



Digitalization in Healthcare - Mobile Health (M-Health) Applications

Sağlık Hizmetlerinde Dijitalleşme- Mobil Sağlık (M-Sağlık) Uygulamaları

Arzu Eşiyok, Sevilay Uslu Divanoğlu ve Resul Çelik

¹PhD Student, Aksaray University, Social Sciences Institute, Department of Business Administration, arzuesiyok1905@gmail.com, Orcid ID: 0000-0001-6126-8607.

²Assoc. Dr., Aksaray University, Faculty of Economics and Administrative Sciences, Department of Business Administration, sevilayuslu@yahoo.com, Orcid ID: 0000-0001-8210-2622.

³Instructor, Mersin University, Anamur Vocational School, Department of Marketing, clkresul@gmail.com, Orcid ID: 0000-0001-7605-5698.

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ABSTRACT

Nowadays, the rapid and effective delivery of health services is a very important issue. The integration of health services into technology-based systems has ensured the integration of the health field with an innovative style. With the development of technology and the diversification of technological tools, important steps have been taken in the digitalization of health services. These steps are taken for the digitalization of health services offer great opportunities for the health sector. The fact that health institutions follow the digitalization process closely and adapt quickly to this process has brought many advantages. This process provides great convenience in terms of providing better health services for both individuals who want to benefit from health services and all other stakeholders, as well as health personnel working in private or public institutions. Moreover, the concept of digital health, which has gained importance with the digitalization of health services, has many applications in itself. These are wearable technologies, virtual reality technologies, tele-medicine, e-health, 3d printers and m-health applications. Among these applications, mobile health technology makes a significant contribution to the delivery of health services. Individuals witness new developments in technology day by day and adapt easily to these developments. Increasing demand for smartphones/devices is a result of these developments. Therefore, mobile health applications that enable remote access and can be easily downloaded to smart devices are actively used by many users. It is possible to say that mobile health applications have positive effects as well as negative effects, especially on privacy and trust. Examples of these mobile health applications developed by the Turkey Ministry of Health are applications such as "Hayat Eve Sigar", "Korona Onlem", "E-Nabız", "MHRS (Central Physician Appointment System)" which have been popular recently. In this study, it is aimed to examine the positive and negative effects on health services by giving information about mobile health applications developed by the Turkey Ministry of Health for both citizens and health personnel.

ÖZET

Günümüzde sağlık hizmetlerinin hızlı ve etkin bir şekilde sunulması çok önemli bir konudur. Sağlık hizmetlerinin teknolojiye dayalı sistemlere entegrasyonu, sağlık alanının yenilikçi bir üslupla bütünleşmesini sağlamıştır. Teknolojinin gelişmesi ve teknolojik araçların çeşitlenmesi ile sağlık hizmetlerinin dijitalleşmesinde önemli adımlar atılmıştır. Sağlık hizmetlerinin dijitalleşmesi için atılan bu adımlar sağlık sektörüne büyük fırsatlar sunmaktadır. Sağlık kuruluşlarının dijitalleşme sürecini yakından takip etmesi ve bu sürece hızlı uyum sağlaması birçok avantajı beraberinde getirmiştir. Bu süreç hem sağlık hizmetlerinden yararlanmak isteyen bireylere hem de diğer tüm paydaşlara, özel veya kamu

