahimi et al. (2009) mentions that an engineering infrastructure of the HIS process should be well-designed from a technical point of view and that it is a team effort (58). The relevant literature shows that the importance of health informatics in the management of health services is increasing day by day.

Nawaz et al. (2015) stated in their research on HIS that the strength of a good reporting system and threat as objective information is sometimes not a good social economic indicator. (59). Klinis vd. et al. (2012) defined efficiency, rapid data collection, and access to more patients with remote management systems as strengths in their studies. But they also pointed out weaknesses such as data parsing and cost regulation. Data banking, data synthesis and networking i opportunities and cyber security have also identified hacker attacks and technological problems as threats (60). When these studies are examined, it is seen that subjects such as human resources, new management approach, big data, cyber security, efficiency, technical infrastructure come to the fore in the HIS process.

CONCLUSION

When searching the literature, it can be said that it is advantage to get innovative and digital tools or applications to manage hospital information system in general (61). In this context, this study thought that e-Government portal's e-services can be a good sample to understand HIS' services. Table 4 shows SWOT analysis for using HIS through e-Government portal in Turkey as below:

Table 4. SWOT Analysis for HIS Management by e-Government

Strengths	**Weaknesses**
There are important strengths of using HIS through e-Government portal as: Benefits for individuals: Acceleration into access to information Cost reduction Time efficiency 7/24 service Transparency Higher satisfaction by fast service Benefits for healthcare professionals: Acceleration into access to information Savings in time, cost, employee and office equipment Access to information quickly Mobility Time efficiency when giving less time for activities of HIS	To use e-government portal, there is a need of internet and digital devices. Also, password is a vital to access data for professionals. Some technical problems can cause problem for HIS management.
Opportunities	**Threats**
As it is purposed, e-Government portal accelerates the process of information access between healthcare professionals, individuals and institutions among HIS. Accordingly, HIS process can be directly managed by digital applications and tools in the long term. When healthcare professionals access data easily and fast, other important healthcare services can be provided in a better way.	There may be security and privacy problems for individuals and professionals when using e-Government portal.

Source: created by authors

Like as other e-services in e-Government portal, "inquiry services, application services, document production services, information services" are main characteristics of sub-services in health

category. Both of individuals and healthcare professionals can benefit from e-Government portal (5); (47). As a result, it can be said that the management of HIS may be a challenge for countries who has not adopted digital technologies or applications yet. Turkey has accelerated digital transformation in public services during the Covid-19 pandemic and e-Government Portal develops and adapts several public services (5). Future studies can investigate different digital applications or web-based systems to examine HIS management or develop new model. This study has some limitations as being a review study and giving limited sample implications from e-Government portal.

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REVIEW

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Effects of the Covid-19 Pandemic Process on Migrants in Turkey

ABSTRACT
The aim of this study is to examine the effects of the pandemic process on immigrants in Turkey based on the findings of previous studies and to make policy recommendations based on the results obtained. The question of the research is "*What are the effects of the pandemic process on immigrants in Turkey?"* presented in the form. In order to answer this question, five sub-questions were sought in the study. In the study, in which qualitative research methods and techniques were used, the document analysis technique, which is one of the qualitative data collection techniques, was used to obtain the data to be used. In order to provide data for the study, first of all, national and international databases were searched by using keywords, word groups and subject headings that could provide data about the study subject. The documents obtained with the easily accessible sampling method were evaluated by considering the questions to be answered in the study. As a result of the evaluation, themes were created by taking into account the study areas covered in the researches. The data related to the themes created are transferred under the related theme title. Finally, quantitative data on the themes created are presented in a table. Although the data presented by the studies differ from each other, when these data are taken as a whole, it is seen that the majority of immigrants have information about Covid-19. However, the rate of immigrants accessing information through public institutions and organizations is very low. Social media and traditional media are the channels that immigrants use most in accessing information. In this process, some of the immigrants who applied to the hospital units had problems in accessing health services. A significant part of the children of immigrants did not have any problems in accessing distance education. A significant part of the immigrants had problems in accessing their livelihoods in this process. As a result of this situation, immigrants also experienced problems in accessing adequate food, shelter opportunities, energy resources and basic hygiene requirements.
Keywords: Covid-19, Pandemic, Immigrant.

