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Research Article

A Foresight Study of the Health System at the National Level in Iran: A Systematic Review

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Abstract

Context: Health systems' main mission is to improve society's well-being and fulfill their health needs.

Objectives: This study aimed to describe the intrinsic and extrinsic events that had influenced Iran's health system over the previous decade, as well as to identify the possible factors influencing it until 2025 and investigate their positive/negative impacts.

Methods: To determine previous driving forces, a systematic review of electronic databases was conducted up to December 2018. Then the most frequent contributing factors were extracted and discussed in expert panels, and finally, scenarios were composed. After identifying the internal and external driving forces as well as their effects, an input-output model was designed by using a sequence of events' scenarios. Finally, findings were presented using a scenario-based expert system model.

Results: The most important driving forces affecting health system's policies included "demographic changes", "economic changes", "natural disasters", "changes in population's health status", and "changes in the health system's management." Furthermore, other events such as "risks associated with emerging technologies", "cold wars", and "changes in personal vehicle utilization rates" may have, directly or indirectly, affected the benefits from health services, status, costs, and out-of-pocket payments.

Conclusions: In sum, it was found possible to implement the most effective crisis management system, eliminate the negative effects of these uncertainties, and reap the most considerable benefits by identifying the factors influencing health system, determining their interrelationships and effects, as well as designing separate scenarios for all possible outcomes.

Keywords: Health System; Driving Forces; Futures Studies; Uncertainty; Trend

1. Context

Health is one of the basic human rights; however, it is a rapidly changing field due to the ever-changing disease trends, medical technology advancements, and ever-transforming concepts. The health system's main mission is to improve people's health status and fulfill their needs (1). These needs have undergone rapid transformations as the result of various economic, social, cultural, political, and environmental events. On the other hand, diseases and health-threatening agents are also subjected to dramatic changes continuously, especially in the present era (2). Thus, matching the health system's responses to these changes is the most important requirement based on which the health system is promoted and transformed. Implementing change in the health system is a global challenge; but employing a smart strategy in Iran takes on an added importance, especially due to the health system's commitment to fulfill the health requirements and achieve the country's 20-year national vision.

Over the last four decades, Iranian health system has undergone various policy changes and executed several plans, which are prone to certain flaws and criticisms

(3). Iranian health system venues greatly depends on income derived from national exports (e.g., oil), leaving the system vulnerable to economic, political, and cultural crises as well as, more importantly, to economic sanctions. Out-of-pocket payment rates further illustrate the system's weaknesses in financing services. As the result, many of the primary goals and political developments aimed at achieving universal health coverage (UHC) have not been met, which in some cases has even led to unintended consequences (4, 5).

Even though the country has gone through some political reforms during the past decades, many of these political actions, decisions, and their impacts have not been thoroughly inspected yet (6, 7).

2. Objectives

This study, aimed to identify the uncertainty factors affecting the health system at national level and to propose appropriate coping strategies. This was an important step towards achieving the goals outlined in the health system's vision in 2025, which states: "I.R. Iran is a nation with the highest health status and the most developed health system in the region", "its general goals include promoting physical, psychological, social, and spiritual health", and "it is the top country in the region, which distributes health service based on equity and respects the Islamic, civil, and human rights".

3. Methods

This future study aimed to identify the driving forces influencing the Iranian health system by adopting an exploratory approach, predict the unexpected future agents likely affecting the system at the national level by conducting a situation analysis, and propose appropriate coping strategies in order to lift the heavy burden from the health system and families.

Knowledge is limitless; thus researchers are bound to and must only focus on a limited and specific scope. Our study limitations were of geographical, time, and expert availability nature.

3.1. Geographical Limitations

The context of this study as well as the reviewed strategies, policies, and plans were specific to Iranian territory (at a national level).

3.2. Time Horizon

The timeline considered for this study was until 2025.

3.3. Expert Characteristics

Views and comments of academic experts (i.e., university professors in social, technological, economy, and political fields), experts from government sectors (in public and government-affiliated organizations), and experts from private and industrial sectors were reviewed in this study.