kurumlarında çalışan sağlık personeline daha iyi sağlık hizmeti sunulması açısından büyük kolaylık sağlamaktadır. Ayrıca sağlık hizmetlerinin dijitalleşmesiyle önem kazanan dijital sağlık kavramının kendi içinde birçok uygulaması bulunmaktadır. Bunlar giyilebilir teknolojiler, sanal gerçeklik teknolojileri, tele-tıp, e-sağlık, 3d yazıcılar ve m-sağlık uygulamalarıdır. Bu uygulamalar arasında mobil sağlık teknolojisi, sağlık hizmetlerinin sunulmasına önemli katkı sağlamaktadır. Bireyler her geçen gün teknolojideki yeni gelişmelere tanık olmakta ve bu gelişmelere kolayca uyum sağlamaktadır. Akıllı telefonlara / cihazlara olan talebin artması bu gelişmelerin bir sonucudur. Bu nedenle uzaktan erişim sağlayan ve akıllı cihazlara kolayca indirilebilen mobil sağlık uygulamaları birçok kullanıcı tarafından aktif olarak kullanılmaktadır. Mobil sağlık uygulamalarının özellikle gizlilik ve güven üzerinde olumlu etkilerinin yanı sıra olumsuz etkilerinin de olduğunu söylemek mümkündür. T.C. Sağlık Bakanlığı tarafından geliştirilen bu mobil sağlık uygulamalarına örnek olarak son zamanlarda popüler olan “Hayat Eve Sığar”, “Korona Önlem”, “E-Nabız”, “MHRS (Merkezi Hekim Randevu Sistemi)” gibi uygulamalar verilebilir. Bu çalışmada, T.C. Sağlık Bakanlığı tarafından hem vatandaşlara hem de sağlık personeline yönelik geliştirilen mobil sağlık uygulamaları hakkında bilgi verilerek sağlık hizmetleri üzerindeki olumlu ve olumsuz etkilerin incelenmesi amaçlanmıştır.

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With the rapid increase in technological developments over time, a new era has emerged. With this period, which is called the digital age, some transformations are experienced. First of all, some concepts need to be explained. Although digitization and mathematization are used in the same sense, they are different in meaning. The concept of mathematization is a process that allows to create a digital representation of physical objects. Therefore, mathematization is the process of turning anything non-digital into a digital representation or artifact. From this point of view, digitalization means activating, improving or transforming the business process by making use of digitized data (Bouza, 2018). In other words, digitalization can be expressed as the transformation or marketing of interactions, communications, functions of business processes and business models into smart production with a mixture of different operations (I-Scoop, 2016). The concept of digital transformation is expressed as “the holistic transformation of organizations in human, business processes and technology elements in order to provide more effective and efficient service and to provide beneficiary satisfaction, in line with the opportunities offered by rapidly developing information and communication technologies and changing social needs, together with the digitization and digitalization process” (Yankin, 2019: 12-15). From this point of view, how the digital transformation in the field of health occurs is an issue that will be important. With the digitalization of health services, new definitions have emerged and many applications that have emerged as a result of digital transformation have started to be used in a wide range. In this study, information was given about mobile health, which is among the digital health applications, and the advantages and disadvantages of mobile health applications developed by the Turkey Ministry of Health were emphasized.

1. DIGITAL HEALTH

Digital health or the use of technologies for health has become an important practice to use routine and innovative forms of information and communication technology to meet the needs of health care. According to the World Health Organization, the term digital health is expressed as the use of information and communication technology to support health and health-related fields (World Health Organization, 2021). This term, which includes the concepts of e-health and its sub-component m-health also covers emerging fields such as artificial intelligence, big data and use in genomics. The use of digital technology in health services has brought an important dimension to the health sector. The integration of technology with health services has also facilitated access to health services. Digitization of health plays an important role by providing interaction between healthcare professionals and patients, being informative, easily diagnosing patients in hard-to-reach areas, providing evidence-based health services and supporting effective and positive health behaviors (Unlu and Satilmis, 2020: 920). Digital health, which is essentially a multidisciplinary field, covers disciplines such as computer science, engineering, information science, journalism, economics, clinical medicine, public health, epidemiology. This concept, which is expressed as the use of information and communication technologies in order to improve the health, health services and healthy life of individuals and societies, has become an important element of the technology world by being included in different fields (Kostkova, 2015: 1 - 2).

