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).

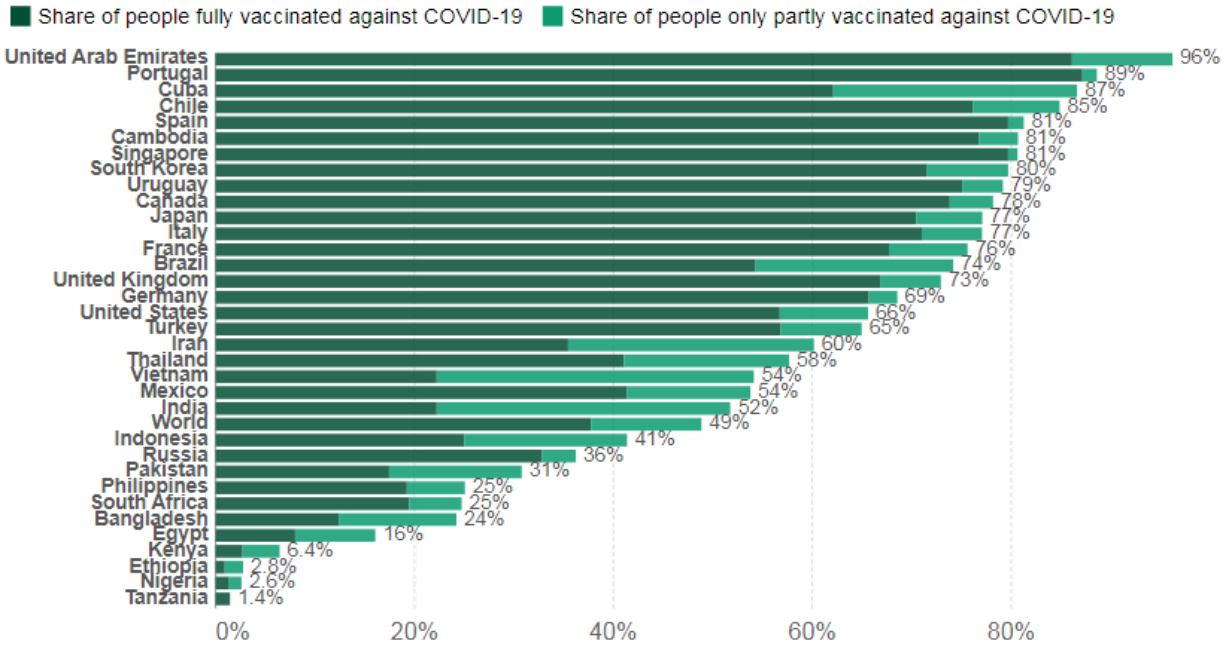

Figure 1. Vaccination rates against COVID-19; Source: (11)

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.