The study was carried out in three stages: Data collection, method implementation, and output production. The techniques employed in this study were often complementary (i.e., the outputs of each were the inputs of the other). The steps, methods, tools, and techniques used in different stages are discussed in the following paragraphs.

3.4. Stage One: Collecting Input Data

A systematic review, expert panel, and STEEP analysis were performed in this stage in order to gather the required input and initial data. This stage's goal was to improve our understanding of the factors influencing health systems around the world, collect available evidence and, above all, identify key factors affecting Iranian health system's future.

To identify the effective components of Iran's health system, an electronic systematic search was conducted independently by two researchers. This systematic review was performed in careful steps as follows; a, determining PICO (i.e., population, intervention, comparison, and outcomes); b, designing relevant search strategies; c, defining inclusion and exclusion criteria; d, conducting quality assessment of included studies; e, performing data extraction; and f, performing data synthesis.

Study's structured components (PICO) were as follows:

- Target community: Iranian health system
- Intervention(s): Factors affecting Iranian health system
- Comparison(s): None
- Outcome: Relevant health system outcomes

Electronic databases, such as PubMed, Scopus, and Cochrane, were systematically searched until December 1st, 2018. To broaden our scope, other searching techniques and engines like Google, Google Scholar, reference tracking, and PRISMA were also utilized. Each database was searched by two independent researchers, and the disagreements were settled through discussions or third-party consultations.

3.4.1. Inclusion and Exclusion Criteria

There was no language and time limitations for inclusion. Various types of studies, such as randomized clinical trials, cohort studies, and case-controlled studies, were reviewed, and documents like background papers, technical reports, case reports, or letters were excluded. Relevant studies with available titles and abstracts, whose full texts were not retrievable despite our efforts to contact their authors, were also excluded.

3.4.2. Quality Analysis

Quality evaluation was conducted by two researchers

separately, and disagreements were settled through discussions or third-party consultations.

3.4.3. Data Extraction

Data extraction forms were designed based on the available documented information from included studies and the required information from similar and relevant previous studies. Data from several studies were extracted as a pilot, and then the extracted data were arranged in tables after identifying and resolving the form's defects. Extracted data included the study properties (i.e., design, duration, and follow-up period), factors affecting the health system, and measured health system outcomes. Two researchers worked separately on this specific template, and disagreements were settled through discussions or third-party consultations. The authors of the studies containing valuable information on their design or findings were contacted in order to extract further details.

3.4.4. Data Combination

The extracted data were combined qualitatively. To analyze them, the interviews were first documented and the qualitative evidences were coded; in other words, the important themes from the documented interviews were extracted and classified, and their interrelationships were identified to obtained their essence. Finally, the identified factors affecting the future of health system were listed.

After reviewing upstream and related documents, examining experiences of countries with similar conditions, and holding an expert panel among authors and some of the available health system experts, uncertainties were inspected based on two scenarios: Miracle and catastrophe.

It should be noted that data gathering for this step was performed based on the examination of future building blocks (i.e., trends, events, images, and actions) in each one of STEEP driving forces (i.e., social, technological, environmental, economic, and political) for a period of 18 years (until 2025).

3.5. Stage Two: Implementing Method

In this stage, affective driving forces of Iranian health system were identified performing cross impact analysis (CIA) by MICMAC software. This stage consisted of two steps: (1) identifying and describing relationships among identified variables, and (2) identifying key variables based on their relationships and influencing factors. In this stage, our researchers quantified the influence network in the format of matrix. Finally, the most important driving forces (in terms of importance and effect) from the ones that were in the second quadrant of the chart (dichotomous variable) were extracted based on expert opinion (expert panel).

3.6. Stage Three: Output Production

Finally, scenarios were narrated using a logical approach after identifying key factors, driving forces, and uncertainties, as well as drawing general view. To seek the experts' opinions, expert samples were obtained using a Heterogeneous Sampling method, with a consideration for multilateral expertise. In this study, five experts in social, political, economy, and technology fields were added to study's expert team; when narrating scenarios, futurist (as moderator), stakeholder, and experts were also present and guided the process.

