Barriers to Telemedicine Establishment in Iran: A Systematic Review

Mohammad Hossein Mehrolhassani [1], Vahid Yazdi-Feyzabadi [1], Reza Dehnavieh [1], Kambiz Bahaadinbeigy [2], *Mohammad Kargar [3]

1. Health Services Management Research Center, Institute for Futures Studies in Health, Kerman University of Medical Sciences, Kerman, Iran
2. Medical Informatics Research Center, Institute for Future Studies in Health, Kerman University of Medical Sciences, Kerman, Iran
3. Faculty of Management and Medical Informatics, Kerman University of Medical Sciences, Kerman, Iran

*Corresponding Author: Email: m.kargar768@gmail.com

Abstract

Background: Despite the implementation of some experimental and temporary telemedicine projects in Iran in recent years, it has not been deployed in formal healthcare services. The first step in establishment of this technology in health system is identification of barriers of this area. Therefore, this study aimed to identify the barriers to telemedicine establishment in Iran health system.

Methods: A systematic review was conducted according to PRISMA guidelines. Searches were conducted in PubMed, Web of Sciences, Scopus, Cochrane Library, Iranmedex, Magiran, SID and Google Scholar. The inclusion criteria were studies that reported barriers to telemedicine in Iran, non-review studies, published studies in English and Persian between Nov 22, 2010 and Mar 20, 2022. Data were analyzed using narrative synthesis and deductive-inductive thematic analysis and the World Health Organization building blocks framework was used in this regard.

Results: Out of 1148 studies identified, 21 studies met the inclusion criteria for review. The findings fell into four themes, including governance/leadership, financing, health workers, and health information system besides 11 sub-themes. No specific findings were derived from the building blocks of service delivery and medical product, vaccines and technologies.

Conclusion: Governance is an integral part of other building blocks of the health systems. Hence, overcoming the barriers in this field can be prioritized. Therefore, ensuring the existence of strategic policy frameworks along with some other factors such as effective supervision, coalition building, laws and regulations, and community participation can be the first solutions for establishment of telemedicine in Iran.

Keywords: Telemedicine; Telehealth; Telecare; E-health; M-health; Iran

Introduction

The health system in Low and Middle-Income Countries continues to face many challenges in providing health care services with high quality, affordable and universal coverage. In response, policymakers are looking for innovative approaches to eliminate geographical, financial and

cultural barriers to healthcare services. This has led to increased interest in the potential of eHealth in these countries (1). The eHealth solutions such as telehealth, mobile health, telemedicine, Electronic Health Records (EHR) and E-prescribing are increasingly used to enhance the quality of care, improve access, reduce medical errors, enhance patient safety and reduce health care costs (2). One of the most important eHealth solutions is telemedicine (3).

The WHO provides the most common definition of telemedicine: "the delivery of health care services, where distance is a critical factor, by all health care professionals using information and communication technologies to exchange valid information for the diagnosis, treatment and prevention of diseases and injuries, research and evaluation, and for the continuing education of health care providers, all in the interest of advancing the health of individuals and their communities" (4). Telemedicine is changing the way of delivering health care. In addition to its benefits, such as improving the quality and mitigating health care costs (5). The main goal of telemedicine services is to ensure access to medical care for all patients regardless of their residence (4, 6). Through the implementation of telemedicine, it is possible to conveniently monitor the patients who live in remote areas, especially when their health condition does not allow them to access the physicians (4, 6, 7).

In developing countries such as Iran, providing healthcare services has faced many problems such as growing elderly population, dispersed population, unequal distribution of physicians, inadequate road transportation facilities, and infectious diseases outbreak. Hence, telemedicine could be an appropriate substitute for more and faster accessibility to some healthcare services (8). However, the process of establishing telemedicine in developing countries faces many barriers such as legal, financial-economic, technical-technological, managerial-process and cultural-social (9).

Although a number of experimental and temporary telemedicine projects have been carried out in Iran in recent years, telemedicine has not been implemented in formal healthcare services of Iran. Hence, the first step in establishing this technology is identification of barriers and challenges of this area. To the best of our knowledge, despite many studies have been conducted in the field of telemedicine in Iran in recent years, no systematic review has investigated the barriers in the field. Therefore, this systematic review aimed to identify barriers to telemedicine establishment in Iran. We applied a new approach to categorize the barriers of telemedicine. To this end, the building blocks' framework of the WHO was contributed. This framework is a tool that can be used to describe and assess health systems along six dimensions: governance/leadership, financing, service delivery, health workforce, health information system, and access to medical products, vaccines, and technologies. Since Iran's health system governance is a governmental issue, our findings can provide insight to policymakers and executives of related sectors to dealing with the current challenges.