1.1. Digitization of Hospitals

It is expressed as integrating information and communication technologies into clinical and administrative business processes and integrating them with transactions in order to provide high quality digital hospital health services. By using advanced technologies and applications, it is aimed to ensure personnel efficiency in hospitals, to ensure that the procedures are fast and of high quality during the delivery of health services, and to ensure patient safety. Paper use in digital hospitals is very low due to the transfer of transactions to the digital environment. All information in the hospital is stored in digital media and examined when it is necessary (Kilic, 2017: 207). A digital hospital is defined by the Turkey Ministry of Health as a hospital where information technologies are used in administrative, financial and medical processes, all kinds of communication tools and medical devices are integrated with each other and with other information systems, and where healthcare professionals and patients can exchange data inside or outside the hospital with telemedicine and mobile medicine applications (Turkey Ministry of Health, 2021).According to a different definition, the digital hospital; It is a hospital where all kinds of medical

and non-medical information systems in health institutions are interconnected, equipped with advanced technology, and all operations are carried out with automation systems (Peker et al., 2018: 241). Since these hospitals have a smart card system, the risks that may cause any confusion are eliminated. All information about the patient is recorded in the system and physicians can access this information from different places when necessary. Thus, physicians can easily follow-up patients through mobile devices. These time-saving applications facilitate the service delivery of health personnel and provide a great advantage for increasing the time allocated to the patient (Ak, 2013: 973-974). Digital hospitals improve communication between healthcare professionals and between hospital and patient. In addition, digital hospitals have important advantages in terms of accessing the data processed in the system quickly and protecting patient privacy by protecting patient information with the help of passwords. However, it can be disadvantageous if patient information is exposed to any cyber-attack in the digital environment or faces the risk of data loss (Aslan and Guzel, 2020: 1643).

1.2. Digital Health Applications

Applications in digital health technologies can be expressed as wearable technologies, virtual reality technologies, tele-medicine, e-health, m-health and 3d printers (Demirci, 2018: 712). This concept, called wearable technology or device, is a computing technology that can be attached to the human body as a computer accessory or as part of a wearable material. These devices are used in different forms as watches, glasses, bracelets or jewelry. Wearable devices have basic features such as non-uniform, borderless, observable, controllable, careful and communicative. These devices are usually combined with different sensors to detect daily activities such as walking, running, sitting, eating. Many examples of applications can be given in the fields of health, elderly care, personal health, entertainment or performing arts (Ching and Singh, 2016: 19-20). The concept of virtual reality is expressed as a technology that draws users into a different world and makes them feel like they are in a real world by combining three-dimensional graphics prepared in computer environment with different screen technologies (Mazuryk and Gervautz, 1999:4).

Virtual reality technologies are used in many areas today. These are fields of education, health, games and entertainment, aviation, defense industry, etc. In addition, this technology is used for purposes such as education, treatment and rehabilitation in the field of health. Also, virtual reality technologies are used in educational processes or surgical procedures for healthcare workers and students in health departments (Ozturk and Sondas, 2020: 165-166).

In order to explain the concept of tele-medicine, the concept of tele-health needs to be expressed first. Telehealth is defined as the transfer of health services to people or patients living elsewhere through networks established (Ertek, 2011:127). Tele-medicine is defined as the clinical applications of tele-health services and the methods used for treatment and patient follow-up (Ertek, 2011:127). This method is classified in two different ways as the application used by healthcare personnel to share information among themselves and the application used between healthcare personnel and sick individuals. The technology, which has many applications, can provide health services, for example, for elderly or pregnant patients who cannot go to the doctor (Kilic, 2017: 206-207). In addition, tele-medicine applications had been very important during the pandemic period. Interactions were restricted due to the necessity of social isolation. For this reason, health services were provided to patients who could not access health institutions with the support of video calls over the internet (Capaci and Ozkaya, 2020: 261).

The concept of e-health is defined as the use of information and communication technologies in health services and the development of health services by preventing diseases. the letter "E"; It symbolizes the electronic, digital, internet-based technological structure of health services (Kilic, 2017: 205). In addition, there are many features expressed as the "10 e" of e-health. These are listed as efficiency, enhancing quality of care, evidence-based, empowerment of consumer and patients, encouragement, education, enabling information, extending the scope of healthcare, ethics and equity (Toygar, 2018: 106-107). Many examples can be given for the usage areas of e-health and the services put into practice by the Turkey Ministry of Health. These are services such as tele-medicine, tele-radiology, tele-cardiology, home health care. The e-health applications, which have a wide usage area, also host many services.

