



A National Strategy for Pandemic Preparedness: Strengthening Iran's Public Health System Through Indigenous Solutions

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Abstract

Objectives: This policy brief proposes an indigenous model to strengthen Iran's public health system during pandemics of emerging respiratory diseases by integrating context-specific interventions and mechanisms.

Methods: A realist review and qualitative study with public health experts in Iran and Sweden informed the model. Evidence synthesis emphasized effectiveness, equity, and applicability within Iran's socio-political context, guided by the WHO health systems framework and CIMO (Context, Intervention, Mechanism, Outcome) model.

Results: Key challenges were identified across the six WHO building blocks, and tailored solutions were proposed. Contextual and functional factors—ranging from governance gaps to sociocultural dynamics—were integrated. The model emphasizes coordinated leadership, sustainable financing, digital infrastructure, and public engagement.

Conclusion: A resilient public health system in Iran requires systemic reforms, multi-sector collaboration, and culturally informed strategies. The proposed model offers a roadmap to improve pandemic preparedness and health equity.

Keywords: Strengthening, Public Health System, Pandemics, Iran.

Introduction

Emerging respiratory diseases like COVID-19, SARS, and MERS have consistently challenged health systems ^[1, 2]. The COVID-19 pandemic highlighted the importance of strong public health systems, particularly those focused on prevention and early intervention. In Iran, factors such as urban density, limited infrastructure, and the impact of sanctions contributed to the severity of the COVID-19 outbreak ^[3].

In 2021, daily COVID-19 deaths exceeded 700 ^[4]. By October 2024, Iran reported 7.6 million cases and nearly 147,000 deaths. These figures underscore the urgency for reform.

The WHO promotes horizontal, goal-oriented health reforms as more sustainable than problem-focused, vertical ones ^[5]. Strengthening Iran's system means adapting these insights within its unique sociopolitical and economic realities.

Methods

This policy brief is based on a realist review and a qualitative study that utilized semi-structured interviews with public health experts in Iran and Sweden. The purpose of the study was to compare the insights gathered from the interviews in Iran with those from Sweden's health system and pandemic response. The study employed critical purposive sampling to select cases that could provide valuable lessons. Sweden was chosen as a comparison due to its transparent public health strategies, strong government-public trust, and internationally recognized pandemic response, which can serve as useful models for Iran. The study was conducted in three main phases: First, a realist review was conducted to identify global public health system challenges and solutions during pandemics. Second, qualitative research was conducted using purposive sampling and semi-structured interviews with experts in Iran and Sweden to explore context-specific challenges

and lessons. This stage involved two groups of participants. The first group consisted of 21 Iranian public health professionals (14 men, 7 women) aged 40-65, with an average of 22 years of experience. Most of the participants were from the Health Deputy (66.67%), with others from the University of Medical Sciences, MOHME, and a health center. The second group included Swedish experts from diverse institutions such as Uppsala University and the Public Health Agency, with an average age of 55 and 24 years of experience,

representing various cities and professional roles in public health. Finally, an initial model to strengthen Iran's public health system was developed using grounded theory and validated through the Delphi method with health system experts. See figure 1.

Results

The following tables show challenges and solutions in different sections [Tables 1,2].

