



E-HEALTH

Challenges of using artificial intelligence in Iran's health system: a qualitative study

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Keywords

Artificial Intelligence • Healthcare • Iran • Health Policy • Ethical Issues • Qualitative Study

Summary

Background. Artificial intelligence (AI) is transforming health-care globally, enhancing diagnostics, treatment, and efficiency. However, low- and middle-income countries (LMICs) like Iran face significant barriers to AI integration. Iran's health system, challenged by an aging population, increasing non-communicable diseases, and limited resources, could benefit from AI-driven, patient-centered care. Yet, its adoption remains limited. Understanding the barriers to AI implementation is critical for informed policymaking.

Methods. This qualitative study involved semi-structured interviews with 15 stakeholders from healthcare management, policymaking, and AI sectors in Iran, conducted between January and April 2025. Participants were selected purposively to represent government, academia, healthcare, and technology. Data were analyzed thematically using Braun and Clarke's framework. Rigor was ensured through member checking, tri-

angulation, and adherence to qualitative research standards.

Results. Five major barriers to AI adoption emerged: (1) organizational and structural limitations, including poor infrastructure and fragmented governance; (2) legal and policy challenges, marked by regulatory gaps and ethical concerns; (3) data-related issues such as low data quality, lack of standardization, and security risks; (4) shortage of skilled professionals and limited training opportunities; and (5) challenges in integrating AI into policymaking, including concerns about losing human oversight in decision-making.

Conclusion. AI implementation in Iran's health system faces complex and interrelated challenges. Addressing these requires a coordinated strategy focused on legal reform, infrastructure investment, capacity building, and cultural adaptation. Balancing technological innovation with ethical and human-centered care is essential for successful and sustainable integration.

INTRODUCTION

Artificial intelligence (AI) has emerged as a transformative force in healthcare, revolutionizing diagnostic accuracy, treatment planning, and operational efficiency [1]. AI-driven technologies, such as machine learning algorithms and natural language processing, are increasingly being integrated into health systems worldwide. These advancements have demonstrated significant potential in improving patient outcomes, optimizing resource allocation, and reducing medical errors [2]. However, while AI adoption in healthcare is progressing rapidly in high-income countries, its implementation in low- and middle-income countries (LMICs), including Iran, faces substantial challenges [3]. Iran's health system is a mixed public-private model, with the Ministry of Health and Medical Education (MoHME) serving as the central authority responsible for policymaking, regulation, financing, and service delivery [4, 5]. The system is characterized by a strong public sector presence, especially in primary and secondary care, alongside a growing role for private healthcare providers. Healthcare services are delivered

through a tiered structure, including health houses, rural and urban health centers, and hospitals [5-7]. The Iranian health system is under increasing pressure due to a growing elderly population, the rising burden of non-communicable diseases, and the need for more efficient healthcare delivery [4]. Traditional healthcare models often struggle to meet these demands, resulting in inefficiencies in resource allocation, workforce shortages, and delays in patient care [5]. AI offers a promising solution to these challenges by enhancing diagnostic accuracy, optimizing treatment plans, and improving hospital management systems. By adopting AI-powered tools, Iran's healthcare system can transition toward more data-driven and patient-centered care, ultimately improving health outcomes and operational efficiency [6].

Despite its potential, the adoption of AI in Iran's healthcare system remains in its nascent stages. While some healthcare institutions have begun exploring digital health solutions, broader integration of AI-based technologies in clinical practice, medical research, and health administration is still lacking [7]. AI can

support healthcare professionals in decision-making, facilitate early disease detection, and streamline hospital workflows. Furthermore, AI-driven predictive analytics can assist policymakers in allocating resources more effectively, ensuring equitable healthcare access for all citizens [8]. As Iran's health system evolves, understanding the feasibility and implications of AI adoption is critical for maximizing its benefits and ensuring sustainable implementation [9, 10].