Materials and Methods

Search strategy and Study selection

This systematic literature review was conducted in line with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (10). National and international databases, including PubMed, Web of Sciences, Scopus, Cochrane Library, Iranmedex, Magiran, SID and Google Scholar were searched for peer-reviewed published articles. A grey literature search was also undertaken across several databases and organizational websites which included: World Health Organization, Ministry of Health and Medical Education of Iran, Ministry of Information and Communications Technology of Iran, Iranian Telemedicine Association. Literature search was done between Mar 21, 2022 and Mar 25, 2022. The search strategy was mainly the systematic use of keywords with all possible combinations. To improve the search sensitivity, general keywords were used as follows: "Telemedicine" OR "Telehealth" OR "Telecare" OR

"eHealth" AND "Iran". Additionally, the reference list of the published studies was evaluated to increase sensitivity and select further studies. The full search strategy and keywords can be found in Appendix 1.

Duplicate articles were removed using the End-Note reference management software. One reviewer (M.K) screened the titles and abstracts of all articles for potential inclusion. Two independent reviewers (MH.M and M.K) reviewed all full-text versions of all potentially eligible studies to prevent selection bias. In the case of disagreement in the selection process, each disagreement was resolved by discussion. Figure 1 illustrates the study selection process.

Inclusion criteria were:

- Studies with the content of barriers to the establishment of any types of telemedicine in Iran that their participants included policy makers, managers, key informants, experts, researchers, providers, staffs and patients who had working experience in the field of electronic health or telemedicine.
- Mixed methods, qualitative or quantitative Studies.
- Studies reported in English or Persian.
- Studies that were published between Nov 22, 2010 and Mar 20, 2022. The reason is that telemedicine in Iran has been seriously considered by health policy makers after the approval of the comprehensive scientific plan of the health sector of this country in Nov 22, 2010.

Exclusion criteria were:

- Repeated data.
- Studies that were not conducted as a review. However, their included studies were reviewed to retrieve related studies.
- Studies that had unknown method, letter to the editors, editorial and commentary articles.
- Other countries, other dates, other languages.

Data extraction and Quality assessment

For each included study, following data were extracted: title, author(s), year of publication, Participants, setting, methodology, and the major findings.

The quality assessment of the 25 included studies was assessed by two independent reviewers (MH.M and M.K) using the Joanna Briggs Critical Appraisal checklists (11). This research instrument comprises a separate checklist for each type of methodology. These checklists may have different question numbers. According to the checklists, one point (Yes = 1, No = 0) was given for each question. Studies that scored equal or more than 70% were included in the final review by the agreement of the research team. For example, if the checklist had ten questions and the article had a minimum score of 7 out of 10, it would enter the study. Any discrepancies in scoring were discussed until consensus was reached.

Data analysis

For data synthesis, a combined thematic analysis method was used to classify the data of the included studies (12). Deductive thematic analysis was used to identify the related themes. For this purpose, we used the WHO health system building blocks framework. This framework describes and evaluates health systems in six dimensions: governance/leadership, financing, service delivery, health workforce, health information system, and access to medical products, vaccines, and technologies (13). Inductive thematic analysis was used for data coding and identify the sub-themes. Each of the selected studies was read meticulously. Two members of the team coded the data independently (M.K, MH.M). Based on the conceptual similarity, codes were divided into different sub-themes. Any disagreements were discussed and resolved by consensus. Two researchers reviewed and confirmed the analysis results to evaluate the coordination between the themes and subthemes.

Results

As shown in Fig. 1, 1148 articles were retrieved from the search strategy. After removing duplicates, 637 irrelevant articles were excluded and titles and abstracts of 511 articles were screened.