4. Results

4.1. Identification and Inclusion of Studies

The search was conducted adopting the PICO strategy, and the inclusion and exclusion criteria were defined based on articles' titles and abstracts. Afterwards, the retrieved articles were listed in EndNote version 8 software. A total of 6299 related articles were identified, duplicates were removed by an initial review of titles and abstracts, and relevant articles were selected. Next, the full texts were thoroughly assessed by two researchers in order for identifying the relevant studies and recording the required information such as first authors' names, journals' names, and the findings. In this step, 2000 articles were found eligible for full-text review. Only the studies completely meeting our criteria (n = 7) entered the final stage. Removal of the articles during the screening was performed based on a credible and logical reason, the disagreements between two researchers were discussed, and the final decision was made by a third researcher when they failed to reach an agreement. Finally, the remaining studies were analyzed, and a PRISMA flew chart was used to display the inclusion and exclusion process (Figure 1).

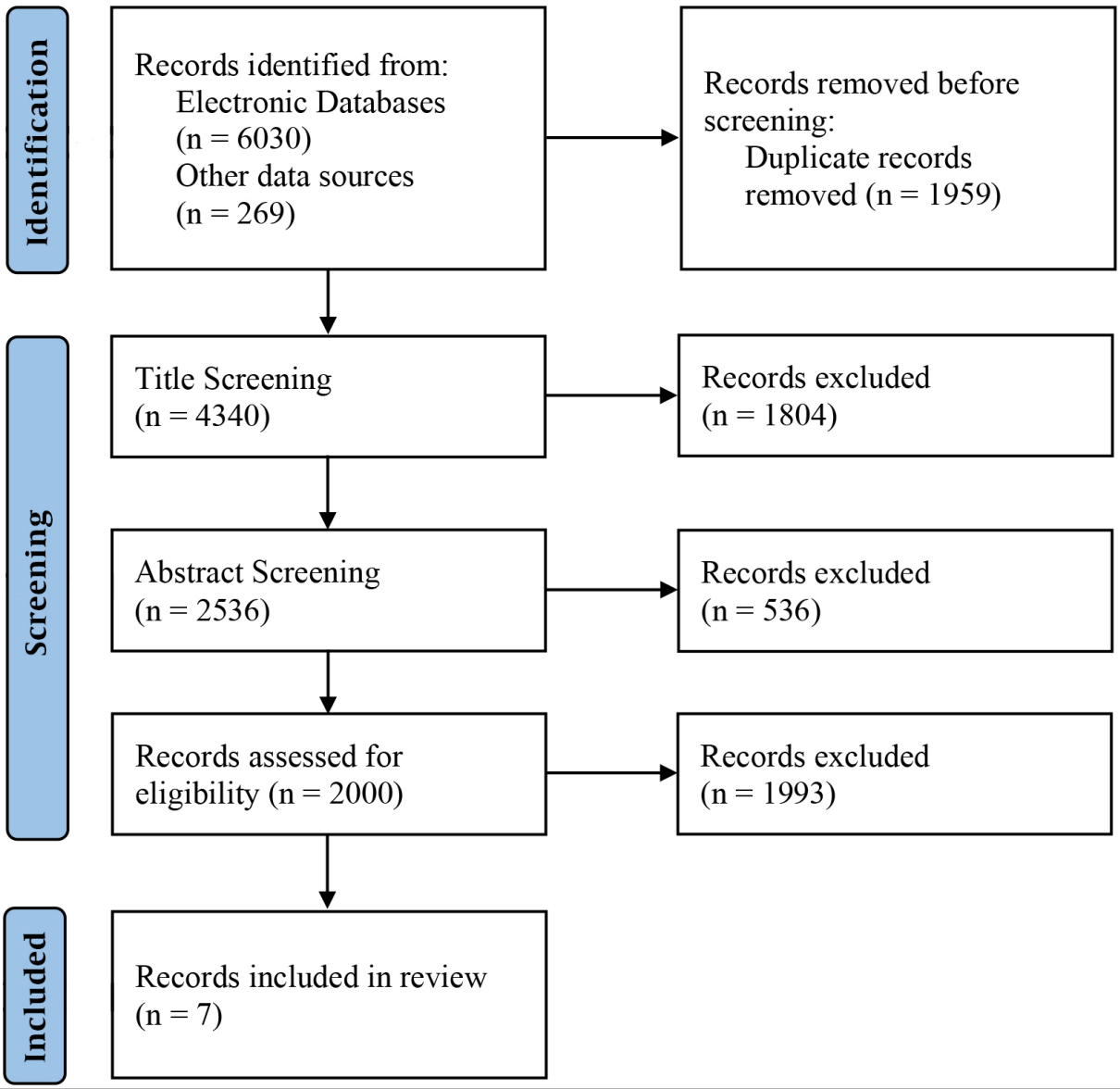

Figure 1. PRISMA chart of included and excluded studies

4.2. Included Studies' Characteristics

Seven studies were included in the review, which are presented in Table 1.

Table 1. The Studies Included in This Review

No.	Title	Year of Publication
1	From primary health care to universal health coverage in the Islamic Republic of Iran: A Journey of four decades (8)	2019
2	Iran's health system transformation plan: A SWOT analysis (9)	2018
3	Universal health coverage in Iran: Where we stand and how we can move forward (10)	2019
4	Qualitative analysis of national documents on health care services and pharmaceuticals purchasing challenges: Evidence from Iran (11)	2018
5	Moving toward universal health coverage: Four decades of experience from the Iranian health system (12)	2019
6	Health policy-making requirements to attain universal health coverage in the middle-income countries: A brief report (13)	2018
7	2012 - 2025 Roadmap of I.R.Iran's disaster health management (14)	2012

4.3. Analysis of the Studies' Findings

Overall, the findings from included studies were interpreted and analyzed as below (Tables 2-8):

Table 2. Scenarios Related to the Demographic Changes

Levels	Triggering Event	Sub-level Events	Definition	The Consequences of the Triggering Event
Demographic change	Sudden changes in the rates of urbanization, ruralization, and marginalization; sudden changes in population distribution	Transient demographic trends	Demographic changes due to changes in the fertility and mortality rates	Health costs; health status
