Research Paper

Understanding the Components of Community Risk Perception: A Qualitative Approach

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ABSTRACT

Background: Disaster risk perception is a pivotal component of effective disaster management. Public awareness and hazard perception can directly influence preventive behaviors and community preparedness. This study aimed to identify the key components shaping disaster risk perception in Iran.

Methods: A qualitative research approach using conventional content analysis was employed. A total of 42 semi-structured interviews were conducted with two participant groups: 22 members of the general public (selected for maximum diversity) and 20 experts from various fields, including health management, social sciences, Islamic sciences, philosophy, and health in disasters and emergencies, in several major provinces of Iran. The study ensured diversity across demographic, geographic, and ethnic backgrounds.

Results: Notably, 61.9% of participants reported prior direct experience with at least one type of disaster, predominantly geological hazards such as earthquakes. Data analysis identified seven main themes and 22 sub-themes related to factors affecting risk perception. The findings indicate that disaster risk perception is a complex, multidimensional phenomenon shaped by cognitive, cultural, social, institutional, environmental, and political factors. Influential elements include individual knowledge, societal values, social structures, mass communication, and personal experiences with disasters.

Conclusion: Disaster risk perception is a multidimensional process shaped by individuals' personal and social characteristics. Educational interventions and social participation play a crucial role in shaping this perception. Strengthening disaster risk perception can contribute to enhance community resilience in the face of disasters.

Keywords: Disasters, Risk, Perception, Natural disasters

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Introduction

Natural and human-made disasters pose substantial threats to the lives and well-being of millions worldwide [1]. In such situations, disaster risk perception is vital for reducing community vulnerability and serves as a foundational element of risk-reduction strategies and the promotion of social resilience [2]. How individuals and communities perceive risk directly influences their preventive actions, preparedness levels, decisions regarding emergency evacuations, and acceptance of risk-mitigation policies [3]. International frameworks, such as the Sendai framework, emphasize the importance of enhancing public understanding of hazards and fostering a culture of prevention; analyzing disaster risk perception in its social, cultural, and historical contexts is essential for developing effective and culturally appropriate interventions [4–6]. While numerous studies have examined individual-level factors affecting risk perception [7–9], less attention has been given to broader structural elements, including political influences, media impact, public policies, and environmental characteristics [10].

Based on previous studies, the gap in identifying factors that influence risk perception necessitates fundamental (infrastructural) research. Since qualitative research is inherently fundamental and aims to provide a deep, detailed understanding of related phenomena and processes [11], we conducted this qualitative study in the cultural, geographical, and historical context of Iran. This study seeks to identify key components of public perception of natural disaster risk in Iran.

Methods

This study examined disaster risk perception in Iran during 2024-2025 to identify key components and influencing factors. Participants were selected through purposive sampling with maximum diversity (n=42) across demographic, geographic, and experiential traits, forming two groups. Interviews were recorded, and data were analyzed by three researchers to code concepts, subthemes, and themes. The following sections detail the procedures.

Selection of participants

Purposive sampling ensured diverse representation to recruit participants [12], whose demographic characteristics are summarized in Table 1.

Data collection

Data were collected through semi-structured interviews, conducted face-to-face or online. Each interview lasted between 40 and 90 minutes and was conducted in the participants' work or living environment (at a location of their choice). Interview questions explored disaster risk perception components, personal experiences, influencing factors, and how individual and social characteristics shape risk perception (Table 2). Data collection continued until saturation was reached, confirmed when the codes from the last three interviews repeated prior codes and no new subcategories or categories emerged. Saturation was considered overall, not separately for each participant group.

Data analysis

Data were analyzed qualitatively following the Elo and Kyngas method [13]. Initially, two researchers independently reviewed the interview transcripts, reading them multiple times. Open coding was then conducted, resulting in 1,427 initial codes. These codes were subsequently organized into main and specific categories, yielding 22 categories across seven main themes.

MAXQDA software, version 2018 was used to facilitate coding and data analysis. When the team disagreed on coding or categorization, they resolved discrepancies through discussion and consensus.

In the next stage, similar codes were merged, and primary codes related to a central concept were grouped into subgroups. The team reviewed these subgroups several times and compared similarities and differences to form categories and themes. Finally, the results were summarized, and a conceptual framework, solutions, and barriers to natural disaster risk perceptions were extracted. Table 3 presents examples of codes, themes, and categories.