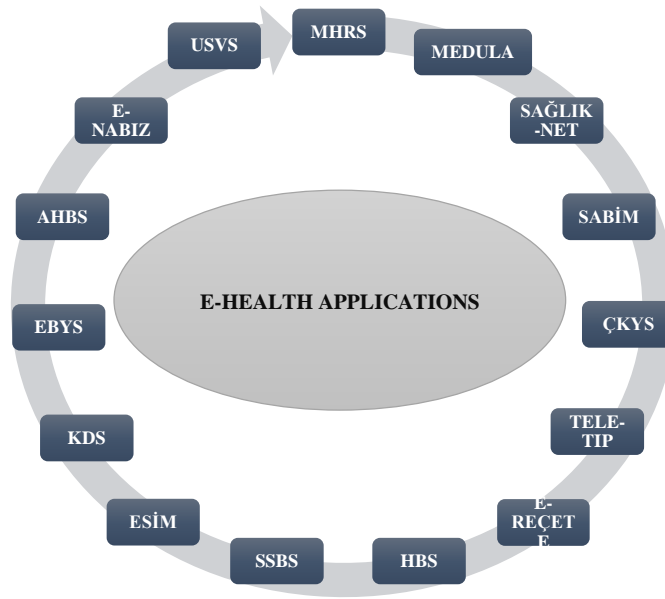


Figure 1. E-Health Applications

Source: Akca, 2013: 162-172; Isik, 2019: 24-28

3D printers are defined as a type of robot that can create three-dimensional products or objects that can be controlled via a computer (Aydın and Küçük, 2017:1). This technology, which is used in medicine and health services, has become increasingly widespread in the field of education as medical visualization products. This technology has come to an important position in the health sector as it is effective in many sectors. This method, which is used in medical technology, is also used in areas such as limb prostheses, assistive hearing aids, and dental health (Arslan et al., 2018: 100-102).

2. MOBILE HEALTH (M-HEALTH)

Mobile health is defined by the World Health Organization as medical and public health applications powered by mobile devices such as cell phones, patient monitoring devices, personal digital assistants, and other wireless devices (World Health Organization, 2021). It is expressed as a useful public health tool, especially in underserved environments (World Health Organization, 2021). According to a different definition, they are applications that enable health services to integrate with technologies such as digital environments, patient tracking devices, smart phones (Ozdemir and Sendir, 2020:211).

The number of mobile phone subscribers in countries is increasing day by day. The ubiquity of smartphones makes it easy to access mobile health applications. This technology, designed to adapt to the diagnosis and treatment processes of patients and to improve healthcare worker and patient education, also has the potential to address the human resources gap (Colaci et al., 2016:923). Many sectors play an important role in the use of mobile health technology. In addition to doctors and health workers who have a critical role in the delivery of health services, patients, relatives of patients or healthy people who are considered consumers are also an important part of this process. Moreover, health service providers, nursing homes, medical call centers, reimbursement institutions, private sector organizations, pharmaceutical and medical device companies and health-related non-governmental organizations play important roles in this process (Tezcan, 2016: 33-34).

2.1. Mobile Health Applications

Mobile health applications, which can be integrated with existing medical technologies, are used both for patient follow-up of healthcare professionals and for tracking personal health data of individuals (Kopmaz and Arslanoglu, 2018: 253). In addition, these applications are important for ensuring communication among healthcare professionals. The delivery of health services has been moved to smart devices thanks to mobile health technology. Many mobile health applications were made available to users by the Turkey Ministry of Health. The mobile health applications developed by the Turkey Ministry of Health, which can be downloaded from the Google Play Store and App Store application stores, are as follows (Google Play Store and App Store, Turkey Ministry of Health Mobile Applications).

Dr. E- Pulse: With this mobile application developed by the Turkey Ministry of Health on January 6, 2021, it is possible for patients and physicians to have video calls in order for people to access health services.