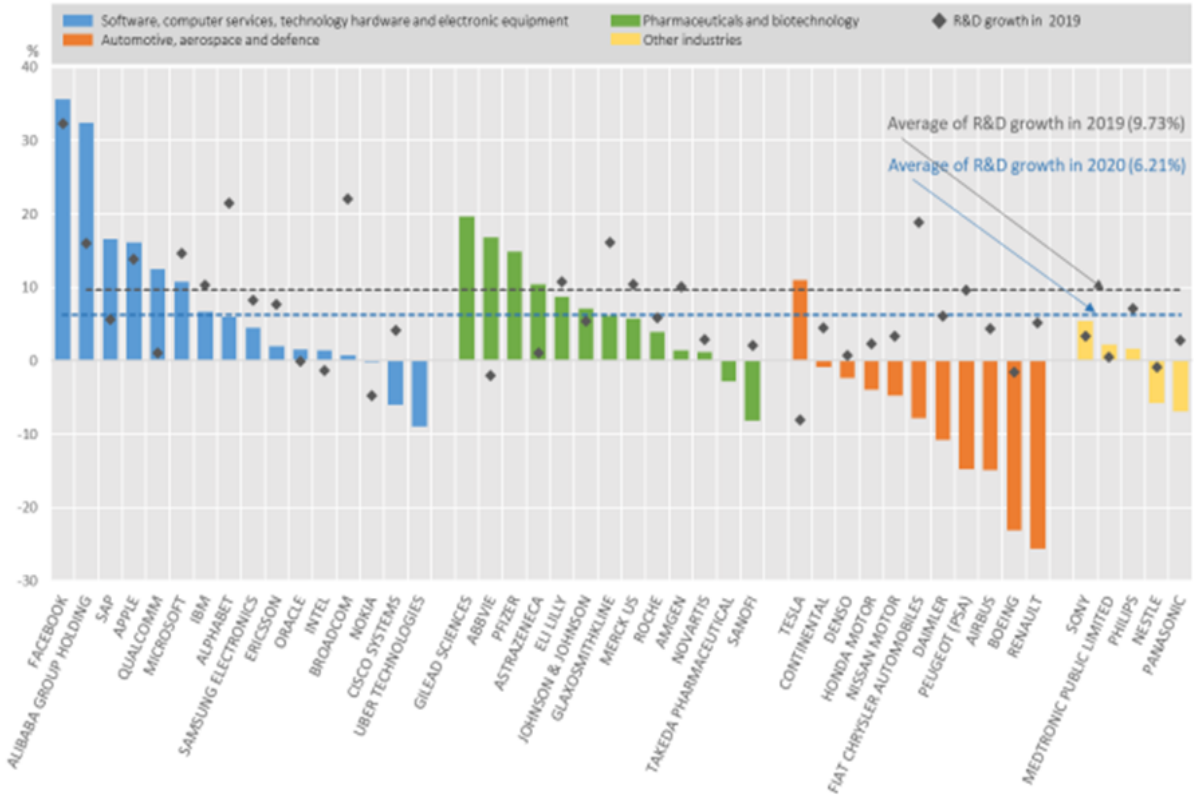

Figure 2. Reported nominal R&D expense growth in selected top R&D companies, 2020; Source: (17)

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).

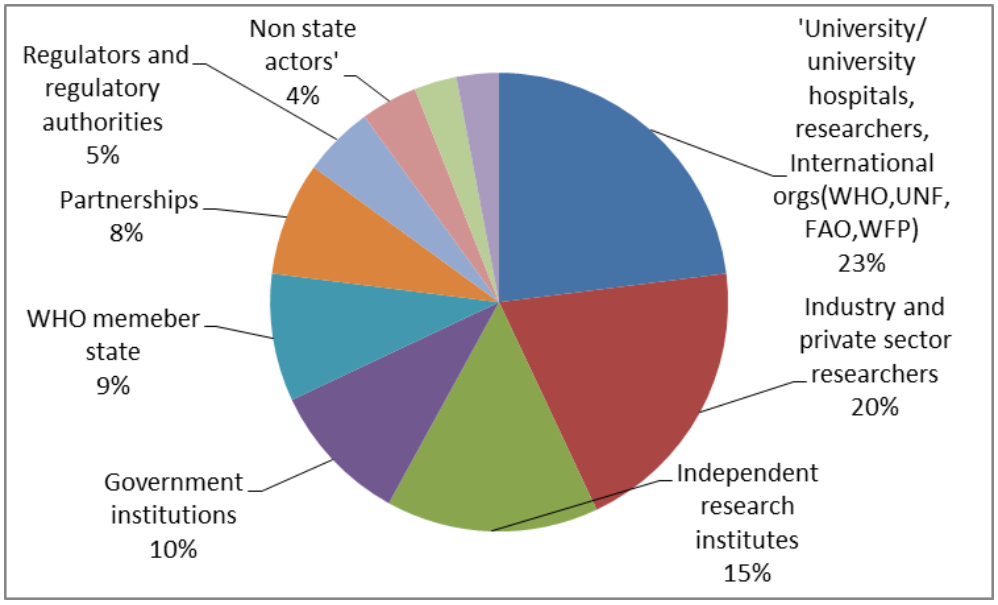

Figure 3. COVID-19 research and innovation collaboration; Source: (18)

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.