Trustworthiness

To ensure the trustworthiness of the findings, the Guba and Lincoln criteria were utilized to enhance the rigor of the research. To enhance credibility, member checking was employed [14]; interview summaries were returned to participants to confirm data accuracy. Furthermore, multiple independent researchers reviewed the coding and analyses to ensure the reliability and consistency of the coding process. Expert opinions in qualitative analysis were also sought to optimize the categorization and extraction of final themes.

Table 1. Demographic and professional characteristics of participants in the study on public risk perception of disasters, Iran, 2024

Variables	Subcategories	Group A: Experts	Group B: Laypeople
Gender	Female	(6 participants)	(13 participants)
	Male	(14 participants)	(9 participants)
Education level	Postdoctoral	(2 participants)	
	PhD	(15 participants)	(5 participants)
	Master's degree	(3 participants)	(3 participants)
	Associate and bachelor's degree	-	(7 participants)
	Below high school and high school diploma	-	(7 participants)
Occupational group	University faculty	(16 participants)	(1 participant)
	Health professionals	(2 participants)	
	Crisis manager	(2 participants)	
	Teachers, school staff, religious instructors		(8 participants)
	Homemakers, students, military, freelancers, and other occupations		(13 participants)
Urban/Rural	Urban		(14 participants)
	Rural		(8 participants)
Disaster Experience	Had direct experience with disasters	(19 participants	(18 participants))
	No direct disaster experience	(1 participant)	(4 participants)
Ethnicity	Fars		(9 participants)
	Azari		(3 participants)
	Kurdish		(3 participants)
	Torkaman		(2 participants)
	Lor, Gilak, Baloach, Mazandarani, Arab		Each group (1 participants)
Exposed	Earthquake-flood-storm-landslide	(18 participants)	(20 participants)

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Table 2. Examples of interview questions

Initial Questions	Main Questions	Exploratory Questions
What comes to mind when you hear the term "perception of natural disaster risk"?	What does understanding natural disaster risk mean to you?	Explain this further.
Tell the story of a situation in which you had the greatest or least understanding of the risk of natural disasters.	What are the characteristics of risk perception?	What do you mean by that?

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Table 3. Classification of themes, subthemes, and codes extracted from qualitative content analysis of disaster risk perception among the public

Main Theme	Sub-theme	Codes
Individual/cognition/perceptions	Self-awareness knowledge	Self-awareness, existing knowledge, information, cognition, lack of hazard knowledge
	Experience learning	Cause experience generating feelings, positive experience impact, negative experience impact, experience leading to awareness, sharing experience with others, focus on objectivity
	Individual will	Strengthening will through cognition, relation of disaster harm with will
	Risk estimation and capability	Hazard strength, estimation errors, confidence in own ability, accurate hazard assessment, normalization and underestimation of risk
	Subjective risk assessment	Formed mindset, event interpretation, mindset change, difference between denial and perception, sense of helplessness, despair
Social values/culture	Cultural background	Culture about: Objectivism, individualism, duality, requirements, superstitions, prevention, change, starting from childhood
	Individual Values	Risk-taking due to awareness, human value based on risk-taking, risk-taking stemming from capability
	Social norms	Wastefulness and selfishness, altruism, honesty, truthfulness, preference of appearance over safety, community value differences
	Misconceptions	Misinterpretation of religious teachings, selective belief, lack of internalization, perception of risk happening to others
Responsibility/social participation	Collective will	Family, solving collective problems, gender differences in risk perception, father's resistance to safety measures
	Sense of social responsibility	Acceptance of responsibility, abdication of responsibility, blaming society, weak social support, small personal boundaries, social harms
	Social unity	Sense of solidarity, obstacles to unity, role of community, influence of community on elites, public ownership of risk
	Conflict of interest	Decision-making based on personal benefit, economic interest, importance of collective benefit, relationship between materialism and ethics/value of life
Education/information	Effective education	Education from childhood, fundamental education, ethical education, responsibility education, manager training, law compliance training, proper methods, specialized and continuous training, education integration
	Effective education	Objectification of positive experiences, proper critique of incidents
	Disaster risk communication	Responsible parties, use of technology, information exchange, showing solutions, suitable platforms for communication
	Communication networks	Role of family, friends, virtual communication, parental role modeling, commitment to children, family support
Structure/Management	Supportive structures	Governmental organizations, non-governmental organizations, Red Crescent role, active community participation, organizational empowerment, unified procedures, strategic goals
	Local community Management	Educational planning in neighborhoods, local volunteer participation, infrastructure improvement, periodic drills, local community participation
Policy/Governance	Managerial commitment	Hazard prediction, attention to human lives, need for official attention, strict law enforcement, proper managerial understanding
	Mutual criticism of government and people	Blaming government or people, conservatism, multiplicity of authorities, shared responsibility
	Political factors	Policy changes, safety expansion, long-term planning, episodic policies, individualistic policymaking, policy arrangement, socio-political backing
Perceptual barriers	Resistance to change	Father's resistance, resistance to government actions, new causes of resistance
	Projecting mistakes and disasters	Blame the machine, blame society, blame the government
	Not taking the future seriously	Priority of one's own interests over others, disregard for danger, indifference