Despite the growing global interest in AI applications in healthcare, limited research has examined the contextual and systemic challenges of AI adoption in LMICs, particularly in Iran. Most existing studies focus on high-income settings, where infrastructure, policy frameworks, and resources differ significantly. This study addresses this gap by exploring the specific barriers to AI implementation from the perspective of diverse stakeholders within Iran's health system. By doing so, it contributes context-specific evidence to inform national strategies and guide responsible AI integration in similar LMIC contexts.

Methods

STUDY DESIGN

This study utilized a qualitative descriptive research design, conducting in-depth semi-structured interviews to investigate the challenges associated with implementing AI in Iran's health system. Thematic analysis was employed to systematically analyze the data and identify key themes. The research followed the Consolidated Criteria for Reporting Qualitative Research (COREQ) checklist to improve methodological transparency and rigor (Tab. S1) [11]. This design was chosen to offer a thorough understanding of participants' perspectives and to reveal underlying themes pertinent to the adoption of AI in healthcare.

PARTICIPANT SELECTION

Purposive sampling was employed to recruit participants with expertise in healthcare management, policy-making, and AI applications in Iran. The inclusion criteria were: (a) professionals with a minimum of five years of experience in health policy, management, or clinical practice; (b) direct involvement in decision-making related to digital health or AI; and (c) representation from various sectors, including government agencies, academic institutions, healthcare providers, and technology developers. A total of 15 individuals were interviewed. Invitations were sent through email and phone, outlining the study's objectives and the participation process. Some individuals declined due to time limitations, unfamiliarity with AI, or concerns regarding the sensitivity of the topic. Despite these challenges, the final sample comprised professionals from diverse backgrounds, ensuring a thorough exploration of AI-related issues within Iran's health system.

INTERVIEWER CHARACTERISTICS AND RELATIONSHIP WITH PARTICIPANTS

The interviews were carried out by two authors, each with a doctoral degree in health policy and significant experience in qualitative research. This expertise allowed for a structured and knowledgeable approach to data collection, helping to reduce bias. There were no pre-existing relationships between the interviewers and the participants before the study. Participants were made aware of the study's purpose and the interviewers' professional backgrounds to build rapport and promote open communication.

SETTING

Data collection took place in various settings, including participants' workplaces, academic institutions, and healthcare facilities. To accommodate participants' schedules and geographical constraints, interviews were conducted both in person and via video calls.

DATA COLLECTION

A semi-structured interview guide (Tab. S2) was created following an extensive literature review and consultations with experts. The guide was pilot-tested with three professionals to confirm its clarity and relevance. Each interview lasted between 45 and 60 minutes and was audio-recorded with the participants' consent. Field notes were also taken to document non-verbal cues and contextual details. Data collection persisted until thematic saturation was reached, ensuring that no new significant information was identified.

STUDY DURATION

Interviews were conducted between January 2025 and April 2025. The entire process, including participant recruitment, data collection, and analysis, was completed within this timeframe.

DATA ANALYSIS

Thematic analysis was carried out using Braun and Clarke's six-step framework: (a) becoming familiar with the data through multiple readings, (b) systematically generating initial codes, (c) identifying possible themes, (d) refining and reviewing those themes, (e) defining and naming the final themes, and (f) integrating the themes into a cohesive report. Two authors performed coding iteratively, addressing any discrepancies through discussions with a third researcher. Feedback from participants was included to validate the findings. MAXQDA Version 10 software was utilized to aid in the systematic organization and interpretation of the qualitative data.

TRUSTWORTHINESS AND RIGOR

To establish credibility and dependability, the research utilized various methods: (a) member-checking, which involved sharing initial results with participants for their confirmation; (b) extended involvement of researchers in the subject matter to facilitate thorough analysis; (c)

Tab. I. Characteristics of study participants.

