Evaluation of E-health Innovations towards Public Health in Izmir, Turkey

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Abstract BACKGROUND: The aging of the population is challenging the health sector. Sedentary behaviours in society, chronic health conditions have shown a significant increase. The health sector is in demand for solutions more than ever. In this environment, e-health and its applications are considered as a possible solution to these needs. METHODS: Data collection tools and SPSS 20.0 package software were used for the analysis of collected data. In the analysis of the data obtained from the research, frequency, and crosstabs analysis. The current study followed the IMRaD structure and its design aimed to examine parameters of e-health in the population in İzmir provinces. RESULTS: A total of 105 participants were included in the survey. Parameters such as the Distribution of Participants Using Digital Practice on E-health and Distribution of Participants Using Health-Related Search Engines were examined. 27 of the participants thought that they understood all aspects of health technology, and 78 did not. 74 of the participants used social media to get information about any health status, and 31 did not. 22 of the participants had communicated with a health professional via social media and 83 did not. 72 of the participants had information about wearable or portable technological devices for health control, and 33 did not know. CONCLUSIONS: According to the findings of the study: e-health, a new digital system that emerged with the need for innovation in the health sector, should be understood within the scope of improving healthcare. It is a system that has great potential in terms of improving healthcare quality, reducing costs and can serve without a physical presence in infectious diseases such as Coronavirus disease 2019 (COVID-19). With the correct implementation and education, e-health services are quite promising.

***Keywords:** e-health, public health, management, patient, medicine*

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1. Introduction

Health is the undeniable connection point of all human beings. With the urge to live healthily and have a long life span, each person regards health as a serious matter. Today, the aging of the population adds even more pressure to an already challenged health sector. In addition, with the increase in sedentary behaviours in society, chronic health conditions have shown a significant increase [1]. The health sector is in demand more than ever [2]. With the increase in the human population and the population aging, governmental authorities have more responsibilities in terms of health care. When the number and lifetime of people increases, the health sector requires even more resources and investments. E-health is considered as a possible solution to this problem.

E-Health, a word that has recently entered the daily life, was firstly used in the fields of industry and marketing. It is an area that combines health informatics, community health, and business since technology is a must for e-health services. Nevertheless, e-Health is not simply related to technological developments. It should be understood within the scope of improving health care and changing the way of thinking [3]. It is a trustable system that is expected to reduce healthcare costs [4]. What this means is that it makes it possible for patients to benefit from the health system in a customized way, while providing a chance to healthcare professionals to track the medical condition of their patients [5]. E-health may be an effective tool in several areas such as the diagnosis

process of diseases, treatments, monitoring of physical and metabolic activities, healthcare support, management of medical establishments, etc. [6,7,8].

1.1. E-health Services

E-health may be defined as the combined total of health services powered by digital information technologies. The extent of e-health services is quite wide including telehealth, mobile health, online health recordings, health applications such as fitness tracker apps, etc. According to the definition of the World Health Organisation (WHO) e-health is "the cost-effective and secure use of information and communication technologies in support of health and health-related fields, including health-care services, health surveillance, health literature, and health education, knowledge and research" [9].

While e-health has become more common in developed countries in the past years, it is even more necessary in developing countries. In developing countries, health care services are often limited. The number of health care professionals and medications, budgets, and resources is finite. In this sense, online health services are expected to overcome inadequacies in developing countries and provide a better public health care system [10]. Furthermore e-health can serve the medical system of all the countries globally without physical presence, in future periods of pandemia, in infectious diseases such as Coronavirus disease 2019 (COVID-19).

There are several types of e-health services. Electronic health records, mobile phones, and computers are quite worthful to benefit from digital health [11]. They have the potential to help countless people who have health conditions such as Alzheimer's and Parkinson's by creating a self-sufficient environment to let them continue their daily lives as smoothly as possible. In addition to the above, there are also other e-health technologies such as wearable devices. These devices include a sensor system that allows them to measure and monitor body temperature, body activity, electro dermal activity, pulse, photo plethysmography, etc. These sensors systems can be found in several devices, allowing for healthcare to be included in human life as a wearable device [12].