Covid-19 Pandemi Sürecinin Türkiye'deki Göçmenler Üzerindeki Etkileri

ÖZET
Bu çalışmanın amacı pandemi sürecinin Türkiye'deki göçmenler üzerindeki etkilerini, daha önce yapılmış olan araştırmaların bulgularına dayalı olarak incelemek ve elde edilen sonuçlara dayalı olarak politika önerilerinde bulunmaktır. Araştırmanın sorusu "*Pandemi sürecinin Türkiye'deki göçmenler üzerindeki etkileri nelerdir?"* şeklinde ifade edilmiştir. Bu soruya cevap vermek için çalışmada beş alt soruya cevap aranmıştır. Nitel araştırma yöntem ve teknikleri kullanıldığı çalışmada, kullanılacak verileri elde edebilmek için nitel veri toplama tekniklerinden olan doküman incelemesi tekniği kullanılmıştır. Çalışmaya veri sağlamak için öncelikle çalışma konusu ile ilgili veri sunabilecek anahtar kelimeler, kelime gurupları ve konu başlıkları kullanılarak ulusal ve uluslararası veri tabanlarında tarama yapılmıştır. Kolay ulaşılabilir örneklem yöntemi ile ulaşılan dokümanlar çalışmada cevap aranan sorular dikkate alınarak değerlendirilmiştir. Yapılan değerlendirme sonucunda, araştırmalarda ele alınan inceleme alanları dikkate alınarak, temalar oluşturulmuştur. Oluşturulan temalarla ilgili veriler, ilgili tema başlığının altında aktarılmıştır. Son olarak oluşturulan temalarla ilgili nicel veriler tablo halinde sunulmuştur. Her ne kadar araştırmaların sunduğu veriler birbirinden farlılık gösterse de, bu veriler bir bütün olarak ele alındığında göçmenlerin çoğunluğunun Covid-19 hakkında bilgi sahibi olduğu görülmektedir. Fakat kamu kurum ve kuruluşları aracılığı ile bilgiye erişen göçmen oranı oldukça düşüktür. Göçmenlerin bilgiye erişimde en yoğun olarak kullandıkları kanal ise sosyal medya ve geleneksel medyadır. Bu süreçte hastane birimlerine başvuran göçmenlerin bir kısmı sağlık hizmetlerine erişimde sorunlar yaşamışlardır. Göçmenlerin çocuklarının önemli bir kısmın ise uzaktan eğitime erişimde sorun yaşamamışlardır. Göçmenlerin önemli bir kısmı ise bu süreçte geçim kaynaklarına erişimde sorun yaşamışlardır. Bu durumun bir sonucu olarak göçmeler yeterli gıdaya, barınma olanaklarına, enerji kaynaklarına ve temel hijyen gereksinimlerine erişimde de sorunlar yaşamışlardır.
Anahtar Kelimeler: Covid-19, Pandemi, Göçmen.

INTRODUCTION

Important economic, social and political transformation processes affect the basic concepts and approaches of the general perspectives of the disciplines. The Covid-19 epidemic, which has become a global threat, has affected social life in every conceivable field, from production to consumption, from international relations to education, from transportation to entertainment, from worship to sports events, and has caused significant changes and transformations. The desire for change in public institutions and organizations does not arise spontaneously, most of the time this change is initiated by social demands and political power (1). In this sense, it is possible to say that the Covid-19 pandemic is the harbinger of a new era that necessitates change in public administration.

From the past to the present, many countries have struggled with the epidemic, sometimes these struggles have been successful in a short time, and sometimes they have reached a global dimension that affects the whole world in the long term. Policies implemented by countries within the scope of combating epidemics have affected almost every field and social segment. All over the world, many groups working with the Covid-19 pandemic process, retired, unemployed, students, young or old have been affected by this process. The people and their families in the section we call immigrants and refugees are among the groups that are negatively affected by this process (2).

In the society he is in; Social groups that cannot benefit from the socio-economic opportunities of the country due to deprivation or poverty and need special protection are called disadvantaged groups. Disadvantaged groups include women, children, youth, the elderly, the disabled, immigrants and minorities (3).

In this context, in the 1st article of the UN Minority Declaration published in 1992; “States protect the existence of minorities in their territories and their national or ethnic, religious or linguistic identity and promote the creation of conditions for their development.” statement is included (4). Although there is no international consensus on what constitutes a minority, 3.6 million Syrians under temporary protection, as well as Afghans, Iranians, Iraqis and Somalis under international protection in Turkey, meet the definition of a minority in the UN Minorities Declaration (5).