		Sudden changes in people's expectations and demands	Changes due to two transient demographic processes and changes related to urbanization, ruralization, and marginalization, altering people's demands for health services.	Health costs; health status; financial protection
Scenarios	If the rates of urbanization and society's expectations of the health system increase, the costs of health also increase.			
	If urbanization increases, the priorities of the health system will be managing the infectious diseases and supplying safe drinking water.			
	If the urbanization rate increases, the infertility rate and health costs will increase due to poor environmental conditions (e.g., pollution, etc.) and the health status will decrease.			
	If urbanization increases, hidden unemployment and health costs will soar, and health status will decrease.			

Table 3. Scenarios Related to the Economic Changes

Levels	Triggering Event	Sub-level Events	Definition	The Consequences of the Triggering Event
Economic changes	Multilateral or unilateral sanctions	Changes in the unemployment rate	Changes related to the number of active members of the society who fail to find a job	The benefits of health services to people; financial protection; health status
		Changes in the inflation rate	Changes related to the soaring prices of goods and services	The benefits of health services to people; financial protection; health status
		Instability of the financial resources of the health system	Changes related to an increase or decrease in the share of the main financial sources of the health system in the budget	The benefits of health services to people; financial protection; health status
		Changes in GDP	Changes related to the values of all goods and services produced in the country	The benefits of health services to people; financial protection; health status
		Governmental budget surpluses or deficiencies	Changes associated with the failure to meet the government's predictions of incomes and costs in the budget bill	The benefits of health services to people; financial protection; health status
		Abrupt changes in disruption of drug supply chain	Changes in the production, import, and distribution of drugs	Supply (quality and efficiency) and distribution (access, equality) of drugs; boosting the efficiency and effectiveness of producing drugs and medical equipment; the benefit of health services to people
		Sudden changes in the health system's share in GDP	Changes related to the share of total health costs in GDP	The benefits of health services to people; financial protection; health status