1.2. Benefits and Challenges

E-Health is considered an up and coming field in the world of medicine and public health. These services are expected to reduce costs and enhance efficiency. In particular, in terms of decreasing health costs, e-health allows physicians to have access to the previous treatments and diagnoses of the patient, and thus, repetitive treatments can be prevented. The increased communication between the parties involved in the patient's treatments is another important benefit of e-health in economic terms. In addition to economic efficiency, the quality of health care services increases through e-Health [3]. E-health provides a service which not only allows doctors but also patients to have access to their medical records. Through the internet, people can see their records and keep track of their health. With this method, patients can make better health decisions; whereas also the health care system is being transformed

putting the patient at the centre. E-health may be considered as a breakthrough in the dynamics of patient-doctor relationships. Electronic health services include the patient in the treatment process more than ever. Thus, the patient is as involved in the decision making process as the doctor.

Medicine is a limitless field where new techniques and treatments appear rapidly. Therefore, doctors and health care professionals need to continue learning constantly. To be able to fully use electronic health services, they must have more access to information and improve their knowledge. Another benefit of e-health is its global scope. Traditionally, health care services are accessible to the public at a local level. Yet, with the developments in technology, today online services are accessible from everywhere. People have access to more than local treatments or medicines. Instead, anyone can have access to different health care professionals, receive medical advice, or order various types of medication from all over the world.

In the case of health care, ethics is a delicate issue. However, ethics in the case of e-health is quite controversial. Along with electronic health services, new potential problems occur in terms of the protection of private medical data and consents. In the sense of health care equity, e-health is a positive innovation. Yet, some arguments indicate e-health may affect the issue of equity negatively and even increase the inequity. E-health is a service that requires certain infrastructures. For example, to use and benefit from electronic health services, one has to have access to the internet, network, and a technological device. Those who live in rural regions where infrastructure is inadequate or those who do not have an economic status to afford such requirements are not likely to use the services provided by e-health. Thus, while e-health could fix the problem of health care inequity, it may also trigger it even more [3].

2. Material and Methods

In the study, a descriptive and scanning-oriented method which aims to reveal the current situation was used. The research is composed of two phases: theoretical and practical. In the first stage, the literature on the subject was reviewed, the results of previous studies were examined and a detailed framework was prepared regarding the subject of the thesis. In the second stage, the data collection tool was developed in consideration of this theoretical framework. The participation of a person in evaluation is based on voluntariness.

2.1. Research Population and Sample

The sample selection in this study was made İzmir provinces. 105 participants were included in the survey.

2.2. Data Collection Tools

A nominal scale developed by the researcher was used as the data collection tool in the study.

The research is based on 15 nominal questions. The research is limited to the data collected with these scales.

2.3. Data Analysis

Data collection tools and SPSS 20.0 package software were used for the analysis of collected data. In the analysis of the data obtained from the research, frequency, and crosstabs analysis.

3. Results

3.1. Frequency Analysis

Table 1. Gender Distributions of Participants

What Is Your Gender?		Frequency	Percentage	Valid Percent	Cumulative Percent
Valid	,00	0	1,0	1,0	1,0
	Female	59	55,2	55,2	56,2
	Male	46	43,8	43,8	100,0
	Total	105	100,0	100,0	

59 of the participants were female and 46 were male.

Table 2. Age Distribution of Participants

What Is Your Age?		Frequency	Percentage	Valid Percent	Cumulative Percent
Valid	,00	0	1,0	1,0	1,0
	18 and below	4	2,9	2,9	3,8
	19-30	67	63,8	63,8	67,6
	31-42	13	12,4	12,4	80,0
	43-54	15	14,3	14,3	94,3
	55 and older	6	5,7	5,7	100,0
	Total	105	100,0	100,0	

4 of the participants were in the age group of 18 years and older, 67 were in the 19-30 age group, 13 were in the 31-42 age group, 15 were in the 43-54 age group and 6 were in the 55 and over age group.