ID	Sex	Age	Work Experience	Specialty	Type of Activity	Interview Format
1	Male	45	17	Policy maker	Public / Government	Virtual
2	Female	39	14	Researcher	Public / Government	Virtual
3	Male	42	16	Physician	Private	In-person
4	Female	40	15	Insurance manager	Public / Government	Virtual
5	Male	41	15	Associate Professor of Health Economics	Public / Government	Virtual
6	Male	46	20	Insurance manager	Private	Virtual
7	Male	39	13	Pharmacist	Public / Government	In-person
8	Female	42	17	Researcher	Public / Government	In-person
9	Male	55	24	Associate Professor of Health Policy	Public / Government	In-person
10	Male	60	27	Medical specialist	Public / Government	In-person
11	Female	32	11	Hospital manager	Public / Government	Virtual
12	Male	40	16	Physician	Public / Government	Virtual
13	Male	37	12	Professor of Public Health	Public / Government	In-person
14	Male	41	16	Researcher	Public / Government	Virtual
15	Female	36	10	Pharmacist	Private	Virtual

triangulation of data sources and researchers to reduce bias; (d) incorporation of direct quotes from participants to boost authenticity; and (e) choosing participants from a range of professional backgrounds to enhance the applicability of the findings.

ETHICAL CONSIDERATIONS

The study was approved by the Ethics Committee of Lorestan University of Medical Sciences (IR.LUMS.REC.1404.112). Informed consent was obtained from all participants before the interviews, ensuring voluntary participation and confidentiality. Data were anonymized to protect participant identities, and all ethical guidelines for conducting qualitative research were strictly followed.

Results

The study included 15 participants, comprising 10 males and 5 females, with a mean age of 46.29 ± 5.71 years and an average work experience of 14.16 ± 7.38 years. Of the total interviews, 11 were conducted virtually, while 4 took place in person. Table I presents a summary of participant characteristics, including their roles, years of experience, and sectors.

This qualitative study explored the challenges associated with integrating AI into health policymaking in Iran through in-depth interviews. The analysis revealed five overarching themes: organizational and structural barriers, legal and policy constraints, data and information-related issues, skill and human resource challenges, and challenges associated with integrating AI into policymaking. Figure 1 presents the identified themes and subthemes. Each theme encompasses distinct sub-themes that encapsulate participants' perspectives on the specific impediments encountered in this context.

THEME 1: ORGANIZATIONAL AND STRUCTURAL BARRIERS

Participants consistently identified organizational and structural impediments as critical obstacles to the effective adoption of AI in health policymaking. This theme is subdivided into three key areas: lack of technical infrastructure, absence of coherent planning and management, and resistance to change.

Interviewees frequently cited inadequate technical resources as a fundamental barrier to AI implementation. They emphasized the scarcity of modern hardware, software, and reliable internet connectivity.

Some participants pointed out that:

“Our current equipment is outdated, and we lack consistent access to the tools required for AI deployment. Even basic connectivity issues undermine our efforts. For AI to be viable in this sector, substantial investments in foundational infrastructure are essential to support its functionality.” (Participants 2, 8, 9)

Participants underscored the lack of a unified strategy and poor inter-organizational coordination as significant hurdles.