Scenarios	If new sanctions are imposed on the country (e.g., international sanctions in addition to the US sanctions) and the country's overall inflation rate increases, the benefits of health services to people will decrease.
	If new sanctions are imposed on the country (e.g., international sanctions in addition to the US sanctions) and drug supply chains are disrupted, then the benefits of health services to people and the public's health status will decrease.
	If new sanctions are imposed on the country (e.g., international sanctions in addition to the US sanctions) and the government's budget deficiency increases, then financial protection programs for patients will be disrupted and financial protection will decrease.
	If new sanctions are imposed on the country (e.g., international sanctions in addition to the US sanctions), then GDP, the health system's share in the budget, financial protection for patients (a rise in out-of-pocket payments), and the benefits of health services to people and level of well-being will decline.
	If new sanctions are imposed on the country (e.g., international sanctions in addition to the US sanctions) and the country's overall inflation rate increases, then health will no longer be a priority for the government, reducing the implementation of preventive interventions and policies, the quantity and quality of research, and the quality of medical education.
	If new sanctions are imposed on the country (e.g., international sanctions in addition to the US sanctions), the unemployment rate of the country's active population will increase, while insurance coverage, the benefits of health services to people, and the public's health status will decrease.

Table 4. Scenarios Related to Natural Disasters

Natural Disasters	**Earthquake**	**Structural and non-structural vulnerabilities of health facilities when facing natural disasters**	**Hospital's structure should be strong and resistant enough to not only avoid damage but also provide health services to the victims when natural disasters occur.**	**Effectiveness and performance of the health delivery system; the benefits of health services to people; health status**
Scenarios	If a strong earthquake occurs in large cities and causes massive damage to vulnerable health service provider facilities, then the effectiveness of the health service delivery system and, consequently, its performance will decrease, leading to a dramatic decline in health status and care provision to the people injured physically and mentally by earthquake.			
	If a strong earthquake occurs in large cities and completely destroys the buildings of highly vulnerable health facilities and leads to the loss of hospital personnel and equipment, then the effectiveness and performance of the health service delivery system will be zero, which leaves heavy casualties, creates great psychological pressure, and raises expectations from the Ministry of Health. The loss of professors will also reduce the quality of medical education dramatically.			

Table 5. Scenarios Related to Changes Associated with Public Health Status

Changes Related to Public Health Status	**The emergence of lethal diseases**	-	**Sudden epidemics of infectious diseases such as influenza**	**Supply (quality and efficiency) and distribution (access, equality) of drugs; health status; health costs**
Scenarios	If sudden outbreaks with high mortality rates (like SARS) occur, public panic, sudden influx of people with various symptoms, and overcrowding of clinics will cause dissatisfaction among people and health personnel as well as increase the likelihood of failure among available facilities. The supply and distribution of drugs will be severely disrupted, health care personnel will become infected, and situation will be difficult for the Ministry of Health to control. Consequently, public health status will decrease, and requests for help from international organizations and other countries will be inevitable.			
	If sudden epidemics occur, health costs will increase.			