Table 3. Height Distribution of Participants

What Is Your Height?		Frequency	Percentage	Valid Percent	Cumulative Percent
Valid	,00	0	1,0	1,0	1,0
	160 cm and below	19	17,1	17,1	18,1
	161-171 cm	28	26,7	26,7	44,8
	172-182 cm	37	35,2	35,2	80,0
	183-193 cm	20	19,0	19,0	99,0
	194 cm and taller	1	1,0	1,0	100,0
	Total	105	100,0	100,0	

19 of the participants were in 160 cm and six groups, 28 in 161-171 cm, 37 in 172-182 cm, 20 in 183-193 and 1 in 194 cm and over.

Table 4. E-Health's Meaning Distribution of Participants

Do You Know What E-Health Is?		Frequency	Percentage	Valid Percent	Cumulative Percent
Valid	,00	1	1,0	1,0	1,0
	YES	54	51,4	51,4	52,4
	NO	50	47,6	47,6	100,0
	Total	105	100,0	100,0	

54 of the participants know what e-health means, and 50 of them don't know what the e-health means.

Table 5. Distribution of Participants Using Digital Practice on E-health

Do You Use E-Health Apps In Your Daily Life On Your Phone, Computer Etc?		Frequency	Percentage	Valid Percent	Cumulative Percent
Valid	,00	0	1,0	1,0	1,0
	YES	63	59,0	59,0	60,0
	NO	42	40,0	40,0	100,0
	Total	105	100,0	100,0	

63 of the participants are using health-related digital practice. 42 of them do not use health-related digital practice.

Table 6. Distribution of Number of Applications the Participants Use

If You Use Digital Health Apps, How Many Do You Use?		Frequency	Percentage	Valid Percent	Cumulative Percent
Valid	,00	0	1,0	1,0	1,0
	NONE	78	73,3	73,3	74,3
	1	3	2,9	2,9	77,1
	Between 2-4	21	20,0	20,0	97,1
	5 and more	3	2,9	2,9	100,0
	Total	105	100,0	100,0	

78 of the participants did not use digital applications, 3 of them were digital applications, 21 of them were using between 2 and 4digital applications, and 3 of them were using 5 and more digital applications.

Table 7. Distribution of Doctors to Recommend Digital Practice to Participants

Have Your Physician Ever Proposed You To Use Health Apps?		Frequency	Percentage	Valid Percent	Cumulative Percent
Valid	,00	0	1,0	1,0	1,0
	YES	12	10,5	10,5	11,4
	NO	93	88,6	88,6	100,0
	Total	105	100,0	100,0	

It was observed that 12 of the participants suggested that their physicians applied digital health care and 93 of them did not recommend digital health practice.

Table 8. Distribution of Participants in All Aspects of Health Technology

Do You Feel You Understand All The Aspects Of Technology Used In Health?		Frequency	Percentage	Valid Percent	Cumulative Percent
Valid	,00	0	1,0	1,0	1,0
	YES	27	24,8	24,8	25,7
	NO	78	74,3	74,3	100,0
	Total	105	100,0	100,0	

It was observed that 27 of the participants thought that they understood all aspects of health technology, and 78 did not think that they understood all aspects of health technology.

Table 9. Distribution of Participants Using Health-Related Search Engines

Have You Ever Used Online Search (Google Etc.?) To Find Information On A Health Issue?		Frequency	Percentage	Valid Percent	Cumulative Percent
Valid	,00	0	1,0	1,0	1,0
	YES	99	93,3	93,3	94,3
	NO	6	5,7	5,7	100,0
	Total	105	100,0	100,0	

It was observed that 99 of the participants had searched on a search engine to get information about their health status, 6 of them had not searched.