Ethical considerations

First, after obtaining the ethical approval and following legal procedures, the interviews were planned. Before conducting the interviews, the researchers explained the study objectives to participants and obtained informed consent. Participants were assured that their information would remain confidential and that they could withdraw from the study at any time without consequence.

Results

This study included 42 participants. The duration ranged, with a mean of 46.63±17 minutes. In-depth analysis of the interviews resulted in seven main themes and 22 sub-themes, as described below.

Individual cognition and perceptions

Self-awareness and knowledge

Many participants emphasized the role of individual knowledge in shaping risk perception. Participants identified understanding disasters, familiarity with warning signs, and basic information on how to face risks as key sources of self-awareness. Without this knowledge, people cannot make appropriate decisions during crises.

"... Awareness must be created; if awareness is not established, no one understands. The essence is awareness. If you want individuals' knowledge about risk to increase, you must raise awareness" (interview 4, man, 57 years old, physician).

Experience and learning

Direct experience with disasters was effective in increasing awareness and internalizing risk-related concepts. Some experiences led to the development of traits, such as patience, gratitude, and enhanced emotional and social intelligence. Participants also noted that personal experiences were shared with others, contributing to collective awareness within social contexts.

"We should transfer that experience to others and objectify it. Archive it, turn it into films, documentaries, and documents. We should even establish a university dedicated to disaster education...."(interview16, man, 53 years old, PhD).

Individual willpower

Awareness of disasters and their consequences led some individuals to increased willpower and motivation for prevention and care. Several participants also mentioned that facing disasters strengthened their spirit and self-efficacy. "... Willpower is the coordinating axis of human existential dimensions …which is closely related to the system of human moods and thoughts "(Interview 18, 59 years old, man, faculty member).

Risk estimation and capability

Some overestimated or underestimated the threat level. Others were overconfidence in their abilities and thus did not take preventive measures seriously. Cognitive errors in risk assessment were identified as a major factor in neglecting risks.

"... Based on his previous experience, he believed he could cross, but the wave's force and, as we say, the water's splash caused the mud on the pipe to become slippery, making him slip and be carried away. His car was a light Pride model..."(Interview 9, man, 46 years old, teacher).

Subjective risk evaluation

Individuals' mental interpretations of disasters often differed significantly from reality. Some perceived events symbolically or as fate-driven. Negative mentalities such as feelings of helplessness and despair after experiencing a disaster led to withdrawal from responsibility and reduced sensitivity toward risk.

"Risk perception is a mental construct formed in individuals based on their conditions and life experiences. This mental construct can be objectified and continuously modulated over time. The concept of risk perception may fluctuate, increase, or decrease for them "(Interview 7, woman, health manager).

Social values and culture

Cultural background

An individualistic culture, superstitious beliefs, and a superficial approach to life contributed to weakening risk perception. Participants particularly emphasized cultural dualities (between traditional and modern values) and cultural norms, such as reluctance to issue public warnings.

"Perhaps this culture was functional at that time, but it is no longer effective. However, time must pass—time is needed; eventually, it must start from somewhere. In historical matters, time matters more, but it still has to start somewhere. We must accept that our overall ben-

efit lies in society's welfare. If this is corrected, many disaster-related problems will be resolved."(Interview 11, woman, 21 years old, student)

Individual values

Some considered risk-taking as a sign of courage and strength and proudly spoke about facing disasters fearlessly. This mindset led to a decreased tendency to take precautionary measures and disregard warnings.