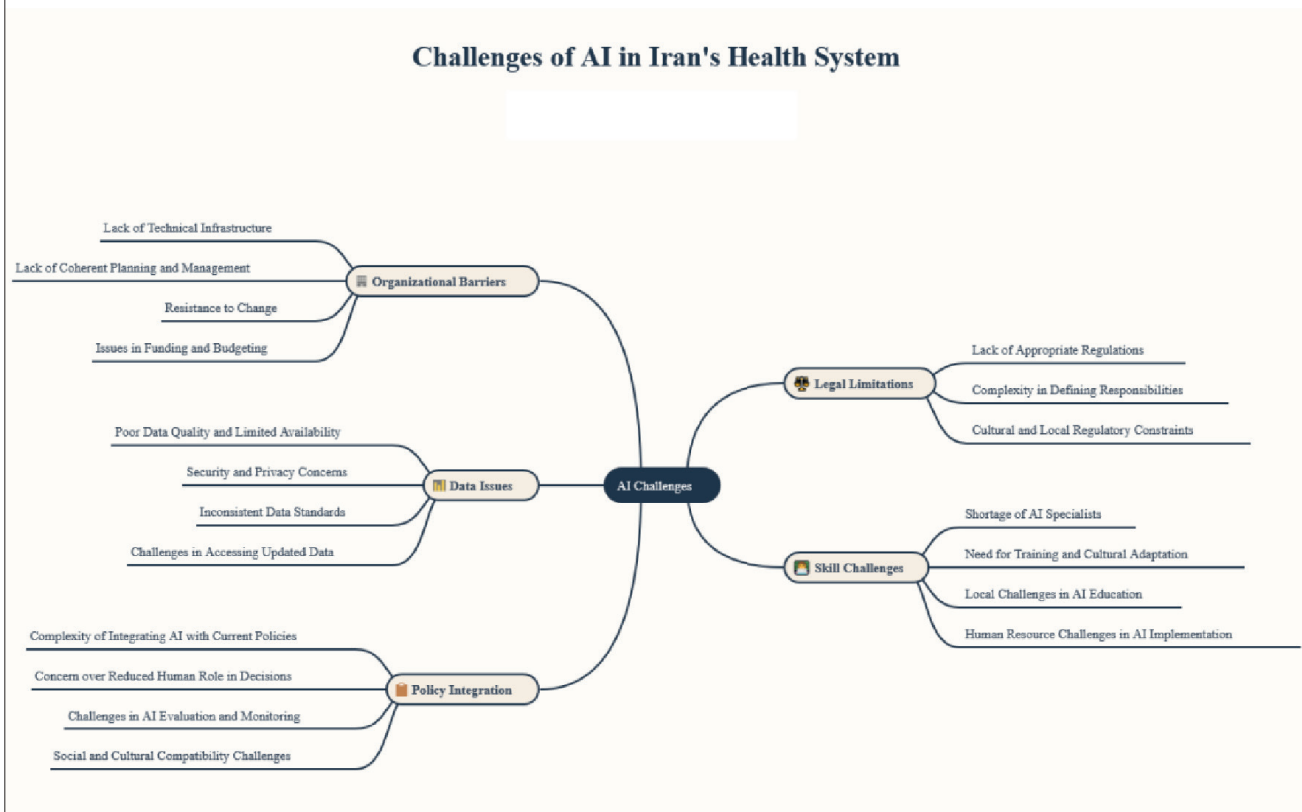
It was emphasized that:

“There’s no overarching plan for AI integration in our health system. Organizations work in isolation, leading to inefficiencies and redundancy. We need a centralized framework that defines AI’s role and ensures alignment across the sector to maximize its potential.” (Participants 3, 5, 13).

Many participants noted a pervasive reluctance to embrace technological innovation at both individual and institutional levels.

A concern raised was that:

“A cultural aversion to change is evident, particularly among administrators who fear job displacement or misunderstand AI’s purpose. This resistance stifles progress, as it hinders project initiation and staff engagement.” (Participants 1, 6, 11).

Fig. 1. Key themes and subthemes identified in the study.

THEME 2: LEGAL AND POLICY CONSTRAINTS

The absence of a supportive legal and policy framework emerged as a substantial barrier to AI adoption. This theme is characterized by two sub-themes: lack of appropriate regulations and complexity in assigning responsibilities.

Participants highlighted the absence of clear guidelines and regulatory support as a deterrent to AI use.

It was pointed out that:

“Without policies that promote and safeguard AI applications, health officials hesitate to proceed. Ethical and legal uncertainties further complicate adoption. Comprehensive legislation is needed to define permissible boundaries and foster confidence in AI initiatives.” (Participants 4, 7, 12)

Uncertainty surrounding accountability for AI-driven outcomes was a recurring concern.

A suggestion made was that:

“Determining liability when AI influences decisions is challenging. Leaders are wary of potential legal or ethical fallout, especially without clear directives. This ambiguity positions AI as a risk rather than a resource, slowing its uptake.” (Participants 2, 9, 14).