After initial screening 427 articles were excluded. By assessing the full text of the remaining 84 articles, 25 studies met the inclusion criteria. After quality assessment of included studies, 4 studies were excluded. Finally, 21 studies were included in the final review.
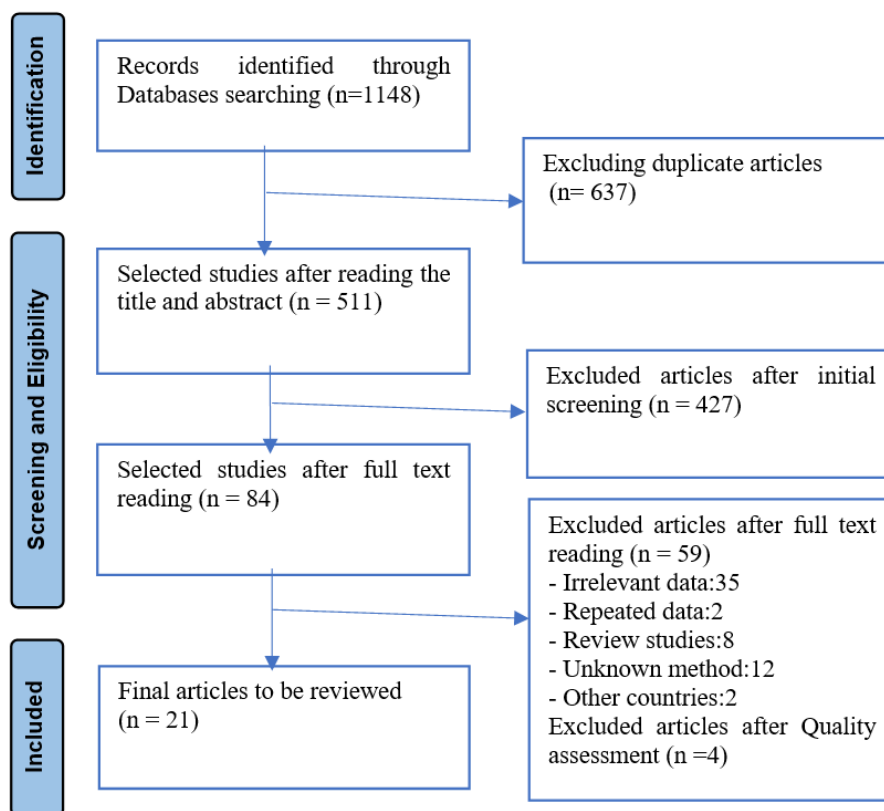
Records identified through Databases searching (n=1148)

Excluding duplicate articles (n= 637)

Selected studies after reading the title and abstract (n = 511)

Excluded articles after initial screening (n = 427)

Selected studies after full text reading (n = 84)

Excluded articles after full text reading (n = 59)
- Irrelevant data:35
- Repeated data:2
- Review studies:8
- Unknown method:12
- Other countries:2
Excluded articles after Quality assessment (n =4)

Final articles to be reviewed (n = 21)

Identification

Screening and Eligibility

Included

Fig. 1: PRISMA flow diagram for the search strategy

Study characteristics
The study characteristics of the included studies are summarized in Table 1. These studies were published between 2010 and 2022. Of the included studies, ten were in English (14-23) and eleven were in Persian (24-34). Amongst them, three studies were qualitative (14, 22, 23), and eighteen studies were quantitative (15-21, 24-34). All the quantitative studies were cross-sectional. Most of the included studies examined the feasibility of telemedicine establishment and/or barriers to establishing telemedicine in Iran. None of the studies achieved a full quality assessment score. Mousavi et al study (14) gained the highest quality assessment score in qualitative studies and

Salehahmadi et al study (28) gained the highest one in cross-sectional studies. The quality assessment score of the included studies is reported in Table 1.

Barriers to telemedicine establishment in Iran
Despite the advantages of telemedicine, the implementation of this technology is associated with barriers. Hence, recognizing and eliminating these barriers can play a vital role in the effective implementation of this technology.
Our study categorized the extracted data based on WHO building blocks framework. Thematic synthesis identified four barriers to telemedicine establishment in Iran: governance/leadership,

financing, health workforce and health information system (Tables 2-5). No findings drew from building blocks of service delivery and access to medical products, vaccines, and technologies.