Considering the general living conditions of the immigrants, it is possible to mention that most of them live below the poverty line, their incomes cannot meet their expenses, they have difficulty in paying rent and service bills and getting food. In addition, it is obvious that the situation of immigrants, who were employed informally at a high rate before the pandemic, became more disadvantaged with the pandemic and faced more economic difficulties.

Structural functionalism theory, which is an important sociological theory, sees society as a complex system that works together to provide solidarity and stability. The elements that make up the society are norms, traditions, habits and institutions. Popularized by Herbert Spencer (1820-1903), this theory presents all of the elements listed above as "organs" that work for the proper functioning of the "body" as a whole (6). Therefore, in order to successfully manage the pandemic process, the policies implemented for immigrants under the assumption that they are a part of a whole in the society are very important in order to cope with the pandemic.

In this context, the aim of this study is to examine the effects of the pandemic process on immigrants in Turkey based on the findings of previous studies and to make policy recommendations based on the results obtained. The question of the research is "What are the effects of the pandemic process on immigrants in Turkey?" In order to answer this question, answers to the following questions were sought.

1. Do the immigrants have enough information about the pandemic?
2. Have the official institutions adequately informed the immigrants about the pandemic?
3. How has the pandemic affected immigrants' access to health services?
4. How has the pandemic affected immigrants' access to distance education services?
5. How has the pandemic affected migrants' access to livelihoods and basic needs?

After the above-mentioned studies, inferences will be made, problems will be identified, and feedback and solution suggestions will be presented to public institutions, local governments and non-governmental organizations for the solution of these problems.

DESIGN OF THE RESEARCH AND SAMPLE FEATURES

Qualitative research methods and techniques were used in the study. In order to obtain the data to be used in the study, the document analysis technique, which is a qualitative data collection technique, was used. Document analysis, which is one of the data collection techniques frequently used in qualitative research, According to Yıldırım and Şimşek, “It is a technique that includes the analysis of materials (text, audio, video, visual, etc.) containing information about the phenomenon or phenomena that are aimed to be researched …” (7). The reason for using the document review technique in this study is that this method allows a researcher to reach the amount of participant data that it would be difficult for a researcher to reach with his/her own means. By using this method in the study, the cost was reduced, time was saved and it was possible to

examine the data of a larger sample. When Table 1, which includes the sample characteristics of the studies examined, is examined, it is seen that the studies examined within the scope of this study contain data obtained from 853 families and 2551 participants.

The universe of the study is all the documents that can present data about the subject examined in the context of the study. In this context, in order to provide the documents to be used in the study, national and international databases were searched by using keywords, phrases and subject headings that could provide data about the study subject. First of all, the searches were made using the "scan and advanced search" tabs in the "thesis name, subject, index, abstract, all" categories in the National Thesis Center database of the Council of Higher Education (https://tez.yok.gov.tr). Scanning has been expanded using digital media such as https://dergipark.org.tr/tr/, https://scholar.google.com/, https://www.ilo.org and https://reliefweb.int/. In addition to digital media, printed sources such as books and magazines were scanned and documents that could be used in the study were reached.

Using the purposeful sampling method in the study, the documents obtained as a result of the scans were included in the sample. According to Büyüköztürk et al., purposive sampling method is a sampling method that allows one or more samples to be selected and examined in depth, in accordance with the purpose of the subject to be researched, with rich information content about the subject to be researched (8). The documents (8 quantitative and 2 qualitative) selected using purposive sampling method were evaluated by considering the questions to be answered in the study. The criteria for inclusion in the examination of the documents to be examined is that the data (quantitative and qualitative) contained in the documents are of a quality to answer the research questions and contain information about the situation of immigrants in Turkey during the pandemic process. As a result of the evaluation, themes were created by taking into account the study areas covered in the researches. The data related to the themes created were transferred under the related theme title. Then, qualitative studies containing data related to the relevant theme were examined and the data presented by these studies were transferred. Finally, quantitative data on the themes created were presented in a table. The sample characteristics of the studies examined within the scope of the study were presented in Table 1.