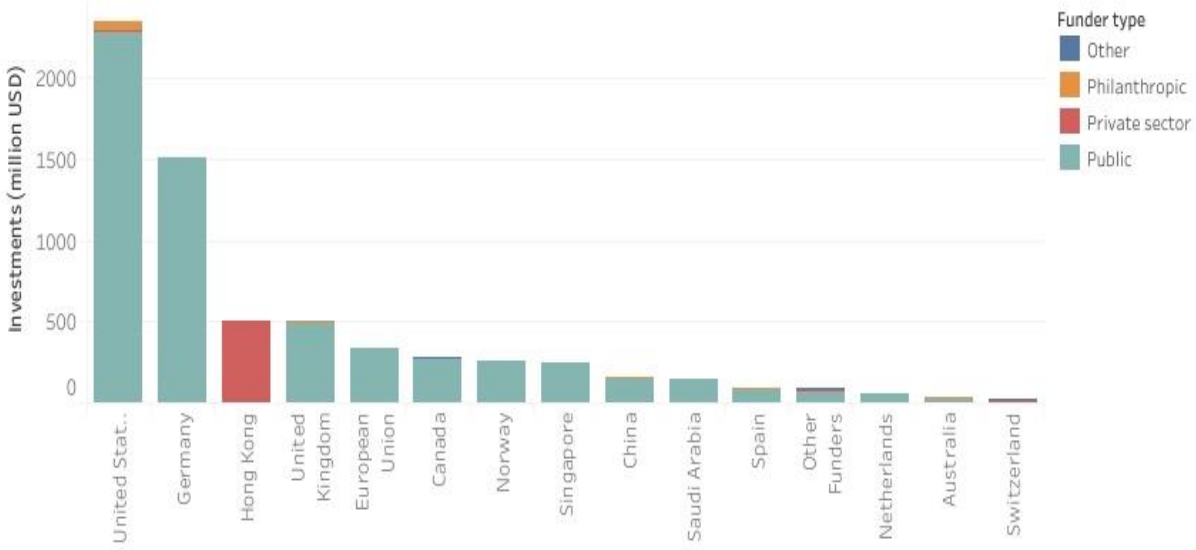

Figure 4. Source of COVID-19 vaccine R&D investments, by source country and funder type; Source: (19)

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.

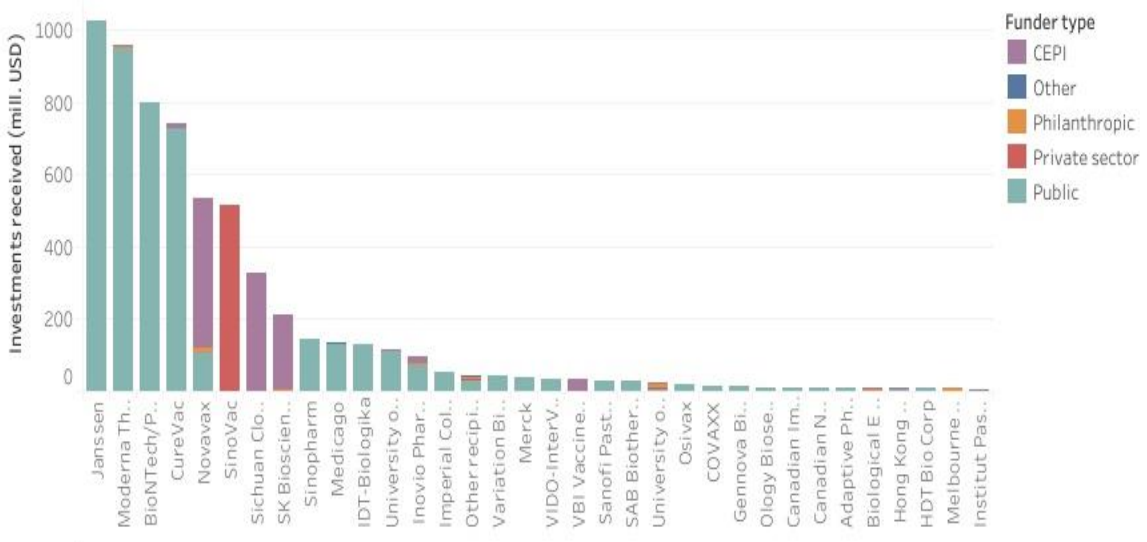

Figure 5. Main recipients of COVID-19 vaccine R&D investments, by funder type; Source: (19)

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.

