JQRHS

Journal of
Qualitative Research in Health Sciences

https://jqr1.kmu.ac.ir
10.34172/jqr.1627
JQRHS. 2025;14:1627

Policy Brief

Mitigation of Dust Hazard in Comprehensive Health Centers

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Abstract

Dust, as a natural hazard, has widespread health, economic, and social impacts on society. The problems caused by this phenomenon arise from the lack of a single model and differences in the performance of health care systems. This policy brief presents solutions and strategies for mitigation of comprehensive health centers to dust hazard to improve responses and effective management of this hazard. The present policy brief is the result of a sequential mixed exploratory study (qualitative-quantitative) that was conducted in six phases with the aim of producing a comprehensive health center mitigation program for dust hazards. First, a systematic review was conducted to identify strategies to reduce health harm caused by dust. Then, interview questions were designed, and face-to-face and telephone interviews were conducted with 23 managers and health professionals. Using a guided approach to qualitative content analysis, primary codes, main codes, subcategories, main categories, and themes were extracted. In the third phase, using the results of the systematic review and the codes from the interviews, the dimensions and components of the program were identified. In the fourth and fifth phases of the study, the validation of the dimensions and components of the program was measured in the form of qualitative face validity and the Delphi technique, and finally, the FEMA proposed model was used to design a comprehensive health center mitigation program against dust hazard.

Keywords: Program, Strategy, Mitigation, Dust, Comprehensive health centers

Citation: Sarani A, Tavan A, Moradi M, Farahmandnia H. Mitigation of dust hazard in comprehensive health centers. *J Qual Res Health Sci*. 2025;14:1627. doi:10.34172/jqr.1627

Received: June 22, 2025, **Accepted**: September 9, 2025, **ePublished:** December 16, 2025

Introduction

Disasters are sudden and unexpected events that result in loss of life, health, and environmental damage, destruction or loss of property and assets, and adverse effects on the social and economic structures of a region or country (1). More than 90 percent of the total number of people affected and 50 percent of the financial and human losses from natural disasters are related to the Asian continent, and our country, Iran, is one of the most dangerous countries in the world in terms of accidents and disasters due to its climatic and geographical location; so that it is among the countries that have experienced numerous natural disasters. From the point of view of natural hazards, according to the World Disaster Risk Reduction Report, among the natural hazards, earthquakes, floods, droughts, landslides, and storms are at the top of the dangers that the country is facing (2).

One of the natural hazards is the dust phenomenon, which is defined by the World Meteorological Organization (WMO) as the effects of surface winds that carry large amounts of dust into the air and reduce visibility at eye level (1.8 km) to less than 1 km (3).

The most important effects of dust hazards include immediate and long-term effects. Immediate effects include immediate human health problems (e.g., respiratory and cardiovascular problems) and premature mortality; annual and permanent crop losses, livestock mortality, infrastructure damage (e.g., buildings, electrical and telecommunications structures, machinery, greenhouses), decreased performance in daily activities, and increased drug use (4).

Long-term effects include the accumulation of human health problems (e.g., bronchitis, cardiovascular disease, and other chronic disorders), soil contamination through the deposition of toxic biological substances (fungi and bacteria), heavy metals, salts, and microplastics, and disruption of the climate cycle through global warming, melting glaciers, and changes in precipitation (5).

Also, the assessment and analysis of vulnerability to dust storms in Kerman province showed that 86 percent of the area of Kerman province is highly vulnerable to dust storms, with Baft, Bardsir, and Rabor counties being most exposed to this phenomenon, and the cities of Kerman, Bam, and Orzuieh being most sensitive (6).

Given the unpredictable and ambiguous nature of disasters, if they are not managed properly, the devastating economic, social, environmental, and infrastructural impacts of disasters will be much more severe (7). In fact,

careful planning and training to prepare individuals in health organizations for disasters seem essential. Having a standard plan and protocols will help improve the disaster risk management system (8).

Maintaining these facilities to provide services to the affected community, especially in underserved areas, is crucial during the occurrence of this hazard. A resilient health facility minimizes the number of non-seriously injured people who may seek care at the hospital (9). In the absence of appropriate disaster risk management plans and strategies, the occurrence of various hazards, including dust, will create needs in all areas of the health system, including increased emergency medical dispatches due to respiratory problems, increased hospitalizations and admissions of cardiovascular and respiratory patients, and increased daily visits and workload in health centers (10).

Problem

According to interviews with relevant experts, the authors found that currently, a program that can effectively mitigation of comprehensive health centers from dust hazards in structural, non-structural, and functional dimensions has not been designed by Iranian researchers, and it seems that the problems caused by the occurrence of dust phenomena and the differences in the performance of different units of health care systems when hazards occur are due to the lack of a single guide, program, and model. Also, to demonstrate the necessity of conducting this research, the results of the study of the Medical Emergency and Disaster Management Center of Kerman Province (2021), which was conducted to develop a program to reduce the risk of accidents and incidents caused by natural and man-made hazards in Kerman Province using a combined risk assessment approach, showed that the third priority hazard of the province after earthquake and flood hazards is dust hazard. Another study conducted by Khademipour et al aimed at assessing the disaster risk of primary health care facilities in southeastern Iran in three dimensions of hazard, vulnerability, and response capacity using a hybrid approach showed that the level of disaster risk in most primary health care centers in Kerman province is very high. It was also revealed that out of 26 hazards threatening these centers, the dust hazard is in second place after earthquakes (11), which can lead to structural, non-structural, and functional vulnerability of these centers. Therefore, this study aimed to design a program to reduce the damage of comprehensive health centers to dust hazards so that different units in comprehensive health centers can address all the needs that this hazard can impose on these units in an integrated and coordinated manner by utilizing a single model at the local level and paying attention to geographical requirements.