Table 1. Sample characteristics of the studies reviewed

Study	Research Type	The Number of Participants	Gender %		Nationality %				
			Male	Female	Syria	Afghanistan	Iranian	Iraq	Other
MUDEM, 2020	Quantitative	385 family	51.6	48.4	84.4	6.3	4.1	5.2	0
SGDD-ASAM. 2020	Quantitative	1162 person	47.52	52.48	82.61	11.27	1.77	4.17	0
Doğanay et al., 2020	Qualitative	50 person	64	36	34	66	0	0	0
İSMDD, 2020	Quantitative	300 person	10	90	100	0	0	0	0
Relief International, 2020	Quantitative	879 person	54	46	100	0	0	0	0
WATAN F., 2020	Quantitative	60 person	50	50	*	*	*	*	0
IFRC & Kızılay, 2020	Quantitative	468 family	*[1]	*	*	*	*	*	0
SEVKAR, 2020	Quantitative	30 person	50	50	100	0	0	0	0
Konak Mülteci Der., 2021	Quantitative	50 person	48	52	100	0	0	0	0
Köşer-Akçapar and Çalışan, 2021	Qualitative	20 person	11	9	100	0	0	0	0

DESCRIPTIVE FINDINGS

In this section, the data obtained from the researches reached as a result of the scans made in national and international databases are classified and transferred in accordance with the research questions and the themes created. The data obtained from the reviewed studies, which contain quantitative data, are presented in the form of a table (Table 2).

Since one of the analyzed qualitative studies did not contain numerical data other than sample characteristics, this study was not included in the table.

[1] No data

Table 2. Situation of immigrants in Turkey during the pandemic process (%)[2]

Created Themes and Examined Areas		MUDEM, 2020	SGDD-ASAM, 2020	Konak Mülteci Der., 2020	Doğanay et al, 2021	İSMDD, 2020	Relief Int., 2020	WATAN F. 2020	IFRC & Kızılay, 2020	YYD, 2020
Access to Information	Lacking sufficient knowledge	*	17	*	2	9	16	26	*	20
	Access to information through public institutions	1	8	*	12	21	15	4	*	27
	Accessing information from other sources [3]	99	92	*	88	79	85	96	*	73
Health Service Access	With chronic disease	34	*	*	24	*	11	*	22	*
	Positive case detected	1[4]	*	*	*	*	*	*	*	*
	Unable/forced access to services	26	15	*	10	*	71	32	61	26
Education Service Access	Having a school-age child	53	70	100	72	77	*	58	93	*
	Have not possibility of access	25	54	30	11	*	*	68	*	*
	Unable to access services	31	48	40	11	85	*	*	31	54
Livelihood and Basic Needs	Lost their livelihood	87	88	*	66	85	87	80	82	*
	Insufficient food	90	63	*	46	75	59	*	81	70
	Insufficient shelter	39	32	*	*	*	*	*	44	73
	Insufficient energy sources	30	33	*	*	*	*	*	*	60
	Insufficient hygienic material	28	53	*	36	58	37	32	16	43
	Insufficient health conditions	17	*	*	*	*	5	*	*	*
	Insufficient education and clothing	10	*	*	6	*	*	*	8	*

Access to Information About the Pandemic: With the notification of the first Covid-19 case by the Ministry of Health on March 10, 2020, the process of combating the epidemic started in Turkey. In this process, the Ministry of Health provided the necessary information both through the traditional media and the official website. In addition, the Ministry provided necessary information through information booklets and hand brochures prepared in English and Arabic. However, the results of the study conducted by the Refugee Support Association (MUDEM) with 385 immigrant families in April 2020 show that 79% of the participants obtained information about Covid-19 through social media channels in their mother tongue. The rate of participants who obtained information about Covid-19 from local authorities is 1.1% (9).

According to the results of the research conducted by the Association for Solidarity with Asylum Seekers and Migrants (SGDD-ASAM) in 2020, 83% of the participants have sufficient information about Covid-19. The rate of participants who obtained information about Covid-19 through the Ministry of Health and other public institutions is only 10%. 65% of the participants obtained information through social media or other written/visual media, and 19% through their neighbors or friends (10). According to the results of the research conducted by the Association for

[2] Within the scope of the study, the data presented by 10 researches, 2 qualitative and 8 quantitative, were examined. Since one of the analyzed qualitative studies did not contain numerical data other than sample characteristics, this study was not included in the table.
[3] Traditional media, social media, close circle etc.
[4] In the period when this data was available, the rate of positive cases detected in Turkish citizens was 0.18%.

Solidarity with Syrian Refugees in Izmir with the support of the Heinrich Böll Stiftung, 91.3% of the participants have enough knowledge about Covid-19. The rate of participants who obtained information about Covid-19 through public institutions is 20.83%. 53.13% of the participants obtained information through social media tools and 16.8% through non-governmental organizations (11).