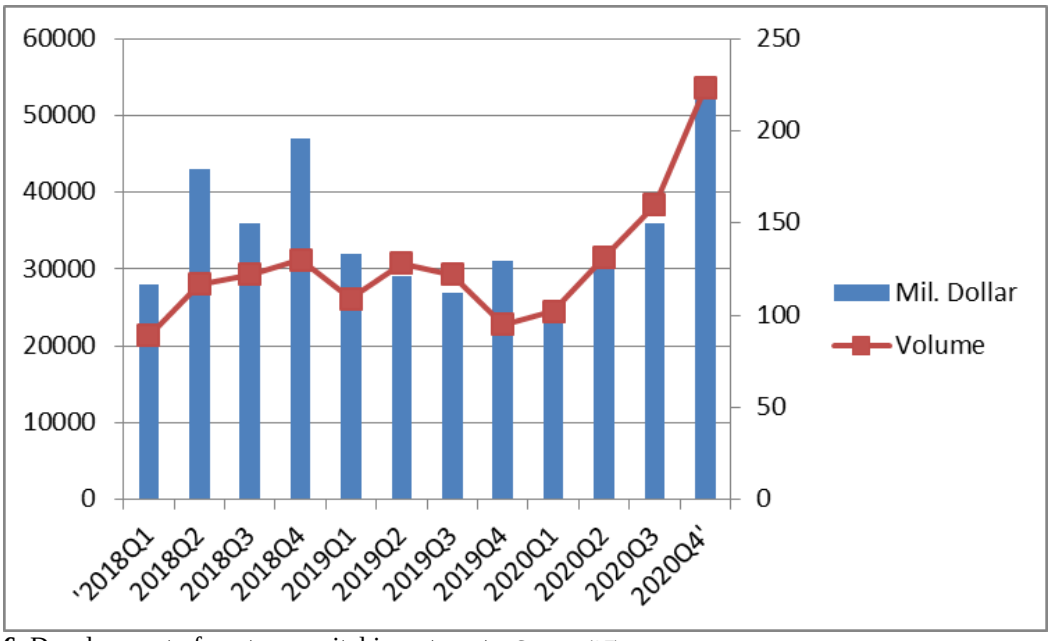

Figure 6. Development of venture capital investments; Source: (27)

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.

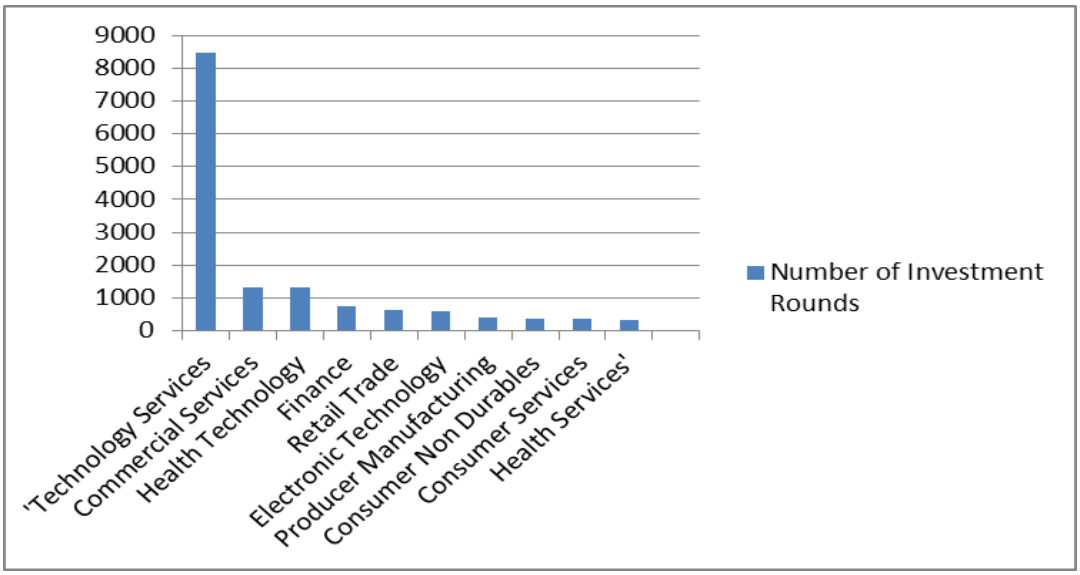

Figure 7. Venture capital investment by sector (2020); Source: (27)

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.

