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JHMT Editorial

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EVALUATION OF WEARABLE HEALTH TECHNOLOGIES IN ALZHEIMER'S PATIENTS: A SYSTEMATIC REVIEW*

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Research Article

Abstract

Aim: This study aims to identify the use areas of wearable health technologies developed for Alzheimer's patients and to present the results obtained.

Methods: The study was conducted using the systematic review method. Scanning was carried out on Medline, Scopus, and Web of Science (Core Collection) electronic databases.

Results: The scanning resulted in 798 publications. At the end of the detailed full-text analysis, 5 articles that were found to be suitable for the study were evaluated. Usage areas of WHTs have been determined

to prevent possible falls, plan daily activities (personalized care planning, medication follow-up, disease management), and improve recall and autobiographical memory.

Conclusion: The research is important in terms of giving information about wearable health technologies that developed for Alzheimer's patients. However, we need more evidence related to the use of these technologies. The study additionally observed that the social media effect significantly affects the impulse purchases of consumers.

Keywords: Alzheimer's Disease, Wearable Health Technology, Wearable Devices, Biosensor, Systematic Review

INTRODUCTION

The elderly population is increasing rapidly throughout the world, including in developed and developing countries (WHO, 2011; WHO, 2021). In parallel with the increase in the elderly population, the frequency of chronic diseases is also increasing (Bilir, 2006). Alzheimer's Disease (AD), a chronic brain disorder like all neurodegenerative diseases, is the most common type of dementia (Acosta and Wortmann, 2009; OECD, 2013) and is among the most common chronic diseases in the elderly population (Bilir, 2006). Due to the aging of the population and the increase in the number of elderly individuals with AD (Eroymak and Yiğit, 2017; Eroymak and Yiğit, 2020; OECD, 2013), the use of technological solutions developed to help these patients gain importance (Maresova et al., 2018). In this context, it is seen that there is an increased interest in health technologies that address the health problems of the elderly population and can contribute positively to their lives. These technologies make a significant contribution to meeting the needs of elderly individuals in all areas related to basic health services, personal care, safety, protection, independence, and participation in social life (Ekici and Gümüş, 2016).

The health care needs of the elderly are an important and priority issue. AD, negatively affects the cognitive and physical capacities of patients, causing them to need long-term care (Aşiret and Kapucu, 2015; OECD, 2013). The need for long-term care increases the importance of technical support in care processes. For this reason, the development and use of wearable health technologies are increasing rapidly for Alzheimer's patients to maintain their independence, improve their cognitive status, mood, and social functions, and reduce unnecessary service use (Maresova et al., 2018).

Wearable health technologies; it is defined as electronic and computer-based devices such as jewelry, watches, glasses, clothes, hair bands, wristbands, implants that can be carried

on the body to collect data on the health status of individuals (Özkan, Yeşilaydın and Bülüç, 2018; Wright and Keith, 2014). Thanks to wearable health technologies, it is possible to motivate individuals to monitor and evaluate their health status and to control their health (Aydan and Aydan, 2016). As a matter of fact, with these health technologies, all kinds of data that inform the health status of users such as sleep patterns, heart rate, the number of calories burned, body temperature, sugar, and oxygen levels in the blood can be collected. The data obtained can be used to monitor the health status of individuals and to carry out the diagnosis and treatment process. Thanks to wearable technologies, it has become possible to monitor individuals with chronic health problems 24 hours a day, 7 days a week (Özkan, Yeşilaydın and Bülüç, 2018). In addition, thanks to remote monitoring and monitoring systems, patients' health information during the day (heart rhythm level, etc.) can be obtained with the help of sensors, and they can create warnings or alarms when necessary (Ekici and Gümüş, 2016). This provides the opportunity for early intervention in case of any negativity (Sopic et al., 2018). Similarly, wearable technologies are also used for security purposes. For example, with accelerometer-based wearable sensors, it is possible to detect and prevent negative and abnormal situations that patients may experience such as falling, exposure to high heat or smoke (Ekici and Gümüş, 2016). In short, thanks to wearable health technologies, it is possible to continuously monitor the health results of individuals and to intervene remotely and instantly (Ouertani et al., 2017; Şimşir and Mete, 2021). This situation reduces the time individuals spend in health centers and contributes to a better quality of life in their environment. In recent years, smart home systems have been developing to include remote monitoring. Thanks to these developments, it becomes possible to obtain data that can be used in the long term by making use of the activities of the patient in the environment and the wearable sensor data on it (Ekici and Gümüş, 2016). In addition, the integration of these technologies into health services removes time and location restrictions and creates a more flexible health system (Şimşir and Mete, 2021). As a matter of fact, with the integration of wearable health technologies into health services, service providers have more information about the users of the service. This situation plays an important role in the development of personalized, informative, preventive, protective, and interventional health services for individuals. Wearable health technologies also have a positive effect on improving the quality of life of individuals (Aydan and Aydan, 2016). However, some problems may be encountered in integrating wearable health technologies into the health system and the lives of users (Habibipour, Padyab, and Ståhlbröst, 2019; Padyab and Habibipour, 2021). In addition, there are some obstacles in the implementation of these technologies, as they are relatively expensive and cause privacy and security concerns about patient data (Wright and Keith, 2014).

However, it is stated that the widespread use of these technologies is extremely beneficial in terms of reducing the delivery costs of health services, providing quality and effective services, facilitating access to services, and providing remote control of the health status of users (Özkan, Yeşilaydın and Bülüç, 2018).

It is stated that the interest in the development of wearable health technologies has increased in recent years, especially to help Alzheimer's patients who need to be constantly monitored and kept under control (Maresova et al., 2018; Ouertani et al., 2017). It is seen that these technologies have been developed and used intensively to locate Alzheimer's patients, monitor them remotely, ensure their safety, plan daily life activities such as nutrition, taking medication, exercising, and meeting their socialization needs (Abbate, Avvenuti and Light, 2012, Abbate, Avvenuti and Light, 2014; Buckley et al., 2019; Grierson, Zelek and Carnahan, 2009; Khattak et al., 2011; Ouertani et al., 2017; Woodberry et al., 2015). It is stated that the data obtained within the scope of wearable health technologies have an important place in diagnosing Alzheimer's patients, monitoring the patients, and developing their treatments (McCarthy and Schueler, 2019).

In this systematic review, as it was aimed to identify and compile the results of wearable health technologies developed for Alzheimer's patients and also experimentally tested on Alzheimer's patients. In other words, it is to determine in which areas wearable health technologies are used for Alzheimer's patients and to compile experimental studies and results for these areas. In addition to these, in particular, we aimed to clarify the following aspects too: (a) Which technologies have been used? (b) How did patients react to these technologies? (c) What is the purpose of the WHT used? (d) What is the clinical significance of WHT? (e) What is the benefit of WHT to patients or their families?

1. RESEARCH METHODOLOGY

First of all, we determined the search strategy by getting support from a database expert. We set our inclusion and exclusion criteria. Then, we developed a common search strategy for all databases in line with the possibilities offered by the databases. Table 1 shows examples of this strategy. Studies were obtained by searching electronic databases and pooling in Mendeley, the online reference management software. MEDLINE, SCOPUS, and WEB OF SCIENCE (CORE COLLECTION) were used as an electronic database. The scan was conducted between 1-31 June 2020. Since the topic is up-to-date, the date restriction was not used while searching. An

ethical committee report was not necessary for this study which used secondary data derived from the literature.

Table 1. The Search Words Used in Databases

Databases	Search words	Number of articles
Medline	(MH "Alzheimer Disease") OR (TI alzheimer) AND wearable technology OR wearable devices OR wearable sensor OR biosensor OR wearable	153
Web of Science (Core Collection)	TS=(alzheimer disease OR alzheimer) AND TS=(wearabletechnology OR wearable devices OR wearable sensor OR biosensor OR wearable)	319
Scopus	(TITLE-ABS-KEY ("Alzheimer disease" OR "alzheimer")) AND (TITLE-ABS-KEY ("wearable technology" OR "wearable devices" OR " wearablesensor" OR biosensor OR wearable)) AND (LIMITTO (LAN GUAGE , "English")) AND (LIMIT-TO (DOCTYPE , "ar")	326

The two authors decided on inclusion and exclusion criteria, and in case of disagreement, a consensus was reached through verbal deliberation. Articles were selected according to inclusion and exclusion criteria. Because the main purpose of this study is to determine the testing areas of wearable health technologies on Alzheimer's patients. The studies were examined using content analysis to discuss the results of the studies, the methods used, the purpose of the study in detail, and to obtain answers to the research questions.

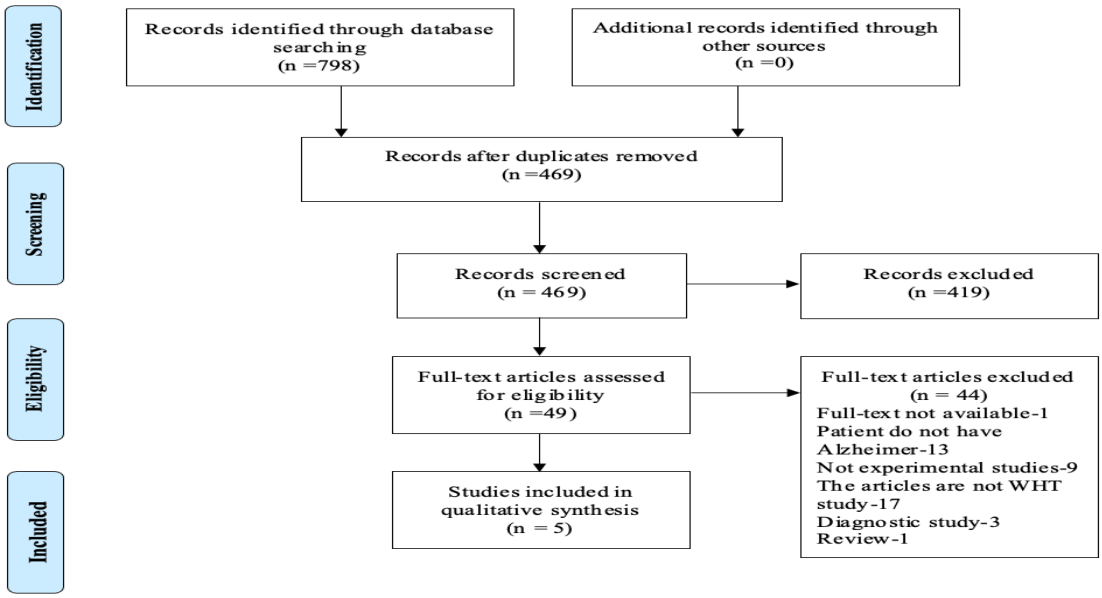

Figure 1: Prisma Flow Chart

After searching the databases as given in Table 1, a total of 798 articles were reached. By examining the titles and abstracts of these articles, the articles found suitable for the study were tried to be selected. Although the title and abstract section were examined, full-text analysis was made in the unsure articles. After this stage, 49 articles were included in the full-text review. A full-text review was conducted for 49 articles, taking into account the inclusion and exclusion criteria. As a result, 5 articles that met the inclusion and exclusion criteria were reached.

Inclusion Criteria

The included studies consisted of articles published in English with full texts available. It was essential in the studies that wearable health technologies were tested on Alzheimer's patients.

Exclusion Criteria

Non-article publications - papers, book chapters, editorials, commentary pieces, and opinion articles are excluded. Wearable health technology studies in patients with Parkinson's and other forms of dementia were not included.

2. FINDINGS

In the articles we included in the full-text examination; Studies have been conducted on usability and acceptability, planning of daily life, contribution to cognitive development, testing of a heterogeneous motion detection sensor (Abbate, Avvenuti and Light 2014; Buckley et al., 2019, Silva et al., 2017; Woodberry et al., 2015; Khattak et al., 2011).

Table 2. Summary of Studies

Study ID	Subjects	Purpose	Method	Results	Conclusion	Usage Areas
Abbate et al., 2014	4 patients with AD (age 75-92)	Testing WHT's usability and acceptability	Patients staying that long-term nursing home were observed for 1 month. Patients have worn shimmer sensor and Enobio sensor for 1 month.	It has been concluded that ergonomics and aesthetics are important for patients to accept these devices.	The design and development of a monitoring device must consider its target users' preferences.	Prevent possible falls
Buckley et al., 2019	36 patients with AD (age 71-83) and 26 person control	In-depth analysis of walking behavior	Participants were asked to wear a tri-axial accelerometer continuously on the lower back for one week. Upon completion of the recording, participants removed the device and sent it back.	Gait variable time-series of walking activity were significantly different between groups for one hour during the evening hours (between 18:00 and 20:00)	The application of SPM may therefore help indicate when impairments occur and may contribute toward personalized care, disease management, and targeted intervention strategies for people with AD.	Gait analysis, disease management, personalized care, medication follow-up
Silva et al., 2017	46 patients with AD (age 62-80)	The cognitive effects of wearable cameras	Patients were divided into 3 groups (Memo, SenseCam, Diary). The data were collected for 6 weeks, and the researcher and the subjects were interviewed 11 times.	SenseCam provides a clear and continuous benefit for the recall of autobiographical memories.	As a result of the study, improvements were found in autobiographical memory, which was greater than other forms of memory rehabilitation and continued six months later.	Autobiographical memory rehabilitation
Woodberry et al., 2015	6 patients with AD (age 64-84)	Providing evidence that SenseCam improves the ability to remember	The experimental period lasted 3.5 months. The study followed a within-subject longitudinal design, comparing the effects of using Sense-Cam vs. a written diary to aid retrospective recall of significant personal events. The patients were given a SenseCam and a laptop computer, with detailed instructions on how to use both. The process was followed by the wife of the patients and the experimenters.	The subjects were able to remember the events they did not remember while looking at the SenseCam images.	Whether the improvements in the recall will occur in the long term is not yet known, but positive results have been obtained in the short term.	Make it easy to remember
Khattak et al., 2011	A patient with AD (age not specified)	Focusing on activity recognition using video-based, wearable sensor-based, and location-based activity recognition engines	The heterogeneous sensor system was placed in a test center for a patient with AD, and observations were made.	It has been observed that the human activity recognition engine (HARE) works well for patients with AD.	The HARE system can also be used for diseases such as Parkinson's and depression.	Remote monitoring of the individual with the control of daily activities and reminders

In the articles, we identified the use of a fall tracking sensor, a wearable camera to facilitate recall, a wearable device that collects gait analysis data, motion detection placed in the living environment, and a heterogeneous sensor system that allows remote control and monitoring (Table 2). In this case usage areas of WHTs; It has been determined as preventing possible falls, planning daily activities (personalized care planning, medication follow-up, disease management), improving recall and autobiographical memory. The fact that wearable health technologies have been studied in a small number of Alzheimer's patients is among the important results we have obtained, and it is among the points emphasized in the articles we included in the research (Abbate et al., 2014, Silva et al., 2017). Another important issue in the use of WHT's by Alzheimer's patients is that their usability and acceptability by patients are also important, as well as facilitating the care of patients and improving their health status (Abbate et al., 2014).

Wearable health technologies have the goal of being curative as well as making the lives of patients and their relatives easier. The results of SenseCam (Table 2), especially used to improve memory, are quite exciting (Silva et al., 2017; Woodberry et al., 2015). However, much more randomized controlled experimental studies are needed in this area. The use of the wearable camera with clinically positive results is possible with the help of patient relatives or care nurses. It is thought that a person living alone and at the beginning of his illness may need to be reminded of the use of the device by a staff member. The heterogeneous sensor system, on the other hand, can provide a great convenience for patient relatives in terms of facilitating the work of nursing nurses in nursing homes. Thanks to the device that performs the gait analysis of the person, the time intervals where the patient's follow-up should be done more tightly, the planning of the person's day (such as the time to take a walk) will make the patient's care process more quality and comfortable.

The inclusion of 5 articles (Table 2) as a result of the screening reveals that the studies on the subject are insufficient. On the other hand, besides the fact that not all studies are randomized controlled studies, the studies were not deemed sufficient in terms of duration and number of patients, too. In studies, it has been determined that Alzheimer's patients have different levels of diseases such as advanced, mild, and moderate (Abbate et al., 2014; Silva et al., 2017; Woodberry et al., 2015). In fact, this point appears to us as a different criterion in the diversity of studies in the field. In other words, it is not enough for wearable health technologies to be studied only on

Alzheimer's patients. The results should be carefully evaluated by working with Alzheimer's patients at different stages of the disease. In other studies, we see that wearable technologies are also used and studied to detect subtypes of dementia and to diagnose Alzheimer's disease early. In particular, wearable gait analyzers are promising for the future with the development of algorithms that can analyze these data (Hsu et al., 2014; Avitabile, Coviello and Margiotta, 2015). This actually guides us that wearable health technologies can be useful not only after diagnosis but also in early diagnosis.

3. DISCUSSION

The rapid change in health technologies, the increase in chronic diseases, the aging of the population, the increase in the expectations of patients and their relatives, the demand for access to health information, the increase in the health literacy level of individuals have brought the issue of wearable health technologies in health services to the agenda (Özkan, Yeşilaydın and Bülüç, 2018; Wright and Keith, 2014). There has been an unprecedented increase in the development of these technologies in the healthcare field (Maresova et. al., 2018), and a variety of products continue to be developed. Among these products, wearable medical sensors, motion sensors, bed sensors, medication reminders, and dispenser systems developed for remote monitoring are used extensively (Ekici and Gümüş, 2016). The increase in users' interest in wearable health technologies also reveals the importance of these technologies in the health sector. As a matter of fact, these technologies provide effective solutions to the problems of disabled individuals, patients with chronic health problems and the elderly, and play an important role in facilitating their daily lives (Özkan, Yeşilaydın and Bülüç, 2018).

Increasing health problems of elderly individuals generally increase the economic and psychological burden on society and individually on their families (Maresova et al., 2018). Especially in dementia-type diseases such as AD, which the elderly population suffers from, the needs of caregivers to cope with this disease arise (Matthews et al., 2015). In this respect, the development of health technologies that will contribute to the independent life of these patients gains importance (Powell-Cope, Nelson and Patterson, 2008). It is stated that the restriction of the lives of Alzheimer's patients, who need to be kept under constant surveillance, creates an important area of difficulty for them. In this context, a wearable device that allows these patients to interact

with their families and relatives in a secure and limited social network area has been developed and put into use (Ouertani et al., 2017). Similarly, it has been determined that another wearable device developed to help Alzheimer's patients who have significant deterioration in their periodic memories to remember events has a positive effect on the autobiographical memories of the patients (Woodberry et al., 2015). The results obtained from another wearable sensor, which was developed for the planning of daily living activities of Alzheimer's patients, revealed that this device is useful for providing better care to patients (Khattak et al., 2011). As can be seen, with the development of wearable health technologies, solutions have been found to various problems experienced by elderly individuals with AD. Developments in wearable health technologies have also increased the success in medical applications.

However, an issue as important as the development of technologies is the adoption of these technologies by older individuals who use them. While some technologies are adopted very quickly, the adoption and acceptance of the use of some technologies are at a lower level (Dunn, Runge and Snyder, 2018; Mitzner et al., 2019; Padyab and Habibipour, 2021). Another issue to be considered is ensuring that individuals do not give up on the use of technologies that they easily adapt and use at the beginning. For this reason, these technologies must be interesting and flexible enough to be used by individuals (Aydan and Aydan, 2016).

The negative mental state created by social isolation causes the health problems of elderly individuals to worsen and their quality of life to decrease (National Academies of Sciences, Engineering, and Medicine, 2020). Similarly, the restriction of the lives of Alzheimer's patients, who must be kept under constant surveillance, poses a significant challenge for their social life (Ouertani et al., 2017). As a matter of fact, it is stated that the use of health technologies based on social needs will contribute to the happiness of elderly individuals (Ekici and Gümüş, 2016) and will have a positive effect on improving their quality of life (Aydan and Aydan, 2016; Pulli et al., 2012). Considering the physical and mental health problems of the patients in question, it is thought that the comfortable use of the devices developed will increase the expected effect of WHTs on patients and the disease. However, more qualified studies are needed to clearly demonstrate this effect. In addition, the need to increase the number of participants in the studies is among the important results obtained.

The articles in this study; focused on usability and acceptability, planning of daily life, contribution to cognitive development, testing a heterogeneous motion detection sensor. These issues should be studied further and their effects on individuals such as patients, their relatives, and health personnel should be revealed. As the studies are carried out, the benefit of individuals from WHT will increase by identifying the deficiencies and making the regulations. In particular, the results of the article, which tests the usability and acceptability of wearable devices, draw attention to ergonomics and aesthetics, which are not in the foreground (Abbate et al., 2014). Even if it is an extraordinary device, a device that is not used by patients will not benefit anyone. Therefore, there is a need for wearable devices that care about the comfort of the patient and perhaps need to be personal specially designed.

Considering that the number of Alzheimer's patients will increase further shortly (Alzheimer Association, 2021), increasing more experimental, observational, and case-controlled studies of WHTs on Alzheimer's patients will be a proactive approach in terms of preparation for this disease. It is also important to evaluate the developed devices within the scope of health technology evaluation. The increase in the number of WHT soon will facilitate the development of the health policies of countries. Conducting cost studies will also facilitate decision-making processes on an institutional basis or in long-term care homes.

Developments in the field of wearable health technologies guide and support digital transformation in the fields of health education, health policies, and policy implementations. In this respect, it is foreseen that the full integration of these technologies into health systems will increase the benefits of the applications in health services, decrease the costs and minimize the errors in the process. Therefore, technology companies, policymakers, patient relatives, researchers, and even insurance companies need to work together (Maresova et al., 2018). This is important in terms of considering WHTs from different perspectives.

4. CONCLUSION

As a result of the evaluation, it was determined that WHTs were used to prevent possible falls, to plan daily activities (personal care planning, medication follow-up, disease management), to improve recall and autobiographical memory in individuals with AD. There are different wearable devices in the evaluated articles. More studies should be done to clearly state the benefits of these

wearable technologies on Alzheimer's patients and their relatives. The research is important in terms of providing information about wearable health technologies developed for Alzheimer's patients. However, need more evidence related to use of these technologies. In this context, it is recommended to make further research that has high evidence value such as meta-analysis about the use of wearable health technologies in these patients.

In this article, publications published outside of "Scopus, Web of Science, Medline" databases, which have a language other than English and whose full text is not available are not included. This situation constitutes the limitation of the study. In addition, in this study no quality assessment was made. However, if the number of WHT studies on Alzheimer's patients increases, it may be possible to conduct systematic studies with quality assessment. In this case, it is recommended to use quality assessment checklists and various quality assessment tools for systematic reviews and meta-analyses. This situation also was constituted the second limitation of the study.

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References

Abbate, S., Avvenuti, M. and Light, J. (2012). MIMS: A minimally invasive monitoring sensor platform. *IEEE Sensors Journal*, 12(**3**), 677–684. https://doi.org/10.1109/JSEN.2011.2149515

Abbate, S., Avvenuti, M. and Light, J. (2014). Usability study of a wireless monitoring system among Alzheimer's disease elderly population. *International Journal of Telemedicine and Applications*, 1–8. https://doi.org/10.1155/2014/617495

Acosta, D. and Wortmann, M. (2009). What is dementia? In M. Prince and J. Jackson (Ed.), Alzheimer's Disease International World Alzheimer Report (pp. 14–21). Alzheimer's Disease International.

Alzheimer Association. (2021). Global Dementia Cases Forecasted to Triple by 2050. The Alzheimer's Association International Conference 2021. USA.

Aşiret, D. G. and Kapucu, S. (2015). Alzheimer Hastalarının Bilişsel ve Davranışsal Sorunları

Üzerine Etkili Bir Yöntem: Anımsama Terapisi. *Hacettepe Üniversitesi Hemşirelik Fakültesi Dergisi,* 2(**3**), 60–68.

Avitabile, G., Coviello, G. and Margiotta, N. (2015). Preliminary study on gait variabilty analysis with a single axis gyroscope for Alzheimer and Parkinson's diseases. *International Journal of Biology and Biomedical Engineering*, 9, 155-158.

Aydan, S. and Aydan, M. (2016). Sağlık Hizmetlerinde Bireysel Ölçüm ve Giyilebilir Teknoloji: Olası Katkıları, Güncel Durum ve Öneriler. *Hacettepe Sağlık İdaresi Dergisi,* 19(**3**), 325–342.

Bilir, N. (2006). Değişen Sağlık Örüntülerinde Halk Sağlığı Çalışanlarının Rolü: Kronik Hastalıklar ve Yaşlılık Sorunları. *Toplum Hekimliği Bülteni,* 25(**3**), 1–6.

Buckley, C., Mc Ardle, R., Galna, B., Thomas, A., Rochester, L. and Del Din, S. (2019). Evaluation of Daily Walking Activity and Gait Profiles: A Novel Application of A Time Series Analysis Framework. Proceedings of the Annual International Conference of the IEEE Engineering in Medicine and Biology Society, EMBS, 2482–2485.

Dunn, J., Runge, R. and Snyder, M. (2018). Wearables and the medical revolution. *Personalized Medicine*, 15(**5**), 429-448.

Ekici, K. S. and Gümüş, Ö. (2016). Technology Usage in Older Ages. *Ege Journal of Medicine*, **55**(Supplement), 26–30.

Eroymak, S. and Yiğit, V. (2017). Alzheimer Hastalığının Maliyet Analizi. *Süleyman Demirel Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 4(**29**), 167–196.

Eroymak, S. and Yiğit, V. (2020). Cost Effectiveness Analysis of Alzheimer's Disease. *Turkiye Klinikleri Journal of Health Sciences*, 5(**1**), 99–111. https://doi.org/10.5336/healthsci.2019-66536

Grierson, L. E. M., Zelek, J. and Carnahan, H. (2009). The Application of A Tactile Way-Finding Belt to Facilitate Navigation in Older Persons. *Ageing International*, 34(4), 203–215. https://doi.org/10.1007/s12126-009-9039-2

Habibipour, A., Padyab, A. M. and Ståhlbröst, A. (2019). Social, Ethical and Ecological Issues in Wearable Technologies. AMCIS 2019, Twenty-fifth Americas Conference on Information Systems, Cancun.

Hsu, Y. L., Chung, P. C., Wang, W. H., Pai, M. C., Wang, C. Y., Lin, C. W., ...and Wang, J. S. (2014). Gait and balance analysis for patients with Alzheimer's disease using an inertial-sensor-based wearable instrument. *IEEE Journal of Biomedical and Health Informatics*, 18(**6**), 1822-1830.

Khattak, A. M., Truc, P. T. H., Hung, L. X., Vinh, L. T., Dang, V. H., Guan, D., Pervez, Z., Han, M., Lee, S. and Lee, Y. K. (2011). Towards Smart Homes Using Low Level Sensory Data. *Sensors*, 11(**12**), 11581–11604. https://doi.org/10.3390/s111211581

Maresova, P., Tomsone, S., Lameski, P., Madureira, J., Mendes, A., Zdravevski, E., Chorbev, I., Trajkovik, V., Ellen, M.and Rodile, K. (2018). Technological Solutions for Older People with Alzheimer's Disease: Review. *Current Alzheimer Research*, 15(**10**), 975–983.https://doi.org/10.2174/1567205015666180427124547

Matthews, J. T., Lingler, J. H., Campbell, G. B., Hunsaker, A. E., Hu, L., Pires, B. R., Hebert, M. and Schulz, R. (2015). Usability of a Wearable Camera System for Dementia Family Caregivers. *Journal of Healthcare Engineering*, 6(**2**), 213–238. https://doi.org/10.1260/2040-2295.6.2.213

McCarthy, M. and Schueler, P. (2019). Can Digital Technology Advance the Development of

Treatments for Alzheimer's Disease? *The Journal of Prevention of Alzheimer's Disease-JPAD*, 6(**4**), 217–220. https://doi.org/10.14283/jpad.2019.32

Mitzner, T. L., Savla, J., Boot, W. R., Sharit, J., Charness, N., Czaja, S. J. and Rogers, W. A. (2019). Technology adoption by older adults: findings from the PRISM trial. *The Gerontologist*, 59(**1**), 34-44.

Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *PLoS Med* 6(7): e1000097. doi:10.1371/journal.pmed1000097

National Academies of Sciences, Engineering and Medicine. (2020). Social Isolation and Loneliness in Older Adults: Opportunities for the Health Care System. Washington, DC: The National Academies Press. https://doi.org/10.17226/25663.

OECD. (2013). Emerging trends in Biomedicine and Health Technology Innovation: Addressing the Global Challenge of Alzheimer's.

Ouertani, H. C., Al-Mutairi, A., Al-Shehri, F., Al-Hammad, G., Al-Suhaibani, M., Al-Holaibah, M. and Al-Saleh, N. (2017). A Smartwatch Centric Social Networking Application for Alzheimer People. *International Journal of Advanced Computer Science and Applications*, 8(**12**), 357–361.

Özkan, O., Yeşilaydın, G. and Bülüç, F. (2018). Innovation and Global Issues Congress III: Extended Abstracts Book. In N. Bilici, R. Pehlivanlıand K. Ashırkhanova (Ed.), Wearable Health Technologies (pp. 114–119). Innovation and Global Issue in Social Sciences.