In the study conducted by Relief International with the participation of 879 Syrian immigrants living in 6 settlements (Istanbul, Izmir, Manisa, Gaziantep, Kilis, Reyhanlı), 84% of the participants declared that they had sufficient knowledge about Covid-19. When the sources of access to information of the participants are examined, It is seen that 37% of them find information about Covid-19 from social media tools, 18% reach from traditional media, 17% from Relief International supported centers, 9% from close circles and 4% from other channels. Teaching to Covid-19 is one of those who benefit from communication from public and institutions (15%) (12). The survey conducted by the WATAN Foundation with the participation of 60 immigrants in Ankara shows that 76% of them have knowledge about Covid-19. It is seen that the participants get information about Covid-19 mostly from social media, and then they learn from television, neighbors and/or friends circle/NGOs, radio and public institutions, respectively. In this process, the rate of participants who obtained information about Covid-19 from public institutions and organizations is 4% (13).

In the research conducted by Doğanay et al., with the participation of 50 immigrants, representing 50 households where 263 immigrants live, during the pandemic period, 98% of the participants stated that they had sufficient knowledge about Covid-19. When the sources of access to information of the participants are examined, it is seen that only 6% of them access information through public institutions and organizations. It is seen that the majority of the participants access information through traditional media and social media (14).

Access to Health Services: There are 180 Migrant Health Centers (GSMs) in 29 cities across Turkey. Migrants who applied to these centers with the suspicion of Covid-19 during the pandemic process were directed to hospitals, if necessary, after fever measurements were made. However, the health services offered to immigrants in Turkey are different for those with and without temporary protection status. Primary health care and hospital services are free of charge for immigrants under temporary protection. However, it is not possible for irregular migrants to benefit from similar services. However, with a decision that came into force in April 2020, this situation was relaxed for irregular migrants due to pandemic conditions (15). However, the results of the study conducted by MUDEM show that 26% of those who applied to the hospital units due to any illness during this process could not benefit from health services. At the time of the research, the rate of the participants who were diagnosed positively in the diagnostic tests was 1%. However, the rate of positive cases detected in Turkish citizens in the same period was 0.18% (9). This shows that the rate of positive cases observed in the participants is about 5 times compared to Turkish citizens.

The results of the study conducted by SGDD-ASAM show that 15% of the participants who applied to the hospital units due to any ailment during this process could not benefit from health services. Among the participants, 68% of the people in need of regular medication stated that they could not obtain their medication during this period (10). The results of the research conducted by Doğanay et al. with the participation of 50 people during the pandemic period show that 10% of the participants did not access health services during this period. The reasons why the participants could not benefit from health services were that they could not enter the hospital because they did not have an identity card, could not go to the hospital without an appointment, and were registered in another province despite having an identity card (14). Migrants registered in another province are likely to be reported to the police when they go to the hospital, which causes them to abstain from applying to the hospital. Similarly, it is observed that irregular migrants do not apply to hospitals even if they need to, due to the possibility of being reported to the police and being deported when they go to the hospital (15).

According to the report of Relief International, it shows that 71% of the participants have problems in accessing health services during the pandemic process. The provinces where participants have the most difficulty in accessing health services are Istanbul and Izmir (12). When the findings obtained from the qualitative research conducted by Koser-Akçapar and Employees are examined, it is seen that some of the participants have problems in accessing health services. These participants associated the reason for having problems in accessing health services with the crowding of public transportation vehicles, the density of hospitals and the lack of translators (16).

Access to Education Services: Shortly after the first positive case in Turkey was reported on March 10, 2020 (March 23, 2020), distance education was started. In this process, the Ministry of National Education started to provide services both through television channels and through the Education Information Network. In this process, the Ministry of National Education, municipalities, non-governmental organizations and some companies distributed tablets to students in order to provide access to distance education for students who do not have the opportunity. However, the results of the study conducted by MUDEM show that 25% of the migrant families participating in the research do not

have the opportunities (television, computer, tablet, smart phone, internet connection) necessary for their children to access distance education. In this process, the rate of families whose children cannot access distance education is 31% (9).

