



Strengthening Firefighter PPE Quality in Iran: Addressing Challenges & Policy Options

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Abstract

Objectives: The firefighters, to protect their lives and health against occupational stressors, must use high-quality and standard personal protective equipment. This article addresses the challenges and policy options related to improving the quality of personal protective equipment used by firefighters in Iran.

Methods: Due to the complex nature of the problem, the Walts and Gilson policy triangle was utilized to examine multiple facets of the issue. After reviewing different dimensions, challenges in the content of laws, actors and stakeholders, policy processes, and the social and economic context of the problem were identified through document review, database searches, and field interviews.

Results: The results showed that the main challenges include the standardization of firefighters' protective equipment, weak intersectoral cooperation, lack of sustainable financing, weak supervision, especially in high-risk jobs like firefighting.

Conclusion: The most important policy option is utilizing the capacity of the Food Safety and Security Working Group in each province to address related issues, signing memoranda of understanding to establish networking, avoid isolated work approaches, and increase political commitment.

Keywords: Firefighter, PPE, Quality, Compliance, Legal Requirements, Policy.

Introduction

Firefighting is a highly challenging job, a job in which daily tasks are often performed in dangerous environments ^[1], and the use of Personal Protective Equipment (PPE) is the only and irreplaceable safeguard for firefighters exposed to multiple hazards ^[2]. Personal Protective Equipment (PPE) includes devices used by employees to protect themselves from hazards and should be selected based on the specific work and working conditions. In some high-risk jobs like firefighting, it is practically impossible to carry out the job tasks without this equipment ^[3]. On the other hand, non-standard protective equipment can reduce individuals' effectiveness and increase the risk of injury or death. Therefore, considering the hazards of

firefighting, the quality and standardization of this equipment for optimal field use are of great importance ^[4, 5].

Firefighters' exposure to fire and high heat can lead to irreparable casualties. Therefore, the use of high-quality PPE is critical ^[5]. However, challenges such as insufficient budgets and the lack of protective and safety equipment that meet reputable standards in the market result in the use of low-quality PPE, which in turn causes incidents such as burns and inhalation of toxic gases by firefighters.

Additionally, numerous issues are observed in the safety policymaking process, including neglecting key stakeholders and actors, insufficient attention to the policymaking structure, problems in the content of laws,

failure to consider social, economic, and international contexts, and the lack of effective systems in the processes of policy formulation, implementation, and evaluation. Furthermore, high-level documents such as the Labor Law do not sufficiently address safety issues, including the quality of safety equipment for individuals in high-risk jobs, especially firefighters.

In higher-level policies and laws, funding for the procurement of safety equipment and PPE has been assigned to municipalities, which often poses significant challenges for the fire departments in those areas. Additionally, each city's fire department, based on its budget and local initiatives, is responsible for acquiring safety equipment and PPE for firefighters, with no national regulations or structured oversight in this regard. Therefore, this study was conducted to present policy options based on a comprehensive view and evidence, to provide fundamental and effective solutions to policymakers and main stakeholders in this field, in alignment with the policy cycle.

Methods

This study, by reviewing existing literature, aims to find evidence regarding the standardization of PPE used by firefighters and the legal requirements related to complying with recommended standards for this equipment. Therefore, a search was conducted in some databases, including PubMed, Scopus, Web of Science, and the Iranian databases IranMedex and Magiran. Keywords used involved "Standard", "Compliance", "Personal Protective Equipment," "PPE," "firefighters," "legal requirements," "quality," "policy," "Policy cycle," and "cooperation. The search was limited to publications from 2015 to 2023.

The inclusion criteria encompassed systematic reviews, meta-analyses, and experimental studies that assessed interventions or strategies designed to address the standardization of firefighters' PPE in medical, safety, and protection sciences.

Data Extraction and Synthesis: The next, Data extracted from selected sources included study design, PPE investigated and reviewed, participants, key findings, and policy implications. Moreover, to examine the identified issue, efforts were made to analyze the various dimensions of the problem's nature using Walt and Gilson's policy triangle ^[6], considering its components (content, actors, processes, and context). To this end, the existing high-level documents in this field were reviewed.

Additionally, based on field analysis and interviews with key informants and knowledgeable individuals, existing shortcomings and deficiencies were identified. Ultimately, policy options were proposed based on [Source 6].

Results

In a study conducted by the authors in one of the provinces of the country, the results showed that in most counties of this province, the PPE used by firefighters does not meet the necessary standards ^[7]. Additionally, other studies carried out in various countries worldwide found a significant relationship between the non-standardization of firefighters' PPE and injuries ^[8] and the loss of lives and property among firefighters ^[3]. Therefore, given that safety policies are cross-sectoral and involve stakeholders and actors from various organizations such as the municipal organization, the Ministry of Cooperatives, Labour, and Social Welfare, and the Ministry of Health and Medical Education, a unidimensional approach is not sufficient. All stakeholders should be involved in the formulation and implementation of safety laws, including in the PPE procurement process in sensitive jobs.

Given the problem's complexity, encompassing legal frameworks, socioeconomic contexts, and the involvement of various actors, we recommend the following policy options.