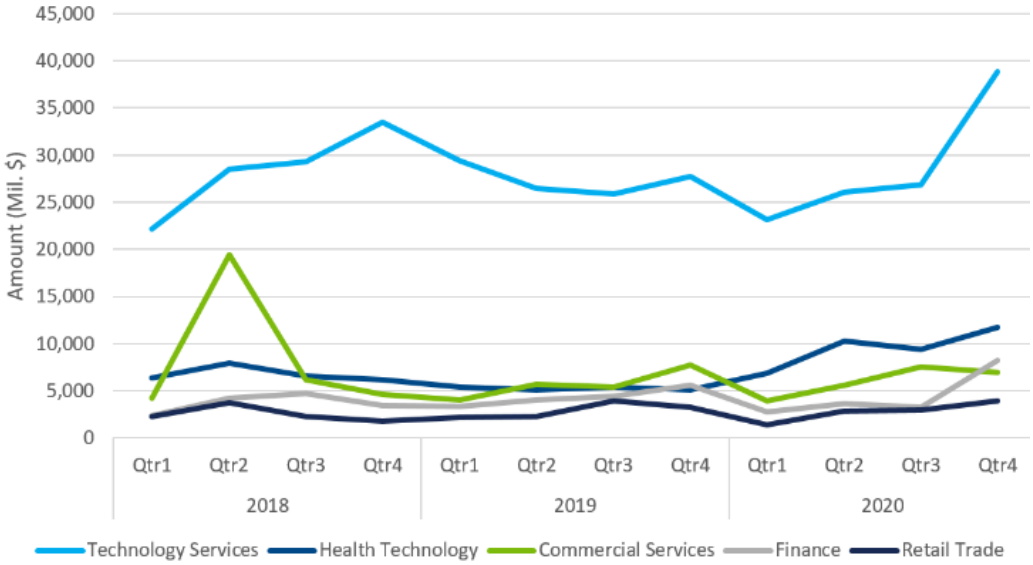

Figure 8. Sector growth; Source: (29)

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.

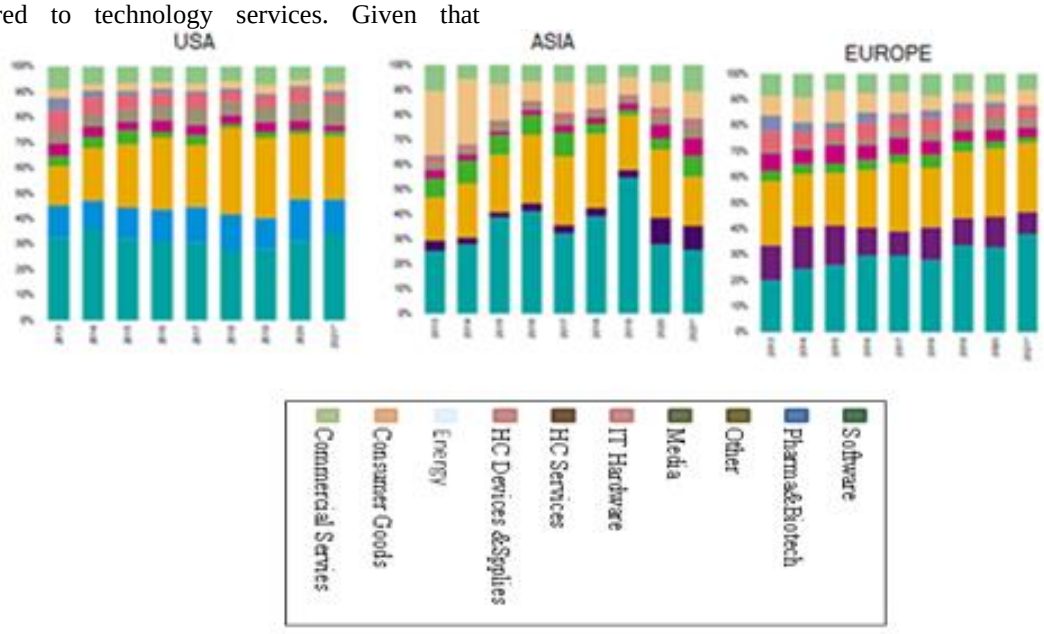

Figure 9. Venture financing of VC-backed companies by sector($B); Source: (29)

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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