Table 6. Scenarios Related to Changes Associated with Health System Management

Changes Related to the Health System Management	**The president being a doctor**	-	**Changes in the health system in when a doctor is elected president**	**Effectiveness and performance of the health delivery system; the benefits of health services to people; financial protection; health costs**
	Sudden changes in the human resources management of the health system	A sudden change in the required manpower of the health system		Effectiveness and performance of the health delivery system; the benefits of health services to people; financial protection; health costs
		A sudden change in the capacity of admitting students in medical and paramedical fields	Changed annual capacities of admitting and educating students in medical and paramedical fields	
Scenarios	If the president is a doctor, then the decision-making power of the Ministry of Health will decrease, and a higher budget will be allocated to the Ministry of Health. The budget will be spent on populistic activities, and there will be a higher control over the health-related policies of other organizations. The policies opposing public health are less likely approved, and health services are distributed more fairly.			
	If human resource management policies change and the admission of medical students declines, the ratio of physicians to the population and the benefits of health services to people will decrease.			
	If human resource management policies change and the admission of nursing vs. medical students increases, the ratio of health service providers to the population and the benefits of health services to people will increase, reducing the government's health costs.			
	If human resource management policies change and the manpower needed by the health system increases, the benefits of health services to people and health costs will increase.			
	The sudden doubling of student admission capacity by the Ministry of Health will decrease the quality of medical education and treatment as well as the satisfaction rates of students, health providers, and patients.			
	If medical education is separated from the Ministry of Health, a shortage of staff and university professors will occur, and public hospitals' supervision will be reduced.			

Table 7. Scenarios Related to Changes Associated with Other Events

Other Events	**The threats related to emerging technologies**	**The demands raised by emerging new medical technologies**	**Changes related to emerging new medical technologies at prevention, therapeutic, and rehabilitation levels**	**Health costs; health status; financial protection**
		The threats of other technologies possibly affecting people's health	Changes related to the effects of "high-tech" technologies on public health	Health status; effectiveness and performance of the health delivery system; the benefits of health services to people
	Threats related to soft wars	Propagating big rumors; hacking	Changes related to the threats from adversaries (propaganda)	Health status; effectiveness and performance of the health delivery system; the benefits of health services to people
Scenarios	If the sequalae of new technologies arise (e.g., nuclear pollution), then people's health will decline.			
	If a soft war is initiated by adversaries, which increases the false rumors, then the benefits of health services to people will decrease.			
	If the provided new and beneficial health technologies are not approved by the society (e.g., rumors, etc.), then the benefits of health services to people will decrease.			

Table 8. The Combination of Rules Related to Driving Forces

The Recommended Interrelationships Between Events	**If unilateral or multilateral sanctions increase, then GDP and the share of the health system in GDP will decrease.** **If GDP decreases, the unemployment rate and marginalization will increase, and the public health literacy will decrease.** **If sudden climate changes escalate, then there will be sudden changes in the patterns of diseases as well.** **If unilateral or multilateral sanctions increase, the drug supply chain will be disrupted.** **If the government's general budget deficiency increases, then the inflation rate will soar, followed by sudden changes in the people's nutritional patterns.** **If the financial resources of the health system shrink, then the human resources of the health system will diminish, followed by sudden changes in the patterns of diseases.** **If the incidence of natural disasters and structural and non-structural vulnerabilities of health care facilities increase, then there will be sudden changes in the patterns of diseases.** **If the population transition moves toward the elderly, then there will be sudden changes in the expectations and demands of the population as well as in the patterns of diseases.**
Consequences	If health costs and out-of-pocket payments increase, then the benefits of health services to people will decrease. If health costs increase and out-of-pocket payments decrease, then the benefits of health services to people will increase. If health costs decline and out-of-pocket payments increase, then the benefits of health services to people will decrease. If the benefits of health services to people decrease, then public health will decrease. If the benefits of health services to people increase, then public health will increase.
A number of overall scenarios	If the country's general inflation rate increases, then health costs will increase and the benefits of health services to people will decrease. If unilateral or multilateral sanctions increase, then the benefits of health services to people and public health status will decrease. If unilateral or multilateral sanctions are reduced, then the benefits of health services to people and public health status will increase. If the drug supply chain is disrupted, then the benefits of health services to people and public health status will increase. If the government's budget deficiency increases, then the benefits of health services to people and public health status will decrease. If the share of the health system in GDP decreases, then the benefits of health services to people will decrease. If GDP decreases, then the benefits of health services to people will decrease. If the share of the financial resources of the health system decreases, then the benefits of health services to people will decrease.