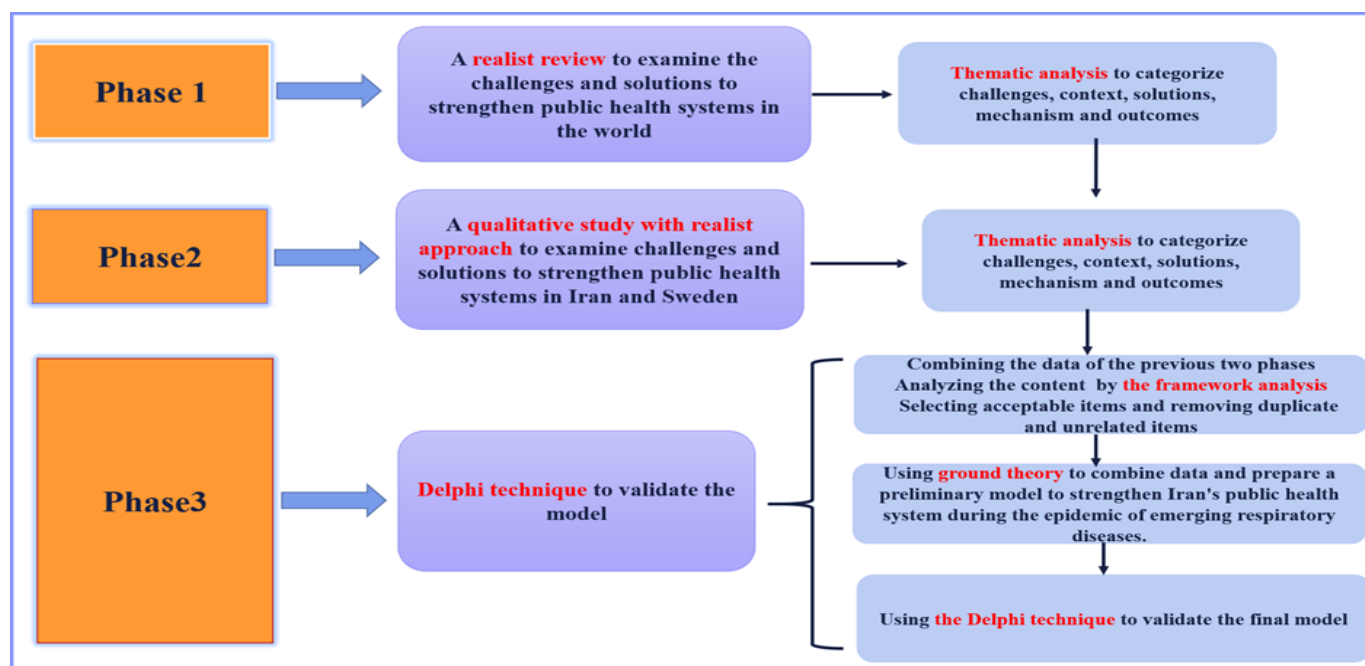


Figure 1. Methodology of study

Table 1. Challenges and proposed solutions are outlined within the six building blocks [6, 7].

Category	Component	Key Challenges	Proposed Solutions
WHO Building Blocks	Leadership & Governance	- Fragmented command structure, - Poor intersectoral coordination - Low trust in authorities	- Establish a national public health crisis command center - Develop standardized national protocols - Involve private sector and charities - Run regular simulation drills
	Financing	- High out-of-pocket payments (38%) - Payment delays to workers - Precarious funding sources	- Design multi-source financing system - Reduce out-of-pocket costs via targeted support - Improve resource efficiency
	Health Workforce	- Migration of health workers - Staff shortages - Poor psychological support	- Crisis volunteer workforce database - Smart personnel distribution - Continuous psychological support
	Health Information Systems	- Fragmented platforms - No integrated records - Disorganized data	- Interoperable electronic health record systems - AI-driven early warning dashboard - Health messaging system - Use GIS for disease surveillance
	Access to medicines and healthcare products	- Vaccine/supply shortages - Sanctions - Fragile supply chain	- Support local pharma - Sustainable supply policies - Increase domestic production - Strategic stockpiles
	Service Delivery	- Weak remote services - Poor home screening - Underserved areas	- Expand telemedicine - Home screening for high-risk groups - Strengthen infrastructure in deprived areas
Contextual Factors	Situational	- Rise in zoonotic diseases - Climate change effects - Population aging	- GIS-based disease surveillance - Targeted programs for vulnerable populations
	Structural	- Accelerated urbanization - Sanctions - Poor intersectoral coordination	- National health fund with sustainable resources - Cross-sectoral crisis task force
	Cultural	- Low public trust in official media - Authority denial culture - Diverse health beliefs	- Awareness campaigns via community leaders - Transparency in decisions and reports
	International	- Globalization of disease - Import dependency	- Strengthen health diplomacy - Expand domestic production of key supplies

Table 2. Functional mechanisms for strengthening the health system [7,8].