Vaccination: With this application, which was put into service by the Turkey Ministry of Health on January 10, 2021, physicians and health personnel can easily and quickly follow the vaccination process of citizens. Moreover, vaccination records can be made and vaccination appointments can be made.

Drug Tracking System: It is a mobile application that provides detailed information about the drug by querying whether the drugs offered for use in Turkey are registered in the system by scanning the QR code on the package. It was put into service by the Turkey Ministry of Health on May 3, 2021.

Health Pass: It is a mobile application that can keep vaccine, test and immunity certificates in international standards and is used during travel. Vaccine, test and immunity information can be transferred to the “Health Pass” application via the “e-Nabız” and converted into certificates, and the produced certificates can be safely stored on the phone. The application was put into service of citizens by the Turkey Ministry of Health on 21 June 2021. This application, which is compatible with the Digital Green Certificate standard published by the European Union, has been developed to facilitate the rapid and reliable progress of international travel and cooperation in the fight against pandemics between countries.

Investment Tracking System: It is an application that allows the collection of investment proposals in accordance with the needs programs, which provides more effective management of health investment processes in the Central and Provincial organization, planning, revision processes, and monitoring the construction levels of investments. It was put into service on 19 August 2021 by the Turkey Ministry of Health.

Statistics and Causal Analysis in Health: This application, which offers dynamic reports specific to each user, is open to all physicians and health managers in Turkey, including inspection, family practice, state, university, foundation hospitals, and medical centers. It was developed and put into service on 14 March 2020 by the Turkey Ministry of Health.

Corona Prevention: This mobile application, which was developed to inform and guide about the Covid-19 virus, was put into service by the Turkey Ministry of Health on March 20, 2020. Citizens can learn about the possibility of being infected with the corona virus disease by verifying their identity information in the Republic of Turkey and answering the questions asked.

Mental Health Support System: With this application specially developed for healthcare personnel, support can be obtained from specialist physicians. The mobile application was put into service by the Turkey Ministry of Health on March 29, 2020.

Filiation and Insulation Tracking: It was put into service by the Turkey Ministry of Health on April 9, 2020. Thanks to this application, the filiation teams carry out the entries of the positive cases close to their own location and the contacts of these cases through the system. Important information such as whether the danger still continues during the filiation studies and whether other people are at risk is carried out thanks to this application. In addition, physicians, family relatives, people with whom the positive case may come into contact based on the last hospital visits, and anyone who may come into contact with them at work are added to this application as suspects and brought to the attention of the filiation teams.

Hayat Fits Home: It is a mobile application developed by the Turkey Ministry of Health on April 10, 2020 to inform and guide about the new type of coronavirus (Covid-19) epidemic, to minimize the risks that may arise from the epidemic and to prevent its spread. With the application, citizens can follow the risk status and the intensity of the disease in the region they live in or in the places they want to go, on the map. In addition, the locations that need to be known for urgent needs such as hospitals, pharmacies, markets, stops are also shown to the citizens. In the application, it is ensured that people stay away from risky environments by adding their families or relatives to the list with approval. While the daily coronavirus table is included in the application, the “HES” Code information, which is also used in travels, can be accessed through the application (Turkey Ministry of Health, 2020).

Special Children Support System: It is a mobile application developed by the Turkey Ministry of Health on April 11, 2020. It provides online interviews to provide psychological support to children with autism or special needs and their families. The application, which supports children and their families with special mental needs and whose behavioral problems increase during the Covid-19 epidemic process, is a first in the world (Turkey Ministry of Health, 2020).

Central Physician Appointment System: It is a mobile application offered by the Turkey Ministry of Health on 18 December 2020 to the service of citizens. The “MHRS” (Central Physician Appointment System) application is a system that allows citizens to make an appointment with the physician they want and on the date they determine for all State Hospitals, Oral and Dental Health Hospitals and Centers affiliated to the Turkey Ministry of Health. It also offers the opportunity to make an appointment via the internet or call centers.