Padyab, A. and Habibipour, A. (2021). Issues and Adoption Barriers in Wearable Technologies. *International Journal of Technology Diffusion (IJTD)*, 12(**1**), 75-89. http://doi.org/10.4018/IJTD.2021010104

Powell-Cope, G., Nelson, A. L. and Patterson, E. S. (2008). Patient Care Technology and Safety. In R. G. Hughes (Ed.), Patient safety and quality: An evidence-based handbook for nurses (pp. 207-220). Rockville.

Pulli, P., Hyry, J., Pouke, M. and Yamamoto, G. (2012). User Interaction In Smart Ambient Environment Targeted for Senior Citizen. *Medical and Biological Engineering and Computing*, 50(**11**), 1119–1126. https://doi.org/10.1007/s11517-012-0906-8

Rita Silva, A., Salome Pinho, M., Macedo, L.and JA Moulin, C. (2017). The cognitive effects of wearable cameras in Mild Alzheimer disease–An experimental study. *Current Alzheimer Research*, 14(**12**), 1270-1282.

Sopic, D., Aminifar, A., Aminifar, A. and Atienza, D. (2018). Real-Time Event-Driven Classification Technique for Early Detection and Prevention of Myocardial Infarction on Wearable Systems. *IEEE Transactions on Biomedical Circuits and Systems*, 12(**5**), 982-992.

Şimşir, İ. and Mete, B. (2021). Sağlık Hizmetlerinin Geleceği: Dijital Sağlık Teknolojileri. *Journal of Innovative Healthcare Practices*, 2(**1**), 33–39.

WHO. (2011). Global Health and Aging. National Institute on Aging. National Institutes of Health. U.S. Department of Health and Human Services (No. 11-7737). USA. NIH Publication.

WHO (2021). Ageing and Health. https://www.who.int/news-room/fact sheets/detail/ageing-and-health.

Woodberry, E., Browne, G., Hodges, S., Watson, P., Kapur, N. and Woodberry, K. (2015). The Use of Wearable Camera Improves Autobiographical Memory in Patients with Alzheimer's Disease. *Memory*, 23(**3**), 340–349. https://doi.org/10.1080/09658211.2014.886703

Wright, R. and Keith, L. (2014). Wearable Technology: If the Tech Fits, Wear It. *Journal of Electronic Resources in Medical Libraries*, 11(**4**), 204–216. https://doi.org/10.1080/15424065.2014.969051

https://dergipark.org.tr/tr/pub/ijhmt Doi Number: 10.31201/ijhmt.1122825

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RELATIONSHIP BETWEEN PATIENT SATISFACTION AND HOSPITAL BRAND IMAGE: A META-ANALYTIC STUDY

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Abstract

Aim: In this meta-analytic study, the relationship between satisfaction and brand image variables was investigated from the perspectives of patients and hospitals.

Methods: After our review of the literature which covered 2010 and 2021, 19 studies that met the inclusion criteria were analyzed with the meta-analysis method. The Comprehensive Meta-Analysis package program was used in the analysis of the data.

Results: The sample consisted of 6,038 studies on the subject. It was determined that 100% of the studies were published as articles, 68.4% were in English, 31.6% were published between 2010 and 2015, and 68.4% were published between 2016 and 2021. According to the random effect model, a statistically significant, positive, and strong relationship (r: ~0.50) was determined between patient satisfaction and hospital brand image variables.

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Conclusion: According to the results of the research, a positive and strong relationship was found between patient satisfaction and hospital brand image. In this context, it can be recommended that hospital administrators who want their hospitals' brand image to be perceived by health service recipients as high should attach more importance to patient satisfaction.

Keywords: Patient Satisfaction, Branding, Hospital Image, Hospital Brand

INTRODUCTION

Today, the way for a business to survive in the long term is to achieve a competitive advantage (Porter, 1985). This issue is of critical importance in ensuring the existence, and financial sustainability of healthcare organizations in a sector such as healthcare services where a chaotic, destructive and intensely competitive environment prevails.

One of the most important ways to achieve a competitive advantage in health services is to ensure patient satisfaction, an important quality indicator (Ng and Luk, 2019). On the other hand, for a healthcare business to acquire a more competitive advantage, it is very important that has a positive corporate brand image (Hawrysz et al., 2021).

It has been shown that there is a relationship between patient satisfaction and hospital brand image concepts, and brand image affects satisfaction (Gronholdt et al., 2000). In some studies, it has been shown that patient satisfaction has positive effects on the corporate image (Bankaoğlu, 2013), while in some studies, hospital brand image has positive effects on patient satisfaction (Sukawati, 2021; Diputri and Yusuf, 2019). In the study, studies examining the relationship between patient satisfaction and brand image were subjected to meta-analysis and the relationship between them was tried to be examined.

1. BACKGROUND

The fact that the quality of health service, which is one of the elements of patient satisfaction in the health sector, cannot be fully perceived even after the service is received (Gill and White, 2009) increases the significance of the variables such as patient satisfaction and hospital brand image even more (Altaf et al., 2018). From this point of view, in the next section, the definitions of the related variables, the relationships between them, and why they are important for health care organizations were discussed.

1.1. Patient Satisfaction

The concept of satisfaction can be defined as a satisfactory situation or the degree of fulfillment of needs and it is determined by the relationship between expectations and perceived performance (Oliver, 1999). Similarly, the concept of patient satisfaction is expressed as a psychological satisfaction level between expectations and perceptions (Erdem et al., 2008). The situation where the perception exceeds the expectation level defines as satisfaction (Ng and Luk, 2019).

Although the terms "health services" and "marketing" were regarded as concepts away from each other until the 1970s, the importance of marketing health services was realized in the following periods and these concepts started to use together (Macstravic, 1990). As a result of which the patient-centered provision of services and therefore the concept of patient satisfaction have come to the fore (Afrashtehfar et al., 2020).

Patients' being satisfied with the services they receive from hospitals plays a critical role in patients' recommending the hospital to others, maintaining relations with the same health institution, continuing to use hospital services, being willing to pay more to the health institution, and complying with treatment (Hoşgör and Cengiz, 2020).

1.2. Hospital Brand Image

Brand image is the set of perceptions that emerge from the connotations in the minds of consumers about the brand (Keller, 1993). According to Zhang (2015), consumers make decisions when they purchase something mostly by considering the brand image rather than the product. Similarly, Aaker (1991) emphasized that having a good and well-established brand image could provide competitive advantage for businesses within the scope of strategic management.

Brand image, a relatively new concept for the healthcare industry, is important for healthcare organizations to gain competitive advantage (Hawrysz et al., 2021). Owing to the nature of health services, it is unlikely to evaluate the quality fully even after the services are received (Gill and White, 2009), which is made the brand image even more important for hospitals (Altaf et al., 2018).

It can be thought that the recipients of health services who perceive the brand image of a hospital as high quality and highly prestigious, will have a positive perspective on the health institution and its services. In this context, it can be stated that the patient or their relatives will have a high level of satisfaction, quality perception and positive behavioral intentions. According

to Wu (2011), patients' having an appropriate hospital brand image strengthens their intentions to choose that hospital. Similarly, in a study conducted in Turkey (Zor and Biçer, 2020), it was reported that the hospital brand image had a significant effect on their re-preferring the hospital from which they previously received service and perceiving that the hospital is a high quality hospital.

Brand image, an important concept in the marketing literature, has a vital role, especially in the medical tourism industry (Fong and Goh, 2021). In a study on medical tourists (Cham et al., 2014), it was revealed that hospital brand image had a positive and significant effect on the variables such as perceived service quality and re-preference intention. On the other hand, in a study in which the effects of corporate image on internal customers were investigated (Huang and Lai, 2021), it was reported that training and orientation studies on brand image affected the brand value of the institution positively. It can be stated that the brand image perceived positively by internal customers will also reflect positively on external customers, which will generally improve patient satisfaction.

Literature review demonstrated that studies conducted the relationship between patient satisfaction and hospital brand image and their effects on each other are available. The effect of brand image on satisfaction has been shown in many studies, and in some studies, it has been concluded that brand image has a mediating effect on company loyalty (Zhang, 2015). As was stated by Gronholdt et al. (2000), brand image has an effect on satisfaction in many different areas such as education and health sectors.

Variables such as perceived service quality, loyalty and brand image play a crucial role in determining patient satisfaction (Vimla and Taneja, 2020). In a study (Bankaoğlu, 2013), patient satisfaction was determined to affect the corporate image positively whereas in some studies, hospital brand image was reported to affect patient satisfaction positively (Sukawati, 2021; Diputri and Yusuf, 2019). In their study, Hoşgör and Cengiz (2020) reported that brand image positively affected patient satisfaction in private hospitals, but such an effect was not significant in public and university hospitals.

2. RESEARCH METHODOLOGY

2.1. Study Pattern and Process Followed

In this meta-analytic study, the significance and direction of the relationship between patient satisfaction and hospital brand image variables were investigated. Ethics committee approval is not required for the study. In a meta-analysis, a particular subject is discussed in the axis of quantitative research on the studies that were conducted on different samples in different geographical areas (Siyonr, 2018). According to Paul and Barari (2022), meta-analysis is a collection of statistical methods that integrates the results of multiple studies to provide an aggregated summary of information in a particular research area. According to Paul and Barari the meta-analysis process consists of five stages.

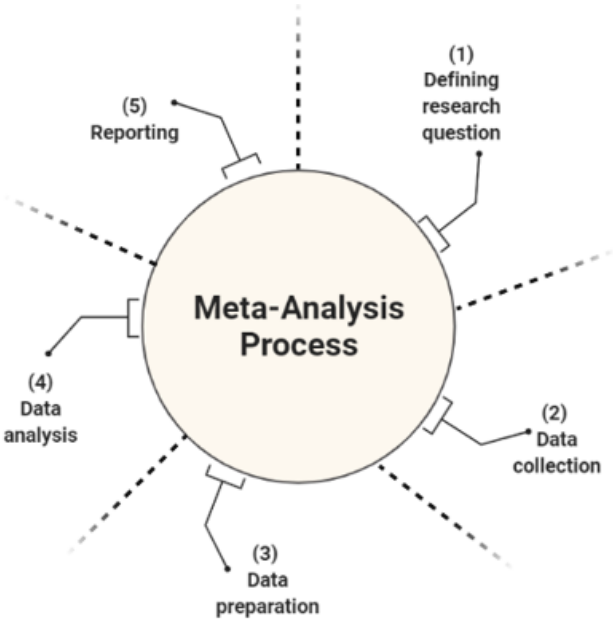

Figure 1: Meta-Analysis Process

(Created by the authors of the present study by browsing "biorender.com")

Meta-analysis studies, which enable researchers to produce information with a high level of evidence and to process scattered data (Benligül et al., 2022), significantly contribute to the health management literature and help managers of health institutions understand the perceptions and expectations levels of the patients about services.

In the meta-analysis method, relationship-, effect- and difference-seeking studies are frequently used. In particular, the main purpose of relationship-based correlational studies is to determine the average effect size and homogeneity by combining the relevant data. As in the

present study, the calculated correlation coefficient (r) is also an effect size parameter (Gedik and Üstüner, 2017). The hypothesis of the present study is as follows:

H_1: "There is a positive and significant relationship between patient satisfaction and hospital brand image".

2.2 Literature Scanning Strategy and Inclusion Criteria

Google Scholar, Ulakbim, National Thesis Center, Science Direct, Web of Science, Researchgate, Social Science Research Network (SSRN) and PubMed databases were used to search for publications suitable for the scope of the subject. The aforementioned databases were first scanned on March 28, 2022, and necessary controls were performed on May 6, 2022. During the systematic compilation phase, the PRISMA (Preferred items for Systematic Reviews and Meta-Analyses) directive was followed (Moher et al., 2009).

While the Turkish databases were scanned, Turkish words "hasta memnuniyeti" (patient satisfaction) and "hastane marka imajı" (hospital brand image) or "hastane imajı" (hospital image) keywords were used. For articles in English, the keywords "patient satisfaction" and "hospital brand image", or "hospital image" were used. The inclusion criteria of the study are as follows:

- Studies carried out between 2010 and 2021
- Studies addressing the relationships between patient satisfaction and hospital brand image
- Studies written in Turkish or English
- Studies in the types of articles, thesis or full-text papers
- Values that should be reported to carry out meta-analysis (Pearson correlation coefficient or sample size with standardized regression coefficient)

The titles, abstracts and full texts of the publications on the subject were scanned by the authors of the study independent of each other. Cohen Kappa coefficient of agreement between raters was 0.87. According to Landis and Koch (1977), a coefficient above 0.80 is interpreted as a perfect fit. From the 1877 studies; 1848 studies were excluded from the evaluation due to the fact that they are outside the health sector, there are deficiencies in statistical reporting, and they are in

the form of a summary conference statement. After the scanning process, 19 publications that met the inclusion criteria were subjected to the meta-analysis process.

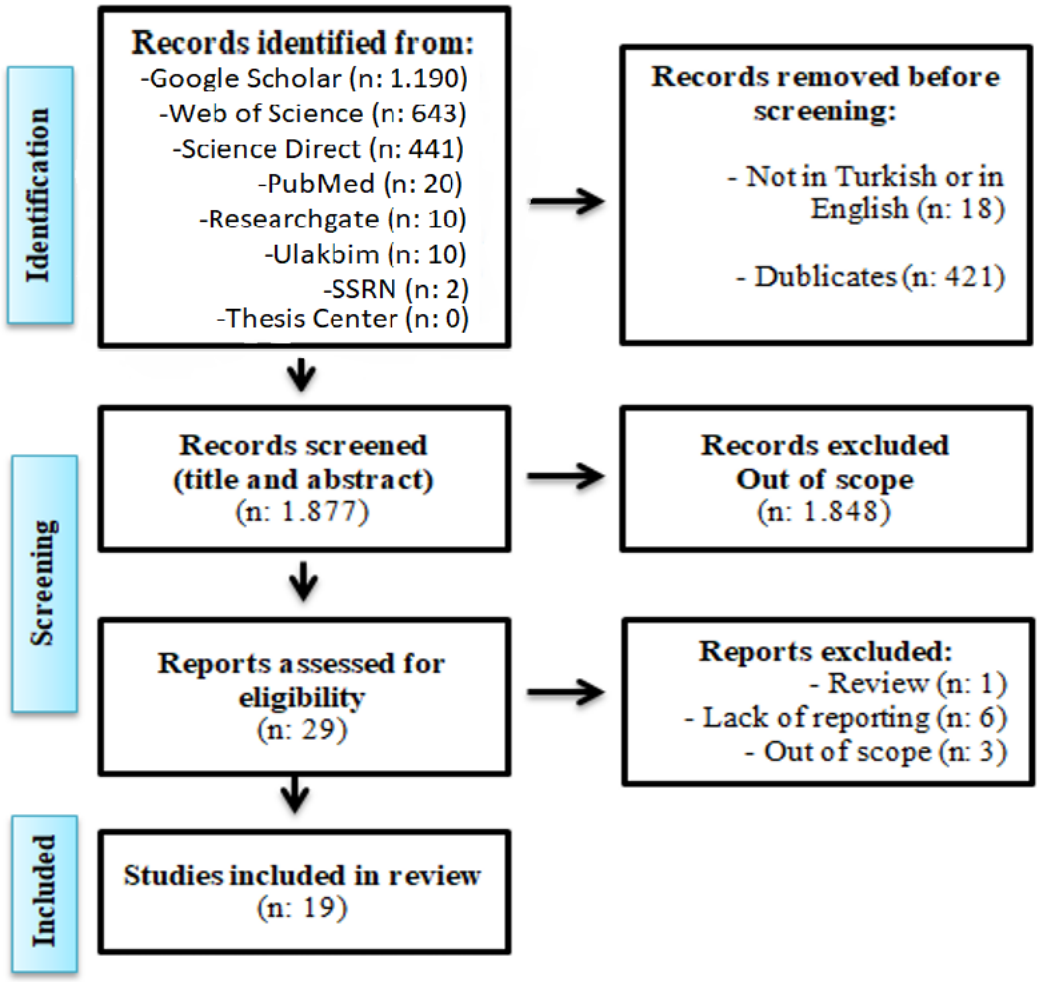

Figure 2: Preferred items for Systematic Reviews and Meta-Analyses (PRISMA) Flow Diagram

2.3. Analysis of Data

In the analysis of the data, the CMA (Comprehensive Meta-Analysis) V.3.0 package program was used. The author(s), publication years, correlation coefficients and sample numbers of each study were entered into the program. For each study, the data entered is automatically calculated by the program for the lower and upper correlation values, z values and p values. Especially in studies in which regression analysis or structural equation modeling is used, standardized regression coefficients were used as an alternative to correlation coefficients.

3. FINDINGS

The total number of the participants in the samples within the scope of the studies was 6,038, and all of the studies consisted of article type publications. Of the studies, 100% were published as articles, 68.4% were in English, and while 31.6% were published between 2010 and 2015, 68.4% were published between 2016 and 2021. According to Palamutçu et al. (2016), the p value of the Q statistic being less than 0.05 and the I^2 value being at least 70% which are an indicator of heterogeneity and require the random effect should be taken as a reference. Therefore, Q (630.934) and I2 (96.208) values, which include homogeneity results, indicate that all the variables have a high level of heterogeneity. Therefore, the random effect model was taken as the basis for the assessment of the mean effect size and confidence interval levels (Table 1).

Table 1. Descriptive Analysis of the Studies Analyzed and the Results of the Homogeneity Test

Variables (n)	**Total Number of the Participants**	**Type of Publication**		**Languages Used in Publications**		**Year Range of the Publications**	
Patient Satisfaction * ***Hospital Brand Image*** (n: 19)	6.038	Article	Other	Turkish	English	2010-2015	2016-2021
	n (%)	19 (100%)	0 (0%)	6 (31.6%)	13 (68.4%)	6 (31.6%)	13 (68.4%)
Homogeneity Test	**Q**	**Q(df)**		**p**		**I^2**	
	630.934	18		0.000		96.208	

The effect sizes calculated according to the Fixed and Random Effect Models and the statistics related to the studies are given in Table 2. According to the random effect model, there is an effect of ~0.50 between patient satisfaction and hospital brand image variables. According to Cohen (1992), if a coefficient is at least 0.50, it indicates a high level of effect size. At the 95% confidence interval, the effect size was between 0.477 and 0.515 in the fixed-effect model. In the random effect model, the effect size varied between 0.377 and 0.604. Therefore, H_1 was confirmed.

It is possible to summarize some of the study results used in the confirmation of the H1 hypothesis as follows: Sukawati (2021) showed in his study that patient satisfaction has a positive effect on hospital brand image, and that service quality has a mediating role on patient satisfaction

in relation to hospital brand image. Hoşgör and Cengiz (2020) showed that brand image positively affects patient satisfaction in private hospitals. However, they reported that there was no such significant effect in public and university hospitals. Biçer (2020) showed that hospital brand image has a positive effect on perceived service quality, patient satisfaction and loyalty. Haque (2020) study showed that there is a strong and direct relationship between service quality and hospital image. It has been shown that service quality has a partial effect of 21.7% on patient satisfaction and the partial effect of hospital image on patient satisfaction is 49.5%. Hosseini and Behboudi (2017) conducted a study to examine the effects of brand trust and brand image on health care users, and it has been shown that the most effective items with the greatest impact on customer satisfaction and utilization of health services are brand image, staff's sincerity towards their patients, interactions with physicians, and closeness.

Table 2. Average Effect Size of the Relationship between Patient Satisfaction and Hospital Brand Image

Model	Study name	Statistics for each study					Sample size	Correlation and 95% CI
		Correlation	Lower limit	Upper limit	Z-Value	p-Value	Total	-1,00 -0,50 0,00 0,50 1,00
	Sukawati_2021	0,580	0,414	0,709	5,851	0,000	81	
	Bicer_2020	0,570	0,507	0,627	14,290	0,000	490	
	Vimla & Taneja_2020	0,340	0,214	0,454	5,095	0,000	210	
	Hosgor & Cengiz_2020	0,150	0,046	0,251	2,815	0,005	350	
	Haque et al._2020	0,830	0,791	0,862	20,476	0,000	300	
	Zor & Bicer_2020	0,350	0,264	0,430	7,552	0,000	430	
	Asmaryadi et al._2020	0,340	0,163	0,496	3,663	0,000	110	
	Tosyali et al._2019	0,260	0,185	0,332	6,637	0,000	625	
	Diputri & Yusuf_2019	0,600	0,533	0,659	13,811	0,000	400	
	Emül & Naldöken_2019	0,740	0,691	0,782	18,504	0,000	382	
	Novela et al._2018	0,330	0,182	0,464	4,227	0,000	155	
	Hosgor et al_2017	0,340	0,205	0,463	4,737	0,000	182	
	Hosseini & Behboudi_2017	0,540	0,444	0,624	9,301	0,000	240	
	Juhana et al._2015	0,230	0,120	0,335	4,036	0,000	300	
	Sener_2014	0,830	0,792	0,862	20,716	0,000	307	
	Cham et al._2014	0,380	0,293	0,461	7,971	0,000	400	
	Izci & Saydan_2013	0,420	0,317	0,513	7,370	0,000	274	
	Wu_2011	0,200	0,108	0,288	4,223	0,000	437	
	Solayappan & Jayakrishnan_2010	0,760	0,713	0,800	18,954	0,000	365	
Fixed		0,497	0,477	0,515	42,136	0,000		
Random		0,499	0,377	0,604	7,095	0,000		

After this stage, the issue to which attention should be paid is whether there is publication bias. Here, the methods used in the literature most are as follows: Funnel Plots, Rosenthal's Fail-Safe-Number (FSN), Begg and Mazumdar Rank Correlation Test, Egger Regression Test, Duval and

Tweedie Trim and Fill Test. As is seen in Figure 3, most of the studies are at the top of the figure and close to the combined effect size symmetrically. Within this context, although limited, it can be stated that there is no publication bias in the studies.

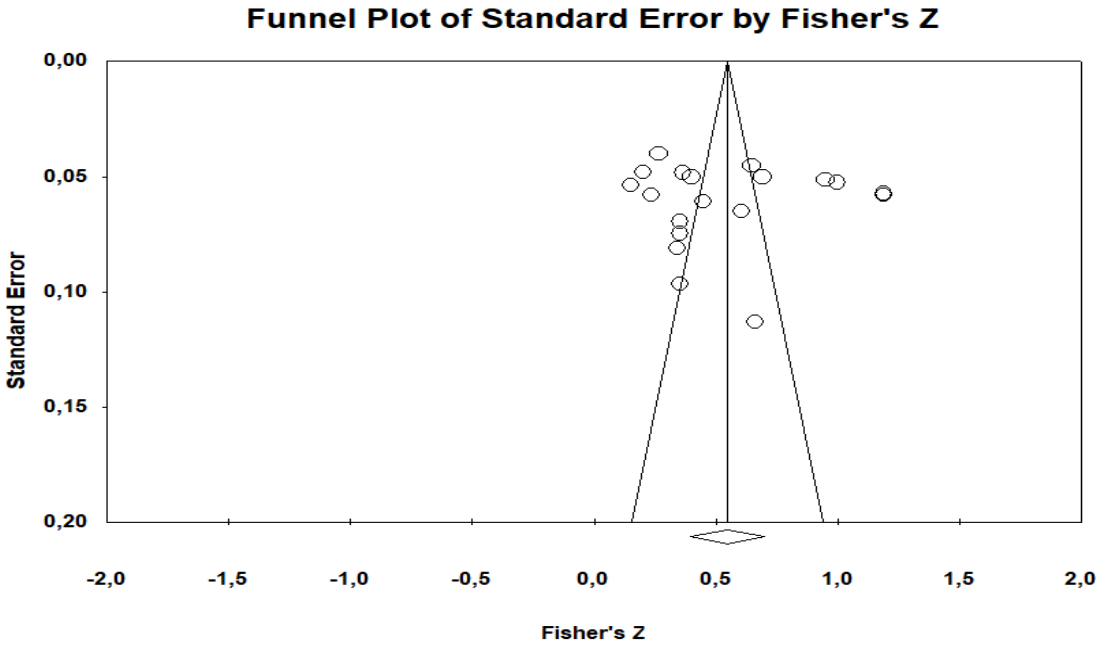

Figure 3: Funnel Plot of the Relationship Between Patient Satisfaction and Hospital Brand Image

Rosenthal's Fail-Safe-Number is the other piece of evidence for publication bias in studies. According to Rosenthal (1979), if N/5k+10>1, the results of the meta-analysis are strong and there is no publication bias. The "k" in the formula represents the number of studies included in the meta-analysis (k: 19), and "N" represents the total number of the participants in the samples of all the publications included in the study (N: 6.038). In this case, the result of the formula in the present study is 57.5, which is greater than 1, and this can be interpreted as the absence of publication bias in the studies.

In the rank correlation test, which is another test method for the absence of bias (Begg and Mazumdar, 1994), the two-tailed p value of the Kendall test is calculated. If the p value is greater than 0.05, there is no publication bias. Considering that the Tau value was 0.169 and the p value was 0.31 in the present study, it can be said that there is no publication bias in the studies.

The results of Egger's Regression Test are the other parameter about whether the funnel plot is asymmetrical or not. If this test yields the p value as >0.05, this confirms that there is no publication bias. Considering that the p value in the present study was 0.83, it can be said that there was no publication bias in the studies.

Another test used to assess publication bias is Duval and Tweedie's trim and fill parameters. According to these test results, if publication bias is to be avoided, there should be no difference between observed and corrected values. The fact that the difference between the observed and corrected values was zero in the present study indicates that there was no publication bias. In brief, the results of the five different methods clearly indicated that there was no publication bias in the present study.

4. CONCLUSIONS AND RECOMMENDATIONS

In this study, the significance and direction of the relationships between patient satisfaction and hospital brand image variables were tested. After the review process carried out to cover 2010 and 2021, 19 studies that met the inclusion criteria were analyzed with the meta-analysis method. The sample consisted of 6,038 studies on the subject. It was determined that 100% of the studies were published as articles, 68.4% were in English, while 31.6% were published between 2010 and 2015, 68.4% were published between 2016 and 2021. According to the random effect model, a statistically significant, positive and strong relationship (r: ~0.50) was determined between patient satisfaction and hospital brand image variables, which confirmed the H_1. Of the patients who were satisfied with the results of the health service they received, those whose satisfaction level was high perceived the brand image of the hospital more successfully. In other words, it is possible to state that the recipients of health service who perceived the brand image of the hospital from which they received service as superior and successful had a significantly higher level of satisfaction.

In general, it is seen that hospital image increases patient satisfaction (Sukawati, 2021; Diputri and Yusuf, 2019). In addition, Hoşgör and Cengiz (2020) reported that brand image had a positive effect on patient satisfaction in private hospitals, but not such a significant effect in public and university hospitals. Besides Biçer (2020) showed that hospital brand image has a positive effect on perceived service quality, patient satisfaction and loyalty.

The results of the study can be evaluated in terms of hospitals and patients. When evaluated in terms of hospitals; it can be considered as strong evidence that hospital managers who want to

position the hospital's brand image levels at a high point should attach more importance to patient satisfaction. In addition, hospitals with a high brand image can use this situation as a preference criterion.

When evaluated in terms of patients; in today's competitive environment, there are many alternatives for individuals who demand service in the sector where there are many service providers. When individuals perceive the brand image of the institution, they receive service to be high, their satisfaction levels will also increase. This will make it easier for individuals to make decisions on financially and morally exhausting issues such as minimizing uncertain situations in choosing a healthcare provider and seeking a hospital or physician.

Research results show that there is a positive and strong relationship between patient satisfaction and hospital brand image. It has been concluded that individuals who are satisfied with the service they receive have higher hospital images. In addition, it is possible to say that the satisfaction levels of individuals who perceive the brand image as superior and successful are significantly higher than the others. Based on the analysis of the results obtained within the scope of the present study, it can be recommended that hospital administrators who want their hospitals' brand image to be perceived by health service recipients as high should attach more importance to patient satisfaction. Thus, it is very important to measure the satisfaction and brand image perception levels of healthcare service recipients systematically and periodically with valid and reliable measurement tools and to report the results of the measurements to the hospital senior management objectively. In addition, hospital administrations can establish online or physical systems within the institution and/or at the hospital website, where health service recipients can freely state their opinions, suggestions and complaints.

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References

* Studies Included in Meta-Analysis

Aaker, D. A. (1991). *Managing Brand Equity: Capitalizing on the Value of a Brand Name.* New York, Free Press, 411-423.

Afrashtehfar, K. I., Assery, M. K. A., & Bryant, S. R. (2020). Patient Satisfaction in Medicine and Dentistry. *International Journal of Dentistry*, *2020*, 1-10.

Altaf, M., Tabassum, N., & Mokhtar, S. S. B. (2018). Brand Equity and the Role of Emergency Medical Care Service Quality of Private Cardiac Institutes an Empirical Investigation. *International Journal of Pharmaceutical and Healthcare Marketing*, *12*(1), 44-60.