Challenges related to data availability, quality, and security were identified as pivotal constraints, encompassing two sub-themes: low-quality data and data limitations and security and privacy concerns.

Participants emphasized that fragmented and unreliable datasets impede AI’s effectiveness.

It was argued that:

“Our data is inconsistent and poorly organized, drawn from disparate sources without standardization. This lack of robust, unified data restricts AI’s ability to deliver meaningful insights for health policy.” (Participants 5, 8, 10).

Concerns about safeguarding sensitive health information were widely expressed.

A key point raised was that:

“The risk of data breaches or misuse looms large, given the sensitivity of health records. Stronger security measures and public assurances are prerequisites for building trust in AI applications within healthcare.” (Participants 1, 4, 9).

THEME 4: SKILL AND HUMAN RESOURCE CHALLENGES

The limited availability of qualified personnel and the need for enhanced training were prominent issues, divided into shortage of skilled AI professionals and need for training and cultural awareness.

Participants pointed to a dearth of experts proficient in both AI and healthcare.

It was mentioned that:

“We lack individuals with the dual expertise needed to bridge technology and health systems. Specialized training programs are scarce, forcing us to temper our expectations for AI implementation.” (Participants 6, 12, 13).

The necessity for education to bridge knowledge gaps and promote AI acceptance was evident.

Another point highlighted was that:

“Digital literacy among health administrators is limited, fueling skepticism about AI. Targeted training initiatives are critical to demystify the technology and position it as an asset rather than a threat.” (Participants 7, 10, 15).

THEME 5: CHALLENGES RELATED TO INTEGRATING AI INTO POLICYMAKING

Participants identified difficulties in embedding AI within existing policymaking structures, reflected in two sub-themes: complexity of integrating AI with existing policies and concerns over reducing human judgment in decision-making.

Adapting AI to align with established health policy frameworks proved challenging.

It was noted that:

“Our traditional policymaking processes aren’t designed for AI integration, requiring significant restructuring. This overhaul demands time and readiness that many stakeholders lack.” (Participants 3, 5, 8).

Ethical apprehensions about diminishing human oversight were frequently raised.

A major concern was that:

“While AI offers efficiency, it lacks the nuanced understanding of human needs. Striking a balance between technological precision and compassionate decision-making remains a key struggle.” (Participants 2, 13, 14).

Discussion

This study explored the challenges of integrating AI into health policymaking in Iran, revealing five overarching themes: organizational and structural barriers, legal and policy constraints, data and information-related issues, skill and human resource challenges, and difficulties in integrating AI into policymaking. These findings align with and expand upon existing literature on AI adoption in healthcare, particularly in LMICs, while also highlighting unique contextual factors specific to Iran.

ORGANIZATIONAL AND STRUCTURAL BARRIERS

The lack of technical infrastructure, poor planning, and resistance to change emerged as significant barriers to AI adoption in Iran’s health system. These findings are consistent with studies from other LMICs, such as India and Nigeria, where inadequate infrastructure and fragmented governance structures have similarly hindered AI implementation [12, 13]. However, Iran’s challenges are exacerbated by economic sanctions, which restrict access to advanced technologies and funding. The resistance to change observed in this study is also reflective of broader cultural and institutional inertia, a phenomenon noted in other healthcare systems undergoing digital transformation [14]. Addressing these barriers will require substantial investments in infrastructure, coupled with efforts to foster a culture of innovation and adaptability.

LEGAL AND POLICY CONSTRAINTS

The absence of a supportive legal and policy framework was a recurring concern among participants. This finding echoes studies from countries like Brazil and South Africa, where the lack of clear regulations has slowed AI adoption in healthcare [15, 16]. In Iran, the situation is further complicated by ethical uncertainties and the complexity of assigning accountability for AI-driven decisions. These challenges underscore the need for comprehensive legislation that addresses both the technical and ethical dimensions of AI, as seen in the European Union’s AI Act, which provides a regulatory framework for AI applications in healthcare [17].