Operational Level	Key Mechanisms	Proposed Solutions
Individual	- Increased public awareness and sense of responsibility- Compliance with health guidelines	- Provide virtual and in-person public health education- Utilize digital platforms (e.g., health apps)
Organizational	- Coordination between the Ministry of Health, hospitals, and research centers- Data sharing	- Develop an integrated health information system with data analytics capabilities- Establish inter-organizational joint task forces
National	- Political commitment and sustainable budget allocation- Policy flexibility	- Pass legislation for sustainable health financing in Parliament- Establish an independent oversight body to evaluate health system performance

The proposed model is based on a realist review and semi-structured interviews with experts from Iran and Sweden. As shown in Figure 2, we developed this model using the realist Context, Intervention, Mechanism, Outcome (CIMO) framework to design interventions aimed at strengthening Iran's public health system against emerging respiratory disease pandemics [8].

Context: Refers to the social, cultural, economic, and political conditions that influence how interventions operate in a specific environment. These factors explain why a particular outcome occurs in one setting and may differ elsewhere.

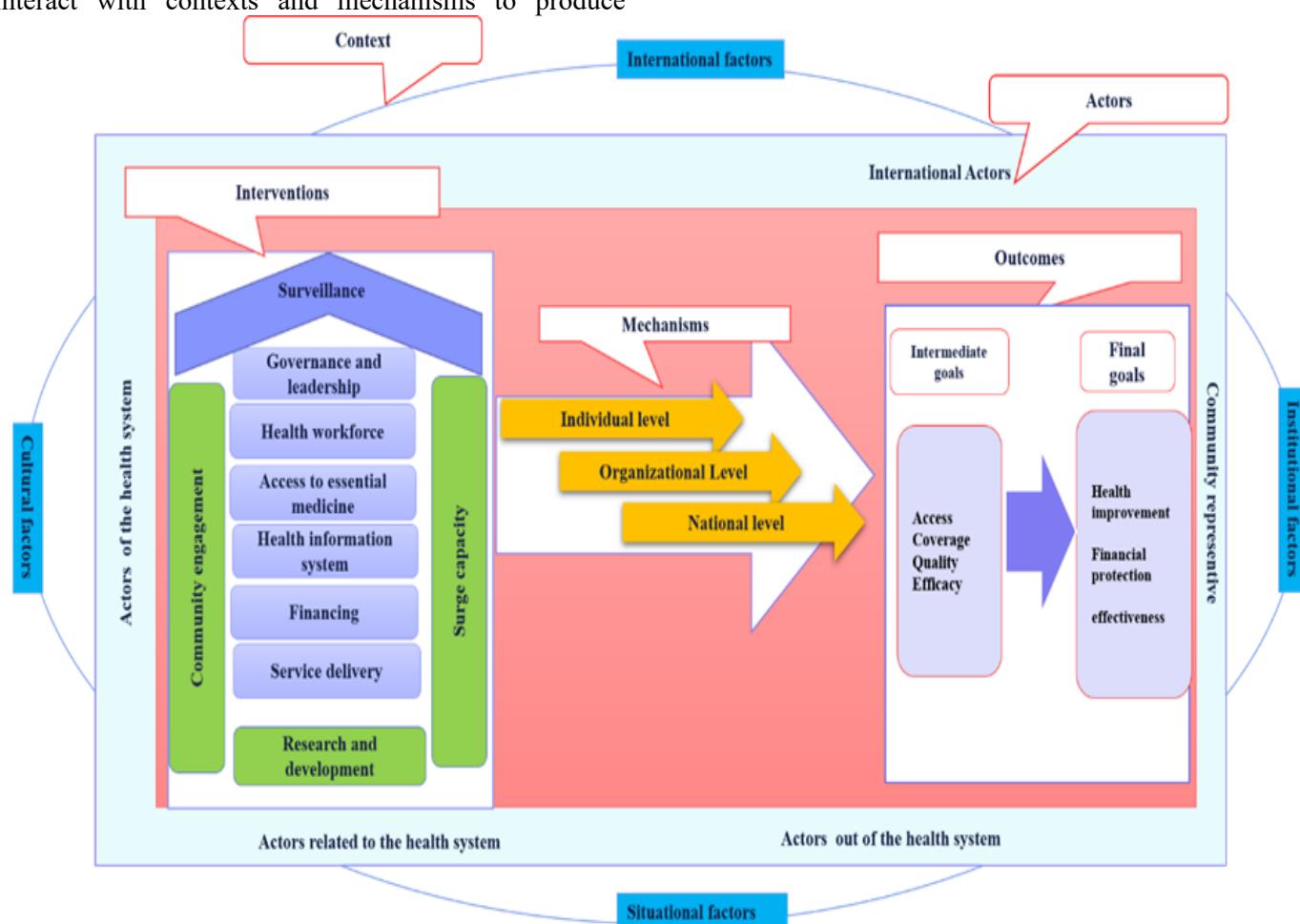
Interventions: Actions or programs designed to create change. Researchers examine how these interventions interact with contexts and mechanisms to produce

specific outcomes.