"Risk-taking and confronting danger, and the degree of risk we face against multiple hazards, are measures of our strength. In fact, if we want to define a person's value, we say it is their value of risk-taking" (Interview 40, 53 years old, man, faculty member).

Social norms

Norms such as altruism and honesty were effective in increasing collective responsibility. Conversely, wastefulness, selfishness, and prioritizing appearances and luxury over safety were significant barriers to improving risk perception.

"When society, for any reason, does not respect an individual, that person will not respect themselves either. Naturally, their life's value decreases, and they stop caring about it. One reason is the social perspective."

"In the past couple of years, neighbors spent so much on their houses, but if you tell them to reinforce the building for safety, they laugh at you. They spend on luxury, but not on safety—they even mock you" (Interview 23, 55 years old, man, physician).

Misconceptions

Some misconceptions and wrong beliefs from religious teachings or selective interpretation became an obstacle to preventive measures.

«I know we always think accidents happen to others, not to ourselves. We think we are always safe, and nothing ever happens to us. Because of this mindset, people do not feel the risk. I feel people only imagine death for others because they are too confident about themselves (Interview 27, 35 years old, woman, housewife).

Responsibility and social participation

Collective will

The role of family and small communities in enhancing risk perception was highly prominent. Participants noted that group decisions and collective deliberation made risk more seriously considered. However, in some cases, the father's resistance to safety compliance—especially against the recommendations of younger family members—was cited as a factor reducing family resilience.

"My father was so anxious; he was running around collecting everything. Maybe he had some childhood experience, and I think our life's experiences have an impact. The support we receive might also have an effect, and the trainings provided might help—but the trainings I received did not help. (I just got scared within minutes; maybe then I realized I should also support someone else...)" (Interview 5, 41 years old, woman, housewife).

Sense of social responsibility

Some felt responsible, while others considered themselves innocent and blamed society or the authorities. Lack of effective social support and small social boundaries contributed to psychological and social damage after disasters.

"Our people have large personal boundaries but small public boundaries. We Iranians consider what is ours really ours. We have clean houses but dirty alleys.... It means personal space is big but public space is not ours" (Interview 3, man, 53 years old, faculty member).

Social unity

The sense of solidarity and public ownership of risk was stronger in communities with greater cohesion. However, obstacles such as social distrust and weak cohesion hindered effective collective responses to risk.

"Societies where trust is fragmented—each individual or family trusts only themselves, and different parts of society do not trust each other—there is no social unity. For example, if you say gossiping is a big danger, people say, 'How do we avoid it?' They say, 'Run away quickly,' which means they order you to flee. They do not stay in the gathering." (Interview 19, man, 55 years old, military)

Conflict of interest

Decision-making based on personal interests was identified as a factor weakening risk management. In many cases, individual economic benefit was prioritized over collective benefit, which relates directly to materialism and the neglect of the value of human life.

"Later on, I thought maybe if I go forward, they might hit me. I said to myself, well, let them hit me—I will just die. In spiritual matters, you have to trust and move forward; in other matters, you must prioritize what is important. Some are stubborn, brave, and fearless, and some say they will not even take a small risk. They say, 'I will not do this.' Depending on the benefit and profit, they decide whether to act or not" (Interview 32, woman, 32 years old, employee)".

Training and information dissemination

Effective training

Participants emphasized that training should start from childhood and be based on fundamental methods. Ethical training, training on regulations, continuous training of managers, and the use of cumulative methods were considered essential from their perspective. Occasional, superficial training did not have the necessary impact.

"Many of the issues in our lives we can manage; God also says in the Quran that God does not change the fate of any people unless they themselves want it. This also goes back to the fact that they have not been trained" (Interview 17, woman, 35 years old, teacher).

"I think that happens through training; we must make the danger tangible. It is not necessary that the danger must happen for someone to learn — the knife does not have to cut the hand for us to learn that it is sharp" (Interview 8, man, 48 years old, manager).

Learning from experience

Reviewing past experiences and properly critiquing them was introduced as a tool for collective learning. Participants wanted to turn experiences into tangible lessons to prevent repeating mistakes.

"Whatever is experience or lesson helps you know what to do. If a flood comes, what should you do to save yourself from the flood, or anything that helps keep you safe from disasters" (Interview 33, man, 45 years old, teacher).