DATA AND INFORMATION-RELATED ISSUES

Participants highlighted the poor quality of data and concerns about data security as major impediments to AI integration. Similar issues have been reported in other LMICs, where fragmented health information systems and limited data standardization hinder AI’s potential [18]. In Iran, the lack of centralized data repositories and inconsistent data collection practices further exacerbate these challenges. Additionally, concerns about data privacy reflect global apprehensions about the misuse of health data, particularly in the absence of robust cybersecurity measures [19]. Addressing these issues will require investments in data infrastructure, standardized protocols, and public awareness campaigns to build trust in AI systems.

SKILL AND HUMAN RESOURCE CHALLENGES

The shortage of skilled AI professionals and the need for training were identified as critical barriers. This finding aligns with studies from countries like Kenya and Bangladesh, where a lack of interdisciplinary expertise has limited AI adoption [20, 21]. In Iran, the scarcity of professionals with dual expertise in AI and healthcare is compounded by limited access to specialized training programs. This highlights the urgent need for educational initiatives that bridge the gap between technology and healthcare, as well as efforts to promote digital literacy among healthcare administrators.

CHALLENGES IN INTEGRATING AI INTO POLICYMAKING

Participants expressed concerns about the complexity of integrating AI with existing policies and the potential reduction of human judgment in decision-making. These findings resonate with studies from high-income countries, where the ethical implications of AI-driven decision-making have sparked debates about the balance between efficiency and human compassion [22]. In Iran, the tension between technological precision and the human touch in healthcare is particularly pronounced, reflecting broader cultural values that prioritize personalized care. Addressing these concerns will require a nuanced approach that leverages AI’s strengths while preserving the human element in healthcare decision-making.

IMPLICATIONS FOR POLICY AND PRACTICE

The findings of this study highlight critical areas where strategic action is needed to facilitate the successful integration of artificial intelligence into Iran's healthcare system. Policymakers, healthcare administrators, and technology stakeholders must collaborate to address the identified barriers through targeted interventions. First, developing robust legal and regulatory frameworks is essential. This involves creating clear policies that define the scope, accountability, and ethical boundaries of AI applications in healthcare. Establishing a dedicated regulatory body to oversee AI implementation can ensure compliance with data privacy standards and ethical guidelines. Pilot testing localized ethical frameworks in select healthcare settings can help strike a balance between AI-driven efficiency and the necessity of human oversight, particularly in sensitive areas such as diagnostics and treatment planning. Second, a significant investment in digital infrastructure is required to support AI technologies. Modernizing data systems with secure cloud storage, high-speed internet, and interoperable platforms will provide the foundation for effective AI deployment. Standardizing data collection and management practices across institutions will improve data quality and usability for AI applications. Creating centralized national health data repositories can address current fragmentation and enable more comprehensive AI-driven analyses.

Building human capacity is another critical priority. Interdisciplinary training programs that combine AI, healthcare, and ethics should be introduced in academic and professional development curricula. Upskilling current healthcare professionals through workshops and certification programs can enhance AI literacy and practical application skills. Additionally, attracting global AI expertise through incentives such as grants or partnerships with international organizations can help bridge existing knowledge gaps. Fostering collaboration across sectors is equally important. Public-private partnerships can facilitate the co-development of AI solutions tailored to Iran's specific healthcare challenges, such as managing non-communicable diseases or optimizing resource allocation. Addressing cultural resistance to AI adoption requires targeted awareness campaigns that emphasize AI's role as a supportive tool rather than a replacement for human judgment. Starting with small-scale pilot projects in low-risk areas, such as administrative workflows, can demonstrate AI's value and build confidence among stakeholders. Integrating AI into health policymaking processes can enhance decision-making and resource allocation. Forming multidisciplinary task forces within the Ministry of Health and Medical Education (MoHME) can ensure AI considerations are embedded in policy design and evaluation. Using AI-driven simulations to model policy impacts can provide policymakers with dynamic, data-informed insights. Maintaining transparency in AI applications, such as through explainable AI systems, will be crucial for sustaining trust among healthcare providers and patients. Addressing economic and

geopolitical constraints requires innovative approaches. Supporting domestic AI innovation through funding and regulatory sandboxes can mitigate challenges posed by limited access to international technologies. Seeking partnerships with global health organizations for funding and technical support can further bolster Iran's AI capabilities in healthcare.