*Asmaryadi, A., Pasinringi, S. A., Thamrin, Y., & Muis, M. (2020). Influence of Patient Experience and Hospital Image on Patient Loyalty in Meloy Public Hospital of Sangatta, East Kutai Regency. *Open Access Macedonian Journal of Medical Sciences*, *8*(2), 147-151.

Bankaoğlu, E. (2013). Hasta Memnuniyetinin Kurumsal İmaj Üzerindeki Etkisi: Antalya Eğitim ve Araştırma Hastanesi Üzerine Bir Araştırma. Akdeniz Üniversitesi Sosyal Bilimler Enstitüsü Yüksek Lisans Tezi.

Begg, C. B., & Mazumdar, M. (1994). Operating Characteristics of a Rank Correlation Test for Publication Bias. *Biometrics, 50*(4),1088-1101.

Benligül, E. M., Bektaş, M., & Arslan, G. (2022). Meta-Analizi Anlamak ve Yorumlamak: Hemşireler İçin Öneriler. *Dokuz Eylül Üniversitesi Hemşirelik Fakültesi Elektronik Dergisi*, *15*(1), 74-86.

*Biçer, D. F. (2020). Marka İmajı ile Algılanan Kalite, Memnuniyet ve Bağlılık İlişkisinin Yapısal Eşitlik Modeliyle İncelenmesi: Bir Hizmet İşletmesi Örneği. *Turkish Journal of Marketing*, *5*(2), 158-178.

*Cham, T. H., Yet Mee, L., & Nai-Chiek, A. (2014). A Study of Brand Image, Perceived Service Quality, Patient Satisfaction and Behavioral Intention Among the Medical Tourists. *Global Journal of Business and Social Science Review*, *2*(2), 32-43.

Cohen, J. (1992). A Power Primer. *Psychological Bulletin*, *112*(1), 155-159.

*Diputri, D. R., & Yusuf, A. (2019). The Effect of Service Quality and Hospital Image on Patient Satisfaction (Survey on Outpatients at Saraswati Cikampek General Hospital). *Manajemen Bisnis*, *9*(2), 168-175.

Erdem, R., Rahman, S., Avcı, L., Demirel, B., Köseoğlu, S., Fırat, G., Kesici, T., Kırmızıgül, Ş., Üzel, S., & Kubat, C. (2008). Hasta Memnuniyetinin Hasta Bağlılığı Üzerine Etkisi. *Erciyes Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, *31*, 95-110.

Fong, C., & Goh, Y. (2021). Why Brand Equity is so Important for Private Healthcare? View from an Emerging Market. *International Journal of Healthcare Management*, *14*(4), 1198-1205.

Gedik, A., & Üstüner, M. (2017). Eğitim Örgütlerinde Örgütsel Bağlılık ve İş Doyumu İlişkisi: Bir Meta Analiz Çalışması. *E-Uluslararası Eğitim Araştırmaları Dergisi*, *8*(2), 41-57.

Gill, L., & White, L. (2009). A Critical Review of Patient Satisfaction. *Leadership in Health Services*, *22*(1), 8-19.

Gronholdt, L., Martensen, A., & Kristensen, K. (2000). The Relationship between Customer Satisfaction and Loyalty : Cross-Industry Differences. *Total Quality Management*, *11*(4/5&6), 509-515.

*Haque, R., Rahman, A., & Kow, A. P. A. (2020). Factors Affecting Customer's Satisfaction and Loyalty in Hospitals in China. *Asian Journal of Technology & Management Research*, 10(1), 101-115.

Hawrysz, L., Gierszewska, G., & Bitkowska, A. (2021). The Research on Patient Satisfaction with Remote Healthcare Prior to and during the COVID-19 Pandemic. *International Journal of Environmental Research and Public Health, 18*(10), 1-14.

*Hosseini, S. H. K., & Behboudi, L. (2017). Brand Trust and Image: Effects on Customer Satisfaction. *International Journal of Health Care Quality Assurance*, 30(7), 580-590.

*Hoşgör, H., & Cengiz, E. (2020). İlişkisel Pazarlama Stratejileri, İlişkisel Kalite Unsurları ve Davranışsal Niyetler Arasındaki İlişkilerin İncelenmesi. *Hacettepe Sağlık İdaresi Dergisi, 23*(3), 465-484.

*Hoşgör, H., Memiş, K., Gündüz Hoşgör, D. & Koç Tütüncü, S. (2017). Kurumsal Hastane İmajı, Algılanan Fiyat Uygunluğu, Hasta Tatmini ve Sadakati Arasındaki İlişkilerin Yapısal Eşitlik Modeliyle İncelenmesi. *International Journal of Academic Value Studies, 3*(16), 439-453.

Huang, C., & Lai, C. (2021). Effects of Internal Branding Management in a Hospital Context. *The Service Industries Journal*, *41*(15-16), 985-1006.

*İzci, F., & Saydan, R. (2013). Algılanan Hizmet Kalitesi Kurumsal İmaj ve Sadakat İlişkisi (Van Bölge Hastanesi Uygulaması). *Cumhuriyet Üniversitesi İktisadi ve İdari Bilimler Dergisi, 14*(1), 199-219.

*Juhana, D., Manik, E., Febrinella, C., & Sidharta, I. (2015). Empirical Study on Patient Satisfaction and Patient Loyalty on Public Hospital in Bandung, Indonesia. *International Journal of Applied Business and Economic Research*, *13*(6), 4305-4326.

Keller, K. L. (1993). Conceptualizing, Measuring and Managing Customer-Based Brand Equity. *Journal of Marketing, 57*(1), 1-22.

Landis, J. R., Koch, G. G. (1977). The Measurement of Observer Agreement for Categorical Data. *Biometrics, 33*, 159-174.

Macstravic, R. S. (1990). The End of Health Care Marketing?. *Health Marketing Quarterly*, *7*(1/2), 3-12.

Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & PRISMA Group. (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *Annals of Internal Medicine, 151*(4), 264-269.

Ng, J. H. Y., & Luk, B. H. K. (2019). Patient Satisfaction: Concept Analysis in the Healthcare Context. *Patient Education and Counseling*, *102*(4), 790-796.

*Novella, S., Polla, J. R., Dharma, O. M., & Walia, P. (2018). The Influence of Service Quality, Perceived Value and Corporate Image Toward Inpatient Satisfaction on Private Hospital. *Social Economics and Ecology International Journal*, *2*(1), 9-17.

Oliver, R. L. (1999). Whence Consumer Loyalty?. *Journal of Marketing, 63*, 33-44.

Palamutçuoğlu, B. T., Çavuşoğlu, S., & Terzi Palamutçuoğlu, A. (2016). Örgütsel Adalet ile İş Tatmini Arasındaki İlişkiye Meta Analitik (Meta Analitical) Bir Yaklaşım. *Alanya İşletme Fakültesi Dergisi*, 8(2), 203-216.

Paul, J., & Barari, M. (2022). Meta-Analysis and Traditional Systematic Literature Reviews—What, Why, When, Where, and How?. *Psychology & Marketing, 39*(6), 1099-1115.

Porter, M. E. (1985). *Competitive Advantage*. New York, Free Press.

Rosenthal, R. (1979). The File Drawer Problem and Tolerance for Null Results. *Psychological Bulletin, 86*(3), 638-641.

*Solayappan, A., & Jayakrishnan, J. (2010). Key Determinants of Brand-Customer Relationship in Hospital Industry. *Petroleum-Gas University of Ploiesti Bulletin, Economic Sciences Series*, *62*(4), 119-128.

Söyler, S. (2018). Sağlık Çalışanlarının Maruz Kaldıkları İş Stresi ile İş Doyumu İlişkisinin İncelenmesi: Bir Meta-Analiz Çalışması. *Online Türk Sağlık Bilimleri Dergisi*, *3*(4), 190-205.

*Sukawati, T. G. R. (2021). Hospital Brand Image, Service Quality, and Patient Satisfaction in Pandemic Situation. *Journal: JMMR (Jurnal Medicoeticolegal dan Manajemen Rumah Sakit)*, *10*(2), 120-127.

*Şener, H. Y. (2014). Improving Patient Satisfaction in Health Services: An Application at Dumlupinar University Kutahya Evliya Celebi Education & Research Hospital. *European Journal of Business and Management*, *6*(30), 172-181.

*Tosyalı, H., Sütcü, C. S., & Tosyalı, F. (2019). Patient Loyalty in the HospitalPatient Relationship: The Mediating Role of Social Media. *Erciyes İletişim Dergisi*, *6*(1), 783-804.

*Vimla, & Taneja, U. (2020). Navigating from Brand Image to Patient Loyalty: Mediating Effect of Service Quality and Patient Satisfaction. *Journal of Health Management*, *22*(3), 430-445.

*Wu, C. C. (2011). The Impact of Hospital Brand Image on Service Quality, Patient Satisfaction and Loyalty. *African Journal of Business Management*, *5*(12), 4873-4882.

Zhang, Y. (2015). The Impact of Brand Image on Consumer Behavior: A Literature Review. *Open Journal of Business and Management*, *3*(1), 58-62.

*Zor, M. G., & Biçer, D. F. (2020). Hastaların Sağlık Kuruluşu Tercihlerinde Marka İmajının Etkisi. *Business & Management Studies: An International Journal*, *8*(3), 3655-3689.

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INVESTIGATION OF PREVENTIVE BEHAVIORS IN THE BEGINNING TERM OF COVID/19 PANDEMIC, EVIDENCE FROM TURKEY

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Abstract

Aim: In this study, it is aimed to determine the level of compliance of individuals to preventive health behaviours before, during and, after the pandemic in order to interrupt or reduce the spread of the virus in the Covid-19 pandemic.

Methods: This study is a descriptive and cross-sectional study. "Demographic Information Form" and "Questionnaire of Health Behaviors Regarding Influenza" were used as data collection tools. The questionnaire form prepared was designed as 16 questions, 5-point Likert type. The questionnaire contains the answers of the participants regarding the 14 rule implementation situations before, during and after the flu. The universe of this study was individuals living in 81 provinces in Turkey between 1-9 April 2020. In this study, snowball-sampling method was used. The data were collected with an online questionnaire

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on google forms. 517 people were surveyed from 81 cities in Turkey. In the analysis SPSS 25.0 statistical software was used to evaluate the data.

Results: As a result of the evaluation of the Health Behavior Towards Flu test results; the Cronbach Alpha (α) values were found (0.78) before, during (0.86) and after (0.83). When the participant's compliance with the 14 rules in influenza according to demographic variables was examined according to their learning of these rules, it was determined that; gender, literate in terms of education and housewives made a significant difference in the course (before-during-after) of the pandemic. In addition the application situations of the participants before-during-after learning the 14 rules in influenza were compared; while the information was effective during (ilness) and after (ilness) the informing process and was statistically significant (p<0.05); a low level and significant correlation was found in the influenza prevention behaviors of the participants before and during the pandemic (r =.351 p<,000).

Conclusion: The results showed that in the Covid-19 Pandemic, the adaptation of the society to preventive health behaviors increased; It also shows that individuals will continue to adapt to preventive health behaviors in the presence of common cold/flu-like infectious diseases that they may encounter in the future after the pandemic.

Keywords: COVID-19 Pandemic, Preventive Health Behavior, Influenza, Descriptive Analysis

INTRODUCTION

Influenza (flu) is a state of illness that occurs in immunocompromised individuals as a result of influenza viruses acting on the respiratory system. Although influenza is seen in all individuals; its effects (death, sequelae, etc.) vary according to the risk status of the individuals (age, weight, obesity, etc.). Influenza viruses are defined in four types, A, B, C and D. While influenza A viruses can cause diseases in humans, pigs, horses, and poultry; B viruses are seen in humans, C in pigs and humans and D in cattles. The genetic structure of influenza viruses changes over time and gains the ability to be transmitted from person to person and causes epidemics/pandemics by affecting a large number of people whose immunity is not developed. There have been many pandemics in world history, but five of these pandemics have taken place in the literature. The Spanish flu of 1918-1919, the H2N2 strain of 1957-1963, the Hong-Kong flu of 1968-70, the Russian flu of 1977, the 2009 H1N1 swine flu and the current has been Covid-19 pandemic. Each pandemic has epidemiologically different characteristics. While the 1957 flu had more impact on the children's group; the 1968 flu affected all age groups. In terms of deaths; Especially the Spanish

flu in 1918 effected 500 million people and death 50 million people from this diseases (Camcıoğlu, 2010).

In early 2020, the World Health Organization (WHO) reported that the world is facing a new virus (coronavirus), a potential pandemic agent. This virus, which is an etiologically positive-stranded RNA virus, was thought to originate from bats. While the disease was initially defined as non-fatal pneumonia, it is defined as Covid-19 disease with a mortality rate of 3.4% (Buruk&Ozlu, 2020).

In late 2019 it began diseases in China, in March of 2020 to 75% of the world (including Turkey) spread. Later, with the determination of etiological factors and accumulation, WHO decided to name the disease caused from SARS-CoV-2 as Covid-19, based on the data on the number of cases and diseases, and in March 2020, the coronavirus epidemic was declared as a pandemic.

Covid-19 first case in Turkey Turkey Ministry of Health (TMH) by the first death was reported on March 11, 2020. TMH announced that it spread all over Turkey on March 23, 2020 and the number of cases that infected 27069 and also reported that 574 people lost their lives Covid-19 pandemic (Sağlık Bakanlığı, 2020).

The virus could be found in the respiratory systems secretions of the patients one or two days before onset of the clinical symptoms and two weeks after the symptoms of the disease.
In addition, the presence of the virus had been shown in whole blood, serum, urine, and fecal samples and reported that pediatric patients accommodated the virus in their feces for one month (Young et al, 2020; Chang et al.2020; To et al.,2020; Peng et al., 2020; Cai et al., 2020).
Although the first route of transmission of the disease has not been determined yet, it was reported that it could be transmitted from person to person as a result of contact with the droplet path, the body surface containing the virus and inanimate environments nowadays (Buruk&Ozlu, 2020). The incubation period of the virus had been reported to be an average of 6.4 days (between 2.1 and 11.1 days) (Backer et al., 2020).

Contamination plays an important role in the transmission of the virus. The important point in preventing contamination; to provide individuals with general hygiene habits through hand washing, disinfection of contaminated surfaces in the home environment and environmental disinfection practices within the scope of infection prevention and control measures.

1. BACKGROUND

1.1. The Struggle Against Pandemic in Turkey

In Turkey the first pandemic legislation has been made at 2006 for regarding measures to be taken against the bird flu; then, in 2019, the second legal regulation was prepared for the influenza pandemic. The common point of these legislations are the definition of Pandemic National Preparedness Plans and Pandemic Provincial Preparation and Action Plans and the continuation of the activities according to these plans (HSGM, 2019; Sağlık Bakanlığı, 2020b; AÇSHB, 2021).

Within the scope of the control of the Covid-19 pandemic in line with the relevant Pandemic Plans, The Ministry of Health regulates the roles to be undertaken by the Central and Provincial Organizations with the Covid-19 Guides and corporate official correspondence, which they regularly update. In these guidelines, titles have been determined within the scope of National Level Infection Protection and Control Measures. One of these headings is defined as "Making habits in the society with suggestions for general hygiene habits". Since the beginning of the pandemic process, interventions have been developed by the Ministry of Health through public service announcements, regulations and different media in order to change behavior in society, especially in four subjects. These issues are the use of masks outside the home, ensuring continuous compliance with hygiene rules, especially hand hygiene, maintaining social distance outside the home and isolation.

In this study, it is aimed to determine the level of compliance of individuals to preventive health behaviours before, during and after the pandemic in order to interrupt or reduce the spread of the virus in the Covid-19 pandemic.

2. RESEARCH METHODOLOGY

This study is a descriptive and cross-sectional study. The aim of this research is to determine how individuals behaviour when they met with cold/flu. The universe of this study was individuals living in 81 provinces in Turkey between 1-9 April 2020. In this study, the *snowball*-sampling method was used. The data was collected using an online questionnaire on google forms. 517 people were surveyed from 81 cities in Turkey.

"Demographic Information Form" and "Questionnaire of Health Behaviors Regarding Influenza" were used as data collection tools.

***Demographic Information Form*:** This form, which was created by scanning the literature, included general questions about the participants' age, gender, education levels, jobs, and marital status.

Questionnaire of Health Behaviors Regarding Flu: In the study the questionnaire had been prepared to determine health behaviors for the common cold / flu. This form used in the study was prepared by the researchers using the Ministry of Health (2020) Covid-19 guide, which contains 14 rules against the new coronavirus risk. The questionnaire form prepared was designed as 16 questions, 5-point Likert type, and the participants were asked to mark between 1 and 5 how much they agreed with each item (1 = Strongly disagree to 5 = Strongly agree). The questionnaire had 3 stages. In the first stage, how individuals behave when they have had a cold / flu in the past; The second stage was prepared to measure how it behaves today, and the third stage to measure how they would have behave in the future. The questions in the questionnaire contain the answers of the participants regarding the 14 rule implementation situations before, during and after the flu. The increase in the scores obtained from the questionnaire indicates that the participant's belief in the relevant item increases. The total variance of the questions belonging to the Health Behaviors Scale to Flu scale and the questionnaire containing 14 rules was 49.19% and within the scope of internal consistency, the reliability coefficient Cronbach Alpha (α) was found to be 0.85 for all questions. In the analysis, IBM SPSS 25.0 statistical software was used to evaluate the data.

The data were collected online by using google forms via the internet, taking into account the presence of quarantine due to the epidemic. The explanation regarding the filling of data collection forms was made in the first part of the forms and it was stated that the questionnaires should be answered during the 7-day period between 1-9 April 2020. In the study, to fill/respond the survey form took about 7-10 minutes.

Ethics committee approval was taken from Istanbul Sabahattin Zaim University Etic Committee (2020/07). Information on Informed Consent; before applying the survey, the participants were informed online and the participants who gave their consent reached the survey questions.

The distribution of the questions in the Demographic Information Form was evaluated by using descriptive analysis such as frequency, percentage, and scale scores as mean and standard deviation. Before the analysis, Kolmogorov-Smirnov test used to determine the normal distribution

of the data and the results revealed a normal distribution of the data. In the case of two groups in the comparison of quantitative data, the "t" test was used for independent samples in the comparison of parameters between groups. The results were evaluated at 95% confidence interval and $p< 0.05$ significance level.

3.FINDINGS

In the study; the average age of 517 participants was 84.1% were in the 30-50 age group and 75.4% were women, 43.5% (n = 225) of the participants were civil servants, 77.8 % were university and upper graduates (n = 402), and 78.1% (n=404) were married (Table 1).

Table 1. Socio-demographic Situation (n = 517)

Variables	SS	n	%
Gender	Female	390	75.4%
	Male	127	24.6%
Age	18-30 years	32	6.2%
	31-40 years	164	31.7%
	41-50 years	271	52.4%
	51 and upper	50	9.7%
Education status	Literate	5	1.0%
	Primary Education	22	4.3%
	High School	88	17.0%
	University	278	53.8%
	Upper Graduate	124	24%
Job	Civil Servant	225	43.5%
	Public Worker	10	1.9%
	Private Sector	123	23.8%
	My Own Business	24	4.6%
	Retired	31	6.0%
	Unemployed	9	1.7%
	Housewife	75	14.5%
	Student	20	3.9%
Marital status	Married	404	78.1%
	Single	113	21.9%

As a result of the evaluation of the Health Behavior Towards Flu test results; the Cronbach Alpha (α) values were found (0.78) before, during (0.86) and after (0.83). As a result of the evaluation of the research data, the total score of the participants' compliance with the rules before knowing the 14 rules in influenza was $\bar{X} = 3.76 \pm 0.629$; the total mean score of the 14 rules in flu during illness was $\bar{X} = 4.42 \pm 0.710$; after learning the 14 rules, it was determined that the total average score of

obeying the rules in the event of having influenza was $\bar{X} = 4.57 \pm 0.997$. According to these findings, it was determined that before the participants learned the 14 rules, the average score of applying the rules in the event of getting influenza was lower than during and after (Table 2).

Table 2. Health Behavior Scores Towards Flu and Internal Consistency Coefficients (n = 517)

	Before		During		After	
Status of applying protective measures	$\overline{X}$	**SD**	$\overline{X}$	**SD**	$\overline{X}$	**,633**
Washing hands frequently with soap and water for at least 20 seconds	3,56	1,04	4,48	,902	4,67	,737
Washing hands after coughing and sneezing	3,89	1,20	4,48	,892	4,62	,632
Keeping a distance of at least 3-4 steps from people with cold symptoms	3,56	1,21	4,55	,836	4,67	,708
Covering the mouth and nose with a disposable tissue when coughing or sneezing	3,77	,861	4,42	,913	4,63	,585
Using the inside of the elbow if there is no handkerchief when coughing or sneezing	3,98	1,24	4,58	,797	4,72	,700
Trying not to touch eyes, mouth and nose with hands	3,21	,921	4,40	,895	4,62	,741
Avoiding close contact such as handshaking and hugging	3,61	1,23	4,58	,866	4,59	,694
Frequent ventilation of their environment	4,23	1,07	4,66	,681	4,69	,901
Washing clothes at 60-90 degrees with normal detergent	3,21	1,21	4,17	1,05	4,35	,85
Paying attention to avoid contact with children, the elderly, and people with chronic diseases when cold symptoms are experienced	4,11	,916	4,14	1,05	4,38	,662
Cleaning frequently used surfaces such as door handles, fixtures, sinks daily with water and detergent	2,90	,947	4,66	,761	4,66	1,00
Not going out without wearing a mask when experiencing cold symptoms	1,99	1,06	3,96	1,24	4,19	,732
Not sharing personal items such as towels	3,74	,953	4,50	,912	4,61	,649
To consume plenty of fluids	4,17	1,04	4,49	,868	4,63	,710
Paying attention to sleep patterns	3,99	1,20	4,48	,820	4,58	,725
Applying to a healthcare facility in case of persistent fever, cough and shortness of breath	3,74	1,21	4,30	,876	4,54	,717
Before-During-After Overall Total Score Average	$\overline{X}$		**SD**		**Cronbach Alpha (α)**	
Before	3,76		,629		0,78	
During	4,42		,710		0,86	
After	4,57		,997		0,83	

When the participants' compliance with the 14 rules in influenza according to demographic variables was examined according to their learning of these rules (Table 3), it was determined that;

- Gender made a significant difference and the difference was due to women ($p > 0.05$)

- According to education level there was a statistically significant difference between before and during the illness ($p< 0.05$) and this difference was caused by the average scores of those who were literate in terms of education.
- According to current employment status; there is a statistically significant difference during and after the current employment status ($p< 0.05$) and the difference stems from those who are housewives (Table 3).

Table 3. Comparison of the Demographic Characteristics of the Participants and the Averages of Practice Before-During-After Learning the 14 Rules in Flu (n=517)

	Practice Before Learning 14 Rules in Flu		**Learning the 14 Rules and Applying During Flu**		**Learning the 14 Rules and Applying After Flu**	
	$\overline{X}$	**SD**	$\overline{X}$	**SD**	$\overline{X}$	**SD**
Gender						
Woman	3,93	1,53	4,52	,618	4,64	,590
Man	2,92	1,77	4,12	,876	4,37	,576
t	3,911		4,698		4,531	
P	,000**		,000**		,000**	
Age						
18-28	3,54	,415	4,45	,416	4,49	,431
29-39	3,70	,663	4,50	,654	4,61	,562
40-50	3,60	,634	4,38	,794	4,58	,645
51 and upper	3,58	,559	4,34	,509	4,43	,512
F	1,122		1,221		1,447	
P	,340		,302		,228	
Education Status						
Literate	4,15	,624	4,94	,131	4,55	,513
Primary education	3,99	,568	4,54	,489	4,57	,507
High school	3,62	,639	4,23	,864	4,51	,642
University	3,58	,601	4,45	,625	4,60	,481
Postgraduate	3,64	,660	4,43	,789	4,56	,790
F	3.127		2,601		,451	
P	,015*		,035*		,772	
Marital Status						
Married	4,44	,721	4,59	,617	3,63	,629
Single	4,33	,663	4,53	,518	3,61	,616
t	1,615		917		,308	
P	,124		,406		,758	
Current Employment Status						
Public officer	3,64	,635	4,46	,665	4,66	,505
Public Worker	3,22	,397	2,76	1,52	2,91	1,69
Private sector	3,56	,662	4,36	,754	4,44	,529

Own Business	3,53	,563	4,21	,537	4,54	,415
Retired	3,57	,568	4,46	,367	4,52	,392
Unemployed	3,77	,453	4,54	,404	4,76	,467
Housewife	3,74	,626	4,69	,425	4,78	,395
Student	3,73	,530	4,29	,714	4,51	,705
F	1,459		11,523		17,333	
P	,180		,000**		,000**	

With the t-test analysis conducted in the study, the application situations of the participants before-during-after learning the 14 rules in influenza were compared; it was determined that the information was effective during (ilness) and after (ilness) the informing process and was statistically significant (p< 0.05). A low level and significant correlation was found in the influenza prevention behaviors of the participants before and during the pandemic (r =, 351 p< ,000). A low level and significant correlation was found in the influenza prevention behaviors of the participants before and after the pandemic (r =, 305 p< ,000). In addition, a significant difference was found in the behavior of individuals before and during the pandemic (Table: 4)

Table 4. Results of "t" test

	Paired Differences				**t**	**Sig. (2-tailed)**
	Mean	**Std. Deviation**	**95% Confidence Interval of the Difference**			
			Lower	**Upper**		
Before - During	-,79480	,76487	-,86095	-,72865	-23,604	,000**
Before – After	-,94956	,72170	-1,01191	-,88720	-29,916	,000**
Paired Samples Correlations						
	Correlation		**Sig.**			
Before - During	,351		,000**			
Before - After	,305		,000**			

4. CONCLUSIONS AND RECOMMENDATIONS

Pandemic is an important phenomenon that negatively affects activities that are vital for the state and community. Depending on the perception of pandemic severity, education, work order and public order may deteriorate (HSGM, 2019). When evaluated from a historical perspective, the fact that viruses that cause pandemics act independently of time and place seriously threatens social life. In addition to the effects of the current Covid-19 pandemic on mortality and morbidity (Çınar&Ekinci 2022), it emphasizes the importance of combating pandemics in the socio-economic destruction at the country level.

In the fight against viruses that cause pandemics, it is possible to implement preventive health behaviors and to develop vaccines and drugs. In this context, preventive and therapeutic drugs for the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) virus have started to be developed as of the second quarter of 2020. As of March 2021 While there are 276 studies with different phase studies over the clinical trial; 10 studies were found under the title of drugs that completed Phase 3 and Phase 4 (Sofosbuvir plus Ledipasvir, remdisevir etc.). The number of vaccines developed for preventive treatment has reached six (Clinical Trial gov.tr., 2021). Globally, over 115 million reported cases and 2.55 million deaths since the start of the Covid-19 pandemic and vacained only %0.72 of total population in the World (ews.google.com. 20219). Considering the limitations of the drugs and vaccines developed for the treatment of Covid-19, the effect of the virus on mortality and morbidity, and the fact that the virus progresses through different mutations, it is still possible to evaluate preventive health practices as the most effective solution against to diseases.

This study was conducted to examine the inviduals compliance to preventive health behaviors in the Turkey. As a result of the evaluation of the research data was determined that;

- According to these findings, it was determined that before the participants learned the 14 rules, their adaptation to preventive health behaviors in the event of getting influenza was lower than during and after.
- There was a significant level of awareness increase compared during and after the pandemic in adaptation to protective health behaviors of individuals to before (average increase 27%).
- The highest increase in compliance with protective health behaviors was determined in the item of "Not going out without wearing a mask when experiencing cold symptoms" (98% during and 110% after).
- The second highest increase in compliance with protective health behaviors was determined in the item of "Cleaning frequently used surfaces such as door handles, fixtures, sinks daily with water and detergent" (60% during and 60% after).
- The lowest increase in compliance with protective health behaviors was determined in the item of "Avoiding close contact such as handshaking and hugging" (26% during and 27% after).

- The other lowest increase in compliance with protective health behaviors was determined in the item of "Frequent ventilation of their environment" (10% during and 10% after).

When the participants' compliance with the 14 rules in influenza according to demographic variables was examined according to their learning of these rules, it was determined that; Gender, literate in terms of education and housewives made a significant difference in the course (before-during-after) of the pandemic

In addition the application situations of the participants before-during-after learning the 14 rules in influenza were compared; while the information was effective during (ilness) and after (ilness) the informing process and was statistically significant ($p< 0.05$); a low level and significant correlation was found in the influenza prevention behaviors of the participants before and during the pandemic ($r= ,351$ $p< ,000$).

Literature had shown that the level of adaptation of health professionals to preventive health behaviors in communicable diseases such as flu ect. was good. Thus in a study in which 67 studies were examined, it was concluded that compliance with hygiene rules and the use of masks were effective to break in or reduce the spread of respiratory viruses (Jefferson et al., 2011).