Disaster risk communication

The lack of a specific reference for communication, the dispersion of information, and weak use of technology caused distrust. Participants requested an appropriate platform for exchanging information and providing practical solutions.

"First, we must identify the hazards of the province, prioritize them, and with the help of national media and virtual spaces, which currently work better and people get information through virtual space, raise public awareness about these provincial hazards even before they turn into dangers so that we reduce and minimize physical and financial damages to the people" (Interview 14, woman, 48 years old, faculty member).

Communication networks

Family, friends, and virtual space played an important role in shaping or changing attitudes towards risk. Parents, as behavioral role models, had an important role in instilling a sense of responsibility in their children.

«In my opinion, it is a public duty. Of course, education is at the top of all; radio, television, and families are very influential... Families must also be involved with this education and upbringing. Other organizations, such as health, have influence (Interview 7, woman, 49 years old, PhD student).

Structure and management

Supportive structures

Participants criticized the weak performance of governmental and non-governmental organizations in disaster management. Highlighted challenges included a lack of uniformity, weak empowerment of institutions, and limited public participation in these structures.

"Social support here has been weak. If people knew that even if their entire life went under rubble, insurance would cover their damages, they would never have stayed there; they would have evacuated early" (Interview 37, man, 55 years old, educational manager).

Local community management

Participants emphasized that education and planning must be conducted at the neighborhood level. Local volunteer participation, periodic drills, and improving local infrastructure were among the factors that increased risk perception in the community.

"Encouraging people to participate in local programs and decision-making regarding disaster risk management, which essentially includes community participation in risk perception programs. We should develop local infrastructures — I mean improve local infrastructures for crisis management and establish early warning systems so that people feel secure and aware" (Interview 24, man, 50 years old, health manager).

Policy and governance

Commitment of managers

Failure to predict risks, negligence toward people's lives, and poor law enforcement were cited as serious problems. Participants demanded more active and responsible presence of managers at various levels.

"We must educate that humans have dignity... We must also learn that instead of condemning our people and imposing our values, we need to update our laws. Our laws are sometimes unjust. We say pedestrians have the highest casualties and blame that they are uneducated, but first, we must correct the drivers" (Interview 13, man, 49 years old, faculty member).

Mutual criticism between government and people

The relationship between the people and the government was marked by mutual distrust and blame. Conservatism and fragmentation among decision-makers hindered unified planning and effective accountability.

"But the core issue is that they do not feel ownership, belonging, participation, or impact; thus, they lose trust. When they lose trust, they reject the message. Whatever you say, they think you want to take money from them" (Interview 12, 48 years old, research manager).

Political factors

Participants criticized short-term policies, individualism in policymaking, and lack of socio-political backing for safety. They called for a shift toward macro, sustainable crisis-management policies.

"This must be integrated into all organizational domains and actually be one of the governance priorities, seen at all levels. Certainly, universities alone cannot have all these impacts. Safety culture is a multi-faceted issue influenced by various factors... First, the Ministry of Health's macro policies must prioritize this, so that lower levels are obligated to implement it. Senior managers themselves must believe in risk perception and be able to carry out practical measures" (Interview 2, man, 49 years old, faculty member).

Perceptual barriers

Resistance to change

Some participants mentioned resistance to change, especially from fathers or older individuals. Additionally, some new policies faced social resistance, partly due to a lack of public persuasion.

"Right now, my own father does not accept it at all. He says, 'I have lived in my home and life here for years.' Despite the many losses he has experienced, my father does not accept it...." (Interview 33, woman, 45 years old, housewife).

Projecting mistakes and disasters

People sometimes did not take the risk seriously or attributed it to the future or others. This projection led to inaction, passivity, and repeated harm when facing danger.

"The low perception of disaster risk among people is because disasters happen so often that disasters have become normal for us. We face them every day; thus, no one feels that something must happen, that action must be taken, or that prevention must occur. It has become very normal because now we have all kinds of crises" (Interview 41, woman, 47 years old, health manager).

Not taking the future seriously

This reflects a tendency to ignore future consequences, leading to underestimating long-term risks and overemphasizing immediate needs or desires. "He gets out of the car. The signs installed next to the bridge have gone underwater, and the side of the bridge is not clear; it has gone underwater. He does not pay attention to what they tell him not to cross" (Interview 29, 45 years old, man, teacher).