LIMITATIONS

While this study provides valuable insights into the challenges of AI adoption in Iran's health system, it has several limitations. First, the sample size of 15 participants, though sufficient for qualitative research, may limit the generalizability of the findings. Second, the study focused on the perspectives of healthcare professionals, policymakers, and AI experts, potentially overlooking the views of patients and the general public. Future research should explore these perspectives to provide a more comprehensive understanding of AI adoption in healthcare. Third, the study was conducted in Iran, and while the findings may be relevant to other LMICs, the unique socio-political and economic context of Iran may limit their transferability. Finally, the study relied on self-reported data, which may be subject to social desirability bias.

Conclusion

This study reveals five major barriers to AI integration in Iran's healthcare system: organizational and structural fragmentation, legal and regulatory gaps, data quality and governance issues, a shortage of skilled professionals, and challenges to embedding AI into existing policymaking processes. These interconnected challenges point to the need for a comprehensive, multi-sectoral strategy that includes investment in digital infrastructure, the development of clear legal and ethical frameworks, improved data systems, and targeted capacity-building programs. Additionally, integrating AI into health policymaking requires fostering a culture that supports innovation while maintaining human oversight and ethical accountability. Policymakers should draw on international experiences while adapting strategies to Iran's specific needs and constraints. Future research should develop and test context-sensitive interventions to support responsible, equitable, and sustainable AI implementation in the Iranian health system.

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Not applicable.

Ethics approval and consent to participate

The Research Ethics Committee of Lorestan University of Medical Sciences provided ethical approval for this study (IR.LUMS.REC.1404.112) previously. All methods were performed according to the relevant guidelines and regulations, such as the Declaration of Helsinki. Informed consent for participating in this study was obtained from all the participants before the interview sessions.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Conflict of Interest statement

The authors declare that they have no competing interests.

Authors' contributions

Me.B, Ma.B, MM and SA contributed to the conception and design of the study. Ma.B, MY, MN, AA, MM and SA conducted the interviews, and MM, NS, and Me.B were co-moderators. Ma.B, MM and SA conducted most of the analysis, which and Me.B discussed regularly. Ma.B, BD, and AB wrote the initial draft, and M.M, and S.A contributed to manuscript revisions. MM, MY, and Ma.B: editing. All authors read and confirmed the final manuscript.

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Supplementary material

Tab. S1. Consolidated criteria for reporting qualitative studies (COREQ): 32-item checklist.