In a study evaluating the effect of community-wide use of masks in the control of 2019 coronavirus disease, it was revealed that wearing a mask in the community could contribute to the control of Covid-19 by reducing the transmission of saliva and respiratory droplets (Cheng, 2020). In a study on MERS-CoV to evaluate the reduction of transmission of MERS-CoV outbreaks among healthcare professionals; it was determined that regular wearing of surgical masks had reduced the transmission of MERS-CoV (Ki et al.,2019).

In a study conducted to estimate the preventive behaviors of 761 healthcare workers (HCWs) against Covid-19 based on the Protection Motivation Theory (PMT); Preventive behaviors against Covid-19 among HCWs have been evaluated at a relatively desirable level (Bashirian et al., 2020).

In another study, their intent to follow the recommendations of health authorities was robust and ranged from 68% to 83% for different preventive measures (Anaki D, Sergay J. 2021). Washing hands, the most popular preventive behavior, was exercised by only 62% of participants(Anaki D, Sergay J. 2021). Only 10% applied more than four preventive measures

(Anaki&Segay, 2021). Similar to this result a study, 88% of subjects reported using more than four (out of six total) preventive measures (Zhan et al., 2020).

In this study, we investigated the theoretical structure of health behavior in covid-19 disease and its relationship with various demographic variables. Although studies evaluating adaptation to protective health behaviors at the communal level are rarely encountered in the literature, the results of this study are accepted in accordance with the literature.

In addition to the fact that the Covid-19 virus will undergo new mutations in this process and continue its effects in the long term; by ensuring the sustainability of compliance with infection prevention and control measures at the social level; it seems possible to reduce the spread of infection in the community and the number of cases that will become infected in the early stages of the disease. In this context it is recommended that;

•Adding the training for protection from infectious diseases such as influenza etc. to the routine basic health education like such as oral and dental health hygiene training in the school

•To consider demographic characteristics, employment structure, educational status etc. when planned the training,

•To continue training in Preventive health behaviors compliance rules in pandemic,epidemic etc. in cases

4.1. Limitations of the Study

- This study was conducted in the early stages of the Covid-19 pandemic.
- Preventive health behaviors compliance rules for the Covid-19 pandemic were limited to the rules prepared by the Ministry of Health.

Conflict of Interest: The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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References

AÇSHB, (2021). Covid-19 Pandemisi Yönetimi Ve Eylem Planı Rehberi, Aile,Çalışma ve Sosyal Hizmetler Bakanlığı, 2021

Anaki D, Sergay J. (2021). Predicting health behavior in response to the coronavirus disease (COVID-19): Worldwide survey results from early March 2020. PLoS ONE;16(1): e0244534. https://doi.org/10.1371/journal. pone.0244534.

Backer JA, Klinkenberg D, Wallinga J. (2020). Incubation period of 2019 novel coronavirus (2019-nCoV) infections among travellers from Wuhan, China, 20–28 January 2020. ES;25(5).2000062.

Bashirian S, Jenabi E, Khazaei S, Barati M, Karimi-Shahanjarini A, Zareian S. et al. (2020). COVID-19 among hospital staff in Iran in 2020: an application of the Protection Motivation Theory. Journal of Hospital Infection. https://doi.org/10.1016/j.jhin.2020.04.035.

Buruk K., Ozlu T.(2020). New Coronavirus: SARS-CoV-2. Mucosa. 2020, v:3, n:1, 1-4DOI: 10.33204/mucosa.706906

Cai J, Xu J, Lin D, Xu L, Qu Z, Zhang Y et al. (2020). A Case Series of children with 2019 novel coronavirus infection: clinical and epidemiological features. Clinical Infectious Diseases.2020. https://doi.org/10.1093/cid/ciaa198.

Camcıoğlu,Y.(2010). İnfluenza Enfeksiyonu: Grip, The Journal of Turkish Family Physician;1(1):11-15.

Chang L, Yan Y, Wang L. (2020). Coronavirus disease 2019: coronaviruses and blood safety. Transfusion medicine reviews.2020. https://doi.org/10.1016/j.tmrv.2020.02.003.

Cheng VC, Wong SC, Chuang VW et al. (2020).The role of community-wide wearing of face mask for control of coronavirus disease 2019 (COVID-19) epidemic due to SARS-CoV-2. J Infect. 2020;81(1):107-114. doi:10.1016/j.jinf.2020.04.024

Clinical trial.gov.tr. Accessed on 03. 03.2021

Çınar F. Ekinci G. (2022). Investigation of the Effect of Comorbidity on Mortality in Patients with COVID-19: A Systematic Review and Meta-Analysis. Biointerface Research in Applied Chemistry, 12(4), 5579-5590., Doi:10.33263/BRIAC124.55795590 (Yayın No: 7664777)

ews.google.com/covid19. Accessed on 03. 03.2021

HSGM. (2019). Pandemik İnfluenza Ulusal Hazırlık Planı, TC Halk Sağlığı Genel Müdürlüğü. Ankara. 2019. https://hsgm.saglik.gov.tr.Accessed time: 20 March 2020

Jefferson et all. (2011).Physical interventions to interrupt or reduce the spread of respiratory viruses, Cochrane Database Syst Rev. 2011 Jul; 2011(7): CD006207.Published online 2011 Jul 6. doi: 10.1002/14651858.CD006207.pub4

Ki H.K., Han S.K., Son J.S. (2019). Risk of transmission via medical employees and importance of routine infection-prevention policy in a nosocomial outbreak of Middle East respiratory syndrome (MERS): a descriptive analysis from a tertiary care hospital in South Korea. BMC Pulm. Med;19:190. doi: 10.1186/s12890-019-0940-5

Sağlık Bakanlığı. (2020a). COVID-19 (SARS-CoV-2 Enfeksiyonu) Rehberi. https://covid19bilgi.saglik.gov.tr/depo/rehberler/COVID-19_Rehberi.pdf

Sağlık Bakanlığı. (2020b). Covid-19 Salgın Yönetimi Ve Çalışma Rehberi Bilimsel Danışma Kurulu Çalışması. Sağlık Bakanlığı. 2020

To KKW, Tsang OTY, Yip CCY, Chan KH, Wu TC, Chan JMC et al.(2020). Consistent detection of 2019 novel coronavirus in saliva. Clinical Infectious Diseases. https://doi.org/10.1093/cid/ciaa149.

Young BE, Ong SWX, Kalimuddin S, Low JG, Tan SY, Loh J. et al. (2020). Epidemiologic features and clinical course of patients infected with SARS-CoV-2 in Singapore. Jama,323(15), 1488-1494. doi:10.1001/jama.2020.3204.

Peng L, Liu J, Xu W, Luo Q, Deng K, Lin B, Gao Z. (2020). 2019 Novel Coronavirus can be detected in urine, blood, anal swabs and oropharyngeal swabs samples. Avaible at: https://www.medrxiv.org/content/10.1101/2020.02.21.20026179v1. Accessed on May 3, 2020.

Zhan S, Yang YY, Fu C. (2020). Public's early response to the novel coronavirus–infected pneumonia. Emerg. Microbes Infec. 2020; 9(1):534. https://doi.org/10.1080/22221751.2020.1732232 PMID: 32122250

https://dergipark.org.tr/tr/pub/ijhmt Doi Number: 10.31201/ijhmt.1123824

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DESIRABILITY OPTIMIZATION BASED ON THE POISSON REGRESSION MODEL: ESTIMATION OF THE OPTIMUM DENTAL WORKFORCE PLANNING

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Abstract

Aim: This study aims to estimate the optimum number of dentists needed by determining the social and economic variables that affect the dental workforce planning in Turkey.

Methods: A desirability optimization model based on the Poisson regression model was used to evaluate the importance of the variables of this study and to calculate the optimum values of the variables. The data used in the study cover the years 1960-2018. Population (x_p), gross domestic product per capita (x_{pc}), life expectancy (x_{le}), and literacy rate (x_{lr}) were considered as input variables affecting the dental workforce (y_d).

Results: The values of deviance R^2, adjusted R^2, and Akaike Information Criterion (AIC) were computed as 0.9941, 0.9941, and 960.11, respectively, which confirm the validity of the Poisson statistical test. The dual mechanism reliability was obtained by adhering to the 'what-if' perspective and desirability values of the top-ten optimum values of the dental workforce.

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Conclusion: The results of the study show that social and economic determinants play an important role in the estimated dental workforce planning assessment required for oral and dental health in Turkey.

Keywords: Dental workforce planning, Factors, Poisson regression, Desirability optimization, Estimation

INTRODUCTION

This study is not directly related to oral and dental diseases but is a study for the dental workforce in terms of healthcare management. The most critical issue in healthcare management is determining the number of employments to utilize the healthcare resources efficiently and allocate them to health departments (Atalan & Donmez, 2020). Health resources are defined as physical factors such as beds, triage areas, medical equipment, etc., and human factors such as doctors, nurses, assistants, technicians, civil servants, etc. (Atalan & Dönmez, 2020; Mihaylova et al., 2011). In this study, dentists, defined as a different healthcare resource employed in Turkey, were considered. The dental workforce differs from other healthcare resources because they are employed in private clinics rather than working in traditional hospitals in the Turkish healthcare system (Atalan, 2018). Very few studies on healthcare management contain information about the dental workforce (Vernazza et al., 2021). Most scientific research on dentistry is about dental and oral healthcare (Watt et al., 2020). In this study, an optimum estimation study was carried out by determining the factors affecting the dental workforce in public institutions (Atalan, 2021a).

A study has only examined the impact of demographics features of people on the dental workforce at a national level (Surdu et al., 2021). Another study provided information on factors influencing oral health workforce planning and management in developing countries (DCs) (Knevel et al., 2017). Gayawan examined the impact of the UK on the planning of the oral health workforce after the Brexit process (Eaton, 2020). The effects of many factors, such as the social and demographic factors of a country, on the dental workforce in the healthcare systems were discussed in detail in this study. Studies show that healthcare management decisions are affected by various determinants such as individual, population, economic and educational factors (Gayawan, 2014).

This study investigated the factors affecting the dental workforce in Turkey. The analysis includes data for dependent and independent variables over 59 years. Population, GDP PC ($), life expectancy, and literacy rate factors affecting dental employment were defined as input factors for

the derivation of estimation data. Detailed information about the aims, methods and used factors of the studies on the dental workforce is given in Table 1.

Table 1. Studies on the dental workforce

Purpose of the Study	Factors	Methods	Ref.
Compare the frequency and duration of career breaks taken by the dental surgeons and evaluate the impact of these and changes in working hours on human resource planning	Age, the proportion of hygienists, the duration of career breaks, GDPs of dental surgeons	Questionnaire survey, statistical analysis	(Newton et al., 2001)
Forecasting the supply and demand of dental operations in the UK	Staff type, staff cost, treatment hours, treatment type,	Operational research (OR) techniques- linear programming	(Harper et al., 2013)
Establishing a forecasting model of demand and supply for dentists for workforce planning in dentistry	The age structure of the population, the dentate and edentulous subpopulations of adults,	Forecasting models, statistical analysis	(Try, 2000)
Literature review on factors influencing oral health workforce planning and management in developing countries (DCs)	Lack of data, the restorative and preventive care, the number of dental schools, the dentistry students, privatization of dental care services, skill mix, the scope of practice, workforce management	Literature review	(Knevel et al., 2017)
Identifying data sources from countries concerned with the selection of oral health indicators in a sample of FDI member countries;	Children oral health care, Behaviors and coverage, Oral health economics, Oral health equality of life	A cross-sectional survey- Mann–Whitney U-tests, statistical analysis	(Yamalik et al., 2013)
Develop and operationalize a workforce planning simulation tool based on oral health needs	Gender, age, number of natural teeth, the problem with food/pain, level of service, type of service, frequency of service	Simulation models	(Ahern et al., 2019)

Identify trends in the dental workforce in Oman from 1990 to the present and compare the dental workforce with medical counterparts in Oman and other countries, and assess the future dental workforce in Oman	Dentist workforce, dentist-to-population ratios	Basic integrated model, statistical analysis	(Gallagher et al., 2015)
estimating patient and service ratios for oral health therapists (OHTs), dental hygienists (DHs), and dental therapists (DTs)	Age, sector of practice, practice type, length of service, number of dentists, % of child patients, locations,	self-report questionnaire, statistical analysis	(Teusner et al., 2016)
Identifying factors affecting the dental workforce and predicting the optimum dentist	Economic, population, literacy rate, the life of expectancy, dentist workforce	Poisson Regression, Desirability Optimization	This Study

FDI: World Dental Federation

The present study used the Poisson regression analysis method for response variables with integer values to estimate the optimum dentist workforce. The Poisson model was suitable for the dataset to analyze the effects of controlling and having different types of independent variables on their common response variable. The Poisson model, which has more than one variable, has been preferred by researchers with a wide range of applications in many areas where data sets are matched, resulting in the actual results of the research. The effect of independent variables on dependent variables was revealed by using this statistical analysis for dental health management in the present study. Saman et al. used Poisson regression modelling and geospatial analysis to assess the geographic distribution of dentists in Kentucky to identify the socioeconomic relationships of practice location and predict the future availability of dentists (Saman et al., 2010). The most important feature that distinguishes this study from other studies is that the Poisson regression model is not directly related to a medical issue but health management and informatics (Atalan, 2020). The paper proposes that the Poisson regression model perspective should be used to contribute to the development of data analysis in healthcare management. There is no specific poisson regression model for calculating the predictive values of the data. Input and output variables ran in the Poisson regression model were used to obtain estimated data.

The Poisson regression analysis is commonly used in studies directly related to the human factor. A study used the Australian health survey and the US National Medical Expenditure Survey data, including the number of the physician or specialist consultations, hospital admissions, etc.,

using the bivariate generalized Poisson regression model (BGPR) (Zamani et al., 2016). In another study, the Poisson regression model was preferred using data from the 2008 Nigeria Demographic and Health Survey to statistically analyze the individual and population-level determinants of antenatal care use (Gayawan, 2014). Islam and Chowdhury have demonstrated procedures for estimating and testing bivariate Poisson regression models using Health and Retirement Study data for the number of health conditions and health services (Islam & Chowdhury, 2017).

The Poisson regression model was preferred to determine whether the data obtained from research conducted in Pittsburg Veterans Affairs Hospital had the same incline in all departments before the intervention and whether the instant effect of the intervention was the same in all divisions (GEBSKI et al., 2012). In another study, Poisson regression analysis analyzed independent variables such as age, race, gender, occupation, workplace, and working time that affected the dependent variable, blood and body fluids (BBF) (Dement et al., 2004). Alamgir and Yu used a Poisson regression modelling application with one year of data to investigate occupational injury epidemiology among cleaners working in healthcare locations in British Columbia, Canada (Alamgir & Yu, 2008). The main reason for using Poisson statistical models in health is that the data belonging to the dependent or independent variables and the data obtained as a result of the analysis are integers as a result of the examination of many studies.

This study is motivated to use Poisson regression analysis to identify factors affecting the dental workforce in Turkey and demonstrate to predict the number of dentists employed in healthcare management. This study consists of five main parts. A literature review about the research subject and the methods used were included in the first part of the study. The mathematical explanation of Poisson regression analysis and desirability equations was discussed in the paper's second part. Detailed information about the study data was also provided in this section. The numerical results of the methods used were examined in the third part of the study. Some limitations constraining the subject of the study were discussed in the fourth section. The consequences of the emergence of this study and the results of the recommendations were involved in the last section of the study.

1. RESEARCH METHODOLOGY

The method of Poisson regression analysis was taken into account to analyze the data in this study. Poisson regression analysis was preferred since the data used were integer values. The preference

of the Poisson distribution in studies involving human factors is that it is suitable for the data to be obtained. The regression model, which is generally defined as the log-linear model, is used by researchers as the Poisson regression model. Poisson statistical analysis involves estimating a response variable using one or more input variables. Ethics committee approval is not required as the data used is publicly available and references the data used for this study

This study defined the dependent variable as the number of dentists employed in Turkey between 1960 and 2018. Figure 1 shows the number of dentists employed during the selected period. The number of dentists considered includes only those employed in government institutions. The average of the 59-year data was calculated as 11373, while the number of dentists employed in 2018 was 30615. The number of dentists employed per 1000 people was computed as 0.429 for 2018.

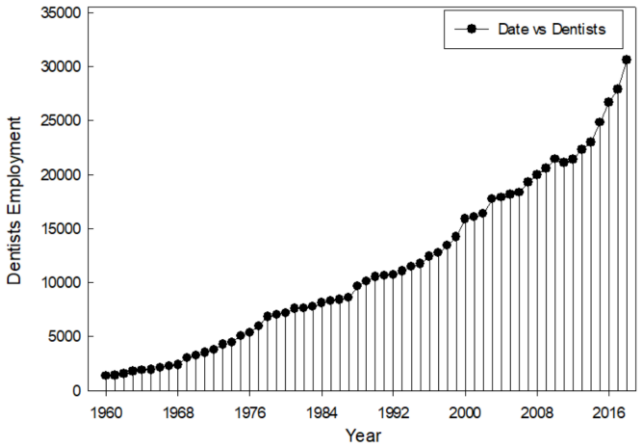


Figure 1. The dentists employed between 1960-2018

Country population, gross domestic product per capita (GDP PC), life expectancy, and literacy rate (considered as an education factor) that affected the dependent variable were defined as independent or input variables. These factors were preferred to establish the link between the increase in the rate of patients applying to dental clinics and the number of employed dentists. In addition to being directly related to the rise in the country's population and the dental workforce, the desire of people to live for a long time also plays an essential role in this relationship. Due to little or no government support for dental treatment in most countries, people have to pay for these treatments out of pocket. In this case, we have taken this factor into account in this study to question the link between people's income rate and dental treatment. With the last input parameter

of the study, people's literacy rate data were taken to analyze the importance that educated people attach to dental treatment. There are two cases in the data used for this factor. The data used belong to the literacy rates of people aged 15 and over. The other case consists of annual data between 2004 and 2018 and five-year data between 1960 and 2004. The data for the years in which literacy rates could not be reached were formed by taking the average values of the differences between the two years. Types, definitions and notations information of dependent and independent variables are provided in Table 2.

Table 2. Detailed Information About Variables

Variables	Types	Definition	Code
Dentists Workforce	Dependent	Number of dentists employed between 1960 and 2018, No distinction was made between men and women in the number of employed doctors. It is considered as a single data, integer, person	y_d
Population	Independent	Country population from 1964 to 2018, integer, person	x_p
Life Expectancy	Independent	Life expectancy at birth. From birth, life expectancy in humans is expressed in years and how long a newborn can expect to live on average. The unit of this variable is taken as the year.	x_{le}
GDP PC	Independent	This variable is considered the gross national product data were covering the years 1960 to 2018. The unit of this variable is USA currency, $.	x_{pc}
Literacy Rate	Independent	The data used belong to the literacy rates of people aged 15 and over. The literacy rate covers all education levels. The unit of this variable is taken as the percentage of the population.	x_{lr}

The following equations express poisson regression models: dependent, y_{ijkl} (with the x_p i; x_{pc}, j; x_{le}, k; x_{lr}, l) and independent factors, $\mu_{ijkl}, v_{ijk}, s_{ij}, t_m$ (Gayawan, 2014):

$$y_{ijklm}|\gamma, \mu_{ijk}, v_{ij}, s_i \sim Poisson\ (\mu_{ijkl}) \tag{1}$$

$$\log(\mu_{ijkl}) = \eta_{ijkl} = x_{ijkl}\gamma + \mu_{ijk} + v_{ij} + s_i \tag{2}$$

where x_{ijkl} represents the corresponding vector value of the covariates, and γ denotes the coefficient of the independent variables. μ_{ijkl} represents the dependent variable and the average number of dentists employed or the dental workforce in the year i. η_{ijkl} characterizes the logarithmic Poisson regression model. The Poisson analysis coefficient estimates consider how

the average number, y, changes after one year in the number of dentists employed. Nevertheless, instead of examining the difference in the average number in the data set, it considers the log of the average number in the data set with Poisson regression. It then converts it back to the original units. The comparison of the two models, for a certain period (i) and after increasing the other period by 1 ($i+1$), is done as follows (Roback & Legler, 2021):

$$\begin{gathered} \log(y_{ijkl}) = x_{ijkl}\gamma + \mu_{ijk} + v_{ij} + s_i \\ \log(y_{(i+1)jkl}) = (x+1)\gamma \\ \log(y_{(i+1)jkl}) - \log(y_{ijkl}) = \gamma \\ \log\left(\frac{y_{(i+1)jkl}}{y_{ijkl}}\right) = \gamma \\ \frac{y_{(i+1)jkl}}{y_{ijkl}} = e^{\gamma} \end{gathered} \tag{3}$$

Estimating the number of dentists employed was provided using the correlation coefficient (R). The equations used for performance measurement are given below:

$$R = \sum_{i=1}^{n} \left[\frac{\tilde{y}_i - y_i}{y_i - \bar{y}_i}\right]^2 \tag{4}$$

where y_i, $\bar{y}_i$, and $\tilde{y}_i$ represent the actual value in the data set, the average value of the data set, and the predictive values generated by the Poisson regression model, respectively. n is the number of samples in a dataset. The value of R takes a number between 0.00 and 1.00. Minitab 18.1 software was utilized for descriptive statistics and the optimum Poisson regression method for data analysis.

The present study aims to calculate the optimum value of the dentist workforce required for Turkey by calculating the optimum values of the factors affecting the dental workforce, defined as decision variables. The desirability degrees of the created algorithm were taken into account while calculating the optimum values (Ayaz Atalan et al., 2020). The desirability value represents the validity of the results of an optimization model and that the results reach the optimum level.

There are three cases for the degree of desirability, and the following equations are considered (Ramanujam et al., 2014):

$$d_i = \begin{cases} \left[\frac{\tilde{y}_i - y_{min}}{T - y_{min}}\right]^s, & y_{min} \le \tilde{y}_i \le T, \quad s \ge 0 \\ \left[\frac{\tilde{y}_i - y_{max}}{T - y_{max}}\right]^t, & T \le \tilde{y}_i \le y_{max}, \quad t \ge 0 \end{cases} \tag{5}$$

$$d_i = \begin{cases} 1, \\ \left[\frac{\tilde{y}_i - y_{max}}{y_{min} - y_{max}}\right]^r, y_{min} \le \tilde{y}_i \le y_{max}, \quad r \ge 0 \end{cases} \tag{6}$$

$$d_i = \begin{cases} 0, & \tilde{y}_i \le y_{min} \\ \left[\frac{\tilde{y}_i - y_{min}}{T - y_{min}}\right]^r, & y_{min} \le \tilde{y}_i \le y_{max}, \quad r \ge 0 \\ 1, & \tilde{y}_i \ge y_{min} \end{cases} \tag{7}$$

where, d_i is defined as the desirability value of $\tilde{y}_i$. y_{min} represents the lower acceptable limit of $\tilde{y}_i$ and y_{max} the allowable upper limit of $\tilde{y}_i$, and $s, t, and\ r$ symbolize the weights measured. The value of $\tilde{y}_i$is used to reach a specific target T (optimal value) (Jenarthanan & Jeyapaul, 2018). The following formula is used to calculate the estimated value of the response based on the optimum parameter level and validate the results:

$$d_i = (d_1^{w_1} d_2^{w_2} d_3^{w_3} \dots d_n^{w_n})^{1/w} \tag{8}$$

where, $w_1, w_2, w_3, \dots, w_n$ are the weight of the desirability approach in $\tilde{y}_i$. w is the sum of the $w_1, w_2, w_3, \dots, w_n$.

2. FINDINGS

The study data were obtained from publicly accessible data by the Turkey Statistical Institution (TUIK) (TUIK, 2021). *A* Poisson statistical analysis was performed to examine the relationship between four different input variables and the employed dentist *f*or the first phase of this study. The data of the dental workforce, which is the dependent variable, were analyzed with the

Kolmogorov-Smirnov normality test to verify that the data were normally distributed (*p-value=0.00553, test value=0.114*, null hypothesis: the data follow a normal distribution, alternative hypothesis: the data do not follow a normal distribution, interpret: *reject the null hypothesis*). The Pearson and Spearman rho correlation tests analyses were performed to measure the correlation values between dependent and independent variables, and the correlation values are shown in Table 3. Correlation values between variables vary between -1 and +1. The closer the correlation value between two variables is to -1 or +1, is interpreted as the vital link between the variables. The values among the variables selected for this study are very high and show a positive trend, approaching +1 (Atalan, 2021b). The lowest correlation values were calculated at 0.821 by the Spearman-rho test, which is valid for x_{pc} and x_{lr} variables. The Pearson correlation test analyzed the lowest value among the correlation values was analyzed at 0.862 by the Pearson correlation test, which is valid for x_{pc} and x_{le} variables. The highest correlation value was calculated as 0.992 with the Pearson correlation test, and this value was between x_p-x_{le} and x_{lr}-x_{le}. The highest correlation value was computed as 0.998 with the Spearman-rho correlation test. This value was between x_p-y_d, x_{le}-y_d, x_{le}-x_p, and x_{lr}-x_{le}.

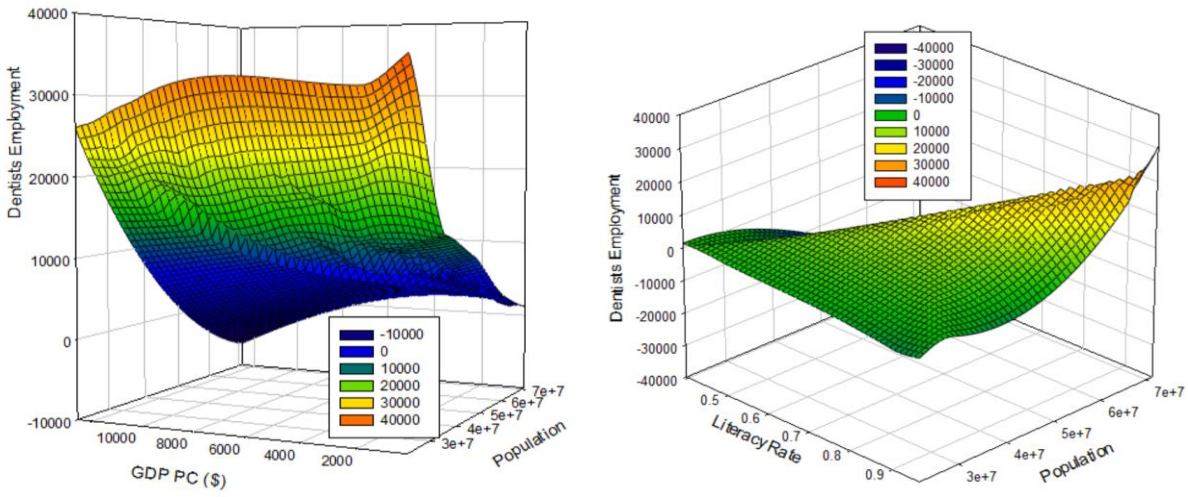
Table 3. Correlation Values of Dependent and Independent Variables

Variables	Test Type	y_d	x_P	x_{le}	x_{Pc}
x_P	Pearson	0.984	------	------	------
	Spearman-rho	0.998	------	------	------
x_{le}	Pearson	0.961	0.992	------	------
	Spearman-rho	0.998	0.998	------	------
x_{Pc}	Pearson	0.927	0.907	0.862	------
	Spearman-rho	0.976	0.976	0.976	
x_{lr}	Pearson	0.943	0.978	0.992	0.911
	Spearman-rho	0.994	0.997	0.997	0.821

The dataset using the Poisson regression model of the dental workforce was created to evaluate the effect of the independent variables on the response factor. The Poisson statistical analysis was performed to measure the effect of independent variables on the dependent variable. The most important reason for choosing this analysis is that the data used and obtained are integers. The values of deviance R^2, adjusted R^2, and Akaike Information Criterion (AIC) were computed as 0.9941, 0.9941, and 960.11, respectively, which confirm the validity of the Poisson statistical test. We determined that the data used was appropriate in terms of the method applied, and the results obtained were consistent since the model's R^2 values were high, and the better the model fits the

data based on the AIC value. Poisson statistical analysis data are analyzed whether the independent variables are statistically effective on the dependent variable. Four independent variables substantially affect the dependent variable. x_p, x_{le}, x_{pc}, and x_{lr} were measured with values of 0.001, 0.014, 0.001, and 0.003, respectively, which were statistically effective on the dental workforce ($p - value \leq 0.05$).

The effect of the independent variables on the interactively dependent variable was discussed in detail. The response surface fitted mean plots were expressed in Figure 2 to understand whether these factors affect positively or negatively. In the Poisson statistical analysis, according to the figures showing the effect of the independent variables on the dependent variables, the values of the independent variables show a non-linear trend as the values of x_{pc} and x_p variables increase, and the number of employed dentists increases. However, due to the interaction between the x_p and x_{le}, the effects on the number of dentists employed seem to fluctuate. There is an interesting correlation between x_{pc} and x_{lr} variables. A decrease in the number of employed dentists is observed as the value of the x_{lr} increases after reaching a certain value of x_{pc}. All of the dependent variables considered adequately described the change in the number of dentists employed in Turkey in the Poisson model combining their effects.