Integrated Enterprise Trading Platform: It was put into service on May 6, 2019 by the Turkey Ministry of Health for all health personnel employed in the health sector to carry out their personal transactions electronically, to provide information to voice or video calls, interactive training, social media cooperation and citizen portals.

UMKE Mobil: The National Medical Rescue Team application was put into service by the Turkey Ministry of Health on July 9, 2019. With this application, “UMKE” personnel working in the field will be able to share their current locations, send photos, videos, messages to each other using GPS, and also it is followed announcements and surveys through the mobile devices.

Ministry of Health Mobile Scanning: It is a document scanning application developed by the Turkey Ministry of Health on July 11, 2019.

Tele-Medicine: The application allows access to images of radiological examinations, reporting of the images, teleconsultation between radiologists, evaluation of medical images and reports in terms of quality and sharing them with citizens through e-Nabız application. It was put into service by the Turkey Ministry of Health on September 28, 2019.

Turkish Medical Congress: It is developed by the Turkey Ministry of Health on October 10, 2019. With the application, the QR codes required for participation in the congress can be obtained, and the events and program starts and announcements can be followed instantly during the convention.

e-Pulse e-Signature: The application, which allows the e-signature process to be carried out in the applications of the Turkey Ministry of Health, was put into service on October 25, 2019.

İNME 112: It provides communication between 112 personnel and İNME centers. Thanks to the application, which was offered by the Turkey Ministry of Health on November 1, 2019, it is ensured that health personnel act quickly by making a correct diagnosis.

White Code: the proceedings and lawsuits carried out within the scope of criminal law due to crimes committed against health personnel during the provision of health services are recorded and followed. It was put into service by the Turkey Ministry of Health on May 15, 2018.

Product Tracking System: It provides citizen-oriented services and has a high number of users. It is an application where all medical devices and cosmetic products produced or imported in our country can be followed from the production line to the place where they are sold and used, and to the patient. It was put into service by the Turkey Ministry of Health on May 30, 2018.

Turkey Nutrition Guide: It was put into service on 4 December 2018 by the Turkey Ministry of Health in order to inform the society about adequate and balanced nutrition and to explain all the conditions.

Obesity and Diabetes Clinical Guide: It was prepared as a guide in the prevention of obesity and diabetes, early diagnosis and timely treatment. It was put into service by the Turkey Ministry of Health on December 4, 2018.

112 Emergency Aid Button: Thanks to the application put into service by the Turkey Ministry of Health on January 17, 2017, in case of an emergency, the emergency service can be notified in case of an emergency in which the person or his/her relatives live or in the vicinity of the person and support can be obtained using location information.

Athlete Health: The athletes can see the content information whether the active ingredients of the drugs have a doping effect according to the publications of the World Anti-Doping Agency. It was put into service by the Turkey Ministry of Health on January 12, 2016.

Personal Health System (e-Pulse): Health data collected from health institutions can be accessed by citizens and health professionals via the internet or mobile devices. The application, where all health information can be accessed and managed, regardless of where the examinations, examinations and treatments are made, is a personal health record system where medical resumes can be accessed from a single place. The mobile application was put into service of citizens by the Turkey Ministry of Health on March 24, 2016.

Vaccine Tracking System: It was developed by the Turkey Ministry of Health on March 21, 2015. It has been created to monitor the temperature of the products (vaccine and anti-serums) subject to the cold chain, which are shipped and managed, in the vehicles they are stored in warehouses and cabinets at all points, in real time, to record the necessary information, to monitor them from the relevant centers by making reports, and to warn the relevant people with appropriate methods when necessary.

Accessible Health Communication Center: Hearing-impaired citizens can call the 112 Emergency Service, initiate a video call or instant messaging through this mobile application in case of emergency. Citizens who can send their location using GPS can also share photos of the emergency with the operators. This application was put into service by the Turkey Ministry of Health on August 24, 2015.

Accessible Audiobook: Developed by the Turkey Ministry of Health on 4 December 2015 to facilitate access to basic health information for disabled citizens.

Ministry of Health Electronic Document Management System: It was prepared by the Turkey Ministry of Health on April 15, 2014 for initialing and e-signature processes.