According to the results of the research conducted by SGDD-ASAM, the rate of participants whose children cannot access distance education in this process is 48%. When the reasons for the participants' inability to access distance education are examined, it is seen that the inadequacy of technical facilities such as television, computer and smart phone (54%) is the most important obstacle to accessing education (10). The results of the research conducted by Doğanay et al. with the participation of 50 people, shows that 72% of the participants have a child attending school in their household, and the education of 59% of the children attending school has been adversely affected by the pandemic process. In this process, the rate of those who cannot access distance education is 11%. The biggest obstacle in accessing distance education is the lack of access to the internet. Other barriers to accessing distance education are the absence of devices such as television, tablet, and computer (14).

When the results of the study conducted by the Konak Refugee Association are examined, it is stated that 30% of the immigrant children cannot access distance education because they do not have access to the internet; It shows that 48% of them do not have a television at home. According to the results of the research, 86% of immigrant children do not have a suitable environment to follow the lessons at home. In this process, the rate of students who can access distance education is 60%. However, when the frequency of access of students who can access distance education is examined, it is seen that 16.66% of these students attend classes regularly (always), while 30% of them rarely attend classes (17). Bu da göstermektedir ki, uzaktan eğitime erişim imkânı bulan göçmenlerin çocukları çeşitli nedenlerle (dil engeli, materyal eksikliği, öğretime ilgisizlik, evdeki koşullar vb.) bu fırsatı kullanamamaktadır.

According to the results of the research conducted by the International Federation of Red Cross (IFRC) and the Red Crescent, in which 468 immigrant families participated, 68% of the participants had school-age children. Televizyon, internet erişiminin olmaması, çevrim içi olarak/televizyondan ders takibi konusunda yeterli bilgilerinin olmayışı nedeniyle bu çocukların %31'inin uzaktan eğitime erişememişlerdir (18). The data of the research conducted by the Doctors Worldwide (YYD) with the participation of 30 Syrian immigrants living in Hatay and Şanlıurfa and holding international protection status, show that 7.1% of the participants have no knowledge of accessing distance education. While the children of 46.4% of the participants benefited from distance education efficiently in this process, the children of 46.5% were able to benefit (19).

When the findings obtained from the qualitative research conducted by Koser-Akçapar and Employees are examined, it is seen that the children of some of the participants have problems in accessing distance education. These participants generally associated the reason for their children's problems in accessing distance education with the lack of materials. In addition, according to the statements of the participants, as a result of having problems in accessing education, their children started to forget Turkish (16). It is possible that this problem will continue to negatively affect the academic performance of immigrant children in the post-pandemic period.

Access to Livelihoods and Basic Needs: Access to livelihoods is expected to have a significant impact on individuals' capacity to access their basic needs. Under normal circumstances, an individual's ability to access basic needs is expected to decrease significantly as a natural consequence of this situation. However, it can be expected that the loss of access to livelihoods of immigrants, who are at the bottom of the society and who are disadvantaged, will have more negative effects on their capacity to access basic needs. Therefore, it can be assumed that immigrants will need more protection, especially in situations that negatively affect societies such as pandemics. However, the results of the research show that immigrants lost a significant amount of their livelihoods in this process. For example, according to the report of Relief International, at least 1 person in the household of 87% of the participants lost access to their livelihoods due to the pandemic. The rate of participants who have problems without meeting their basic needs due to loss of access to livelihoods is 81%. 59% of the participants stated that they had problems in accessing food, 37% in hygiene materials, and 5% in water (12).

According to the results of the study conducted by MUDEM, 87% of the participants could not continue their work during this period. As a natural consequence of not being able to access to a livelihood job, 90% of the participants stated that they could not access enough food in this process. In addition, 39% of the participants stated that they experience barriers to accessing shelter, 30% to necessary energy resources, 28% to hygienic materials, 17% to minimum health conditions, and 10% to education and clothing (9). According to the results of the research conducted by SGDD-ASAM, the rate of participants who did not work before the measures taken within the scope of the Covid-19 epidemic is 18%. However, after March, this rate increased to 88%. During this period, 63% of the participants stated that they had difficulty in meeting their basic hygiene requirements, while 53% stated that they had difficulty in meeting their basic hygiene requirements. In addition, 33.05% of the

participants stated that their bill payments and 31.84% of them their rent payments were adversely affected by this process (10).