Mechanisms: Hidden or explicit processes that explain how interventions work in a given context. These processes are often related to individuals' motivations, beliefs, or behaviors.

Outcomes: The changes or effects that result from the interaction between interventions, context, and mechanisms. These outcomes can be positive or negative and impact individuals or communities.

Actors: Actors are defined as individuals or groups, both within and outside of the health system, who are involved in decision-making, implementation, and performance improvement. They have the ability to influence the achievement of health objectives.

**Figure 2.** Model for Strengthening Iran's Public Health System During Emerging Respiratory Disease Pandemics

Policy Options and Recommendation

- **Integration of Contextual Factors and Functional Mechanisms:** The success of the health system depends on understanding the interplay of cultural, economic, and international influences.
- **Continuous Monitoring:** Establish a performance evaluation system based on quantitative indicators (such as vaccination rates, service accessibility).
- **Inclusive Participation:** Promote collaboration between ministries, the private sector, and civil society for implementing solutions.
- **Establish a Special Task Force on Contextual Factors** within the Ministry of Health, including representatives from various sectors (economy, environment, culture).
- **Create an official position for a health system strengthening advisor** within the Ministry of Health structure.
- **Develop a stakeholder engagement strategy** involving co-creation of policies with local authorities, health professionals, and civil society to ensure relevance and uptake.
- **Disseminate findings** through targeted policy briefs, national health conferences, and digital platforms.

Discussion and Implementation Considerations

The proposed model to strengthen Iran's public health system during pandemics is based on a realist review and expert interviews, focusing on the WHO health system building blocks. It addresses challenges like fragmented governance, limited digital health infrastructure, and financing constraints, which were highlighted during the COVID-19 pandemic. A major barrier to strengthening Iran's public health system during pandemics is public mistrust, which undermines compliance with health directives and vaccine uptake. This mistrust stems from inconsistent communication, limited transparency, and political influences on health messaging. Comparative experience from other middle-income countries, such as Brazil and South Africa, reveals that transparent communication, local production of essential supplies, and community partnerships significantly improved pandemic outcomes^[9,10].

Iran can draw on these lessons while tailoring them to its unique socio-political context. Barriers like sanctions and public mistrust remain critical. To mitigate these, the model suggests promoting domestic innovation, enhancing regional cooperation, and deploying trusted community leaders in risk communication. Furthermore, fragmented intersectoral coordination, limited resources, and the loss of healthcare professionals due to brain drain all contribute to a compromised level of preparedness and response capacity. The centralization of decision-making also limits flexibility and responsiveness at local levels.

To address these barriers, strategies must include transparent risk communication, legal reforms to ensure accountability, investment in domestic production, and building trusted community-based partnerships to bridge the gap between government and citizens^[11,12].

The model recommends a phased approach:

- **Short-term:** Launch pilot sites for telemedicine and electronic health records and create a national task force with intersectoral authority.
- **Medium-term:** Reform health financing and invest in domestic vaccine production.
- **Long-term:** Build public trust through transparent communication, institutionalize preparedness drills, and foster multisectoral collaboration.

Conclusion

An effective response to respiratory pandemics requires a systematic approach with clear goals. Iran's public health system faces challenges such as inadequate infrastructure, limited resources, and varying public awareness. Proposed solutions include an indigenous model that addresses key elements like access to healthcare, community education, surveillance systems, and intersectoral collaboration. By focusing on these areas, the model aims to strengthen Iran's public health system and enhance its ability to respond to future pandemics, ultimately protecting the population's health.

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Competing interests

The authors declare that they have no competing interests.

Abbreviations

CIMO: Context, Intervention, Mechanism, Outcome.

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None

Availability of data and materials

The data utilized in this study are available from the corresponding author upon request.

Ethics approval and consent to participate

This study was approved by the Research Ethics Committee at Isfahan University of Medical Sciences (Ethics Code: IR.MUI.REC.1401.021).

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.

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