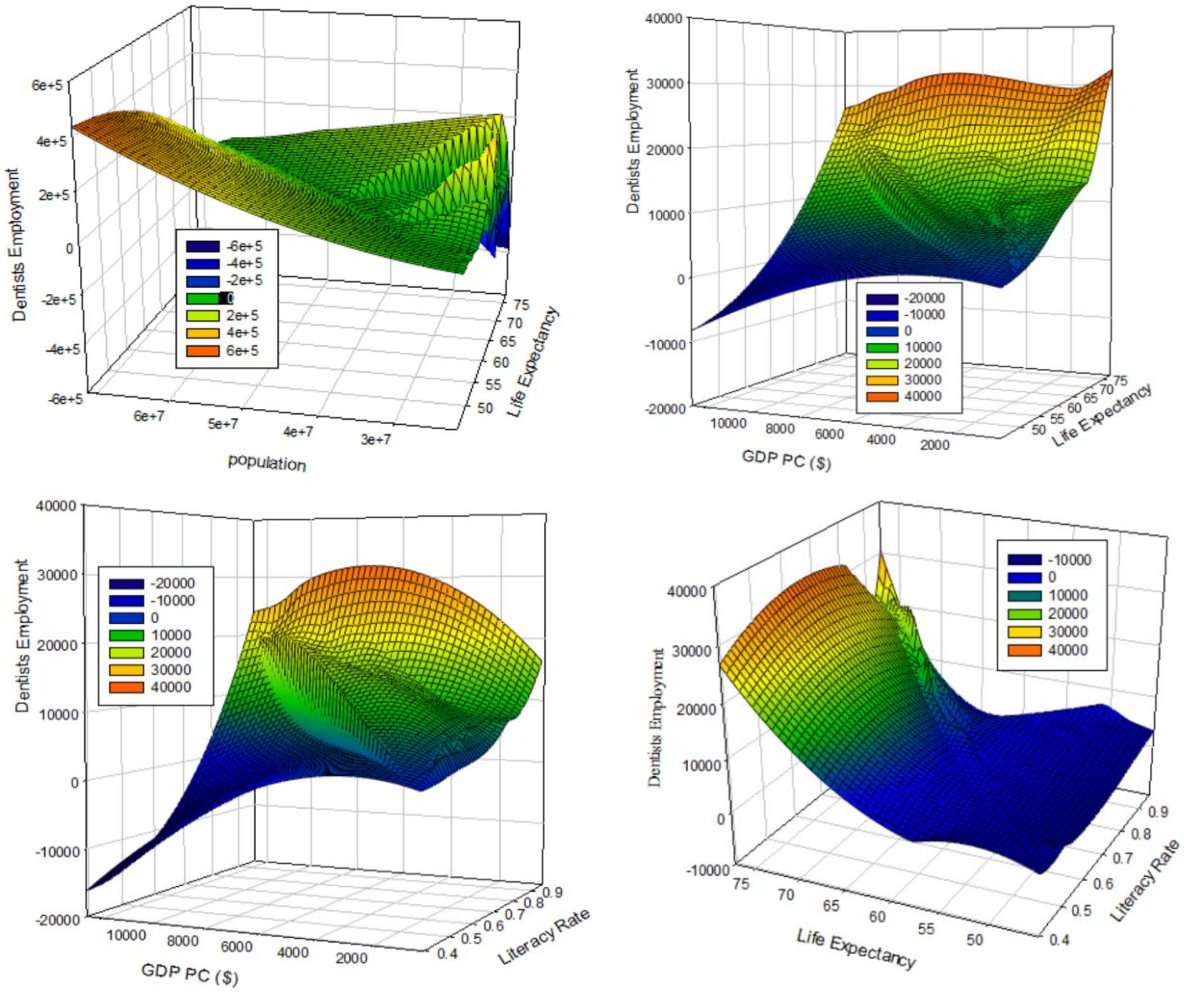


Figure 2. Effects of binary interactions of factors on the y_d

[the relationship of a) x_{pc}-x_p b) x_{lr}-x_p, c) x_p-x_{le}, d) x_{pc}-x_{le}, d) x_{pc}-x_{lr}, e) x_{lr}-x_{le}]

Optimum values according to the degree of desirability are shown in Table 4. The top ten optimum results were evaluated according to the degree of desirability. Each desirability series is also the value included in the optimum solution set. The values of the objective function were calculated according to the values of the decision variables. These results were obtained from the what-if perspective.

Table 4. Optimum values according to the degree of desirability

Optimization Models	Desirability d_i	Objective functions (y_i)	Decision Variables (what if-value)			
			Input (x_p)	Input (x_{le})	Input (x_{pc})	Input (x_{lr})
Solution 1	1.00000	51627.7	21951215	77.3100	---	0.9640
Solution 2	1.00000	31252.5	21951215	77.3100	12614.0	0.9640
Solution 3	1.00000	43058.8	71321399	77.3100	---	0.9640
Solution 4	1.00000	35566.9	71321399	77.3100	---	0.3951
Solution 5	1.00000	42645.0	21951215	77.3100	---	0.3951
Solution 6	1.00000	31258.9	21951215	77.3100	12609.1	0.9640
Solution 7	1.00000	30615.0	21951215	72.1735	---	0.9640
Solution 8	0.99999	30614.6	71321399	73.9573	---	0.9640
Solution 9	0.99998	30614.5	71321398	73.9573	---	0.9640
Solution 10	0.99998	30614.3	71321397	77.3100	8695.30	0.964

--- Absence of values in the feasible solution set but not significantly supporting the optimum result

Desirability differs according to the objective function value of the decision variables according to the optimum values. According to solution 1, the population of the country should be approximately 22 million and the x_{le} and x_{lr} should be at the maximum level for the current workforce of occupational dentists. A dentist is assigned to around 426 patients based on solution 1. Based on the 2018 population value, at least 167744 dentists should be employed. However, according to 2018 data, a dentist is appointed to treat 1381 people. From another point of view, the fluctuation in the number of dental workforces is also inversely proportional to the x_{pc} factor. It is seen that there will be a decrease in dentist power with the increase in x_{pc} value, but there is a decrease in x_p with the same trend. For this result, the optimum x_{pc}value could not be obtained. In addition, for the desirability optimization model, the degree of desirability decreases after the 7^{th} iteration of the model.

Since an objective function has more than one decision variable, it is inevitable to obtain the results obtained from the what-if perspective. In the same way, the method developed according to the values of the decision variables is used to get the optimum value of the dental workforce. This study offers a solution to the resource management problem in dental workforce management with the desirability optimization based on the Poisson regression model. The optimum level of the dental workforce is directly related to the social and economic infrastructure of a country. A country's population, gross domestic per capita, life expectancy, and literacy rate should be at a certain level for optimum dentist needs. As a result, the current values of the indicators and the optimum dentist workforce value do not match the Turkish healthcare system.

3. CONCLUSIONS AND RECOMMENDATIONS

The traditional statistical analysis, Poisson, a popular topic today, was integrated into this study. The factors affecting the decision of the dental workforce in Turkey were analyzed with the Poisson statistical analysis method to estimate the number of dentists employed. Pearson and spearman rho correlation analysis calculated the correlation values between the factors. The strong correlation values were estimated between dependent and independent variables. Poisson statistical analysis model has high R^2 values and proves that the data used is in harmony with the method. The present study shows the effects of x_p, x_{pc}, x_{le}, and x_{lr} on the y_d were very significant. In addition, dual mechanism reliability was achieved by adhering to the what-if perspective and desirability values to determine the optimum values of the objective function in this study.

To conclude, the Poisson regression model provides the opportunity to know the problems that may occur by obtaining predictive data and sensitivity analyses in many areas. The potential of the Poisson regression model in overcoming the complexity of various data and the difficulties encountered in healthcare management has been revealed in this study. The most crucial reason for consistent data in healthcare management is the human factor. To minimize the cost of human resources in healthcare, the Poisson regression model models must be needed to overcome the data of this complex system. This paper showed the method that allows the Poisson regression model to be developed for predictive data to enable more data-driven health informatics and management solutions. The implications of this research are that health system management will become more dependent on the Poisson regression model of complex data such as human resources, health economics, patient rights, patient and health professional satisfaction, etc.

This study has some limitations. The analysis is limited to four input factors, eliminating factors that cannot accommodate long-term data. Therefore, the effects of variables with other demographic characteristics on the dental workforce could not be analyzed. The previous workforce size may well be driven to a greater degree by supply-side factors such as the availability of dental training courses places, the appeal of the career, including pay, and relative ease and amount of immigration of dentists into the country. A second limitation is the x_lr data selected among the independent parameters to reflect the education level in the country. Otherwise, this study does not directly include the education level factor when there is no long-term data on education level. The data obtained in this study were taken into account by four independent factors. Another limitation is that the dental workforce is limited only to those working in

government-supported institutions. Since there is no official data on the dental workforce in private dental clinics, they were not included in the study.

Healthcare expenditure rates in countries are increasing day by day. One of the most significant shares in health expenditures is health resources. Using alternative resource allocation techniques in dental health care, policymakers can provide more information about the economic impact to decision-makers (Vernazza et al., 2021). Inefficient resource management negatively affects health systems in terms of cost and time (Hung et al., 2019). For this reason, it is inevitable to use the Poisson regression model, which is one of the most up-to-date methods of today. This study offers a solution to the resource management problem in health management with the Poisson statistical analysis method.

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Conflict Of Interest

The author declares that there is no conflict of interest.

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References

Ahern, S., Woods, N., Kalmus, O., Birch, S., & Listl, S. (2019). Needs-based planning for the oral health workforce - development and application of a simulation model. *Human Resources for Health*, *17*(1), 55. https://doi.org/10.1186/s12960-019-0394-0

Alamgir, H., & Yu, S. (2008). Epidemiology of occupational injury among cleaners in the healthcare sector. *Occupational Medicine*, *58*(6), 393–399. https://doi.org/10.1093/occmed/kqn028

Atalan, A. (2018). Türkiye Sağlık Ekonomisi için İstatistiksel Çok Amaçlı Optimizasyon Modelinin Uygulanması. *İşletme Ekonomi ve Yönetim Araştırmaları Dergisi*, *1*(1), 34–51. http://dergipark.gov.tr/download/article-file/414076

Atalan, A. (2021a). *Sağlık Sistemlerinde Sağlık Yönetimi Genel Bakış, Güncel Sorunlar, Uygulamalar ve Yaklaşımlar* (A. Atalan (ed.); 1st Editio). Gece Publishing.

Atalan, A. (2021b). EFFECT OF HEALTHCARE EXPENDITURE ON THE CORRELATION BETWEEN THE NUMBER OF NURSES AND DOCTORS EMPLOYED. *International Journal of Health Management and Tourism*, *6*(2), 515–525. https://doi.org/10.31201/ijhmt.949500

ATALAN, A. (2020). Forecasting for Healthcare Expenditure of Turkey Covering the Years of

2018-2050. *Gümüşhane Üniversitesi Sağlık Bilimleri Dergisi*, *9*(1), 8–16. https://doi.org/10.37989/gumussagbil.538111

Atalan, A., & Donmez, C. C. (2020). DEVELOPING OPTIMIZATION MODELS TO EVLUATE HEALTHCARE SYSTEMS. *Sigma Journal of Engineering and Natural Sciences*, *38*(2), 853–873.

Atalan, A., & Dönmez, C. C. (2020). Optimizing experimental simulation design for the emergency departments. *Brazilian Journal of Operations & Production Management*, *17*(4), 1–13. https://doi.org/10.14488/BJOPM.2020.026

Ayaz Atalan, Y., Tayanç, M., Erkan, K., & Atalan, A. (2020). Development of Nonlinear Optimization Models for Wind Power Plants Using Box-Behnken Design of Experiment: A Case Study for Turkey. *Sustainability*, *12*(15), 6017. https://doi.org/10.3390/su12156017

Dement, J. M., Epling, C., Østbye, T., Pompeii, L. A., & Hunt, D. L. (2004). Blood and body fluid exposure risks among health care workers: Results from the Duke Health and Safety Surveillance System. *American Journal of Industrial Medicine*, *46*(6), 637–648. https://doi.org/10.1002/ajim.20106

Eaton, K. A. (2020). Oral healthcare workforce planning in post-Brexit Britain. *British Dental Journal*, *228*(10), 750–752. https://doi.org/10.1038/s41415-020-1579-6

Gallagher, J. E., Manickam, S., & Wilson, N. H. (2015). Sultanate of Oman: building a dental workforce. *Human Resources for Health*, *13*(1), 50. https://doi.org/10.1186/s12960-015-0037-z

Gayawan, E. (2014). A Poisson Regression Model to Examine Spatial Patterns in Antenatal Care Utilisation in Nigeria. *Population, Space and Place*, *20*(6), 485–497. https://doi.org/10.1002/psp.1775

GEBSKI, V., ELLINGSON, K., EDWARDS, J., JERNIGAN, J., & KLEINBAUM, D. (2012). Modelling interrupted time series to evaluate prevention and control of infection in healthcare. *Epidemiology and Infection*, *140*(12), 2131–2141. https://doi.org/10.1017/S0950268812000179

Harper, P., Kleinman, E., Gallagher, J., & Knight, V. (2013). Cost-effective workforce planning: optimising the dental team skill-mix for England. *Journal of Enterprise Information Management*, *26*(1/2), 91–108. https://doi.org/10.1108/17410391311289569

Hung, M., Xu, J., Lauren, E., Voss, M. W., Rosales, M. N., Su, W., Ruiz-Negrón, B., He, Y., Li, W., & Licari, F. W. (2019). Development of a recommender system for dental care using machine learning. *SN Applied Sciences*, *1*(7), 785. https://doi.org/10.1007/s42452-019-0795-7

Islam, M. A., & Chowdhury, R. I. (2017). A generalized right truncated bivariate Poisson regression model with applications to health data. *PLOS ONE*, *12*(6), e0178153. https://doi.org/10.1371/journal.pone.0178153

Jenarthanan, M. P., & Jeyapaul, R. (2018). Optimisation of machining parameters on milling of GFRP composites by desirability function analysis using Taguchi method. *International Journal of Engineering, Science and Technology*, *5*(4), 22–36. https://doi.org/10.4314/ijest.v5i4.3

Knevel, R., Gussy, M., & Farmer, J. (2017). Exploratory scoping of the literature on factors that influence oral health workforce planning and management in developing countries. *International Journal of Dental Hygiene*, *15*(2), 95–105. https://doi.org/10.1111/idh.12260

Mihaylova, B., Briggs, A., O'Hagan, A., & Thompson, S. G. (2011). Review of Statistical Methods

for Analysing Healthcare Resources and Costs. *Health Economics*, *20*(8), 897–916. https://doi.org/10.1002/hec.1653

Newton, J. T., Buck, D., & Gibbons, D. E. (2001). Workforce planning in dentistry: the impact of shorter and more varied career patterns. *Community Dental Health*, *18*(4), 236—241. http://europepmc.org/abstract/MED/11789702

Ramanujam, R., Maiyar, L. M., & Vasan, K. V. M. (2014). Multi response optimization using ANOVA and desirability function analysis: a case study in end milling of Inconel alloy. *ARPN J Eng Appl Sci*, *9*(3), 457–463.

Roback, P., & Legler, J. (2021). Beyond Multiple Linear Regression: Applied Generalized Linear Models and Multilevel Models in R. In *Chapman and Hall/CRC* (1st editio). https://bookdown.org/roback/bookdown-BeyondMLR/ch-poissonreg.html

Saman, D. M., Arevalo, O., & Johnson, A. O. (2010). The dental workforce in Kentucky: current status and future needs. *Journal of Public Health Dentistry*, *70*(3), 188–196. https://doi.org/10.1111/j.1752-7325.2010.00164.x

Surdu, S., Mertz, E., Langelier, M., & Moore, J. (2021). Dental Workforce Trends: A National Study of Gender Diversity and Practice Patterns. *Medical Care Research and Review*, *78*(1_suppl), 30S-39S. https://doi.org/10.1177/1077558720952667

Teusner, D. N., Amarasena, N., Satur, J., Chrisopoulos, S., & Brennan, D. S. (2016). Dental service provision by oral health therapists, dental hygienists and dental therapists in Australia: implications for workforce modelling. *Community Dent Health*, *33*(1), 15–22.

Try, G. (2000). Too Few Dentists? Workforce Planning 1996–2036. *Primary Dental Care*, *os7*(1), 9–13. https://doi.org/10.1308/135576100322748448

TUIK. (2021). *Sağlık İstatistikleri, istatistiksel Tablolar ve Dinamik Sorgulama*. Türkiye İstatistik Kurumu. https://tuikweb.tuik.gov.tr/PreTablo.do?alt_id=1095

Vernazza, C. R., Birch, S., & Pitts, N. B. (2021). Reorienting Oral Health Services to Prevention: Economic Perspectives. *Journal of Dental Research*, *100*(6), 576–582. https://doi.org/10.1177/0022034520986794

Watt, R. G., Daly, B., Allison, P., Macpherson, L. M. D., Venturelli, R., Listl, S., Weyant, R. J., Mathur, M. R., Guarnizo-Herreño, C. C., Celeste, R. K., Peres, M. A., Kearns, C., & Benzian, H. (2020). The Lancet Oral Health Series: Implications for Oral and Dental Research. *Journal of Dental Research*, *99*(1), 8–10. https://doi.org/10.1177/0022034519889050

Yamalik, N., Ensaldo-Carrasco, E., & Bourgeois, D. (2013). Oral health workforce planning Part 1 : data available in a sample of FDI member countries. *International Dental Journal*, *63*(6), 298–305. https://doi.org/10.1111/idj.12084

Zamani, H., Faroughi, P., & Ismail, N. (2016). Bivariate generalized Poisson regression model: applications on health care data. *Empirical Economics*, *51*(4), 1607–1621. https://doi.org/10.1007/s00181-015-1051-7

https://dergipark.org.tr/tr/pub/ijhmt Doi Number: 10.31201/ijhmt.1123098

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THE EFFECTS OF HEALTH BEHAVIORS ON SELECTED HEALTH INDICATOR

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Abstract

Aim: This study was conducted with the aim of investigating the effects of health behaviors on health indicators.

Methods: In this context, data of 38 OECD countries between 2005-2018 were analyzed by Panel ARDL cointegration analysis. Crude mortality rate, infant mortality rate, cancer mortality rate and low birth weight rate were used as health indicators, while calorie, protein, sugar and fat supply and alcohol consumption were used as independent variables.

Results: As a result of the analysis, it was found that calorie supply affected positively the cancer mortality and low birth weight rate and the crude mortality rate negatively; protein supply affects crude mortality rate positively and others negatively; sugar supply positively affects all 4 health indicators; fat supply affects cancer mortality and low birth weight rate negatively and infant

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mortality rate positively; alcohol consumption negatively affects crude mortality and infant mortality rates, and positively affects cancer mortality and low birth weight rates.

Conclusion: As a result, it was concluded that the effects of health behaviors on health indicators, except for sugar supply, are mixed.

Keywords: Health Behaviors, Health indicators, OECD countries, Panel ARDL Model

INTRODUCTION

Individual and community health is the common result of many factors expressed as determinants of health (WHO, 2017). Determinants of health can be defined as personal, social, economic and environmental factors that affect a person's health (Healthy People, 2022). Whether people are healthy or not is affected by the conditions they live in, their environment and their behavior. Behavioral determinants of health are risky personal behaviors that can affect health and have lifelong implications. Behavioral determinants of health include tobacco use, alcohol use, drug use, lack of exercise, nutrition, (Adler et al., 2016; Denton & Walters, 1999; Healthy People, 2022) and risky sexual behaviors (Barton et al., 2019). The impact of these factors on health is greater than the frequently examined factors such as access to and use of health service (Adler et al., 2016; McGinnis et al., 2002; WHO, 2017). Although the USA is among the richest countries in the world and allocates more resources to health than other countries, the fact that it has more negative outcomes than many countries is associated with not focusing enough on the social and behavioral causes of health (Barton et al., 2019).

Focusing on the determinants of health can improve health outcomes and ultimately reduce health expenditures (Adler et al., 2016; Barton et al., 2019). Adopting healthy behaviors (e.g., eating healthy, exercising, avoiding tobacco and avoiding alcohol) and using preventive health services (e.g., going to the doctor, monitoring and treating blood pressure, and monitoring cholesterol) can prevent chronic diseases and contribute to the effective management of existing chronic diseases (Pickens et al., 2019). However, behavioral determinants of health other than alcohol and cigarettes are often overlooked and not monitored in health practices. On the other hand, various studies evaluate the effects of social and behavioral determinants on health as equal and sometimes higher than clinical indicators such as genetic factors and high blood pressure (Adler & Stead, 2015). Approximately 40% of deaths in the USA in 1990 (McGinnis et al., 2002)

and half in 2000 (Mokdad et al., 2004) are due to behavioral patterns that can be changed by preventive interventions.

Behavioral determinants of health affect individual and public health in various ways. Excessive alcohol consumption can cause exogenous and chronic health problems. Depending on alcohol consumption; alcohol poisoning, injuries and accidents (Pickens et al., 2019), deaths from violence, injury and suicide are increasing (Wilkinson & Marmot, 2003). In addition, there is an increased risk of high blood pressure and liver damage in sexually transmitted diseases and unplanned pregnancies (Pickens et al., 2019). According to Mokdad et al. (2004), 3.5% of deaths in the USA in 2000 were due to alcohol-related causes (Mokdad et al., 2004).

A balanced and adequate diet is very important in promoting health and well-being (Wilkinson & Marmot, 2003). Healthy and adequate nutrition is very important in every period of life for different reasons. It is necessary for development during pregnancy, childhood and adolescence, when growth is the fastest (Adler et al., 2016). Good nutrition in adulthood plays a role in preventing premature deaths from cardiovascular diseases and cancers. In the old age, energy needs decrease due to less physical activity. For this reason, the food of elderly people should be rich in micronutrients (World Health Organization Regional Office for Europe, 2001). Improper nutrition causes an increase in disease prevalence and worsening of chronic diseases (Berkowitz et al., 2018). Inadequacy and lack of diversity in food cause malnutrition and related diseases. Conversely, excess food intake (a type of malnutrition) may facilitate/cause the development of cardiovascular diseases, diabetes, cancer and degenerative eye diseases, obesity, and dental caries (Na et al., 2022; Wilkinson & Marmot, 2003). Food-borne health problems, particularly malnutrition, obesity and related NCDs, place an enormous burden on society, especially the most vulnerable. Accordin to the results of a preliminary analysis from the Swedish Institute of Public Health shows that in European Union countries, 4.5% of disability adjusted life years (DALYs) are lost due to malnutrition and 3.7% due to obesity (World Health Organization Regional Office for Europe, 2001).

Nutritional health problems increase the use of health services. Those who are malnourished make more outpatient and emergency visits, more hospitalizations and longer hospital stays (Berkowitz et al., 2018; Clancy et al., 2022). Due to the high health service use of these people, the society requires the highest health expenditure (Berkowitz et al., 2018).

Changes in nutrition quality due to social and economic conditions contribute to health inequalities. In many countries, the poor are replacing fresh food with cheap processed food. Malnutrition, saturated fats and sugar cause more obesity. Obesity has become more prevalent in the poor than in the rich. The nutritional aim of prevention of chronic diseases should be directed towards more fresh fruits, vegetables and grains, less processed starchy foods, refined sugar and salt (Wilkinson & Marmot, 2003).

Although a certain amount of fat is required in the diet, too much fat can lead to heart disease, cancer, obesity and other health problems (Binukumar & Mathew, 2005). Products containing unsaturated fat should be preferred in the diet. Saturated fatty acids are now known to play a role not only in the prevention of cardiovascular diseases through their effects on serum lipids, but also because they directly affect a number of other risk factors in various ways and directly affect atherogenesis (Wahrburg, 2004).

The primary role of dietary proteins is for use in the various anabolic processes of the body. Proteins form the main structural component of muscle and other tissues in the body and are important for human health as they are used to produce hormones, enzymes and hemoglobin (Hoffman and Falvo, 2004).

Negativeness in behavioral determinants of health, as in other determinants, not only affects the current health of the person, but also accumulates and negatively affects the health of the future periods (Adler et al., 2016). In addition, while each of the determinants of health may have an important and independent impact on health, their interactions can also play an important role. For this reason, it is expected that the effects of behavioral determinants on health, monitoring and taking necessary precautions will contribute to public health (Denton & Walters, 1999). In this study, the relationship between the parameters from which healthy data can be obtained from the behavioral determinants of health and some selected health indicators was examined.

2. 2. RESEARCH METHODOLOGY

2.1. Study Design

To investigate the effects of health behaviors on health indicators, Panel ARDL cointegration analysis (Panel ARDL Pooled Mean Group estimator) which were proposed by Pesaran, Shin and Smith (1999) were used. This model allows intersection points, short-term coefficients and error variants to change freely between groups, but keeps the long-term coefficients the same. PMG

estimator enables us to investigate long term homogeneity without implementing the homogeneity of the parameter in the short term (Pesaran et al., 1999). Panel ARDL general equation can be shown as the following regression:

$$Y_{1,it} = \alpha_{1i} + \gamma_{1,i} Y_{1,it-1} + \sum_{l=2}^{k} \gamma_{1i} X_{1,it-1} + \sum_{j=1}^{p-1} \sigma_{1,ij} \Delta Y_{1,it-j} + \sum_{j=0}^{q-1} \sum_{l=2}^{k} \sigma_{1,ij} \Delta X_{1,it-j} + \mu_{1,it}$$

Where "i" is the number of units in the panel, "α" is the constant component of the model, "Δ" is the first difference operator, and "k" is the the number of lags, "μ_{it}" is error term with zero mean and variance constant within each unit.

Stationarity of series is essential for the cointegration analysis (Çıraklı & Yıldırım, 2019). Therefore, stationary tests, which are unit root tests, for time series were firstly performed. Then, Pedroni Panel Residual Cointegration test (Pedroni, 1999), which has 7 different tests and 11 different statistics under the assumption that there is no cross-sectional dependency (Cirakli et al., 2021), were performed to decide a cointegration relation between the variables. After detecting cointegration relationship between series, we conducted Panel ARDL analysis to estimate long run and short run relations between series. We used four different ARDL models as in the following equations:

Model 1.

$$\begin{aligned} \Delta InCrude_{it} = \; & \beta_0 + \sum_{j=1}^{pi} \lambda_{ij} \, \Delta InCrude_{i,t-j} + \sum_{j=0}^{qi} \delta_{ij} \, \Delta InCalorie_{i,t-j} + \sum_{j=0}^{qi} \emptyset_{ij} \, \Delta InProtein_{i,t-j} \\ & + \sum_{j=0}^{qi} \varphi_{ij} \, \Delta InSugar_{i,t-j} + \sum_{j=0}^{qi} \Theta_{ij} \, \Delta InFat_{i,t-j} + \sum_{j=0}^{qi} \ddot{\Theta}_{ij} \, \Delta InAlcohol_{i,t-j} \\ & + \gamma_1 InCrude_{i,t-1} + \gamma_2 InCalorie_{i,t-1} + \gamma_3 InProtein_{i,t-1} + \gamma_4 InSugar_{i,t-1} \\ & + \gamma_5 InFat_{i,t-1} + \gamma_6 InAlcohol_{i,t-1} + \varepsilon_{it} \end{aligned} \quad (1)$$

Model 2.

$$\begin{aligned} \Delta InInfant_{it} = \; & \beta_0 + \sum_{j=1}^{pi} \lambda_{ij} \, \Delta InInfant_{i,t-j} + \sum_{j=0}^{qi} \delta_{ij} \, \Delta InCalorie_{i,t-j} + \sum_{j=0}^{qi} \emptyset_{ij} \, \Delta InProtein_{i,t-j} \\ & + \sum_{j=0}^{qi} \varphi_{ij} \, \Delta InSugar_{i,t-j} + \sum_{j=0}^{qi} \Theta_{ij} \, \Delta InFat_{i,t-j} + \sum_{j=0}^{qi} \ddot{\Theta}_{ij} \, \Delta InAlcohol_{i,t-j} \\ & + \gamma_1 InInfant_{i,t-1} + \gamma_2 InCalorie_{i,t-1} + \gamma_3 InProtein_{i,t-1} + \gamma_4 InSugar_{i,t-1} \\ & + \gamma_5 InFat_{i,t-1} + \gamma_6 InAlcohol_{i,t-1} + \varepsilon_{it} \end{aligned} \quad (2)$$

Model 3.

$$\begin{aligned}\Delta InCancer_{it} = \ & \beta_0 + \sum_{j=1}^{pi} \lambda_{ij}\, \Delta InCancer_{i,t-j} + \sum_{j=0}^{qi} \delta_{ij}\, \Delta InCalorie_{i,t-j} + \sum_{j=0}^{qi} \emptyset_{ij}\, \Delta InProtein_{i,t-j} \\ & + \sum_{j=0}^{qi} \varphi_{ij}\, \Delta InSugar_{i,t-j} + \sum_{j=0}^{qi} \Theta_{ij}\, \Delta InFat_{i,t-j} + \sum_{j=0}^{qi} \ddot{\Theta}_{ij}\, \Delta InAlcohol_{i,t-j} \\ & + \gamma_1 InCancer_{i,t-1} + \gamma_2 InCalorie_{i,t-1} + \gamma_3 InProtein_{i,t-1} + \gamma_4 InSugar_{i,t-1} \\ & + \gamma_5 InFat_{i,t-1} + \gamma_6 InAlcohol_{i,t-1} + \varepsilon_{it}\end{aligned} \tag{3}$$

Model 4.

$$\begin{aligned}\Delta InLBR_{it} = \ & \beta_0 + \sum_{j=1}^{pi} \lambda_{ij}\, \Delta InLBR_{i,t-j} + \sum_{j=0}^{qi} \delta_{ij}\, \Delta InCalorie_{i,t-j} + \sum_{j=0}^{qi} \emptyset_{ij}\, \Delta InProtein_{i,t-j} \\ & + \sum_{j=0}^{qi} \varphi_{ij}\, \Delta InSugar_{i,t-j} + \sum_{j=0}^{qi} \Theta_{ij}\, \Delta InFat_{i,t-j} + \sum_{j=0}^{qi} \ddot{\Theta}_{ij}\, \Delta InAlcohol_{i,t-j} \\ & + \gamma_1 InLBR_{i,t-1} + \gamma_2 InCalorie_{i,t-1} + \gamma_3 InProtein_{i,t-1} + \gamma_4 InSugar_{i,t-1} \\ & + \gamma_5 InFat_{i,t-1} + \gamma_6 InAlcohol_{i,t-1} + \varepsilon_{it}\end{aligned} \tag{4}$$

In the above equations, "β_0" is the constant component of the model, "Δ" is the first difference operator, "In" is the logarithm of the series, and "ε_{it}" is error term with zero mean and variance constant within each unit. Regarding the supply of calories, sugar and fat, which are variables related to health behaviors, we assumed that an increase in the supply of these products in a country means an increase in consumption in that country. We used the logarithm of series in the analysis, because it is possible to interpret the results as elasticity when the logarithms of the series are used, and also it helps solve the extreme value problem.