Table 1: Characteristics of the included studies

First Author (yr)	Language	Study design	Participnts and setting	Quality assessment score (percent)
Mousavi et al. (14) (2021)	English	Qualitative	National key informants of Iran	8 of 10 (80)
Ameri et al. (15) (2020)	English	Cross - sectional	Pharmacists working in Kerman	6 of 8 (75)
Sheikhtaheri et al. (16) (2018)	English	Cross - sectional	Zabol tuberculosis center and health centers staff	6 of 8 (75)
Azizi et al. (17) (2017)	English	Cross - sectional	Decision-makers and managers of Ahvaz university of medical sciences	7 of 8 (87.5)
Eghbali et al. (18) (2017)	English	Cross - sectional	Hospital managers and IT staff of educational hospitals in Yazd	6 of 8 (75)
Sheikhtaheri et al. (19) (2016)	English	Cross - sectional	Clinical Staff of Mashhad teaching hospitals	6 of 8 (75)
Keshvari et al. (20) (2015)	English	Cross - sectional	Managers and experts at the health department at Isfahan University of Medical Sciences	7 of 8 (75)
Salehahmadi et al. (21) (2013)	English	Cross - sectional	Medical specialist from hospitals of Tehran medical sciences university	6 of 8 (87.5)
Sharifi et al. (22) (2013)	English	Qualitative	Physicians, medical managers, HIT, staff and healthcare system designers in Isfahan	7 of 10 (70)
Bastani et al. (23) (2012)	English	Qualitative	Hospital managers and staff field middle managers working in medical science universities in south of Iran	7 of 10 (70)
Rezaei et al. (24) (2018)	Persian	Cross - sectional	Specialist of Tabriz teaching hospitals	6 of 8 (75)
Davari et al. (25) (2018)	Persian	Cross - sectional	Managers and specialists of Al-Zahra hospital, Isfahan	6 of 8 (75)
Nobakht et al. (26) (2018)	Persian	Cross - sectional	Physicians and managers of selected hospitals in Iran	6 of 8 (75)
Doshmangir et al. (27) (2015)	Persian	Cross - sectional	National key informants in health technologies	6 of 8 (80)
Mehraeen et al. (28) (2016)	Persian	Cross - sectional	Managers, specialists, and IT staff of hospitals affiliated with Zabol University of Medical Sciences	6 of 8 (75)
Shafiei Nikabadi et al. (29) (2015)	Persian	Cross - sectional	General physicians of Iran	6 of 8 (75)
Keshvari et al. (30)(2014)	Persian	Cross - sectional	Managers and experts at the health department at Isfahan University of Medical Sciences	6 of 8 (75)
Esmailzadeh et al. (31) (2013)	Persian	Cross - sectional	Policymakers, planners, managers, and researchers of the Iran health system who were experts in the field of telemedicine	6 of 8 (75)
Nasiripour et al. (32) (2012)	Persian	Cross - sectional	Professors, experts, and relevant authorities in eHealth of Iran	6 of 8 (75)
Hosseini et al. (33) (2012)	Persian	Cross - sectional	Provider of Hospitals affiliated with the Tehran University of medical sciences	6 of 8 (75)
Haghighi et al. (34) (2010)	Persian	Cross - sectional	Chancellor, information technology manager, and medical specialists of Hormozgan university of medical sciences	6 of 8 (75)

Theme 1: Governance/Leadership

Barriers related to Governance/Leadership theme were categorized into four sub-themes: policy and planning, monitoring and standardization, inter and intra-sectoral collaboration, and community engagement (Table 2).

Table 2: The results related to the building block of governance/leadership

Theme	Sub-themes	Barriers (Code in texts)
Governance/ Leadership	Policy and planning	• Weakness in macro policy making related to telemedicine (31) • Lack of mandatory national programs related to eHealth (14) • Lack of comprehensive and broad picture of eHealth components (14) • Lack of strategic and long-term planning for eHealth (14, 17) • Lack of government support for using this technology (24) • Improper identification and lack of involvement of the main stakeholders in e-health policy formulation (14) • Rapid changes in managers at different levels of the Ministry of Health (20, 30, 32)
	Monitoring and Standardization	• Lack of comprehensive rules, guidelines, and technical and clinical frameworks for using technology (29, 32, 33) • Lack of regular legal and ethical frameworks and guidelines to protect patients' privacy (21, 23, 33)
	Inter and intra-sectoral co-ordination	• Poor inter-sectoral coordination in the Ministry of Health (15, 27, 32) • Weakness in coordination between the sectors involved in the field of telemedicine (27, 31)
	Community engagement	• Society's resistance to adoption and lack of support for this technology (14,15 ,24, 26, 29)

Theme 2: Financing

Barriers related to Financing theme were categorized into three sub-themes: collection and accumulation of resources, resources allocation, infrastructure and facilities (Table 3).

Table 3: The results related to the building block of financing

Theme	Sub-themes	Barriers (Code in texts)
Financing	Collection and accumulation of resources	• Lack of insurance coverage for telemedicine services and reimbursement system (15, 17, 18, 25, 26, 28,29,34)
	Resources allocation	• The high-cost establishment of this technology (17, 23, 24,29) • Problems related to the provision, allocation, and continuity of the necessary financial resources (16, 17, 20,23, 25, 30, 34)
	Infrastructure and facilities	• Weaknesses in the country's information technology infrastructure (15,16) • lack of internet bandwidth (15,18,24,29, 32, 34) • Lack of proper telecommunication coverage in some parts of the country (29,32) • Lack of equipment and facilities (i.e. computer and software) (23, 24,29,33)

Theme 3: Health workforce
Barriers related to Health workforce theme were categorized into three sub-themes: resistance to change, human resources shortage, training and skills (Table 4).