The aforementioned program is the only program designed in the field of incidents and disasters based on an international framework. With the designed program resulting from this research, the activities extracted in the field of mitigation can be implemented operationally by notifying the Health Deputy at the relevant comprehensive health centers to help maintain the stability and continuity of the performance of comprehensive health centers during the occurrence of the dust phenomenon.

It is expected that the design of the aforementioned program will help policymakers and planners in the health sector in creating the necessary framework to mitigate comprehensive health centers, increase resilience, continue to maintain the services of these centers, address the specific needs of this threat to the health of the affected community, and ultimately reduce the human, financial, and social losses of the affected community.

Analysis

In the present study, the dimensions and components of the program were designed by conducting a qualitative study through holding interview meetings with the relevant field experts and reviewing systematic reviews, texts, and relevant resources. The initial program with 107 items entered a small stage, namely, validation through the Delphi technique. During the Delphi process, 87 items were finally finalized to design a comprehensive health center against dust hazard. The dimensions of this program include dust hazard mitigation, management functions, capability and performance improvement, safety maintenance and promotion, and external coordination to implement mitigation functions.

Policy Recommendations

The program designed in this study is a valid and practical program, which was designed based on the opinions of experts, in addition to reviewing relevant literature.

1- Using this program, various mitigation measures for comprehensive health centers can be implemented in the dimensions of mitigation, management, capability and performance improvement, safety maintenance and promotion, and external coordination to implement dust hazard reduction functions operationally; therefore, this program is suggested to be implemented in provinces that have similar climatic conditions to Kerman province and can be used as a model in other provinces.
2- This program can be made available to policymakers and health planners at the national level and will help direct the desired resources towards factors with a higher degree of impact.
3- This program at the local level can help maintain the sustainability and continuity of the operation of comprehensive health centers during dust events.
4- This program can provide an overall picture of the degree of vulnerability of comprehensive health centers in the area covered by the University of

Medical Sciences, so that appropriate measures can be taken to prevent and mitigate.

5- This program can be made available to the health deputy of the country's medical universities so that they can take the necessary steps to establish the program in comprehensive health centers.

6- This program can be the basis for training and practicing employees and managers of comprehensive health centers to increase their risk understanding and awareness.

7- If the program is implemented, in addition to the mitigation of this hazard in comprehensive health centers, the community will also indirectly benefit from the implementation of these measures.

Conclusion

Based on the study findings, measures to mitigation of dust hazard at healthcare centers include internal measures, such as risk assessment, establishment and improvement of an early warning system, inter-sectoral coordination at the public and private levels, retrofitting healthcare centers to improve their resilience, holding training courses to increase risk awareness among managers and employees, using appropriate ventilation, using appropriate personal protective equipment, and external measures including allocating financial resources by responsible organizations to mitigation of dust hazard, implementing green infrastructure, improving water management, mulching, and improving the ability to make predictions. Given the geographical spread of comprehensive health centers across the country and their easy access to people even in remote and less-privileged areas, maintaining them to provide services to the affected community in the event of this hazard is vital; therefore, having strategies and mitigation measures appropriate to them against the occurrence of this event can minimize the numerous problems that may arise in various structural, non-structural, and functional areas of these centers. It is expected that the aforementioned extracted strategies and solutions will help policymakers and planners in the health sector to prioritize and consider this risk important, to give importance to service providers, to develop training protocols to increase risk perception and awareness among personnel and the population covered by the center, and to create the necessary platform to mitigation of health facilities, increase resilience, continue to provide services to these centers, and ultimately mitigation of the economic, social, health, and functional of the hazard on the affected community through continuous vulnerability risk assessments and external cooperation and coordination with other departments consisting of crisis management, environmental protection, meteorology, Iranian Broadcasting Corporation, communications and information technology, road management, relief and rescue, regional electricity, traffic police, provincial and city municipalities, and universities/faculties of medical sciences and health services.

Acknowledgments

The authors would like to thank all participants in the study.

Authors' Contribution

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Competing Interests

The authors have no conflicts of interest to declare.

Ethical Approval

The Ethics Committee of Kerman University of Medical Sciences approved this study, with the ethical code being IR.KMU.REC.1401.260. All methods were performed in accordance with the relevant guidelines and regulations. Study participants were informed clearly about their freedom to opt out of the study at any point in time without having to justify their decision.

Funding

This study was financially supported by the Kerman University of Medical Sciences through Grant No. 401000295.

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