2.2. Data and Analysis

The data of the study were obtained as yearly data for 38 OECD countries spanning 14 years from 2005 through 2018. Variables of study are shown in Table 1. Selection of data dates are made according to the criteria of having full data for these years. Eviews 9.5 package program were used for analyzes.

Table 1. Variables and Abbreviations

Variables	Abbreviation
Total Calory Supply (Kilocalories per capita per day)	Calori
Total Protein Supply (Grams per capita per day)	Protein
Sugar Supply (Kilos per capita per year)	Sugar
Total Fat Supply (Grams per capita per day)	Fat
Crude Mortality Rate (per 100,000)	Crude
Alcohol Consumption (Liter per Capita)	Alcohol
Infant Mortality Rate (per 1,000)	Infant
Cancer Mortality Rate (per 100,000)	Cancer
Low Birth Weight (%)	LBR

3. FINDINGS

3.1. Results of Unit Root Tests

In this study, we used a variety of tests to determine the stationarity of the time series in panel datasets: Levin, Lin and Chu test (Levin et al., 2002), Im, Pesaran and Shin test (Im et al., 2003), ADF-Fisher Chi-square test (Maddala & Wu, 1999), and PP-Fisher Chi-square test (Choi, 2001). The results of unit root tests were shown in the Table 2. According to the unit test results, it is seen that all the variables meet the condition of being stationary in their level values or their first difference values.

Table 2. The Results of ADF Unit Root Test

Variables	Levin, Lin & Chu t*		Im, Pesaran and Shin W-stat		ADF - Fisher Chi-square		PP - Fisher Chi-square	
	Level	First Difference	Level	First Difference	Level	First Difference	Level	First Difference
Calori	0.901 (0.183)	**-17.287 (0.000)**	0.096 (0.538)	**-13.068 (0.000)**	77.653 (0.425)	**289.49 (0.000)**	329.24 (0.191)	**497.21 (0.000)**
Protein	**-5.437 (0.000)**	**-18.803 (0.000)**	**-2.022 (0.021)**	**-13.747 (0.000)**	104.83 (0.015)	**308.29 (0.000)**	**104.96 (0.015)**	**366.13 (0.000)**
Sugar	**1.815 (0.034)**	**-20.260 (0.000)**	0.149 (0.559)	**-15.564 (0.000)**	82.711 (0.280)	**338.98 (0.000)**	86.423 (0.194)	**421.57 (0.000)**
Fat	-0.586 (0.278)	**-19.598 (0.000)**	1.773 (0.962)	**-14.545 (0.000)**	73.678 (0.554)	**319.09 (0.000)**	80.020 (0.354)	**359.37 (0.000)**
Alcohol	**-5.503 (0.000)**	**-19.012 (0.000)**	**-2.221 (0.013)**	**-14.356 (0.000)**	**110.27 (0.006)**	**317.27 (0.000)**	**110.35 (0.006)**	**412.27 (0.000)**

Bold: The test indicates that the variable is stationary at least at 5%; p-values in squared parentheses

3.2. The Results of Panel Cointegration Tests

Pedroni Panel Residual Cointegration test (Pedroni, 1999) was used to decide the cointegration relationship between the variables. The Pedroni Panel Residual Cointegration test includes 7 different tests and 11 different statistics to determine the cointegration relationship between variables, under the assumption that there is no cross-sectional dependency (Pedroni, 1999).

The results of Pedroni Panel Residual Cointegration test were shown in Table 3. From the results shown in Table, 4 out of 11 different statistics for the models of crude and infant mortality rates, 5 for cancer mortality rate model, 6 for the models of low-birth-weight infant rate and health expectancy model show a significant long-run cointegration relationship between series. Therefore, we can conduct Panel ARDL analysis to estimate long-run and short coefficients.

Table 3. The Results of Pedroni Panel Residual Cointegration Tests

Included observations: 532			**Cross-sections included:** 38	
Null Hypothesis: No cointegration			**Trend assumption:** No deterministic trend	
User-specified lag length: 1	Newey-West automatic bandwidth selection and Bartlett kernel			
	CrudeMR	**InfantMR**	**CancerMR**	**LBR**
Panel v-Statistic	-2.90 (0.998)	**2.03 (0.020)****	-2.22 (0.986)	-2.08 (0.981)
Panel v-Statistic- Weighted	-2.14 (0.983)	3.45 (0.999)	-3.61 (0.999)	-3.57 (0.999)
Panel rho-Statistic	4.56 (1.000)	3.21 (0.999)	4.29 (1.000)	4.43 (1.000)
Panel rho-Statistic- Weighted	4.56 (1.000)	3.99 (1.000)	4.96 (1.000)	4.98 (1.000)
Panel PP-Statistic	**-2.94*** (0.001)**	**6.93*** (0.000)**	**9.86*** (0.000)**	**-7.30*** (0.000)**
Panel PP-Statistic- Weighted	**-4.84*** (0.000)**	**-10.02*** (0.000)**	**-7.73*** (0.000)**	**-7.63*** (0.000)**
Panel ADF-Statistic	4.04 (1.000)	0.40 (0.658)	1.79 (0.963)	**-6.58*** (0.000)**
Panel ADF-Statistic- Weighted	1.79 (0.963)	0.35 (0.638)	**2.08** (0.018)**	**-6.78*** (0.000)**
Alternative hypothesis: individual AR coefs. (Between-dimension)				
Group rho-Statistic	7.07 (1.000)	6.27 (1.000)	7.54 (1.000)	7.57 (0.985)
Group PP-Statistic	**10.97*** (0.000)**	**-22.18*** (0.000)**	**12.48*** (0.000)**	**12.65*** (0.000)**
Group ADF-Statistic	2.18 (0.985)	-0.44 (0.327)	-1.24 (0.106)	**-8.98*** (0.000)**

****** Significant cointegration relationship at 5%; ******* Significant cointegration relationship at 1%, p-values in squared parentheses.

3.3. The Results of Panel ARDL Analysis

Table 4 shows thhe results of Panel ARDL Analysis. The selection of the most appropriate ARDL model was made automatically by the Eviews 9.5 package program according to the Akaike information criterion and the maximum lag length of 1 with automatic selection.

Table 4. The Results of Panel ARDL Analysis

Variables (Logarithmic)		Crude	Infant	Cancer	LBR
Calorie	Coeff.	**-0.052*** **	0.028	**0.209*** **	**1.406*** **
	p	**0.000**	0.092	**0.000**	**0.000**
Protein	Coeff.	**0.009*** **	**-0.073*** **	**-0.116*** **	**-0.766*** **
	p	**0.000**	**0.000**	**0.000**	**0.000**
Sugar	Coeff.	**0.650*** **	**0.211** **	**1.408*** **	**7.960*** **
	p	**0.000**	**0.044**	**0.000**	**0.000**
Fat	Coeff.	0.024	**0.268*** **	**-1.056*** **	**-5.499*** **
	p	0.294	**0.000**	**0.000**	**0.000**
Alcohol	Coeff.	**-0.011*** **	**-0.339*** **	**0.106*** **	**0.642*** **
	p	**0.007**	**0.000**	**0.002**	**0.001**

*** Significant at 1%., ** Significant at %5

From the results of Panel ARDL analysis in Table 4, it was found that the effect of calorie supply on crude mortality rate was significantly negative ($p<0.05$), while the effect of calorie supply on cancer mortality rate and low birth weight were significantly positive ($p<0.05$). On the other hand, there was no significant relationship between calorie supply and infant mortality rate ($p>0.05$).

According to the results of Panel ARDL analysis, the effect of protein supply on 3 out 4 health indicators (infant mortality rate, cancer mortality rate, low birth weight was significantly positive, while it was significantly negative on crude mortality rate.

From the findings of sugar supply, it was found that sugar supply has affected the health indicators of crude mortality rate, infant mortality rate, cancer mortality rate and low birth rate in significantly positive way.

When examining the coefficient of the total fat supply model, it was detected that there was a positive way significant relationship between fat supply and infant mortality rate, while the relationship between fat supply cancer mortality and low birth rate significantly negative.

For alcohol, it was found that alcohol consumption affected crude mortality rate and infant mortality rate in significantly negative and, it affected cancer mortality rate and low birth weight rate significantly positively.

4. DISCUSSION

The findings of this study shows that the increase in calorie supply will result an increase in cancer mortality rate and low birth weight rate, while it will result a decrease in crude mortality rate. O'Flanagan et al. (2017) states that excessive calori consumption is among the reasons of cancer,

so that calorie restriction extends life span. On the other hand, our finding of low birth rate is opposite to the finding of Choudhary (2013), which found that increase in calorie intake decreases the low-birth-weight rate.

In this study, it was found that an increase in protein supply will cause a significant reduce in infant mortality rate, cancer mortality rate and low birth weight rate but significant increase in crude mortality rate. The primary role of proteins is for use in the various anabolic processes of the body. Proteins form the main structural component of muscle and other tissues in the body and are important for human health as they are used to produce hormones, enzymes and hemoglobin (Hoffman & Falvo, 2004).

This study reveals that the more sugar supplies the higher crude mortality, infant mortality, cancer mortality and low birth weight rate occur. Ahn and Park (2021) showed that there is a significant inverse relationship between the intake of sweetened beverages and bone mineral density in adults as a result of their meta-analysis. High sugar consumption is associated with the risk of diabetes, metabolic syndrome, cardiovascular diseases and obesity (Bray & Popkin, 2014). Added sugar consumption is generally associated with the development and/or prevalence of fatty liver, dyslipidemia, insulin resistance, hyperuricemia, cardiovascular disease and type 2 diabetes, independent of body weight gain or total energy intake (Lustig et al., 2012). Our result supports the view that sugar consumption is harmful to health.

Significanlty positive relationship between fat supply and infant mortality rate shows that increase in fat supply will result increase in infant mortality rate, while the significantly negative relationship between fat supply cancer mortality and low birth rate opposite. Due to the significant serum cholesterol-increasing effect of saturated fatty acids, it can cause many diseases, especially cardiovascular diseases (Wahrburg, 2004). Similarly, increases in total and saturated fat consumption have been associated with breast cancer (Binukumar & Mathew, 2005) and schizophrenia (Christensen & Christensen, 1988).

For alcohol supply, while the increase in alcohol consumption will decrease the crude death rate and infant mortality rate, it will increase the cancer death rate and low birth weight rate. Yılmaz and Atak (2014) states that there is a concencus in the literature that an increase in alcohol consumption increases the risk of cancer. Our study found a similar finding to this literature. Alcohol consumption causes an increase in traffic accidents and injuries, thus harming people other

than the person himself. Moreover, it has been found to increase the risk of about 60 diseases such as cancer, neuropsychiatric disorders, diabetes, cardiovascular disease. In developed societies, 6.8% of the total disease burden consists of alcohol-related diseases (Room et al., 2005). Denton and Walters (1999) has been found that weekly alcohol consumption and perceived health level are associated with men. In addition, being a former smoker affects the perceived health level negatively in both men and women.

5. CONCLUSIONS AND RECOMMENDATIONS

This study was conducted to reveal the effects of health behaviors on selected health indicators. In this context, we analysed data between 2005-2018 for 14 OECD countries by Panel ARDL model. Data of the study include crude mortality rate, infant mortality rate, low birth weight and health expectancy at birth as dependent variables, and calorie cupply, protein supply, sugar supply, fat supply and alcohol consumption as dependent variables.

According to the results, while an increase in sugar and protein consumption will have a reducing effect on crude mortatliy rate, while an increase in calorie and alcohol consumption will have an increasing effect on crude mortality rate. On the other hand, fat supply was not assosiacted with crude mortality rate. For infant mortality rate, it was revealed that increase in sugar and fat supply will increase infant mortality rate, while increase in protein and alcohol quantity will reduce it. The results of cancer mortality rate model show that cancer mortality rate increase when the quantity of calorie, sugar and alcohol increase, but decrease when protein and fat supply increase. Looking at the results of low-birth-weight model, it is seen that low birth weigth rate is affected in a bad way from the increase in the quanity of calorie, sugar and alcohol. On the other hand, increase in protein and fat supply decreases the low-birth-weigth rate.

In conclusion, this study shows that the effects of health behaviors, such as calorie, protein and fat supply, and alcohol consumption, on crude death, infant mortality, cancer death, and low birth weight rates are mixed. On the other hand, it was concluded that sugar supply effecs negatively these selected health indicators of crude mortality rate, infant mortality rate, cancer mortality rate and low birth weight rate.

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References

Adler, N. E., Cutler, D. M., University, H., Fielding, J. E., & Koh, H. K. (2016). Addressing Social Determinants of Health and Health Disparities A Vital Direction for Health and Health Care About the Vital Directions for Health and Health Care Series. In *Perspectives*.

Adler, N. E., & Stead, W. W. (2015). Patients in context — EHR capture of social and behavioral determinants of health. *New England Journal of Medicine*, *372*(8), 698–701. https://doi.org/10.1056/NEJMp1413945

Ahn, H., & Kyoung Park, Y. (2021). Sugar-sweetened beverage consumption and bone health: a systematic review and meta-analysis. *Nutrition Journal*, *20*, 1–16. https://doi.org/10.1186/s12937-021-00698-1

Barton, L. R., Parke, K. A., & White, C. L. (2019). Screening for the Social and Behavioral Determinants of Health at a School-Based Clinic. *Journal of Pediatric Health Care*, *33*(5), 537–544. https://doi.org/10.1016/J.PEDHC.2019.02.002

Berkowitz, S. A., Seligman, H. K., Meigs, J. B., & Basu, S. (2018). Food Insecurity, Healthcare Utilization, and High Cost: A Longitudinal Cohort Study. *The American Journal of Managed Care*, *24*(9), 399–404.

Binukumar, B., & Mathew, A. (2005). Dietary fat and risk of breast cancer. *World Journal of Surgical Oncology*, *3*(1), 1–7. https://doi.org/10.1186/1477-7819-3-45/COMMENTS

Bray, G. A., & Popkin, B. M. (2014). Dietary sugar and body weight: Have we reached a crisis in the epidemic of obesity and diabetes?: Health be damned! Pour on the sugar. *Diabetes Care*, *37*(4), 950–956. https://doi.org/10.2337/dc13-2085

Choi, I. (2001). Unit root tests for panel data. *Journal of International Money and Finance*, *20*(2), 249–272. https://doi.org/10.1016/S0261-5606(00)00048-6

Choudhary, A. K., Choudhary, A., Tiwari, S. C., & Dwivedi, R. (2013). Factors associated with low birth weight among newborns in an urban slum community in Bhopal. *Indian Journal of Public Health*, *57*(1), 20–23. https://doi.org/10.4103/0019-557X.111362

Christensen, O., & Christensen, E. (1988). Fat consumption and schizophrenia. *Acta Psychiatrica Scandinavica*, *78*(5), 587–591.

Cirakli, U., Dogan, I., & Gozlu, M. (2021). The Relationship Between COVID-19 Cases and COVID-19 Testing: a Panel Data Analysis on OECD Countries. *Journal of the Knowledge Economy*. https://doi.org/10.1007/S13132-021-00792-Z

Çıraklı, Ü., & Yıldırım, H. H. (2019). The Impacts of Economic Crisis on The Public Health in Turkey: An ARDL Bounds Testing Approach. *Hacettepe Sağlık İdaresi Dergisi*, *22*(2), 259–280.

Clancy, H. A., Zhu, Z., Gordon, N. P., Kipnis, P., Liu, V. X., & Escobar, G. J. (2022). Prospective evaluation of social risks, physical function, and cognitive function in prediction of non-elective rehospitalization and post-discharge mortality. *BMC Health Services Research*, *22*(1), 1–11. https://doi.org/10.1186/S12913-022-07910-W

Denton, M., & Walters, V. (1999). Gender differences in structural and behavioral determinants of health: an analysis of the social production of health. *Social Science & Medicine*, *48*(9), 1221–1235. https://doi.org/10.1016/S0277-9536(98)00421-3

Healthy People. (2022). *Determinants of Health*. Healthy People 2020.

Hoffman, J. R., & Falvo, M. J. (2004). Protein – Which is Best? *Journal of Sports Science & Medicine*, *3*(3), 118.

Im, K. S., Pesaran, M. H., & Shin, Y. (2003). Testing for unit roots in heterogeneous panels. *Journal of Econometrics*, *115*(1), 53–74. https://doi.org/10.1016/S0304-4076(03)00092-7

Levin, A., Lin, C. F., & Chu, C. S. J. (2002). Unit root tests in panel data: asymptotic and finite-sample properties. *Journal of Econometrics*, *108*(1), 1–24. https://doi.org/10.1016/S0304-4076(01)00098-7

Lustig, R. H., Schmidt, L. A., & Brindis, C. D. (2012). The toxic truth about sugar. *Nature*, *482*, 27–29. https://doi.org/10.1038/482027a

Maddala, G. S., & Wu, S. (1999). A Comparative Study of Unit Root Tests with Panel Data and a New Simple Test. *Oxford Bulletin of Economics and Statistics*, *61*(S1), 631–652.

McGinnis, J. M., Williams-Russo, P., & Knickman, J. R. (2002). The case for more active policy attention to health promotion. *Health Affairs*, *21*(2), 78–93. https://doi.org/10.1377/hlthaff.21.2.78

Mokdad, A. H., Marks, J. S., & Stroup, D. F. (2004). Actual Causes of Death in the United States, 2000 Topic collections The Immediate vs the Important Related Letters. *Journal of the American Medical Association*, *291*(10), 1238–1245. https://doi.org/10.1001/jama.291.10.1238

Na, M., Dou, N., Liao, Y., Rincon, S. J., Francis, L. A., Graham-Engeland, J. E., Murray-Kolb, L. E., & Li, R. (2022). Daily Food Insecurity Predicts Lower Positive and Higher Negative Affect: An Ecological Momentary Assessment Study. *Frontiers in Nutrition*, *9*, 1–11. https://doi.org/10.3389/fnut.2022.790519

O'Flanagan, C. H., Smith, L. A., McDonell, S. B., & Hursting, S. D. (2017). When less may be more: Calorie restriction and response to cancer therapy. *BMC Medicine*, *15*(1), 1–9. https://doi.org/10.1186/s12916-017-0873-x

Pedroni, P. (1999). Critical Values for Cointegration Tests in Heterogeneous Panels with Multiple Regressors. *Oxford Bulletin of Economics and Statistics*, *61*(S1), 653–670.

Pesaran, M. H., Shin, Y., Smith, R. P., & Hashem, M. (1999). Pooled Mean Group Estimation of Dynamic Heterogeneous Panels. *Journal of the American Statistical Association*, *94*, 621–634. https://doi.org/10.1080/01621459.1999.10474156

Pickens, C. M., Pierannunzi, C., Garvin, W., & Town, M. (2019). Surveillance for Certain Health Behaviors and Conditions Among States and Selected Local Areas — Behavioral Risk Factor Surveillance System, United States, 2015. In *Morbidity and mortality weekly report. Surveillance summaries* (Vol. 67, Issue 9). Centers for Disease Control and Prevention (CDC). https://doi.org/10.15585/MMWR.SS6709A1

Room, R., Babor, T., & Rehm, J. (2005). Alcohol and public health. *The Lancet*, *365*(9458), 519–530. https://doi.org/10.1016/S0140-6736(05)17870-2

Wahrburg, U. (2004). What are the health effects of fat? *European Journal of Nutrition*, *43*(SUPPL. 1), 6–11. https://doi.org/10.1007/s00394-004-1103-9

WHO. (2017). *Determinants of health*.

Wilkinson, R., & Marmot, M. (2003). *Social determinants of health: the solid facts, 2nd ed (en).*

World Health Organization Regional Office for Europe. (2001). *The First action plan for food and nutrition policy : WHO European Region 2000-2005*.

Yılmaz, M. S., & Atak, N. (2014). The evaluation of risk of breast cancer from the perspective of nutritional factors. *Türkiye Halk Sağlığı Dergisi*, *12*(1), 51.

https://dergipark.org.tr/tr/pub/ijhmt Doi Number: 10.31201/ijhmt.1122825

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REFLECTIONS OF HEALTH INEQUALITIES ON THE COVID-19 VACCINATION PROCESS AND THE VIEWS OF HEALTHCARE PROFESSIONALS

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Abstract

Aim: Social and economic conditions are the main reasons for the emergence of inequalities. During the COVID-19 pandemic, inequalities were seen to increase further. This study was conducted to evaluate the reflections of health inequalities on the COVID-19 vaccination process and the views and recommendations of health care professionals in this regard.

Methods: This descriptive research was conducted in eastern Turkey with 344 health care professionals. The research data were collected using a questionnaire and analyzed by using numbers, mean and percentages.

Results: Of the health care professionals, 95.9% reported inequality between countries during the COVID-19 vaccination process, 97.1% reported that access to vaccines was a human right, and 96.1% reported that everyone should have access to vaccines without discrimination. According to health care professionals, not releasing the vaccines into the public domain (86.3%), the income of countries (84.3%), and failure to

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determine vaccination priorities according to public health rules (77.9%) were among the reasons for inequality between countries in COVID-19 vaccination.

Conclusion: Health care professionals reported that there were inequalities between countries in the COVID-19 vaccination process. Almost all of them are of the opinion that access to vaccines is a human right and that everyone should have access to vaccines without discrimination.

Keywords: COVID-19, COVID-19 vaccination, inequality in health.

INTRODUCTION

The COVID-19 outbreak was reported in December 2019, with the first case emerging in Wuhan, China. The World Health Organization (WHO) declared COVID-19 an international public health emergency on January 30, 2020, and a pandemic on March 11, 2020. It has been reported that the coronavirus spread very rapidly to low, middle and high-income countries, making the failures of the health systems of the countries visible, and increasing inequalities with different dimensions by disproportionately affecting the social, economic and political structures of the countries (Ekpenyong & Pacheco, 2020; Siu, 2021). Health inequality refers to preventable situations that develop due to social and economic conditions or inadequate health systems and negatively affect human health. Health inequalities are investigated according to race/ethnicity, gender, education, income status, occupation, and social dimensions (Arcaya et al., 2015; Barreto, 2017). Inequalities negatively affect all countries and increase the burden of disease by making it difficult to prevent and manage infectious diseases, especially in developing countries (Siu, 2021). It has been emphasized that COVID-19 is a major health crisis for all countries since World War II. In line with the pandemic, inequalities between countries continue to increase (Ahmed et al., 2020; Keys et al., 2021). It has been reported that there is a need for fair distribution of resources and urgent internationally coordinated action to prevent increased COVID-19-related inequality worldwide and to reduce its negative impact seen in low-income countries(United Nations Human Right Office of the High Commissioner, 2020).

Vaccines produced to prevent and control the pandemic continue to be a hope for people. As soon as their production, however, most of the vaccines were purchased by rich countries, which led to a debate about vaccine inequality and vaccine nationalism. It is stated that the priorities in vaccination are not determined according to public health principles and that the income of countries is effective in the distribution of vaccines. Following the vaccine production,

it was stated that high-income countries purchased 53% of COVID-19 vaccines in the first three months of 2021, and vaccinated 25% of their own population, compared to less than 1% of vaccination in low-income countries (Eslava-Schmalbach et al., 2021; Forman & Kohler, 2020; Su et al., 2021). It has been stated that income inequality, vaccine production, vaccine distribution, patents, failure to manage vaccine priorities well, unfair attitudes, and ideological and nationalist approaches to vaccination were effective in the formation of inequalities related to COVID-19 vaccines seen in countries (Arcaya et al., 2015; Bolcato et al., 2021; Perry et al., 2021; Su et al., 2021). On the other hand, it has been emphasized that factors such as the social-economic structure of the countries, ethnic, religious, and minority groups, access to the country's health system and health services, poverty, and health labor force cause inequalities in vaccination (Njoku et al., 2021; Okoi & Bwawa, 2020; Sina-Odunsi, 2021). Therefore, during the COVID-19 epidemic, the inequalities that became more evident within countries and in the countries, has led to the emergence of different inequalities in health by the vaccination of COVID-19. It has been reported that during the COVID-19 vaccine production phase and afterwards, some countries with high incomes first purchased most of the vaccines produced with the understanding of my nation. It has been reported that this situation will have negative effects on the global health system, as it will increase the inequality in countries due to the inequality experienced in the COVID-19 vaccination, as well as cause discussions on vaccine nationalism in the world. This situation has negatively affected vaccination priorities and access to COVID-19 vaccines in the world, leading to an increase in inequalities between countries. On the other hand, it has been observed that inequalities in COVID-19 vaccination in some countries have become more pronounced in disadvantaged groups in vaccination. For example, in England and the United States, ethnic inequalities were seen in COVID-19 vaccination and vaccination rates in other religious and black groups were lower than in whites (Bolcato et al., 2021; Watkinson et al., 2022).

In the fight against COVID-19, it has been emphasized that public health principles and human rights are important in reducing inequality. The UN Human Rights Office stated that access to COVID-19 vaccines is a human right without economic discrimination and announced to all countries that vaccines should be considered globally public domain and that vaccine distribution should be determined according to public health priorities and that everyone should have access to vaccines without discrimination (United Nations Human Right Office of the High Commissioner, 2020). However, public health and human rights approaches have not been

effective in determining vaccination priorities between countries during the vaccination. Inequalities in access and distribution of vaccines between countries in COVID-19 vaccination continue to increase. It has been reported that there are significant disparities in access to the vaccine between countries in COVID-19 vaccination, and between groups vaccinated in some countries. This study was conducted to evaluate the reflections of health inequalities in the COVID-19 vaccination process and the opinions and recommendations of health care professionals.

The research sought answers to the following questions.

- According to health workers, is there inequality between countries in the COVID-19 vaccination process?
- What are the causes of inequality between countries in the COVID-19 vaccination process, according to healthcare professionals?
- What are the recommendations of healthcare professionals on preventing the COVID-19 vaccination inequality?

2. RESEARCH METHODOLOGY

This study has a descriptive research design. The research was carried out between 22 November-2021 and 14 January 2022 in two provinces located in eastern Turkey. The study population consisted of all health personnel working in public health institutions in Tunceli and Muş provinces. The study samples consisted of a total of 344 health care professionals (physicians, nurses, midwives, health officers, health technicians) who volunteered to participate in the research between the dates of the study.

The research data were collected using a questionnaire developed by the researcher in line with the literature (Forman & Kohler, 2020; Keys et al., 2021; Su et al., 2021; United Nations Human Right Office of the High Commissioner, 2020). A pilot study was conducted on ten healthcare workers who were not included in the study before the study data were collected. Two questions that were not clearly understood were changed and the questionnaire was given its final form. The first part of the two-part questionnaire consisted of six items about the socio-demographic characteristics of health care professionals, while the second part consisted of seven items about the views of health care professionals on health inequalities during the COVID-19 vaccination. Research data were collected online using google forms. The survey link prepared

with Google Forms was submitted by the researcher to the health care professionals with the help of health institution managers in order to collect research data online. The obtained research data were analyzed by using number, mean and percentage in the computer aided program.