Table 4: The results related to the building block of the health workforce

Theme	Sub-themes	Barriers (Code in texts)
Health work-force	Resistance to change	• The resistance of health providers to the adoption of new methods of services delivery (16,17,21, 24,25, 27,29,34)
	human resources shortage	• Lack of technical staff to establish this technology (16,18,25,26, 28,30,34) • Lack of medical staff to establish this technology (18,25,26,28,30,34) • Lack of training staff to establish this technology (34)
	Training and skills	• Inadequate knowledge, familiarity, and awareness of telemedicine programs managers (33) • Inadequate knowledge, familiarity, and awareness of the providers of the aspects of telemedicine (16,19,23,24,25,29, 30) • Lack of human resources training on telemedicine (26,27,28,32)

Theme 4: Health information system

Barriers related to this theme were categorized into three sub-themes: information confidentiality, information exchange, and information infrastructures (Table 5).

Table 5: The results related to the building block of health information system

Theme	Sub-themes	Barriers (Code in texts)
Health information system	Information confidentiality	• Weakness in ensuring the security and confidentiality of patient's medical information and respecting users' privacy (22,29,34)
	Information exchange	• The unpreparedness of the health information system to exchange information between health centers with each other (21,22) • Absence of an integrated health information system between different stakeholder organizations (22,31)
	Information infrastructures	• Weakness in health information infrastructures (22,32) • Weakness in the implementation of eHealth records of patients (14)

Discussion

The main goal of telemedicine services is to ensure that all patients have access to health care by overcoming geographical barriers. Therefore, establishing telemedicine can be useful for a country like Iran that facing many problems with universal health coverage, such as a large elderly

population, geographical dispersion, and lack of physicians. Our study identifies the barriers to the establishment of telemedicine in Iran based on the WHO's building blocks framework. The barriers categorized into four themes: governance, financing, health workforce, and health information system.

In this study, governance/leadership barriers were related to policy and planning, monitoring and standardization, inter and intra-sectoral collaboration, and community engagement. These findings aligned with previous studies in developing and the Eastern Mediterranean countries (9, 35-37). Insufficient knowledge of the policymakers on the value and role, and various applications of eHealth (35-37) and also not involving of key stakeholders in policy making (9) are important weakness in policy making and planning in telemedicine (35-37). Government should formulate evidence-based policies, regulations and clinical guidelines for telemedicine (35, 38). Involving key stakeholders in policy making and defining of their missions can be proper solutions (9). policy makers can create a partnership among government agencies, academics, patient advocacy groups, and private-sector organizations to rapidly test, evaluate, deploy, and pay for new care models that use telemedicine (39). Reasons such as attitudinal and cultural limitations and community's lack of awareness of the benefits of telemedicine can lead to the lack of community's adoption to this technology (9, 35, 37). Increasing patient awareness through marketing (40) and patient education campaigns funded and initiated by various professional associations would offer the information necessary to move public adoption in a manner that will lead to more widespread acceptance and adoption (41).

We also found that financing barriers were related to the collection and accumulation of resources, resources allocation and infrastructure. These findings aligned with previous studies in developing and the Eastern Mediterranean countries (5, 9, 35, 37-42). Insufficient knowledge of the policymakers on the role of the telemedicine in reducing inequalities is one of the reasons that can lead to lack of insufficient resources alloca-

tion in telemedicine (35-37). Moreover, difficulty of evaluating the cost-effectiveness of telemedicine services is fundamental challenge in investment in developing countries (9). Investment in foundational layers (e.g., broadband connection) should be prioritized. In addition, to develop the budget for telemedicine services, implementation costs should be reviewed across the different phases of implementation- development and set-up, deployment, integration and interoperability, scale-up, and sustained operations (43). Public insurance funds cause accumulation of resources, the reluctance of insurance organizations to accept risk and investment in telemedicine (34), as well as poor regulatory frameworks in relation to the reimbursement of these services are important barriers in this field (34, 35, 37). Although, for successful long-term implementation of telemedicine in sustainable reimbursement from public and private payers, evidence must be compiled to assure that new models do not sacrifice quality or cause harm to patients (44). Moreover, for the telemedicine service to be institutionalized, there will need to be further exploration into how such services are incorporated into the benefit packages covered by different health financing schemes (43).

In current study, barriers related to the health system workforce include; resistance to change, skilled workforce shortage, and problems in training of providers. Adaptation in the traditional services and the attitudinal and cultural constraints of the providers will lead to their resistance to adoption of this new technology (9, 35-37, 45). Furthermore, inadequate knowledge of providers on the efficiency and effectiveness of telemedicine, and unawareness of them in their legal and ethical responsibilities are other reasons leading to resistance to adoption (35, 37, 42). The process of introducing the telemedicine intervention and change management should begin early in the implementation planning process (43). Moreover, education may be required to mitigate negative perceptions of telemedicine that hinder user acceptance and participation. Financial support for professional time for tele-

medicine has been a key driver of professional participation (46). Concerning training and skills, the identified barriers to telemedicine were unawareness of health managers in requirements of electronic health services (9) and the lack of in-service training in the field of health informatics for health care providers (36,37). The education of future clinicians should include a curriculum encompassing the essential competencies in telemedicine care (46). Investment in foundational layers (e.g., care workflow adaptation, workforce training) should be prioritized to pave the way for the implementation of telemedicine to grow into a comprehensive service suite (47).