Item No	Guide Questions/Description	Reported on Page
Domain 1: Research team and reflexivity		
Personal Characteristics		
1. Interviewer/ facilitator	Which author/s conducted the interview or focus group?	Method
2. Credentials	What were the researcher's credentials? <i>e.g.</i> , PhD, MD	Method
3. Occupation	What was their occupation at the time of the study?	Method
4. Gender	Was the researcher male or female?	Method
5. Experience and training	What experience or training did the researcher have?	Method
Relationship with participants		
6. Relationship established	Was a relationship established prior to study commencement?	Method
7. Participant knowledge of the interviewer	What did the participants know about the researcher? <i>e.g.</i> , personal goals, reasons for doing the research?	Method
8. Interviewer characteristics	What characteristics were reported about the interviewer/facilitator? <i>e.g.</i> , Bias, assumptions, reasons and interests in the research topic	Method
Domain 2: study design		
Theoretical framework		
9. Methodological orientation and Theory	What methodological orientation was stated to underpin the study? <i>e.g.</i> , grounded theory, discourse analysis, ethnography, phenomenology, content analysis	Method
Participant selection		
10. Sampling	How were participants selected? <i>e.g.</i> , purposive, convenience, consecutive, snowball	Method
11. Method of approach	How were participants approached? <i>e.g.</i> , face-to-face, telephone, mail, email	Method
12. Sample size	How many participants were in the study?	Method
13. Non-participation Setting	How many people refused to participate or dropped out? Reasons?	Method
14. Setting of data collection	Where was the data collected? <i>e.g.</i> , home, clinic, workplace	Method
15. Presence of nonparticipants	Was anyone else present besides the participants and researchers?	Method
16. Description of sample	What are the important characteristics of the sample? <i>e.g.</i> , demographic data, date	Method
Data collection		
17. Interview guide	Were questions, prompts, and guides provided by the authors? Was it pilot tested?	Method
18. Repeat interviews	Were repeat interviews carried out? If yes, how many?	Method
19. Audio/visual recording	Did the research use audio or visual recording to collect the data?	Method
20. Field notes	Were field notes made during and/or after the interview or focus group?	Method
21. Duration	What was the duration of the interviews or focus group?	Method
22. Data saturation	Was data saturation discussed?	Method
23. Transcripts returned	Were transcripts returned to participants for comment and/or correction?	Method
Data analysis		
24. Number of data coders	How many data coders coded the data?	Method
25. Description of the coding tree	Did the authors provide a description of the coding tree?	Method
26. Derivation of themes	Were themes identified in advance or derived from the data?	Method
27. Software	What software, if applicable, was used to manage the data?	Method
28. Participant checking	Did participants provide feedback on the findings?	Method
Reporting		
29. Quotations presented	Were participant quotations presented to illustrate the themes/ findings? Was each quotation identified? <i>e.g.</i> , participant number	Results
30. Data and findings consistent	Was there consistency between the data presented and the findings?	Results
31. Clarity of major themes	Were major themes clearly presented in the findings?	Results
32. Clarity of minor themes	Is there a description of diverse cases or a discussion of minor themes?	Results

Developed from: Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care* 2007;19:349-57.

Tab. S2. Interview Guide.
Title of Research:
Challenges of Utilizing Artificial Intelligence in the Health System of Iran: A Qualitative Study
Dear Participant's You are invited to participate in this interview. The purpose of this research is to explore the challenges and opportunities associated with the use of artificial intelligence (AI) in the health system of Iran. Your insights and experiences in this field are invaluable and will greatly contribute to a better understanding of this topic.
General Information: Interviewer Name: Date: Time: Location:
Privacy: All information collected during this interview will be kept anonymous and confidential. Participants may choose not to answer any questions at any time.
Interview Questions:
1. Background and Experience Please describe your role and experience in the health system of Iran. Do you have any experience with the use of artificial intelligence in the health system?
2. Familiarity with Artificial Intelligence In your opinion, what role can artificial intelligence play in improving health services? Are you familiar with any AI technologies currently present in the health system of Iran?
3. Challenges Technological Challenges: What technological challenges do you see in implementing artificial intelligence in the health system? Are you facing any infrastructural or hardware issues? Human Challenges: What challenges exist regarding human resources (such as training and skills)? Do health system employees have any resistance towards artificial intelligence? If yes, what are the reasons? Legal and Ethical Challenges: Are you concerned about the legal and ethical aspects of using artificial intelligence in the health system? What laws should be established for the use of AI in health?
4. Opportunities In your opinion, what opportunities exist for the use of artificial intelligence in the health system? What initiatives or projects do you know of in this field?
5. Recommendations and Future Perspectives What recommendations do you have for improving the use of artificial intelligence in the health system? How do you envision the future of artificial intelligence use in Iran's health system? Thank you for participating in this interview and sharing your insights and experiences. If you have any additional comments or questions, we would be happy to hear them.