Table 10. Distribution of Participants Using Social Media Related to Health Status

Have You Ever Used Social Media To Find Information On A Health Issue?		Frequency	Percentage	Valid Percent	Cumulative Percent
Valid	,00	0	1,0	1,0	1,0
	YES	74	69,5	69,5	70,5
	NO	31	29,5	29,5	100,0
	Total	105	100,0	100,0	

It was observed that 74 of the participants used social media to get information about any health status, and 31 of them did not.

Table 11. Distribution of Participants by Contacting Health Specialist via Social Media

Have You Ever Communicated With A Health Professional Through Social Media?				
		Frequency	Percentage	Valid Percent	Cumulative Percent
Valid	,00	0	1,0	1,0	1,0
	YES	22	20,0	20,0	21,0
	NO	83	79,0	79,0	100,0
	Total	105	100,0	100,0	

It was observed that 22 of the participants had communicated with a health professional via social media and 83 of them did not communicate.

Table 12. Distribution of Participants' Access to Personal Health Information via Digital Media

Have You Ever Received Your Medical Records Through Electronic Means?				
		Frequency	Percentage	Valid Percent	Cumulative Percent
Valid	,00	0	1,0	1,0	1,0
	YES	62	58,1	58,1	59,0
	NO	43	41,0	41,0	100,0
	Total	105	100,0	100,0	

It was observed that 61 of the participants had access to personal health information via digital media and 43 of them did not.

Table 13. Speech Distribution of Participants with a Health Specialist on Online Applications

Have You Ever Had A Conversation With A Health Care Provider Through Online Communications (Skype)?				
		Frequency	Percentage	Valid Percent	Cumulative Percent
Valid	,00	0	1,0	1,0	1,0
	YES	11	9,5	9,5	10,5
	NO	94	89,5	89,5	100,0
	Total	105	100,0	100,0	

It was observed that 11 of the participants talked to the healthcare professional using online communication channels and 94 of them did not talk to the healthcare professionals through this means.

Table 14. Distribution of Participants Using Wearable or Portable Technology Device for Health

Have You Ever Used A Wearable Or Portable Health Device?				
		Frequency	Percentage	Valid Percent	Cumulative Percent
Valid	,00	0	1,0	1,0	1,0
	YES	32	29,5	29,5	30,5
	NO	73	69,5	69,5	100,0
	Total	105	100,0	100,0	

It was observed that 32 of the participants used a wearable or portable technology device for health and 73 of them did not.

Table 15. Distribution of Participants' Information about Technological Devices for Health Control

Are You Familiar With Wearable Or Portable Technological Devices (Blood Pressure Monitoring, Step Meter Or Daily Calorie Consumption) For Health Control Purposes?				
		Frequency	Percentage	Valid Percent	Cumulative Percent
Valid	,00	0	1,0	1,0	1,0
	YES	72	67,6	67,6	68,6
	NO	33	31,4	31,4	100,0
	Total	105	100,0	100,0	

It was observed that 72 of the participants had information about wearable or portable technological devices for health control, and that 33 of them did not know.

3.2. Crosstabs Analysis

Table 16. Cross tabulation Table 1

What İs Your Gender * Do You Know What E-Health Is? **Cross tabulation Count**					
		Do you know what E-Health is?			
		,00	Yes	No	Total
What is your gender?	,00	0	0	0	0
	Female	0	37	22	59
	Male	0	18	28	46
	Total	0	55	50	105

It was observed that 37 of the female participants knew what e-health means and 22 did not know what it meant.

It was observed that 18 of the male participants knew what e-health means and 28 did not know what it meant.