According to the results of the research conducted by Doğanay et al., with the participation of 50 people representing 50 households where 263 immigrants live, during the pandemic period, 66% of the participants are unemployed. In this process, the household income of 64% of the participants also decreased and the debts of 36% of them increased. When the average household income of the participants is examined, it is seen that the monthly household income of 42% is 1,000 TL and below. The rate of participants with a monthly household income of 3,000 TL or more is 6%. When the income and expenses of the participants are compared, it is seen that the expenses of 46% are more than their income, the balance between their expenses and income of 46%, and the income of 8% of them is more than their expenses. The biggest payment item among the expenses of 85% of the participants is rent payments. The rate of participants who had problems in accessing basic needs during the pandemic process was 68%, and the number of participants who stated that they had difficulty in accessing food the most was 46% (14).

When the findings obtained from the qualitative research conducted by Koser-Akçapar and Employees are examined, it is seen that most of the participants have problems in accessing their livelihoods. Some participants, who have problems in accessing their livelihoods, stated that they applied to different financial resources (receiving financial aid from their relatives, etc.) to overcome this problem, while others stated that they moved to their friends' house. The results of the study also show that some of the participants who had positive test results and were in contact continued to work by violating the quarantine rules (16). This shows that although it is positive and contact, the anxiety of losing their livelihoods turns the participants into a significant danger in terms of general public health.

DISCUSSION AND SUGGESTIONS

In the context of the questions to be answered in the study, the data presented by the qualitative and quantitative research obtained as a result of the literature were examined. Although the data presented by the studies differ from each other, the conclusions reached when these data are taken as a whole are as follows:

1. The vast majority of immigrants (74-98%) have sufficient information about Covid-19.

2. Although the vast majority of immigrants have sufficient information about Covid-19, the rate of immigrants (1-27%) accessing information through public institutions and organizations is quite low. Social media and traditional media are the channels that immigrants use most in accessing information.

3. Some of the immigrants (10-71%) who applied to the hospital units due to any discomfort during the pandemic process had problems in accessing health services. An important part of the immigrants who use drugs regularly, on the other hand, had problems in supplying their drugs in this process. The reasons why immigrants cannot access health services are the factors such as not being able to enter the hospital because they do not have an identity card, going to the hospital without an appointment, living in a province other than the province where they are registered, crowded public transportation vehicles, the density of the hospitals and the lack of translators.

4. During the pandemic process, a significant part of the children of immigrants (11-85%) had problems in accessing distance education. The most important obstacle to access to distance education is the lack of materials (internet, phone, tablet, television).

5. During the pandemic process, a significant part of the immigrants (66-88%) had problems in accessing their livelihoods. As a result of this situation, immigrants also experienced problems in accessing adequate food (46-90%), shelter opportunities (32-44%), energy resources (30-60%) and basic hygiene requirements (28-58%). . In addition, some participants who had positive test results or were in contact continued to work by not complying with the quarantine rules in order not to lose their livelihoods, and they turned into an important danger in terms of public health.

Covid-19, which opened a new field to the literature, and the regulations or measures it brought, affected all societies in the world in the social, psychological and economic context, as well as in the field of health. (20), (21). Immigrants, one of the most vulnerable groups in the world population, are among the most neglected groups in humanitarian crises such as the global epidemic, despite all the hardships they experience. First of all, it would be appropriate to say that the problems of refugees before the epidemic deepened with the epidemic. In this context, as stated by Thomas et al. (22), first of all, it is important to consider immigrants as a separate subgroup that is disproportionately affected by Covid-19.

With the pandemic process, the way of service delivery in the public sector is expected to change and develop further in terms of speed, quality, efficiency, effectiveness and transparency. It has been seen during the pandemic process that society demands more transparency from the state. Although the public bureaucracy has traditionally operated on the basis of confidentiality, it can be mentioned that a transparent management approach has been adopted with the number of cases and other statistical information shared daily during the pandemic process.

It is vital for governments to provide people with accurate, useful and up-to-date information, especially in times of crisis. During the COVID-19 pandemic, governments started to provide

information through their national portals, mobile apps or social media platforms. Governments have started to publish statistics on the outbreak, which includes the total number of cases in the country, the total deaths, and the reporting of cases by region. Thanks to this situation, it has taken informed decisions about the daily routines of people with reliable information from public institutions, and it is a very important action in terms of the formation of public trust (23).

While researches reveal that the majority of immigrants have sufficient information about Covit-19, public institutions and organizations also reveal their inadequacy in conveying information about Covit-19 to immigrants. Social media and traditional media are the tools that immigrants use most in accessing information. However, since social media is one of the channels with the highest level of information pollution, the accuracy and adequacy of the information conveyed through this medium becomes controversial. Again, this situation may cause immigrants to get wrong information both about Covid-19 and about other practices in this process. In addition, it is known that in this process, news criticizing the measures and practices related to Covit-19 frequently appeared on social media. The fact that immigrants follow news sources only on social media increases the possibility of being affected by these news, but this also reduces the possibility of complying with the measures announced by public institutions and organizations, and may reduce the impact of the fight against the epidemic.