Discussion

Disaster risk perception is a complex, multifaceted process shaped by cognitive, cultural, social, institutional, and political determinants. Transforming perception requires addressing perceptual barriers and promoting social participation and accountability to foster authentic preparedness and resilience. This localized study identified seven themes—encompassing individual cognition and perceptions, social values, and cultural influences—and delineated 22 subthemes, thereby offering a compre-

hensive understanding of the components that shape risk perception within the community.

Individual cognition and perceptions

Risk perception often drives information-seeking behavior, sometimes more than faith or fatalism. Across contexts, individual cognition and disaster perception centralize understanding of risk. Self-awareness and disaster knowledge, reinforced through education and experience, enhance vigilance and elicit appropriate responses [5, 15, 16]. Previous experiences, shape how people interpret risk; positive experiences can bolster resilience [17], while misestimation and cognitive biases hinder effective responses. Feelings of helplessness or hopelessness act as cognitive barriers to appropriate action. These findings align with broader literature on biases in risk perception [18-20].

Social values and culture

Cultural theory posits that social structures, worldviews, subcultures, and group affiliations shape risk perception. Group and network attachment influence risk-taking and coping during crises. A strong sense of social responsibility and collective will enhances resilience and reduces vulnerability.

Cultural background and values further shape risk views. Individualistic cultures may underestimate risks, while religious or superstitious beliefs can impede preparedness [9, 21, 22]. Personal dispositions (risk-seeking or risk averse) also matter [15]. Norms, such as altruism, promote cooperation; selfishness can undermine collective action [16].

Responsibility and social participation

Social responsibility and collective will strengthen resilience and reduce vulnerability. Family units influence protective behaviors [17], while conflicts of personal interest and materialism can undermine safety commitments [23]. Social solidarity supports effective response, but barriers to collective action, such as competing interests or mistrust, can impair readiness [24, 25].

Education and communication

Ongoing education, from childhood onward, strengthens risk perception [26]. Ethical education and responsibility reinforce this process [27]. Accurate information and modern communication technologies aid risk messaging, with interpersonal networks (family and friends) playing critical roles [28]. Providing information alone is insufficient; spaces for deep, realistic understanding are essential.

Structure and management

Cohesive support structures, including government bodies and non-governmental organizations, and active local participation are foundational for effective disaster management [29]. Local coordination and unified procedures improve preparedness and reduce impacts [30]. Regular drills and local planning further strengthen resilience.

Politics and governance

Managerial commitment and accurate risk understanding shape policymaking and safety regulation enforcement [31]. Mutual accountability between the government and public remains a challenge [32]. Political dynamics, policy changes, and policymaker individualism can hinder long-term risk reduction efforts [33, 34].

Perceptual barriers

Self-centeredness can distort judgment, causing dismissal of risks that seem unlikely. Resistance to change within families, particularly among fathers, is a notable barrier to improved perception [35]. Fears, lack of awareness, or adherence to tradition may underlie this resistance [36, 37]. Delaying concerns and projecting mistakes into the future impede preparedness, and these psychological and behavioral barriers hinder accurate risk assessment and preventive actions. Understanding these components clarifies how individuals and groups perceive and respond to potential dangers.

Limitations

This study has limitations. Some participants practice religions other than Islam, as no religious restrictions were set for the lay population. Additionally, access to first-level managers was challenging, and in some cases, middle managers replaced them, potentially affecting the data.

Conclusion

Effective risk perception requires multidimensional approaches—tailored education, inclusive participation, and economic/social/cultural interventions. Programs should leverage media, digital platforms, and AI, with practical training and simulations to strengthen community preparedness. Governments and organizations must invest in infrastructure and safety standards to support these efforts.

Ethical Considerations

Compliance with ethical guidelines

This study was approved by the Ethics Committee of Red Crescent Society of the Islamic Republic of Iran (Code: IR.RCS.REC.1403.016), and Tabriz University of Medical Sciences, Tabriz, Iran (Code: IR.TBZMED.REC.1404.073).

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Authors' contributions

Data collection and formal analysis: Ezat Samadipour and Leila Mohammadinia; Funding acquisition, investigation, visualization and methodology: Leila Mohammadinia and Javad Babaie; Supervision: Ezat Samadipour; Writing the original draft: Leila Mohammadinia; Conceptualization, project administration, validation, software and final approval: All authors.

Conflict of interest

The authors declared no conflict of interest.

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