Before starting the study, ethical approval (No: E.15447) was obtained from the Munzur University of Non-Interventional Research Ethics Committee with decision No:15/7, 23 June 2021-16014.

3. FINDINGS

The mean age of the health care professionals was 34.3±8.5 years, 62.5% was female, 48% had a Bachelor's degree, 49.1% was a nurse, 14% was general practitioner, 12.5% was a midwife, and 57.3% had an unbalanced income (Table 1).

Table 1. Introductory characteristics of the health care professionals

Characteristics	**N**	**%**
Age (X±SD)	34.3±8.5 (Min=19, Max=61)	
Gender		
Female	215	62.5
Male	129	37.5
Education status		
High school	22	6.4
Vocational school	74	21.5
Bachelor degree	165	48.0
Master degree	68	19.7
Doctorate	15	4.4
Occupation		
Nurse	169	49.1
General practitioner	48	14.0
Health technician/technician	45	13.1
Midwife	43	12.5
Health officer	27	7.8
Specialist physician	12	3.5
Perceived average income		
Low	197	57.3
Balanced	108	31.4
High	39	11.3

Of the health care professionals, 95.9% reported inequality between countries during the COVID-19 vaccination, 97.1% reported that access to vaccines is a human right, and 96.5% reported that everyone should have access to vaccines without discrimination. According to the health care

professionals, reasons for the inequality between the countries during the COVID-19 vaccination process include failure to release vaccines in the public domain (86.3%), the income of the countries (84.3%), failure to determine vaccination priorities according to public health rules (77.9%), the dominance of profit-oriented companies in the vaccine production and sales (68.3%), lack of vaccine production in some countries (61%), political structures and regimes of countries (54.6%), and failure of profit-oriented companies to act responsibly in relation to vaccine production and access (50.6%) (Table 2).

Table 2. Opinions of health care professionals about the inequalities in COVID-19 vaccination

Characteristics	**N**	**%**
The inequality between countries during the COVID-19 vaccination		
Yes	330	95.9
No	14	4.1
Believing that access to vaccines is a human right		
Yes	334	97.1
No	10	2.9
The idea that everyone should have access to vaccines without discrimination		
Yes	332	96.5
No	12	3.5
The reasons for the inequality between countries in the COVID-19 vaccination process *		
Vaccines produced are not considered globally public domain	297	86.3
Incomes of countries	290	84.3
Failure to determine vaccination priorities according to public health rules	268	77.9
The dominance of profit-oriented companies in the vaccine production and sales		
Lack of vaccine production in some countries	235	68.3
Political structures and regimes of countries	210	61.0
Failure of profit-oriented companies to act responsibly in relation to vaccine production and access	186	54.6
	174	50.6

* Number of multiple respondents

According to the health care professionals, inequality in COVID-19 vaccination can be prevented by increasing cooperation between countries (69.2%), delivery of vaccines to everyone without discrimination, in accordance with human rights and public health rules (66.3%), meeting the urgent needs of developing countries by the international community (64.8%), transparent sharing of data between countries (62.2%), establishing a global fund to reduce the negative impact on developing countries (59.9%), ensuring that developed countries assume the initiative in solving urgent health problems by providing financial support to international institutions (57.3%). In addition, the health care professionals reported that inequalities in the COVID-19 epidemic can be reduced by releasing vaccines into the public domain and fair delivery of vaccines globally

(47.3%), the help provided by high-income countries to developing countries (44.8%), and foundation of a global health system so that all people have access to basic health services (39.2%) (Table 3).

Table 3. Opinions and recommendations of health care professionals to prevent and reduce inequalities in COVID-19 vaccination

Recommendations on preventing inequality in COVID-19 vaccination*	**n**	**%**
Increasing cooperation between countries	238	69.2
Delivery of vaccines to everyone without discrimination, in accordance with human rights and public health rules	228	66.3
Meeting the urgent needs of developing countries by the international community	223	64.8
Transparent sharing of data between countries	214	62.2
Establishing a global fund to reduce the negative impact on developing countries	206	59.9
Ensuring that developed countries assume the initiative in solving urgent health problems by providing financial support to international institutions	197	57.3
Recommendations for reducing inequality during the COVID-19 pandemic*		
Releasing vaccines into the public domain and fair delivery of vaccines globally	167	47.3
Aid by high-income countries to developing countries	154	44.8
Foundation of a global health system so that all people have access to basic health services	135	39.2

* Number of respondents giving more than one answer

4. DISCUSSION

Gini coefficient indicates the income inequality between high- and low-income countries and shows that low-income countries and disadvantaged groups often need external support to meet their needs and in the solution of urgent health problems. From the past to the present, pandemics have caused high morbidity and mortality due to inequality in disadvantaged communities. COVID-19, which spread all over the world in 2020, continues to have devastating effects on human health through the increasing inequalities between countries (Bambra et al., 2021; Barreto, 2017; Rodríguez-Bailón, 2020). Statistically significant increases in mortality rates due to income inequality and the spread of COVID-19 have been reported among OECD countries(Wildman, 2021). According to the Office for National Statistics, when mortality rates were compared in the most deprived areas of England with those in better economic regions, it was reported that there were twice as many deaths from COVID-19 in most deprived areas (Haynes, 2020). It has been stated that there is inequality between races in access to resources such as social and economic conditions, housing, nutrition, health care, masks, and decontamination in the United States (Njoku et al., 2021) and that income distribution and race are two factors that have been effective in

increased inequality during the pandemic in South Africa (Mubangizi & Mubangizi, 2021; Nwosu & Oyenubi, 2021). In a study of Arab countries, however, it was emphasized that health systems are not adequately equipped to meet health needs (Hasan, 2021). It has been reported that status, age, education, disability, race, ethnicity, caste, tribe, religion, class, profession, and income status are the effective factors in the health inequalities (Seddighi, 2020). It has also been emphasized that public health practices and a human rights-based approach will be effective in ensuring equality and social justice in preventing and controlling the epidemic (Cheshmehzangi, 2022; Mubangizi & Mubangizi, 2021). In this study, health care professionals believe that inequality is caused by similar reasons, such as countries' income levels, and failure to determine vaccination priorities according to public health rules.

Vaccines play an important role in the control of infectious diseases. COVID-19 vaccines developed to combat the epidemic have been the most effective method in the fight against the disease so far. However, there are inequalities in the development, production, licensing, cost, availability, distribution, and prioritization of vaccines between countries (Mathieu et al., 2021; Nafilyan et al., 2021; Njoku et al., 2021; Rađenović et al., 2022). In this study, almost all health care professionals reported that there was inequality between countries in access to COVID-19 vaccines. The reasons for the inequality were also reported as vaccines are not considered to be in the global public domain, countries' income, vaccination priorities, which are not determined according to public health rules, lack of vaccine production in some countries, and domination of profit-oriented companies in the production and sale of vaccines. It has been reported that significant disparities in the production and distribution of coronavirus vaccines between countries and within the countries themselves have affected vaccination (Mathieu et al., 2021; Nafilyan et al., 2021; Rađenović et al., 2022) The fact that some countries stockpiled the COVID-19 vaccines they produced and the vaccines they purchased from other vaccine-producing countries has negatively affected the vaccination prioritization and the access of countries in need to the vaccine (Bolcato et al., 2021). Despite the commitments of the European Union countries about making the COVID-19 vaccines public domain globally, it has been stated that public health principles have been ignored in the distribution of vaccines and that the income of countries has been effective in the distribution of vaccines. For example, as of April 9th, 2021, 40% of the 726 million doses of COVID-19 vaccine administered worldwide were administered by 27 rich countries in the world, and only 1.6% of the vaccine was administered in low-income countries (Forman &

Kohler, 2020; Van De Pas et al., 2022). It has been observed that there are great differences in vaccination rates between countries after COVID-19 vaccine production. It has been reported that the most important reason for this difference is the income of the countries. It has been stated that countries such as Israel, United Arab Emirates, United Kingdom, United States of America and Bahrain, which started vaccination, are high-income countries. For example, as of April 7, 2021, the cumulative number of vaccine doses administered to 100 people was 118% in Israel, while it was reported to be less than 0.1% in countries that have just started vaccination campaigns such as Mali, Namibia and Brunei (Mathieu et al., 2021). According to the literature review, the social-economic conditions, ethnicity, and gender were the most effective factors in the vaccination of adults (Perry et al., 2021). A study conducted in the UK reported that there are large differences in COVID-19 vaccination rates between ethnic and religious groups. The first dose vaccination of elderly people over the age of seventy living in the country was compared and the vaccination rates were lower in Black Caribbean, Black African, Bangladeshi and Pakistani than white British (Nafilyan et al., 2021). In another study, when the first dose of COVID-19 vaccines administered to more than 195 million people in the United States were compared by race and ethnicity, it was seen that non-Hispanic white Americans ranked first, 60.3% of those vaccinated (Njoku et al.,2021). In Pakistan, however, it has been observed that conspiracy theories and anti-vaccine religious leadership negatively affected vaccine hesitancy, and caused inequality between groups in access to vaccines due to the lack of sufficient COVID-19 vaccines in the country (Perveen et al., 2022). In order for the fair distribution of vaccines in countries, it has been stated that transparent planning should be carried out in proportion to the health status and population of all countries, as well as the social and economic structure of all countries (Bolcato et al., 2021). COVID-19 Vaccines Global Access (COVAX) initiative aims to reduce inequalities in vaccinations of high-risk groups in high-income and low-income countries. However, due to the fact that high-income countries purchased a high amount of vaccines, low- and middle-income countries have been negatively affected regarding access to the vaccine through COVAX. In summary, it has been reported that the COVAX initiative is not carried out effectively and efficiently for reasons such as pricing, payment, patent, production, delivery, and management of vaccines(Eslava-Schmalbach et al., 2021; Su et al., 2021). Therefore, it has been stated that it will be important for potential vaccine manufacturers and patent holders and vaccine producing countries to reach an agreement under the leadership of the World Trade Organization and the

World Health Organization for global public health and for fair and effective access to vaccines (Van De Pas et al., 2022).

In this study, almost all health care professionals agreed that vaccination is a human right and all people should have access to a free vaccination. It has been stated that it is important to increase cooperation between countries, deliver vaccines to everyone in accordance with human rights and public health without discrimination, meet the urgent needs of developing countries by the international community, share data transparently between countries, establish a global fund to mitigate negative effects on the developing countries, and to ensure that developed countries assume the initiative in solving urgent health problems by providing financial support to international institutions for the elimination of inequality in access to vaccines. It has also been reported in the literature that access to vaccines is a human right and that it is necessary to ensure that COVID-19 vaccines are accessible to everyone, in accordance with the principles of public health and human rights in the distribution of vaccines and vaccination prioritization (United Nations Human Right Office of the High Commissioner, 2020). It has been stated that only one-third of the World Health Organization (WHO) member states have strong public health capacity and that the health systems of the remaining countries are insufficient and fragile (Kluge et al., 2018; Taylor et al., 2020). On the other hand, it was emphasized that countries with a strong preventive health services infrastructure have achieved significant gains in the fight against the epidemic. For example, Cuba's strong National Health System and its primary health care guarantee an effective and fair response to COVID-19 with its egalitarian principle based on universal, free health insurance (Bermejo et al., 2021). During the pandemic, it has been emphasized that countries with strong health systems are more advantageous in solving the problems experienced due to the epidemic, and it was reported that low-income countries with poor health systems, which are further negatively affected by the pandemic, need the support of the international community and institutions in solving their health problems (Ahmed et al., 2020; Spencer et al., 2020; United Nations Human Right Office of the High Commissioner, 2020). It has been stated that international cooperation and global cohesion should be strengthened in the solution to the pandemic crisis. In addition, it has been stated that international cooperation and global solidarity, strengthening the global economy, strengthening global health security, and health systems, and addressing inequalities are necessary in order to achieve the global health goals (Taghizade et al., 2021).

In this study, the health care professionals reported that inequalities in the COVID-19 epidemic can be reduced by releasing vaccines into the public domain and fair delivery of vaccines globally, help provided by high-income countries to developing countries, and foundation of a global health system so that all people have access to basic health services. It has been stated in the literature that special vaccination approaches should be developed in disadvantaged communities to reduce inequality in vaccination (Perry et al., 2021). It has been emphasized that the commitments made to strengthen the global health system have largely failed to be fulfilled. In line with the COVID-19 pandemic, the world's most vulnerable groups have experienced inequality in access to resources, and that resources were disproportionately allocated to privileged power elites, disproportionately exposing inequalities not only globally, but also regionally and locally (Shamasunder et al., 2020).

4. CONCLUSIONS AND RECOMMENDATIONS

The research results showed that almost all health care professionals believe that there is inequality between countries during the COVID-19 vaccination and that COVID-19 vaccines should be delivered to everyone without discrimination. The reasons for the inequality between countries were reported as the failure to provide vaccines in the public domain globally, the income of the countries, vaccination priorities that are not determined according to public health rules, lack of vaccine production in some countries, and domination of profit-oriented companies in the production and access of vaccines. In line with these findings, it is recommended to strengthen the international common approach to people's global health security, develop public health practices, implement policies based on human rights, and deliver vaccines fairly to everyone regardless of their income.

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References

Ahmed, F., Ahmed, N., Pissarides, C., & Stiglitz, J. (2020). Why inequality could spread COVID-19. *The Lancet Public Health*, *5*(5), e240. https://doi.org/10.1016/S2468-2667(20)30085-2

Arcaya, M. C., Arcaya, A. L., & Subramanian, S. V. (2015). Inequalities in health: Definitions, concepts, and theories. *Global Health Action*, *8*(1). https://doi.org/10.3402/gha.v8.27106

Bambra, C., Albani, V., & Franklin, P. (2021). COVID-19 and the gender health paradox. *Scandinavian Journal of Public Health*, *49*(1), 17–26. https://doi.org/10.1177/1403494820975604

Barreto, M. L. (2017). Health inequalities: A global perspective. *Ciencia e Saude Coletiva*, *22*(7), 2097–2108. https://doi.org/10.1590/1413-81232017227.02742017

Bermejo, P. M., Valdés, L. S., López, L. S., Valdivia Onega, N. C., Vidal Ledo, M. J., Sánchez, I. A., Jo, A. S., Cruz, Y. A., & Ojeda, R. M. (2021). Equity and the Cuban National Health System's response to COVID-19. *Revista Panamericana de Salud Publica/Pan American Journal of Public Health*, *45*, 1–9. https://doi.org/10.26633/RPSP.2021.80

Bolcato, M., Rodriguez, D., Feola, A., Di Mizio, G., Bonsignore, A., Ciliberti, R., Tettamanti, C., Aurilio, M. T., & Aprile, A. (2021). Covid-19 pandemic and equal access to vaccines. *Vaccines*, *9*(6), 1–11. https://doi.org/10.3390/vaccines9060538

Cheshmehzangi, A. (2022). Vulnerability of the UK's BAME communities during COVID-19: The review of public health and socio-economic inequalities. *Journal of Human Behavior in the Social Environment*, *32*(2), 172–188. https://doi.org/10.1080/10911359.2021.1875949

Eslava-Schmalbach, J., Rosero, E. B., & Garzón-Orjuela, N. (2021). Global control of COVID-19: Good vaccines may not suffice. *Revista Panamericana de Salud Publica/Pan American Journal of Public Health*, *45*, 1–7. https://doi.org/10.26633/RPSP.2021.148

Ekpenyong, A., & Pacheco, M. S. (2020). COVID-19: reflecting on the role of the who in knowledge exchange between the global North and South. *Global Social Policy*, *20*(3), 388-392. https://doi.org/10.1177/1468018120966657

Forman, L., & Kohler, J. C. (2020). Global health and human rights in the time of COVID-19: Response, restrictions, and legitimacy. *Journal of Human Rights*, *19*(5), 547–556. https://doi.org/10.1080/14754835.2020.1818556

Hasan, H. F. (2021). Legal and health response to covid-19 in the Arab Countries. *Risk Management and Healthcare Policy*, *14*, 1141–1154. https://doi.org/10.2147/RMHP.S297565

Haynes, K. (2020). Structural inequalities exposed by COVID-19 in the UK: the need for an accounting for care. Journal of Accounting & Organizational Change, 16 (4); 2020, 637-642. doi: 10.1108/JAOC-08-2020-0099

Keys, C., Nanayakkara, G., Onyejekwe, C., Sah, R. K., & Wright, T. (2021). Health Inequalities and Ethnic Vulnerabilities During COVID-19 in the UK: A Reflection on the PHE Reports. *Feminist Legal Studies*, *29*(1), 107–118. https://doi.org/10.1007/s10691-020-09446-y

Kluge, H., Martín-Moreno, J. M., Emiroglu, N., Rodier, G., Kelley, E., Vujnovic, M., & Permanand, G. (2018). Strengthening global health security by embedding the International Health Regulations requirements into national health systems. *BMJ Global Health*, *3*(2005), 1–7. https://doi.org/10.1136/bmjgh-2017-000656

Mathieu, E., Ritchie, H., Ortiz-Ospina, E., Roser, M., Hasell, J., Appel, C., Giattino, C., & Rodés-Guirao, L. (2021). A global database of COVID-19 vaccinations. *Nature Human Behaviour*, *5*(7), 947–953. https://doi.org/10.1038/s41562-021-01122-8

Mubangizi, J. C., & Mubangizi, B. C. (2021). Human rights and access to covid-19 vaccines in rural south Africa: The role of local government. *Journal of Southwest Jiaotong University*, *56*(4). https://doi.org/https://doi.org/10.35741/issn.0258-2724.56.4.54

Nafilyan, V., Dolby, T., Razieh, C., Gaughan, C. H., Morgan, J., Ayoubkhani, D., Walker, S.,

Khunti, K., Glickman, M., & Yates, T. (2021). Sociodemographic inequality in COVID-19 vaccination coverage among elderly adults in England: A national linked data study. *BMJ Open*, *11*(7), 1–6. https://doi.org/10.1136/bmjopen-2021-053402

Njoku, A., Joseph, M., & Felix, R. (2021). Changing the narrative: Structural barriers and racial and ethnic inequities in covid-19 vaccination. *International Journal of Environmental Research and Public Health*, *18*(18). https://doi.org/10.3390/ijerph18189904

Nwosu, C. O., & Oyenubi, A. (2021). Income-related health inequalities associated with the coronavirus pandemic in South Africa: A decomposition analysis. *International Journal for Equity in Health*, *20*(1), 1–12. https://doi.org/10.1186/s12939-020-01361-7

Okoi, O., & Bwawa, T. (2020). How health inequality affect responses to the COVID-19 pandemic in Sub-Saharan Africa. *World Development*, *135*, 105067. https://doi.org/10.1016/j.worlddev.2020.105067

Perry, M., Akbari, A., Cottrell, S., Gravenor, M. B., Roberts, R., Lyons, R. A., Bedston, S., Torabi, F., & Griffiths, L. (2021). Inequalities in coverage of COVID-19 vaccination: A population register based cross-sectional study in Wales, UK. *Vaccine*, *39*(42), 6256–6261. https://doi.org/10.1016/j.vaccine.2021.09.019

Perveen, S., Akram, M., Nasar, A., Arshad-Ayaz, A., & Naseem, A. (2022). Vaccination-hesitancy and vaccination-inequality as challenges in Pakistan's COVID-19 response. *Journal of Community Psychology*, *50*(2), 666–683. https://doi.org/10.1002/jcop.22652

Rađenović, T., Radivojević, V., Krstić, B., Stanišić, T., & Živković, S. (2022). The efficiency of health systems in response to the covid-19 pandemic: Evidence from the eu countries. *Problemy Ekorozwoju*, *17*(1), 7–15. https://doi.org/10.35784/pe.2022.1.01

Rodríguez-Bailón, R. (2020). Inequality viewed through the mirror of COVID-19 (La desigualdad ante el espejo del COVID-19). *Revista de Psicologia Social*, *35*(3), 647–655. https://doi.org/10.1080/02134748.2020.1796298

Seddighi, H. (2020). COVID-19 as a Natural Disaster: Focusing on Exposure and Vulnerability for Response. *Disaster Medicine and Public Health Preparedness*, *14*(4), E42–E43. https://doi.org/10.1017/dmp.2020.279

Shamasunder, S., Holmes, S. M., Goronga, T., Carrasco, H., Katz, E., Frankfurter, R., & Keshavjee, S. (2020). COVID-19 reveals weak health systems by design: Why we must re-make global health in this historic moment. *Global Public Health*, *15*(7), 1083–1089. https://doi.org/10.1080/17441692.2020.1760915

Sina-Odunsi, A. J. (2021). COVID-19 vaccines inequity and hesitancy among African Americans. *Clinical Epidemiology and Global Health*, *12*(August), 14–16. https://doi.org/10.1016/j.cegh.2021.100876

Siu, J. Y. man. (2021). Health inequality experienced by the socially disadvantaged populations during the outbreak of COVID-19 in Hong Kong: An interaction with social inequality. *Health and Social Care in the Community*, *29*(5), 1522–1529. https://doi.org/10.1111/hsc.13214

Spencer, N., Nathawad, R., Arpin, E., & Johnson, S. (2020). Pandemics, epidemics and inequities in routine childhood vaccination coverage: A rapid review. *BMJ Paediatrics Open*, *4*(1), 2019–2021. https://doi.org/10.1136/bmjpo-2020-000842

Su, Z., McDonnell, D., Li, X., Bennett, B., Šegalo, S., Abbas, J., Cheshmehzangi, A., & Xiang, Y. T. (2021). Covid-19 vaccine donations—vaccine empathy or vaccine diplomacy? A narrative literature review. *Vaccines*, *9*(9), 1–10. https://doi.org/10.3390/vaccines9091024

Mathieu, E., Ritchie, H., Ortiz-Ospina, E., Roser, M., Hasell, J., Appel, C., ... & Rodés-Guirao,

L. (2021). A global database of COVID-19 vaccinations. Nature human behaviour, 5(7), 947-953. https://doi.org/10.1038/s41562-021-01122-8

Taghizade, S., Chattu, V. K., Jaafaripooyan, E., & Kevany, S. (2021). COVID-19 Pandemic as an Excellent Opportunity for Global Health Diplomacy. *Frontiers in Public Health*, *9*(July), 1–9. https://doi.org/10.3389/fpubh.2021.655021

Taylor, A. L., Habibi, R., Burci, G. L., Dagron, S., Eccleston-Turner, M., Gostin, L. O., Meier, B. M., Phelan, A., Villarreal, P. A., Yamin, A. E., Chirwa, D., Forman, L., Ooms, G., Sekalala, S., & Hoffman, S. J. (2020). Solidarity in the wake of COVID-19: reimagining the International Health Regulations. *The Lancet*, *396*(10244), 82–83. https://doi.org/10.1016/S0140-6736(20)31417-3

United Nations Human Right Office of the High Commissioner. (2020). Human Rights and Acces to COVID-19 Vaccines. In *OHCHR*. https://www.ohchr.org/sites/default/files/Documents/Events/COVID-19_AccessVaccines_Guidance.pdf

Van De Pas, R., Widdowson, M. A., Ravinetto, R., N Srinivas, P., Ochoa, T. J., Fofana, T. O., & Van Damme, W. (2022). COVID-19 vaccine equity: a health systems and policy perspective. *Expert Review of Vaccines*, *21*(1), 25–36. https://doi.org/10.1080/14760584.2022.2004125

Watkinson, R. E., Williams, R., Gillibrand, S., Sanders, C., & Sutton, M. (2022). Ethnic inequalities in COVID-19 vaccine uptake and comparison to seasonal influenza vaccine uptake in Greater Manchester, UK: A cohort study. PLoS medicine, 19(3), e1003932. https://doi.org/10.1371/journal.pmed.1003982

Wildman, J. (2021). COVID-19 and income inequality in OECD countries. *European Journal of Health Economics*, *22*(3), 455–462. https://doi.org/10.1007/s10198-021-01266-4

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THE USE OF DIGITAL COMMUNICATION CHANNELS IN HEALTH TOURISM IN TURKEY

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Abstract

Aim: In recent years, the digital communication for health tourism has gained undeniable importance in Turkey and all over the world. In tourism sector, the correct and effective use of digital tools that emerged with the advancement of technology both provides benefits for institutions and plays an effective role in the preferences and decisions of consumers. In this study, it was aimed to examine the corporate websites and social media accounts of 10 private hospitals operating in the region of Konya in Turkey, and to reach both domestic and international health tourists. Content analysis was conducted to evaluate whether the hospitals use social media tools effectively. In this context, general information about the hospital, applications, trust, general risks were gathered, as well as financial information and visuals on the website. Regarding social media accounts, the most shared contents on Instagram, retweeted on Twitter and liked on Facebook accounts were included. According to the results of the

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analysis, it was determined that digital communication channels were used to share information; however, they interaction with consumers was inadequate.

Keywords: Digital Communication, Health Communication, Health Tourism

INTRODUCTION

Technological developments, which are increasing day by day, affect the tourism sector as well as all other sectors. Proper use of digital tools with the developing technology provides significant benefits to tourism businesses. In addition, communication also is an important factor in health tourism. With the development of communication technologies, the fact that people can easily access all kinds of information plays an important role in attracting and increasing the interest in therapy-oriented travels (Aydın, 2012). Additionally, communication technologies are needed to reach tourists, build trust and receive their feedback (Öksüz and Altıntaş, 2017). According to previous research, heath tourists' criteria for choosing health services include the quality of the service, affordability, the success of health professionals, and geographical proximity (Aksoy and Yılmaz, 2019). In addition, the limited, restricted or prohibited access to medical products or services in their own country have also led individuals to travel abroad for health tourism (Howze, 2007).

With digitalization, the concept of consumer has tranformed into digital consumer in recent years. Development of new technological tools have led individuals to become more active by communicating directly with businesses (Happ and Ivancso-Horvath, 2018). According to Guttentag (2010), digital environments have an impact on the rapid change of developments in the field of tourism around the world, as well as consumers sharing their experiences with each other (Guttentag, 2010). Studies have proved that customers who use social media are more effective and successful than their competitors (Dülgaroğlu, 2021). In recent years, consumers have been seen to search for a specific product on social media tools such as Facebook, Twitter, and Instagram. People gather information about products more easily and exchange views by sharing their experiences through using these social media platforms (Kapan, 2019). It is possible to reach digital consumers, and to determine their consumption factors by understanding their demands with the internet and social media tools. Therefore, it is possible for countries and businesses to

display a credible image (Kapan, 2019). Globalization has had an impact on consumer behaviors, as wall as allowing people to search for desired products to purchase services. In this direction, the fact that health tourists receive all type of information from the digital environment before purchasing service emphasizes the importance of digital communication in health tourism. In this context, corporate websites of certain hospitals and social media accounts such as Instagram, Twitter and Facebook were examined in the research.

2. RESEARCH METHODOLOGY

2.1. Health Tourism and Digitalization

Tourism, which has become an important source of income in the globalizing world, is constantly changing due to many factors such as human needs and developing technological opportunities (Edinsel and Adıgüzel, 2014). While tourism came to the fore in the world in the 1970s, it started to attract attention in our country after the 1980s (Çiçek and Adveren, 2013). With the increase in the world population and improvements in living standards, people prefer countries that provide more cost-effective and qualified health services for their treatment when they are faced with a disease, which has led to the emergence of health tourism (Kantar and Erdoğan, 2014). Health tourism is basically defined as individuals traveling from their place of residence to another in order to receive preventive, therapeutic and health-promoting services (Öksüz and Altıntaş, 2017). According to another definition, it is expressed as “touristic activities of individuals focused on coping with stress and relaxation” (Bennett et al., 2004). In fact, it may be concluded that health tourism dates back many years. In the Ancient Greek Empire, while people were traveling to Mediterranean countries to meet thermal water treatments, Europeans preferred the Nile after the 18th century, and in the 21st century, people preferred low-cost places with less waiting time (Çiçek and Adveren, 2013). In this respect, problems such as the high cost of health care in their home country, the long waiting period and low number of people with insurance have caused people to travel another place in order to receive health care (Kırıcı, 2020). The increase in the cost of health services, especially in developed countries, has caused people to seek destinations outside where they can receive better services at a lower cost (Younis et al., 2019). The most preferred countries in health tourism include the USA, India, Singapore, Cuba, Costa Rica, Thailand, Colombia, Malaysia, Mexico and South Korea (Aksoy and Yılmaz, 2019).