Influential sudden events: These included demographic changes, threats related to emerging technologies, structural and non-structural vulnerabilities of health facilities, changes in climate and ecosystems, unbalanced development of urban areas, sanctions, threats associated with invasion and cold wars (15), changes in GDP and inflation rates, governmental budget deficiencies or surpluses (14), sudden changes in the budget, a sudden shrinkage in health system's share of GDP, sudden changes in health system human resource management, sudden changes in health system's payment frameworks, unsustainable health system financing, sudden changes in health system's workforce requirements, and sudden changes in drug supply chains (16).

Consequences: These included the benefits from health services, health costs, out-of-pocket payments, and health status.

The most frequent and influential driving forces reported in the studies were as follows:

Demographic changes: These included transient demographic trends, sudden changes in urbanization rates, ruralization and marginalization, sudden changes in population distribution, and people's expectations and demands.

Economic changes: These events included multilateral or unilateral sanctions, changes in unemployment and inflation rates, instability of health system's financial resources, changes in GDP, governmental budget surpluses or deficiencies, and sudden changes in health system's share of GDP.

Natural disasters: The factors in this section were structural and non-structural vulnerabilities of health facili-

ties to earthquakes and sudden climate changes.

Changes in people's health status: Changes in disease patterns, health literacy, and nutritional patterns were the most important factors in this area.

Changes related to the health system's management: The factors outlined in this section included sudden changes in payment frameworks, human resource management, and workforce requirements, as well as abrupt changes in disruption of drug supply chains.

Other events: These were the threats related to emerging technologies, cold wars, and changes in using personal vehicles.

4.4. Driving Forces' Primary Definitions

- Demographic changes
- Economic changes
- Natural disasters
- Changes related to the level of public health
- Changes related to public health status
- Changes related other events

4.5. The Primary Rules for Driving Forces

5. Discussion

Many health systems around the world have faced major challenges including, but not limited to, aging population, disease epidemics, increasing cost of using modern medical technologies, and rapid advancements, especially during the past few years. Another significant challenge is the inequity in healthcare service utilization in different countries. Despite the fact that this inequity must be eliminated in an ideal system, utilization rates among different groups vary in almost every country. Some governments have attempted to provide a standard level of services for all people by designing and implementing universal insurance plans, but these plans have faced numerous barriers for several reasons (17). In recent years, a key question has been posed for many governments of the developed countries with strong economies: "Despite the rapid trend of reforms and developments, how can we prepare our health systems to face unpredictable events?". All these concerns further highlight the need for future research by politicians and authorities. When planning for health system and factors affecting it, future studies, through scenario development, enable policy-makers and managers to understand the current situations and the probability of crisis, reach a consensus, act flexibly, make decisions, and visualize potential effects and outcomes without experiencing any shocks during a crisis (18, 19). According to the findings and arguments of the recognized policy-makers, a futuristic approach and decision-making is the key to success.

However, futures studies are an unfamiliar topic for health system stakeholders and experts, which highlights the need to create the relevant literary and cultural contexts. Although the publication of scientific documents, both educational and research, in this field is necessary, it should be accompanied and completed by appropriate practical measures. Changing managerial and dominating research views should be considered as a main strategy in countries' health sectors (13).

To study and predict the future of the health system transformation plan based on our country's health system goals until 2025, it is necessary to employ its key performance indicators. Therefore, the next step is to identify its strengths, weaknesses, opportunities, and threats. In addition, it is essential to analyze the trend of key political, economic, social, technological, and environmental indicators associated with the health system until 2025 as well as to evaluate their impacts. Finally, it is required to develop favorable scenarios for the proposed health system transformation plan's packages based on the identified and predicted uncertainties (20, 21).

After identifying all factors affecting health system, determining their interrelationships and consequences, and designing a separate scenario for each one of them, it becomes possible to implement the most effective crisis management system, eliminate negative effects of such events, and reap the greatest benefits from such situation.

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