City Hospitals Mobile Applications: The applications that enable you to reach the place you need to go in the hospital without the help of anyone. Thanks to the application, step-by-step visual guidance is provided within the hospital and it is possible to go to the desired place by using the disabled route and the elevator. This application, which shows the route information from the current location in order to reach the hospital, also shows the nearest pharmacies. These mobile health applications; Ankara City Hospital, Konya City Hospital, Başakşehir Çam and Sakura City Hospital, Kayseri City Training and Research Hospital, Yozgat City Hospital, Bursa City Hospital, Mersin City Training and Research Hospital and Manisa City Hospital.

Stay Fit Turkey: Developed by the Turkey Ministry of Health to lead a healthy life. It is an application that contains features such as calorie calculation of consumed foods and ideal weight measurement (Bozdemir, 2021:18).

Poisonings: With the application, which provides information about poisoning types and first aid recommendations, emergency phones can be called with a single click. It is also possible to forward to the location inquiry service via SMS.

Do you drink water? It aims to gain the habit of drinking water and to bring the consumption amount to a certain level.

Tooth Brushing: It aims to better explain and teach children the importance of brushing with games and animations.

Emergencies: It provides information and first aid advice for every emergency and is an application that can be applied in emergency situations.

There have been some studies on the use of smart devices and mobile applications. According to a study conducted by TUIK (Turkish Statistical Institute), the rate of having mobile phones / smart phones in households in 2021 is 99.3%, the rate of having desktop computers is 16.8%, the rate of having laptops and netbooks is 38.3%. rate was determined as 26.3% (Turkish Statistical Institute, 2021). With the increase in the use of smart devices, the usage rates of mobile health applications have also increased. The rate of using e-government services, where access to health services is possible, was expressed as 58.9%. In addition, among the purposes of using e-government services, obtaining information from websites belonging to public institutions or organizations ranked first with 55.8% (Turkish Statistical Institute, 2021). The rate of seeking health-related information (injuries, diseases, nutrition, improvement of health, etc.) in 2021 among individuals' specific purposes of using the Internet was found to be 69.6%. While the rate of searching for health-related information in 2020 was 65.4%, the rate of making an appointment with a doctor via the website or an application (hospital, health center, "e-Nabız", "MHRS", etc.) was found to be 34.4%. The rate of seeking health-related information (injuries, diseases, nutrition, improvement of health, etc.) in 2021 among individuals' specific purposes of using the Internet was found to be 69.6%. While the rate of searching for health-related information in 2020 was 65.4%, the rate of making an appointment with a doctor via the website or an application (hospital, health center, "e-Nabız", "MHRS", etc.) was found to be 34.4%. Moreover, online access to personal health information (appointment, prescription, report, examination results, etc.) was determined as 25.1% (Turkish Statistical Institute, 2021).

According to the report titled "State of Mobile" by mobile analytics company App Annie, the usage rates of mobile devices have increased significantly in 2020 with the emergence of the Covid-19 pandemic (App Annie, 2021). In Turkey, mobile applications have been downloaded 3.4 billion times. While the average time spent in these applications was 3.4 hours a day in 2019, it increased to 4 hours in 2020. While the e-government application ranks seventh among the mobile applications with the highest monthly active users, the mobile health application "Hayat Eve Sığar" ranks ninth. "Hayat Eve Sığar" ranked third among the most downloaded mobile applications. In addition to weight loss and exercise applications, the number of downloads has increased in "Korona Önlem" and "Hayat Eve Sığar" (Journo, 2021).