Tourists receiving services in health tourism are not only people who have lost their health (Uygun, 2018). Health tourism in general is grouped in categories as wellness tourism, health services tourism and medical tourism (Iordoche, Ciochina and Roxana, 2013). In addition to medical tourism for the purpose of receiving medical treatment, health tourism also includes thermal tourism for accessing natural resources, geriatric tourism for individuals with chronic diseases in elderly care centers, and disabled tourism (Yardan et al. 2014). Medical tourism: Henderson (2004) describes medical tourism as where the primary goal is the pursuit of better health and treatment. It includes health screening, hospitalization and surgical operations (Cook, 2008). Thermal health tourism: It incudes all rehabilitative health services such as physical therapy, rehabilitation, exercise, psychotherapy, diet, etc., under the supervision of physicians, together with environmental and climatic factors that have a positive effect on human health such as thermal waters regions (www. shgmturizmdb.saglik.gov.tr). The main purpose in thermal health tourism is to restore body and spiritual vitality through using natural water resources in different ways (Bayer, 1992). Geriatric tourism: “Travels for the protection of the health of the elderly, the prevention of diseases that may develop, and their diagnosis and treatment” (Muğla Governorship Competitiveness Analysis Report, 2010). Disabled Tourism: It can be explained as providing independent and equal participation by offering universally designed tourism products, services and environments to people who need interaction such as freedom of movement, vision, hearing and cognitive dimensions of access (Ankaya and Aslan, 2020).

The target audience in health tourism is people with impaired health and people who want to protect their health and maintain a healthy state. In this case, the people in question are not only those who have lost their health, but also those who want to protect and improve their health, as well as being in need to meet their holiday needs, and getting advantage of recreational activities in their spare time (Tütüncü et al., 2011). In this respect, a health tourist is a person who acts primarily for treatment purposes and purchases various goods and services offered within the scope of health tourism by requesting products and services containing holiday elements (Muğla Governorship Competitiveness Analysis Report). It is possible to explain that health tourism is a holistic service that includes both treatment and vacation elements, as well as purchasing health services at the place they travel to. The aim of health tourism is to get people away from the

stressful city life, get a more peaceful and better quality health service, treat their diseases, and create a source of income for the country by reviving tourism (Kapan, 2019).

The reasons why countries are preferred in terms of Health Tourism are given below (www.shgmturizmdb.saglik.gov.tr):

- Countries whose main income is tourism: such as Thailand, Singapore, Costa Rica and the Greek part of Cyprus.
- Due to geographical and political location: such as Iran, Jordan, Brazil and Malaysia.
- Due to the quality of health services and the advantage of technological equipment: such as the USA, Germany and South Korea.
- Due to its policies towards tourism and health tourism: such as Spain Senior Tourism, Hungary Thermal Tourism and India Medical Tourism.
- Due to the inflow of foreign capital and the advantage of doctors trained abroad: such as India, Jordan, Malaysia, Malta and Brazil.
- Countries with multiple advantages: such as Turkey, Israel and Malaysia.

The countries of which people travel to Turkey to receive health services are considered in 5 groups. These are as follows (T.R. Ministry of Health General Directorate of Treatment Services, 2011, p.13):

1. Countries with a large Turkish population (such as Germany, France and the Netherlands),
2. Countries that have issues due to insufficient infrastructure and physicians (such as Balkan Countries, Turkic Republics in Central Asia).
3. Countries where health services are expensive and demanded services are not covered by insurance (such as America, Germany and England),
4. Countries with long queue times to receive the service (such as Canada, the UK and the Netherlands),
5. Countries that send a certain number of free patients within the framework of bilateral agreements (such as Afghanistan, Yemen and Sudan)

Table 1. Characteristics of Health Service Categories and Beneficiaries in Health Tourism

	Health Promotion Services	**Treatment Services**	**Rehabilitation Services**
Service Beneficiaries	*Middle and high income group *Healthy individuals *All age groups	*Middle and high income group *Middle and older age group *Able to travel as healthy group *Group with variable health risk	*High income group *Special needs *Low to moderate health risk *Elder *Substance addiction
Capacity Requirements of the Service	*Good level basic health service delivery *Increased expectations for hospital services	*Expert physician *Various needs from interventions to supportive treatments	*High level of technology *Expert physician *Primary health services *Therapeutic rather than medical treatment
Service time	*It varies according to the service received or the person receiving the service.	*Predictable *Follow-up may be required *Shorter	*Longer *Variable

Source: Özsarı and Karatana, 2013

The reasons why people prefer health tourism include dissatisfaction with local health services, high cost of health services, inability to reach the service on time, insufficient health insurance coverage, improved health care quality in developing countries, patients' intention to integrate health services with touristic activities together (Connell, 2006). However, social, financial, cultural and religious differences between countries are among some of the obstacles to health tourism. Patients' level of satisfaction and language differences, differences in technologies and materials are also among the most important factors to be taken into consideration (Özsarı and Karatana, 2013). It has been observed that one of the most important needs of health tourists is the perception of trust. For health tourists who receive treatment far from their families and friends, there are various aspects that play a major role in their preferences such as reliability of the health care professionals, facilities of the rooms they stay in, technological infrastructure of the hospital, and the opinions and evaluations of the previous service recipients (Öksüz and Altıntaş, 2017). According to Manaf (2015), although the cost is

very important, it is thought that quality is the first place for hospital preferences of health tourists, and individuals' perception affects the quality of the service provided as well as factors such as communication with health workers, transportation and accommodation (Aksoy and Yılmaz, 2019). Finally, the concept of health tourist is related to health tourism. Tourists are those who stay away from their homes for a period of 24 hours or longer. Those who travel for less than 24 hours are called visitors (Lee and Spisto, 2007). Therefore, people who travel to other regions for at least 24 hours due to health problems are considered health tourists (Trauer, 2006). With today's digital developments, it is necessary to evaluate health tourism in this context.

As in all areas, the field of health is closely affected by the continuous changes and developments in technology (Uysal and Ulusinan, 2020). In fact, the internet is considered an important source of information in terms of health services (Toygar, 2018). With digital health services, individuals and health professionals are able to meet quickly regardless of place and time (Özen, 2021). Therefore, with the spread of digital health applications, individuals' expectations increase as well as speed, sustainability and efficiency (Uysal and Ulusinan, 2020). Due to computer literacy, which has become widespread today, changes in the field of e-Health are followed rapidly. These changes accelerate decision making, improve communication between physicians and patients, and increase productivity. Therefore, e-Health services should not only be considered a technological development, but within a more broad context (Toygar, 2018). Mobile devices, which are a big part of our daily life, also play an important role in the follow-up of health data. These mobile devices make important contributions to lifestyle changes and increase the level of health information while decreasing health costs (Kopmaz and Arslanoğlu, 2018). It is necessary not to think of those who benefit from mobile health services as just patients. In this regard, it is also possible to include many stakeholders such as healthy people, patients' relatives, health professionals, pharmacies, hospitals, social security institutions (Tezcan, 2016).

3. METHOD

3.1. Purpose of the Research

Today, the importance of health tourism is increasing all over the world. Rapidly advancing technological changes and transformations also affect health tourism. With the advancement of

technology, the effective use of digital tools in terms of health tourism will provide great benefits for both health institutions and patients. In this study, it was aimed to examine the corporate websites and social media accounts of 10 private hospitals located in Konya province, Turkey in order to reach both domestic and international health tourists.

3.2. Population and Sample of the Research

The research universe consisted of all private hospitals (10 hospitals) in Konya: Farabi Hospital, Medova Hospital, Private Metropolitan Hospital, Medicana Hospital, Private Akademi Hospitals, Private Anıt Hospital, Private Konya Hospital, Dünyagöz Hospital, Konyagöz Hospital, Private Türkiye Kızılay Derneği Ticaret Borsası Hospital. Three of these hospitals are chain hospitals, and the others are located only in Konya. In the study, the entire universe was reached and no sampling was performed.

3.3. Collection and Evaluation of Research Data

Data collection was carried out over the Internet. The websites of the designated hospitals were accessed one by one. The data were tabulated on the computer. Interpretations were performed over these tables. In addition, names of the were not included in the tables, lettering (A, B, C, D, E, F, G, H, K, L) was used to represent the hospitals.

3.4. Data Analysis

In this study, corporate websites of private hospitals located in Konya were examined using content analysis method. In content analysis, similar data are brought together within the framework of certain concepts and themes, organized and interpreted through ensuring comprehensibility (Yıldırım & Şimşek, 2013, p.259). In the research, a content analysis was conducted to determine whether participants use Instagram, Facebook and Twitter accounts effectively since 2018, which is the common date for all hospitals. The analysis of corporate websites was based on the method used by Mason and Wright (2011). In this method, websites are analyzed in terms of applications, trust, risk, payment and financial information, and general information. Subheadings were created by the researcher in the light of the common information provided on the websites of the hospitals. While examining social media accounts, the accounts

were accessed by clicking on the social media links on the websites in order to prevent errors due to username similarity.

The information on the corporate website includes general information about the hospital, applications, trust, general risks, financial requirements, and visuals.

3.5. Limitation and Assumption of the Research

The research is limited only to private hospitals in Konya. Within the scope of the research, it is assumed that all private hospitals will be willing to attract health tourists to the hospital.

4. FINDINGS

Findings for the corporate website and social media accounts of hospitals were included in the research findings.

4.1. Findings Regarding Corporate Websites

The information on the corporate website includes general information about the hospital, applications, trust, general risks, financial requirements, and visuals.

Table 1. General Information

Information	**Number of hospitals**
Vision and mission	10
About us	10
Corporate identity	3
Corporate news	6
Institutional publications	1
Activity reports	1
Accreditation	1
Received Awards	2
English Website	6

The Table 1 indicates that there are about us and vision-mission tabs on the websites of all hospitals, and that the majority share corporate news. In addition, it was determined that 6 hospitals had English version of their websites, and two were found to have inadequate content.

Table 2. Information on Applications

Information	**Number of hospitals**
E-appointment/ E- result	9
High quality services	9
Medical technologies	6
Directions	2
Contact - suggestion/complaint form	9
Health guide	3
Social media accounts	9
Introduction of physicians	9
Information about health tourism contents	3
Services for international patients	3
Ask the expert a question	5
Remote examination	1

According to Table 2, when the information about the applications on the corporate websites was examined, it was seen that the quality of the services and technological infrastructure of the hospital were introduced, emphasizing the promotion of the physicians. In addition, a suggestion-complaint form was included under the name of the communication form from the patients and their relatives, which is considered to be an indication of the importance attached to feedback of patients and their relatives about the hospital. It was seen that the information about the "Ask a question to the expert" button and the contents of health tourism had started to become widespread.

Table 3. Safety-Related Information

Information	**Number of hospitals**
Information about PDPL	9
Visitor and companion policy	5
Patient rights policy	9
Frequently Asked Questions	2

As seen in Table 3, it was seen that the rights of the patients and confidentiality of information were attached importance through including the PDPL, visitor and companion policy, and patient rights policy. It was observed that two of the hospitals included frequently asked questions. It is considered that this information may influence patients' decision to choose the hospital.

Table 4. General Risks

Information	Number of hospitals
Adverse/difficult situations	-
Legal applications	-

As seen in Table 4, the fact that no information was provided on the general risks and where to apply in case of any adverse situations was considered an inadequacy.

Table 5. Financial Information

Information	Number of hospitals
Contracted institutions	9
Collaborations	2
Sponsorships	2
Information about payments	-
International insurance options	7

As seen in Table 5, there are mainly contracted institutions and international insurance options on the websites of the hospitals. It is considered that this situation is effective in patients' preference for the hospital. Collaborations and sponsorships are included only in two corporate hospitals.

Table 6. Images on Websites

Information	Number of hospitals
The exterior of the hospital	9
Hospital facility/logo	9
Maps	9
Staff photos	4
Post recovery	8
Inside the hospital	9
Medical devices	6

As given in Table 6, the visuals on the corporate websites are the most common visuals, showing the hospital's exterior and contents, its logo, and location on the maps. In addition, the

images of the surgical patients after recovery, the staff and the memorial of the medical devices in the hospital are considered to be important details for the image of the hospital.

1.1. Findings Regarding Social Media Accounts

The most shared content on Instagram accounts, the most retweeted content on Twitter accounts, and the most liked content on Facebook accounts were included.

Table 7. The Most Shared Contents on the Instagram Accounts of Hospitals

Hospital name	Information about diseases	Physician introduction	Scientific meetings etc.	Special day messages	Tips for a healthy life	Post recovery	Information for international patients	Hospital promotion, campaigns, etc.
A	572	65	192	443	217	9	0	313
B	354	27	349	337	120	75	0	66
C	290	12	14	164	78	2	1	74
D	456	1	164	311	351	20	1	167
E	458	55	104	389	121	14	3	199
F	161	15	9	75	13	12	0	32
G	82	23	36	158	14	15	2	70
H	128	7	11	80	25	8	0	25
K	191	26	25	138	42	11	0	53
L	49	21	6	84	98	3	0	34
Total	2741	252	910	2179	1079	169	7	1033

In table 7, it was seen that information about diseases, special day messages, suggestions for a healthy life, promotion of the hospital and campaigns were the most prominent content. Physician presentation and images of post-recovery patients are frequently included on websites, while Instagram accounts include different type of content. It was determined that the

information provided for international patients included only two foreign insurance companies, which was considered inadequate regarding health tourism. The content descriptions of the categories are as follows: Information about diseases, symptoms and treatments in the category of disease information; information on physicians who have recently started seeing patients and fields of expertise of current physicians in physician promotions; scientific meetings and events organized by hospitals in the category of scientific meetings; physicians participating in TV programs; special days such as Mother's Day, Doctor's Day, World Autism Awareness Day in the special day messages category, nutritional recommendations or ways to prevent all kinds of diseases in the category of recommendations for a healthy life; images of the post-operative condition of surgical patients in the post-healing category; foreign insurance options for international patients, information about the medical devices in the hospital, the treatments and the campaigns in the hospital promotion and campaign category.

Table 8. Contents Retweeted Most on Twitter Accounts

Hospital Name	**Account opening date**	**Number of retweets**
A	2014	Special day messages (3) Physician introduction (2) Scientific meetings (1)
B	2011	Special day messages (2) Scientific meetings (6) Information about diseases (2)
D	2010	Special day messages (15) Activity (5) Illness (5)
E	2013	Special day messages (1) Tips for a healthy life (1)
H	2010	Special day messages (3) Tips for a healthy life (2) Information about diseases (3)
K	2015	Special day messages (1) Hospital promotion campaign (2) Tips for a healthy life (2)

As given in table 8, when the Twitter accounts of the hospitals were examined, it was remarkable that the tweets shared were similar to the Instagram and Facebook content; however, the number of likes were quite a few. In this case, it may be concluded that the audience use Twitter more rarely compared to Instagram and Facebook, or that no actions are taken to increase

the number of followers of the Twitter accounts. It is also among the important results that four hospitals do not have Twitter accounts.

Table 9. The Most Liked Contents on Facebook Accounts of Hospitals

Hospital Name	Account opening date	Number of likes
A	2013	Physician introduction (434) Hospital introduction (405) Information about diseases (243)
B	2011	Special day messages (128) Hospital introduction (161) Physician introduction(133)
C	2010	Physician introduction (61) Hospital introduction (356) Information about diseases (669)
D	2010	Tips for healthy living (301) Special day messages (339) Information about diseases (706)
E	2010	Physician introduction (63) After recovery (81) Hospital introduction (41)
F	2012	Physician introduction (404) Special day messages (93) Hospital introduction (144)
G	2013	Special day messages (1) Hospital introduction (8) Information about diseases (2)
H	2010	Special day messages (121) Hospital introduction (146) Information about diseases (117)
K	2014	Physician introduction (707) Hospital introduction (788) Information about diseases (314)
L	2020	Tips for healthy living (103) Hospital introduction (499) Information about diseases (25)

When Facebook accounts of hospitals were examined, they seem to be categorized similarly to Instagram contents. It was determined that the posts with the highest number of likes also included similar content. Those received the highest appreciation were special day messages, information about diseases, and promotion of physicians and hospitals. Therefore, it may be concluded that these categories attract the attention of the audience the most.

5. DISCUSSION

When the studies in the literature are examined, it is seen that similar results are obtained. In the study conducted by Ercan (2020), social media tools are shown as the largest source of data in obtaining information about visitors in smart tourism applications (Ercan, 2020). In this study, corporate websites and social media accounts of 10 private hospitals operating in Konya were examined. The hospital and physician promotion and high quality services are carefully provided, and the fact that no information is provided within the framework of general risks suggests that it prevents patients from adopting a good perception toward the hospitals.

In a study conducted by Öksüz and Altıntaş (2017), the websites of health institutions that have JCI accreditation in Istanbul were examined and results indicating inadequate information in the general risks section supports our study (Öksüz and Altıntaş, 2017). The common date of opening of social media accounts was 2018. Considering that the content shared on Instagram not focusing on health tourism or international patients, and that even institutional hospitals providing limited information in this regard, hospitals are required to improve their credibility. Similar content was shared on Facebook accounts, and the fact that certain posts receiving no reaction from the audience, and others being highly appreciated suggest that the hospitals cannot use their Facebook accounts effectively. The number of retweets was examined since it was considered possible to reach large audiences through retweets. When Twitter accounts were examined, the fact that the number of retweets being negligible despite sharing a similar content with Instagram and Facebook may be interpreted as the low number of consumers using Twitter or the lack of action to increase the number of followers. In this direction, it was determined that hospitals used their social media accounts to provide information and to make announcements which did not interact with consumers. In terms of health tourism, it was seen that the tools were solely used for domestic health tourism, and the promotions shared for foreign patients were inadequate. It is considered that hospitals should recruit social media experts in their corporate marketing departments in order to reach to and interact with larger audience in the digital environment within the scope of health tourism. It can be suggested for those who already work in cooperation with social media experts to increase the number experts and focus on social media to improve these actions.

In a similar study conducted by İnce and Doğantan (2020), it was concluded that hotel businesses should provide necessary training on internet and information technologies to their personnel in order to be more effective in the digital environment. In addition, it was found that individuals with digital skills should be preferred in personnel recruitment, which would benefit the business, and the budget for these interventions should be prioritized and attached importance (İnce and Doğantan, 2020).

Similar results were found in the study conducted by Göde, Yorulmaz and Aydoğdu (2021). In this study, the websites of the agencies that are entitled to obtain a health tourism authorization certificate were examined. Accordingly, the websites of 113 agencies were reached. As a result of the research, it was seen that the agencies do not use their websites effectively and efficiently in terms of health tourism (Göde, Yorulmaz and Aydoğdu 2021).

In the study of Güler (2021), the websites of private hospitals operating in the health sector were examined in terms of their content in the field of human resources. It is seen that 83% of the private hospitals included in the study attach an application link in the human resources section on their websites, and 67% explain their human resources policy and values. It has been determined that only 33% of private hospitals provide information on wages and benefits, career management, performance management, training and development activities (Güler, 2021).

6. CONCLUSION AND SUGGESTIONS

Today, with the development of communication technologies, the necessity of using digital communication channels, which is one of the most important tools in the spread of health tourism, emerges. In this research, a content analysis was conducted to determine whether the private hospitals operating in Konya use their corporate websites and social media tools such as Instagram, Facebook, Twitter effectively in terms of health tourism. As a result of the research, it has been seen that only two corporate hospitals provide content related to both domestic and international health tourism. When the promotions and corporate news of the hospitals are taken into account, it has been observed that the content is generally focused on satisfaction of domestic patients. In this direction, it is concluded that hospitals tend towards domestic health tourism compared to international health tourism. When the contents of the social media accounts have been examined, it has been determined that the shared contents have been

included in the same categories. It is seen that similar information is provided on social media accounts and corporate websites. Generally, special day messages, information about diseases and suggestions for a healthy life have been highly promoted. It has been concluded that hospitals suggest that these issues attract the most attention. In addition, this situation reveals that the content of hospitals is up-to-date. In this direction, hospitals are considered to create a hospital image which attaches importance to the interactions of patients. As a result, it has been seen that hospitals fail to interact with the consumer audience while using digital communication channels. In addition, they use digital communication channels mostly for making announcements and providing information.

Recommendations regarding the results are as follows:

- Marketing activities that will stimulate foreign health tourism in Konya should be planned. Corporate marketing departments should employ foreign language-speaking personnel and actively use social media and websites.
- It should be aimed to improve the concept of health tourism throughout the country, the Ministry of Health and the Ministry of Culture and Tourism should reveal the positive aspects of Turkey, especially in terms of medical and thermal tourism, and select target countries. After the target countries are selected, advertisement promotions tailored to each country's own language should be organized and presented to the target countries with governmental support.
- Special practices and campaigns should be developed for Turkish people living abroad to receive health services in their own countries. In this way, their experiences will contribute to support the marketing and promotions for target countries.
- Congresses should be organized by the Ministry of Tourism for the promotion of international health tourism.
- A sufficient number of foreign language-speaking personnel should be available in the areas where all kinds of activities are provided for health tourists that include holiday elements.
- The field of health tourism should be included in curriculum in the Health and Tourism Faculties of universities and qualified professionals should be trained.

- Certificate programs should be developed in order to ensure that students willing to take part in the fields of activity related to health tourism, yet received education in a different field in undergraduate or associate degree, can work in these fields.
- International insurance options should be increased in order to encourage and facilitate people to receive health services from Turkey.
- In order to create an element of trust, all service details provided in the digital environment should be shared with the consumer audience in all transparency.

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References

Aksoy, C. and Yılmaz, S., (2019). Criteria for Health Tourists to Prefer Hospitals: Managers Views, Journal of Health and Social Welfare Research, 1(2), 27-39.

Ankaya, F.Ü. and Aslan, B.G. (2020). Evaluation of Disabled Tourism Potential; World and Turkey Examples. National Journal of Environmental Science Research, 3(2), 52-57.

Aydın, O. (2012). An Alternative Tourism in Turkey; Health Tourism. Karamanoğlu Mehmetbey University Journal of Social and Economic Research, 14(23), 91-96.

Bayer, M.Z. (1992). Introduction to Tourism, Istanbul University Faculty of Business Publication: Istanbul.

Bennett, M., King, B. and Milner, N. (2004). The Health Resort Sector in Australia: A Positioning Study, Journal of Vacation Marketing, 10(2), 122-137. doi:10.1177/135676670401000203

Connell, J. (2006). Medical Tourism: Sea, Sun, Sand and Surgery. Tourism Management, 27(6), 1093-1100. doi: 10.1016/j.tourman.2005.11.005

Cook, Peta S. (2008) What is health and medical tourism? In: The annual conference of the Australian Sociological Association, 2 to 5 December 2008, The University of Melbourne, Victoria, s.1-13.

Crusher, S. (2020). Medical Tourism in Turkey. Comic Bookstore, 34.

Çiçek, R. and Avderen, S. (2013). A Research to Determine The Current Structure and Potential of Spa and Thermal Facilities in The Central Anatolia Region in Terms of Health Tourism. Karamanoğlu Mehmetbey University Journal of Social and Economic Research, (2), 25-35.

Dülgaroğlu, O. (2021). Digitalization in Tourism: Smart Tourism Applications, Digital Tourism and Tourism 4.0. Journal of Tourism and Management, 2(1), 01-15. doi:10.29329/jtm.2021.421.1

Edinsel, S. and Adıgüzel, O. (2014). Turkey's Position and Developments in Health Tourism Within The World Countries in The Last Five Years, Journal of Çankırı Karatekin University Faculty of Economics and Administrative Sciences, 4(2), 167-190.

Ercan, F. (2020). Big Data Use in Smart Tourism: A Systematic Review. OPUS International Journal of Society Studies, 16(32), 5230-5249. doi:10.26466/opus.780017

Göde, A., Yorulmaz, M. and Aydoğdu, A. (2021). Investigation of the Websites of Agencies

Eligible for Health Tourism Authorization Certificate, Karamanoğlu Mehmetbey University Journal of Social and Economic Research, 23(41), 208-224.
Guttentag, D.A. (2010). Virtual Reality: Applications and Implications for Tourism. Tourism Management, 31(5), 637-651. doi: 10.1016/j.tourman.2009.07.003
Guttentag, D.A. (2015). Airbnb: Disruptive Innovation and The Rise of An Informal Tourism Accommodation Sector. Current Issues in Tourism, 18(12), 1192-1217. doi:10.1080/13683500.2013.827159
Güler, H.N. (2021). Examination of Communications of Private Hospitals for Human Resources on Web Sites. Journal of Economics, Business and Finance Studies, 3(2), 156-166. doi:10.38009/ekimad.936165
Happ, E. and Ivancso-Horvath, Z. (2018). Digital Tourism is the Challenge of Future a New Approach to Tourism. Knowledge Horizons-Economics, 10(2), 9-16.
Henderson, J.C. (2004). Paradigm Shifts: National Tourism Organizations and Education and Healthcare Tourism. The Case of Singapore, Tourism And Hospitality Research, 5(2), 170-180. doi: 10.1057/palgrave.thr.6040016
Howze, K.S. (2007). Note: Medical Tourism: Symptom or Cure?, Georgia Law Review, 41(3), 1013–51.
Iordoche, C., Ciochina, I. and Roxana, P. (2013). Medical Tourism-Between The Content and Socio-Economic Development Goals, Development Strategies, RRM-1, 31-42.
İnce, İ. and Doğantan, E. (2020). Digital Marketing From the Perspective of Hotel Managers. Anadolu University Journal of the Faculty of Business, 2(1), 13-26.
Kantar, G. and Erdoğan, I. (2014). Health tourism in Turkey, Journal of Health Academics, 1 (1), 15-20.
Kapan, S. (2019). Health tourism in Turkey and in the world. Inspector's Thesis. Ministry of Health Inspection Board, Ankara.
Kırıcı, S. (2020). Medical Tourism In Turkey. Internatıonal Congress Of Scıence Culture, Health And Sport Full Text Book. Comic Bookstore, 2020, p.34-36, Antalya.
Kopmaz, B. and Arslanoğlu, A. (2018). Mobile Health and Smart Health Applications, Journal of Health Academics, 5(4), 251-255.
Lee, C. and Spisto, M. (2007). Medical Tourism, the Future of Health Services. In the 12th International Conference on ISO 9000 and TQM Proceedings (p.1–7), Taiwan.
Manaf, N.H.A., Hussin, H., Kassim, P.N.J., Alavi, R. and Dahari, Z. (2015). Medical Tourism Service Quality: Finally Some Empirical Findings. Total Quality Management & Business Excellence, 26(9-10), 1017-1028. doi: 10.1080/14783363.2015.1068597
Mason, A. and Wright, K.B. (2011). Framing Medical Tourism: An Examination of Appeal, Risk, Convalescence, Accreditation, and Interactivity in Medical Tourism Web Sites, Journal of Health Communication, 16(2), 163-177. doi: 10.1080/10810730.2010.535105
Öksüz, B. and Altıntaş, V. (2017). Use of Digital Communication Channels in Health Tourism, Journal of Travel and Hotel Management, 14(1), 59-75. doi:10.24010/soid.303662
Özen. H. (2021). Evaluation of Digital Health Services in Terms of Sustainable Development Goals, OPUS International Journal of Society Researches, 17(38), 5440-5472.
Özsarı, S.H. and Karatana, Ö. (2013). Turkey's Situation in terms of Health Tourism. Journal of Kartal Training & Research Hospital/Kartal Training and Research Hospital Medical Journal, 24(136-144). doi:10.5505/jkartaltr.2013.69335
T.C. Ministry of Health General Directorate of Treatment Services, (2011). Medical Tourism in Turkey, Ankara.

Tezcan C. (2016). An Innovative Perspective on Health Mobile Health, Istanbul: Tüsiad Publications.
Toygar, Ş.A. (2018). E-Health Applications. Legislative Journal, (37), 101-123.
TR. General Directorate of Health Services, General Presidency of Health Tourism (2022). Access Date: 10 February 2022, https://shgmturizmdb.saglik.gov.tr/TR,68082/saglik-turizmi-nedir.html
TR. General Directorate of Health Services, General Presidency of Health Tourism (2022). Access Date: 8 February 2022, https://shgmturizmdb.saglik.gov.tr/Eklenti/10953/0/11pdf.pdf
TR. Ministry of Culture and Tourism (2022), Access Date: 10 February 2022, https://www.ktb.gov.tr/
Trauer, B. (2006). Conceptualizing Special Interest Tourism - Frameworks for Analysis. Tourism Management, 27(2), 183–200. doi:10.1016/j.tourman.2004.10.004
Uygun, M. (2015). Analysis of Turkish Health Tourism in the Vision of Turkey Tourism Strategy (2023). In Translation: An Overview of Health Tourism Within The Context of Turkey's Tourism Strategy (2023), I. Eurasia International Tourism Congress: Current Issues Trends, And Indicators. EITOC, pp. 236-242.
Uysal, B. and Ulusinan, E. (2020). Review of Current Digital Health Applications, Selçuk Health Journal, 1(1), 46-60.
Yardan, E.D., Dikmetaş, H., Us, N.C. and Yabana, B. (2014). Health Tourism in Turkey and the World, Journal of Performance and Quality in Health, 8(2), 27-42.
Yıldırım, A. and Şimşek, H. (2013). Qualitative Research Methods in Social Sciences, (Extended 9th Edition), Ankara: Seçkin Publishing.
Younis, M., O'lawrence, H. and Martinez, I. (2019). The Global Health Issues and Medical Travel: A Review. International Journal of Health Management and Tourism, 4(2), 96-110. doi:10.31201/ijhmt.523635