In our study, health information system barriers were related to information confidentiality, information exchange issues and information infrastructures. Patients' feeling of insecurity in accessibility of unauthorized persons in their health information can lead to patients' resistance to the adoption of telemedicine (35, 48). Additionally, reasons for providers' resistance to adopting telemedicine could be the lack of legal frameworks to protect practitioners in E-prescriptions, patients' informed consent issues, and providers' unawareness in their legal and ethical liabilities (35, 37). Set up a legislative framework dealing with data privacy and confidentiality and develop legislation and policies to protect privacy to strengthen information security at different levels can be considered by policymakers (49). Moreover, data collected by telemedicine applications should be secure, private and confidential, in line with data protection and privacy laws, regulations and frameworks, as well as cyber security protocols (47). The lack of an integrated patient's information system and national exchange standards agreed upon between different stakeholders are reasons for information exchange problems (22, 31). Therefore, management of health service information obtained through telemedicine should be considered for integration into routine health information systems, such as the health management information systems and electronic medical records (43). The correct implementation of the electronic health record (EHR) is one of the necessary informational infrastructures to es-

tablishing the telemedicine (50). Therefore, the lack of EHR hinders the implementation of this technology.

The findings of current study did not present any specific barriers to the building block of services delivery in telemedicine. However, in developing countries, the most important barriers of the services delivery in telemedicine includes the lack of localization of this technology (9) as well as poor interaction between the provider-patient due to languages, cultural, and dialectical diversity (38, 50). In providing telemedicine services, the needs, preferences and circumstances of disadvantaged groups, including people with low literacy or few digital literacy skills, people speaking minority languages, migrant populations, and people with disabilities should be given special attention. (43). In current study no barriers to the building block of medical product, vaccines and technologies were found. However, a lack of framework for economic analysis of benefits and outcomes of telemedicine services in developing countries (9, 37) and also difficulty in evaluating the cost-effectiveness of telemedicine were considered as the main challenges in this field (51). Greater attention to cost/effectiveness analysis in the design, implementation, and evaluation phases of telemedicine projects, along with more thorough consideration of the particular economic properties of these services (high fixed costs and low marginal costs, experiential goods, and network externalities), could significantly strengthen efforts to establishment of telemedicine (52).

Limitation

A common limitation among the selected studies was methodological inconsistency. We retrieved all the relevant studies, regardless of their research methodologies, to provide a narrative review of these barriers. The findings of this study can be used for other countries with similar conditions. However, we could not determine these factors' severity and weakness.

Conclusion

Establishment of telemedicine in Iran health system faces many barriers. In our study, the most significant barriers were related to the building block of governance/leadership. Governance is an integral part of other building blocks of the health systems. Hence, ensuring the existence of strategic policy frameworks along with some other factors such as effective supervision, coalition building, laws and regulations, and community participation can be the first solutions for establishment of telemedicine in Iran. In addition, applying the successful experiences of other countries in overcoming barriers can significantly contribute to implementing this technology.

Journalism Ethics considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

Conflict of interests

The authors declare no conflict of interests.

References

1. Lewis T, Synowiec C, Lagomarsino G, Schweitzer J (2012). E-health in low-and middle-income countries: findings from the Center for Health Market Innovations. *Bull World Health Organ*, 90:332-40.
2. Mousavi SM, Takian A, Tara M (2018). Design and validity of a questionnaire to assess national eHealth architecture (NEHA): a study protocol. *BMJ Open*, 8(12):e022885.
3. OECD Organization, European Union (2016). Health at a Glance: Europe 2016 - State of Health in the EU Cycle. 4nd ed. Paris: OECD Publishing. France.
4. Scott-Kruse C, Karem P, Shifflett K, et al (2018). Evaluating barriers to adopting telemedicine worldwide: A systematic review. *J Telemed Telecare*, 24:4–12.
5. LeRouge C, Garfield M (2013). Crossing the telemedicine chasm: Have the US barriers to widespread adoption of telemedicine been significantly reduced. *Int J Environ Res Public Health*, 10(12):6472-6484.
6. Skoczylas P (2016). Utilizing telemedical solutions in the efficient functioning of a health care system. *J Health Study Med*, 2:69–82.
7. Nittari G, Khuman R, Baldoni S, et al (2020). Telemedicine Practice: Review of the Current Ethical and Legal Challenges. *Telemed J E Health*, 26:1427–1437.
8. Keshvardoost S, Dehnavieh R, Bahaadinibeigy K (2021). The necessity of implementing telemedicine systems in the Islamic Republic of Iran. *East Mediterr Health J*, 27(2):113-115.
9. Khalifehsoltani SN, Gerami MR (2010). E-health challenges, opportunities and experiences of developing countries. 2010 International Conference on e-Education, e-Business, e-Management and e-Learning, Sanya, China, pp.264-268.
10. Moher D, Liberati A, Tetzlaff J, Altman DG, PRISMA Group (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *Ann Intern Med*, 151(4):264-269.
11. Yazdi-Feyzabadi V, Mehrolhassani MH, Zolala F, Haghdoost A, Oroomiei N (2019). Determinants of risky sexual practice, drug abuse and alcohol consumption in adolescents in Iran: a systematic literature review. *Reprod Health*, 16(1):115.
12. Terry G, Hayfield N, Clarke V, Braun V (2017). Thematic analysis. In: The SAGE handbook of qualitative research in psychology. SAGE