2.2. Advantages of Mobile Health Applications

There are many advantages of mobile health technology, which plays an active role in the delivery of health services. These advantages can be listed as follows (Guler and Eby, 2015: 46; Tezcan, 2016: 36; Mercan et al., 2020: 68);

- Thanks to mobile devices, consumers have the opportunity to have personal technology. Also, these devices have an important task in ensuring health and well-being by reaching large masses
- This technology, which allows people to live healthier, plays an active role in the management of diseases and in reducing the expenditures for health services.
- Thanks to the health applications available on smart devices, necessary connections are provided between patients and healthcare professionals, and in this process, great opportunities arise for collaborators.
- Acting as a communication tool that enables the sharing of real-time information and messages.
- Mobile health applications, which have the ability to monitor and report the health status of patients, offer video conferencing for communication between patients and healthcare professionals.
- It is a great convenience for users who use these applications, by reminding them about exercising and taking their medications.
- Remote control of outpatients and inpatients, monitoring their vital signs, transmitting information to the relevant health institution when necessary, and providing necessary information to health workers are among the advantages of this technology.
- Mobile health applications are high quality, low cost and have the feature of providing high compatibility and benefit.
- Providing the opportunity to access health or disease statuses from anywhere at any time by monitoring them remotely.
- With the use of mobile health applications, it causes an increase in the satisfaction rates of patients and their relatives, the productivity of doctors using technology and the level of health knowledge.
- Enabling privacy, security and privacy.

2.3. Disadvantages of Mobile Health Apps

While mobile health applications have advantages, they also have some disadvantages. These can be listed as follows (Bozdemir, 2021: 25; Kopmaz and Arslanoglu, 2018: 254; Arslan and Demir, 2017: 24);

- It is an important discussion topic that users access personal data by asking permission during the use of mobile health applications so there is uncertainty about security and privacy issues.
- Technology-related literacy is not sufficient.
- Due to the incorrect entry of patient information into the systems and the nature of systematic errors, unqualified persons can access this information and even a cyber-attack may occur on patient records.
- The targeted health outcomes are not sufficient due to the fact that smart health applications are not used regularly by some users.
- With the increase in the number of users of mobile applications, their dependence on the internet and smart devices is increasing.
- It is also possible for patients with chronic illness or physical ailment to experience some negative outcomes by making diet or exercise programs through mobile health applications without the support of a doctor.

3. CONCLUSION

Great opportunities have been created for the digitalization of health services. In order to keep up with the digital age with the development of technology, many sectors have developed new systems by taking advantage of technology. The health sector has also integrated its services with technology in order to provide health services more effectively and quickly.

Health institutions actively use electronic-based systems such as electronic document management system, hospital information systems, central physician appointment system, personal health system. Artificial intelligence, wearable devices, virtual reality technologies, tele-medicine, electronic health and mobile health applications are also technology-based health applications that come to the fore today. Mobile health applications make an important contribution to the provision of health services by enabling access to all kinds of personal health information, sharing information among health institutions, and enabling remote access through smart devices. Increasing demands for smart devices and closely following technological developments have increased the interest in mobile applications. Mobile health applications developed by the Turkey Ministry of Health can be downloaded from smart devices by users and access to all kinds of health-related information at any time.

Mobile health applications have features such as video calls between patients and physicians, making vaccination follow-ups, creating certificates such as vaccines and tests, accessing information about the Covid-19 pandemic, getting mental health support for healthcare personnel, making an appointment at the desired hospital at a suitable date, providing health data on demand and accessing the data at any time. These applications, which have a wide variety of features, save time for both healthcare professionals and patients, and also enable the delivery of healthcare services quickly and easily.

Mobile health applications support people to live a healthy life, to receive health services whenever they want, to reduce health expenditures, and to strengthen the communication between people who want to receive health services and health workers. However, there are also disadvantages such as hesitancy on issues such as security and privacy in line with the information requested from the users, the increasing dependence on technology, the lack of technology literacy at the desired level, the possibility of system-based errors being exposed to cyber-attacks, and the inability to achieve the desired result in the provision of health services.

It is thought that determining the effect of mobile health applications on health services will make an important contribution to the literature. For future research, it may be recommended to evaluate mobile health applications under different topics.

AUTHOR DECLARATIONS

Declarations of Research and Publication Ethics: This study has been prepared in accordance with scientific research and publication ethics.

Ethics Committee Approval: Since this research does not include analyzes that require ethics committee approval, it does not require ethics committee approval.

Authors Contributions: The authors contributed equally to the study.

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