Considering the effects of the Covid-19 pandemic on health management and health services in Turkey, it can be said that Turkey has successfully managed this process compared to developing countries (24). However, when the situation is evaluated in terms of immigrants, a different picture emerges. Because the results of the studies examined within the scope of the study show that immigrants have problems in accessing health services during the pandemic process, since they are not citizens. Therefore, it can be said that the diagnosis, isolation and treatment of Covit-19 in the context of immigrants has not been sufficient, and immigrants are at more risk against the virus. It should be taken into account that this situation is likely to turn into a threat to general public health by increasing the possibility of the spread of the epidemic.

Covit-19 has reduced physical activity in the traditional sense in the field of education, as in other areas of life all over the world. As a result of the closures, access to education at all levels has become a crisis. The way to overcome this crisis is online education (25). Therefore, digitalization emerges as an important tool especially in the provision of new services during the pandemic period. In this process, there are findings in the literature that public institutions can perform their service delivery more effectively with digital transformation if they are supported by the necessary infrastructure works. However, research has revealed that immigrant students have difficulties in accessing distance education during the pandemic process. The reasons for this are the inconvenience of their living conditions and economic opportunities. Therefore, for immigrant students with low socioeconomic status, the fact that digitalization is only possible with a certain economic competence brings to light again.

It is known that immigrants prefer regions with lower prices in order to solve the housing problem, and the agglomeration that occurs in certain regions over time causes ghettoization. Since ghettoization contains many problems, especially hygiene, during the pandemic period, the importance of an inclusive spatial planning in the construction of life with the local people in the city emerges.

Numerical data have shown that immigrants face significant problems in accessing food and basic needs during the epidemic. In order to understand the needs of immigrants correctly and to develop the most appropriate sustainable solutions, both in extraordinary and ordinary periods, the necessity for local governments to become important actors of migration governance is to come to the fore. Since local governments are the closest units to the people who touch the daily life, the necessity of reorganizing the legal legislation in order to take the steps that will enable them to become effective actors in migration governance comes to light once again.

Immigrant workers, alongside nationals of the countries themselves, are often the first to be fired but the last to get access to testing or treatment. Migrant workers are often excluded from policy measures to address the national Covid-19 pandemic, such as unemployment benefits or social security and social protection measures. Even where access to Covid-19 testing or treatment is available, migrant workers, particularly those with irregular migrant status, may not be able to access this service for fear of arrest or deportation (26). Under the assumption that the epidemic is not over yet and its effects will continue in the coming periods, it is possible to talk about the inclusion of migrant workers in the national Covid-19 policy measures, which will be an appropriate step for the realization of equality and social justice.

In these days when immigration continues to be a global problem, Turkey continues to face this problem as a country that has a large number of immigrants across the world for a long time. It is certain that the problems experienced by immigrants during the pandemic require solidarity at a universal level, not within national borders. The epidemic conditions have once again revealed the importance of cooperation with third countries and international organizations, especially the UN, in the policies to be implemented and the support to be provided for immigrants.

The Covid-19 crisis is a health-based but economic and social crisis. For this reason, although the epidemic conditions necessitate social expenditures, the worldwide economic crisis aggravates the resource problem of countries. In addition, it is observed that the virus does not only threaten our health and economism, but also seriously affects social structures and individuals. It is possible to talk about the feeling of insecurity and being unsure of the future, while only immigrants lived before, with the epidemic, citizens and immigrants shared similar feelings and concerns.

Studies have accused immigrants and foreigners of spreading the disease in the country; In developed countries, anti-immigrant groups already exist, accusing immigrants of being more irresponsible in the spread of the disease and placing a burden on the health system. Considering that anti-immigrant sentiment has increased during times of economic distress, an increase in anti-immigrant sentiment on a global scale can be expected in the future.

Finally, considering the fact that the Covid-19 epidemic is not only a health crisis and the effects of this crisis will continue after the epidemic; Regarding the prevention of prejudiced attitudes and approaches towards immigrants, it is of particular importance that relevant institutions and organizations, especially public institutions and non-governmental organizations, make efforts to disseminate accurate information and to prevent a social conflict.

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