Publications Ltd, 1st, New York, USA, pp.17-37.

13. World Health Organization (2010). Monitoring the building blocks of health systems: a handbook of indicators and their measurement strategies. 2nd ed. Geneva: WHO Press. Switzerland.

14. Mousavi SM, Takian A, Tara M (2021). Sixteen years of eHealth experiences in Iran: a qualitative content analysis of national policies. *Health Res Policy Syst*, 19(1):146.

15. Ameri A, Salmanizadeh F, Keshvardoost S, Bahaadinbeigy K (2020). Investigating pharmacists' views on telepharmacy: prioritizing key relationships, barriers, and benefits. *J Pharm Technol*, 36(5):171-8.

16. Sheikhtaheri A, Saravani-Aval S, Farzi J, Bagheri S (2018). A feasibility study on the implementation of teleconsultation in tuberculosis patients in Zabol City of Iran. *Stud Health Technol Inform*, 247:501-505.

17. Azizi A, Sharifat Z (2017). Barriers to Telemedicine: Perspectives of the Administrators. *Iran J Med Inform*, 6(1):23-27.

18. Eghbali Zarch ME, Montazeralfaraj R, Shamsi F, et al (2017). Feasibility of Telemedicine Deployment in Major Public Hospitals: A case study in Yazd. *Evidence Based Health Policy, Management & Economics*, 1(2):94-102.

19. Sheikhtaheri A, Sarbaz M, Kimiafar K, Ghayour M, Rahmani S (2016). Awareness, Attitude and Readiness of in Mashhad, Iran. *Stud Health Technol Inform*, 228:142–146.

20. Keshvari H, Haddadpoor A, Taheri B, Aghdak P, Nasri M (2015). Feasibility of Implementing Telemedicine According To the Elements of Strategic Planning In Isfahan University of Medical Sciences. *Health Inf Manage*, 12(5):625-635.

21. Salehahmadi Z, Hajialiasghari F (2013). Telemedicine in Iran: Chances and Challenges. *World J Plast Surg*, 2(1):18-25.

22. Sharifi M, Ayat M, Jahanbakhsh M, et al (2013). E-health implementation challenges in Iranian medical centers: a qualitative study in Iran. *Telemed J E Health*, 19(2):122-128.

23. Bastani P, Abolhasani N, Shaarbafchizadeh N (2014). Electronic Health in Perspective of Healthcare Managers: A Qualitative Study in South of Iran. Iran. *J Public Health*, 43(6):809-820.

24. Rezaei P, Maserrat E, Torab-Miandoab A (2018). Specialist Physicians' Perspectives about Telemedicine and Barriers to Using it in Tabriz Teaching Hospitals. *Iran South Med J*, 20(6):562-572.

25. Davari F (2018). Feasibility of Deploying Telemedicine System in Fatemeh Zahra Hospital of Isfahan. *World Journal of Extensive Management*, 4(1): 24-34.

26. Nobakht S, Bagheri S, Mehraeen E, Shamsabadi AR (2018). The feasibility of telemedicine technology implementation in the selected hospitals of Iran. *J Payavard Salamat*, 12(1):25-33.

27. Doshmangir L, Esmaeil Zadeh H, Arab Zozani M (2015). Assessing the Strategic Position of Telemedicine Technology in Iran. *J Manage Med Inform Sci*, 2(2): 144-151.

28. Mehraeen E, Bagheri S, Karimi M (2016). Review of necessary infrastructures to telemedicine implementation in hospitals affiliated with Zabol University of Medical Sciences. *J Paramed Sci Rehabil*, 5(3):74-82.

29. Shafiei Nikabadi M, Safavi Jahromi G (2015). Identifying and Analyzing the Barriers of Telemedicine Implementation in Iran. *Health Inf Manage*, 12(3):298-305.