Table 17. Cross tabulation Table 2

Have Your Physician Ever Proposed You To Use Health Apps?* Do You Use E-Health Apps In Your Daily Life On Your Phone, Computer Etc? **Cross tabulation Count**					
		Do you use e-health apps in your daily life on your phone, computer etc?			
		,00	Yes	No	Total
Have your physician ever proposed you to use health apps?	,00	0	0	0	0
	Yes	0	10	2	12
	No	0	53	40	93
	Total	0	63	42	105

It was observed that 10 of the participants of the physician's digital health practice recommended health-related practices in daily life, and 2 did not.

It was observed that 53 of the participants used health-related practices in daily life and 40 of them did not use it.

Table 18. Cross tabulation Table 3

Do You Feel You Understand All The Aspects Of Technology Used In Health?*Do You Use E-Health Apps In Your Daily Life On Your Phone, Computer Etc? **Cross tabulation Count**					
		Do you use e-health apps in your daily life on your phone, computer etc?			
		,00	Yes	No	Total
Do you feel you understand all the aspects of technology used in health?	,00	0	0	0	0
	Yes	0	23	4	27
	No	0	40	38	78
	Total	0	63	42	105

It was observed that 23 of the participants, who thought that they understood all aspects of the technologies used in health care, used digital applications related to health in their daily lives, and 4 did not use them.

It was observed that 40 of the participants who did not think that they understood all aspects of the technologies used in health care, used digital applications related to health in their daily lives, and 38 did not use them.

4. Discussion

With the recent developments in technology and the prevalence of the internet, e-health has become a demand by the public [13,14]. E-health applications give the possibility to anyone to have direct access to their health records along with a large quantity of health-related information on the internet. Therefore, patients can be more involved in their health statuses and carry more power in this sense [15,16,17,18]. Yet, along with many benefits, some studies argue that e-health has the potential to compromise public health with misleading information and unethical use [19,20,21]. However, with the correct implementation and education, e-health services are quite promising [22].

A study on e-health demonstrated that severe medical mistakes can be avoided with the assistance of electronic medical records since the healthcare professionals have full access to the patients' previous diagnoses and treatments [23]. Similarly, another research on the benefits of e-health stated that electronic prescriptions prevent medical mistakes [24]. There are still challenges with the implementation and prevalent use of e-health systems. For instance questionnaires study, almost 86% of health care professionals face challenges because the vendors are not able to provide the necessary products. This creates a challenge for the implementation of e-health systems [25].

One study was conducted to analyze e-health use in four developing countries: Turkey, the Kingdom of Saudi Arabia, the United Arab Emirates, and Egypt. The study aimed at understanding the problems e-health may face in these countries through interviews with health care professionals. In conclusion, the study demonstrated that economic problems, insufficient IT infrastructures, cultural differences are some of the potentials when implementing e-health in developing countries [10].

In a literature review on e-health implementation in developing countries, Anwar et al. stated that infrastructure for the internet and networks and number and quality of health care professionals must be increased to implement the e-health system successfully to these countries [26]. Kundi also indicated the same arguments [27]. Thus, it is essential to provide information and communication technology first [28].

5. Conclusion

E-Health is a new digital system that emerged with the need for innovation in the health sector, is not simply a technological development and should be understood within the scope of improving health care. It is a trustable system that has great potential in terms of improving healthcare quality and reducing costs. With the correct implementation and education, e-health services are quite promising. Further research is needed to reveal the most approximate modus to the practical implementation of the e-health digital system in public and private health sectors, especially in eras that the avoidance of physical contact is vital, due to cautious viruses such as Coronavirus disease 2019 (COVID-19).

Conflict of Interest Statement

The authors certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

The Founding Sources

The authors report no involvement in the research by the sponsor that could have influenced the outcome of this work.

Authors' Contribution

O. O. given substantial contributions to the conception or the design of the manuscript, to acquisition, analysis and interpretation of the data. N. N. revised it critically. All authors contributed by writing, editing, and reviewing the manuscript, and read and approved the final version of the manuscript.

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