Policy Options and Recommendation

Some of the proposed policy options for this study are as follows:

1. Develop national laws and regulations regarding safety requirements and reputable standards related to the procurement of PPE and other necessary safety equipment for firefighters and similar jobs. Additionally, designate relevant supervisory agencies to conduct control inspections, technical reviews, and equipment evaluations.
2. Emphasize the participation of key stakeholders, especially the Cooperative, Labour, and Social Welfare Organization, and medical universities in each province, in forming safety committees within the Food Safety and Security Working Group to identify deficiencies and propose solutions through memoranda of understanding among related agencies, particularly municipalities and fire departments.
3. Revise procedures and laws related to safety, such as the Labour Law and personal protective equipment regulations.
4. Secure sufficient funding for fire departments through municipalities. However, due to sanctions and financial restrictions, achieving this goal faces challenges.
5. Implement stricter supervision by the Customs Organization over PPE and its raw materials at border entry points.
6. Provide training to identify substandard or defective PPE and ensure its immediate replacement with safe, high-quality alternatives.
7. Utilize modern technologies, especially artificial

intelligence and robotics, in fire control and incident management.

8. Support knowledge-based companies in producing high-quality PPE domestically to reduce costs and improve accessibility.

The most suitable policy option to ensure the enforcement of existing regulations and directives, and to address current deficiencies through cross-sectoral collaboration in the form of a Memorandum of Understanding, is to leverage the capacities of the Food Safety and Security Working Group, which operates under the supervision of the provincial governorate.

Discussion and Implementation Considerations

The lack of effective participation from government agencies and stakeholders in the development of regulations and directives often results in weak political commitment and improper implementation of these regulations. However, by identifying influential agencies, establishing networks, and fostering collaboration among them, the enforcement of these guidelines, including safety-related measures, can be strengthened. Additionally, opportunities such as the Plasco incident and policymakers' demands for support can be leveraged to improve the supply of high-quality personal protective equipment (PPE) for firefighters. Focusing on safety and protective equipment not only increases awareness but also draws attention to the importance of their safety. Some necessary changes require macro-level interventions, particularly in laws, which can be time-consuming and require collaboration among government agencies. On the other hand, securing sufficient funding in this area is crucial, but international sanctions and financial resource limitations pose serious challenges. A non-centralized approach that prioritizes not only price considerations but also evaluates quality before purchase can ensure efficiency, durability, and compliance with standards of PPE.

Conclusion

Due to the lack of necessary laws and regulations, economic and managerial issues, weak cross-sector collaboration, insufficient supervision, and a shortage of standard equipment in the domestic market, problems are evident in providing PPE that meets recommended standards for firefighters. Therefore, to address these issues, it is suggested to develop national laws and regulations regarding safety requirements for PPE procurement, enhance cross-sector collaboration through executive working groups, ensure sustainable financing, update equipment, provide training for managers, and implement cohesive oversight to guarantee the provision of equipment in accordance with international standards.

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Competing interests

The authors declare that they have no competing interests.

Abbreviations

PPE: Personal Protective Equipment.

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Consent for publication

By submitting this document, the authors confirm their consent for the final accepted version of the manuscript to be considered for publication.

References

1. Smith DL, Horn GP, Goldstein E, Petruzzello SJ. Firefighter Fatalities and Injuries: The Role of Heat Stress and PPE [Internet]. Illinois Fire Service Institute; 2008.
2. Park H, Kim S, Morris K, Moukperian M, Moon Y, Stull J. Effect of firefighters' personal protective equipment on gait. *Appl Ergon*. 2015 May 1; 48:42–8; doi: [10.1016/j.apergo.2014.11.001](https://doi.org/10.1016/j.apergo.2014.11.001); PMID: [25683530](https://pubmed.ncbi.nlm.nih.gov/25683530/).
3. Dirisu JO, Fayomi OSI, Oyedepo SO, Mmuokebe JI. Performance assessment of the firefighting personal protective tunic. *Energy Procedia*. 2019;157:405–18; doi:[10.1016/j.egypro.2018.11.205](https://doi.org/10.1016/j.egypro.2018.11.205).
4. Park JW, Lee JH, Jeon KN, Kim H jun, Kim HJ. Standardization and Future Challenges for the Replication Evaluation of Special Equipment for Fire Disaster. *J Korean Soc Hazard Mitig*. 2015 Dec 30;15(6):261–9.
5. Fent KW, Alexander B, Roberts J, Robertson S, Toennis C, Sammons D, et al. Contamination of firefighter personal protective equipment and skin and the effectiveness of decontamination procedures. 2017;9624(June); doi: [10.1080/15459624.2017.1334904](https://doi.org/10.1080/15459624.2017.1334904); PMID: [28636458](https://pubmed.ncbi.nlm.nih.gov/28636458/).
6. Ashrafizadeh H, Rokhafroz D, Beiranvand S. Policy Analysis of Education Transformation Plan in Iran's Health System Using Walt Gilson Model. *J Med Educ Dev*. 2022;15(46):58–71.
7. Zolghadri Z, Mehrgan M, Saleh E, Hosseinabadi S. Assessment of the compliance of protective and firefighting equipment of firefighters with the recommended standards in the counties of Semnan Province. In: 2nd Student Research and Technology Congress of Academic Planning Region 1 of Iran and the 9th Annual Congress of Semnan University of Medical sciences.
8. Kim DH, Kim S, Lee JY. An empirical investigation of firefighting personal protective equipment and burn injuries in Korea. *Ind Health*. 2022;60(1):2–15; doi: [10.2486/indhealth.2021-0068](https://doi.org/10.2486/indhealth.2021-0068); PMID: [34615835](https://pubmed.ncbi.nlm.nih.gov/34615835/); PMCID: [PMC8826033](https://pubmed.ncbi.nlm.nih.gov/PMC8826033/).

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