30. Keshvari H, Haddadpoor A, Taheri B, Nasri M, Aghdak P (2014). Survey determinant factors of telemedicine strategic planning from the managers and experts perspective in the health department, isfahan university of medical sciences. *Acta Inform Med*, 22(5):320-324.

31. Esmailzadeh H, Doshmangir L, Tafazoli M (2013). Key factors influencing the use of telemedicine technology in Iran: Experts View Points. *Teb o Tazkie*, 22(3):51-58.

32. Nasiripour AA, Rahmani H, Radfar R, Najafbeigi R (2012). Effective elements on e-health deployment in Iran. *Afr J Bus Manag*, 6(16):5543-5550.

33. Hosseini A, Moghaddasi H, Asadi F, Karimi M (2012). Feasibility Study of Implementing Telesurgery in Hospitals Affiliated to Tehran Universities of Medical Sciences, Iran. *Health Information Management*, 9(1):64-74.

34. Haghighi M, Alipour J, Mastaneh Z, Mouseli L (2010). Feasibility study of telemedicine implementation in Hormozgan university of medical sciences. *Hormozgan Medical Journal*, 2:128-37.

749

35. Bali S (2018). Barriers to Development of Telemedicine in Developing Countries. In: Telehealth. Ed,TF Heston. IntechOpen Publishing, 1ˢᵗ, London, United Kingdom.

36. Al Shorbaji N (2008). E-health in the Eastern Mediterranean Region: a decade of challenges and achievements. *East Mediterr Health J*, 14 Suppl:S157-73.

37. Al-Samarraie H, Ghazal S, Alzahrani AI, Moody L (2020). Telemedicine in Middle Eastern countries: Progress, barriers, and policy recommendations. *Int J Med Inform*, 141:104232.

38. Daniel H, Sulmasy L, Health and Public Policy Committee of the American College of Physicians (2015). Policy recommendations to guide the use of telemedicine in primary care settings: an American College of Physicians position paper. *Ann Intern Med*, 163(10): 787-789.

39. Kvedar J, Coye M, Everett W (2014). Connected health: a review of technologies and strategies to improve patient care with telemedicine and telehealth. *Health Aff (Millwood)*, 33(2):194-199.

40. Huang I, Delay R, Boulware A, et al (2022). Telehealth for contraceptive care: Lessons from staff and clinicians for improving implementation and sustainability in Illinois. *Contraception X*, 4: 100083.

41. Lesher A, Fakhry S, DuBose-Morris R, et al (2020). Development and evolution of a statewide outpatient consultation service: leveraging telemedicine to improve access to specialty care. *Popul Health Manag*, 23(1):20-28.

42. Hassibian MR, Hassibian S (2016). Telemedicine acceptance and implementation in developing countries: benefits, categories, and barriers. *Razavi Int J Med*, 4(3):e38332.

43. World Health Organization (2022). Consolidated telemedicine implementation guide. Geneva:World Health Organization.

44. Kircher S, Mulcahy M, Kalyan A, et al (2020). Telemedicine in oncology and reimbursement policy during COVID-19 and beyond. *J Natl Compr Canc Netw*, 1-7.

45. Saghaeiannejad-Isfahany S, Jahanbakhsh M, Shayan A (2015). Telemedicine operational feasibility in selected hospitals of Isfahan University of Medical Sciences in 1393. *Int J Health Syst Disaster Manag*, 3(4):189-194.

46. World Health Organization (2010). Telemedicine: opportunities and developments in member states. Report on the second global survey on eHealth. Geneva: World Health Organization.

47. World Health Organization (2020). Implementing telemedicine services during COVID-19: guiding principles and considerations for a stepwise approach. Geneva: WHO Regional Office for the Western Pacific.

48. Saeedi Tehrani S, Noroozi M (2015). Telemedicine: benefits, disadvantages and ethical challenges. *Journal of Medical Ethics and History of Medicine*, 8(2):29-40.

49. World Health Organization (2019). Regional action agenda on harnessing e-health for improved health service delivery in the Western Pacific. Geneva: World Health Organization.

50. Mirani N, Ayatollahi H, Haghani H (2013). A Survey on Barriers to the Development and Adoption of Electronic Health Records in Iran. *Journal of Health Administration*, 15(50): 65-75.

51. Mafi-Moradi S, Doshmangir L, Kabiri N (2019). Challenges and Opportunities of Telemedicine: A Narrative Review Study. *Health Inf Manage*, 15(6):294-299.

52. Pan American Health Organization (2016). eHealth in the Region of the Americas: breaking down the barriers to implementation. Washington (D.C): Pan American Health Organization.