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Designing and Launching Health Observatory Dashboard of Islamic Republic of Iran

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Abstract

Background: Health observatory dashboard can assist in promoting the quality of academic and governmental services by generator high-quality information. The aim of this research is to describe the stages of designing and launching the national public health dashboard.

Methods: This study was conducted with a qualitative approach and designing a web application using C#, ASP.NET and JQuery languages. The required data were gathered via 2 sources: (1) reviewing existing documents, and (2) gathering expert opinions.

Results: The dashboard is developed in 3 sections, including a conceptual model of the indicators, a page for selecting the indicators, and metadata of each indicator. The indicators are demonstrated in 3 classes based on data sources (surveys and routine data collection), health effects (mortality, morbidity, risk factors, service coverage, social factors affecting health, health system functions, financial protection, population indicators, and macro indicators), as well as a plan, including the health reform plan. The page for selecting the indicators includes 190 major indicators encompassing the 3 mentioned areas. The metadata of each indicator includes the indicator name, its definition, its last figure, its source, the section for descriptive and comparative diagrams (the indicator's trend, provincial distribution, and international comparison of the indicator), and policy options.

Conclusion: The Health Observatory System of Iran has been launched. The credibility of this system and user satisfaction depends on implementation of the health observatory calendar, qualitative control of the path of the recorded data, and national determination of policymakers.

Keywords: Observatory, Health Information Management, Health Indicators, Dashboard, Iran

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Introduction

According to Article 27 of the Universal Declaration of Human Rights, public participation in societal affairs is a right. Accordingly, people reserve the right to participate in determining their destiny. Participation in a local com-

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↑What is "already known" in this topic:
In Iran, the websites that present brief information on health information and indicators include the websites of Statistical Center and Ministry of Health. Yet, no website or system was found providing comprehensive health information for researchers, policymakers, and the public. The health observatory system was designed and disseminated as a charter by the Ministry of Health.

→What this article adds:
The dashboard was developed in 3 sections, including a conceptual model of the indicators, a page for selecting the indicators, and metadata of each indicator. The indicators are demonstrated in 3 classes based on data sources, health effects, and health reform plan.

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munity begins from sensitization, which is the first step in participation. This step is followed by awareness and knowing (1). According to the law of free access to information enacted on November 22, 2014, by the Council of Ministers (decree number: H490116T/99517) (2) in Iran, health information should be provided to social activists, planners, policymakers, researchers, and the public. The term "observatory" has recently found a wide range of applications across different sciences, including economics, law, health, and the environment. The use of "public health observatory" has gained popularity since the mid-19070s as a source for credible and accurate health information. Since then, various health observatories were established throughout the world (3, 4).

Health observatory assists in promoting the quality of academic and governmental services by generator high-quality information and relevant to those in need of that information. Health observatory prepares reliable information within the shortest time (3). Access to health information causes improved quality of health care services and enhanced satisfaction with the services. In addition, it helps policymakers to increase their speed and quality of decision-making. Accurate and timely health information is the fundamental part of any health system. When resources are limited or they are allocated unfairly, this information can develop a significant difference in survival and mortality, making it considerably valuable (5).

In addition, the health observatory can play a significant role in the following areas (6, 7):

1. Supervising the trend of disease and health in a country and specifying the at-risk regions
2. Identifying the information gaps in the country
3. Combining the information obtained from different resources and presenting solutions for health improvement
4. Determining health problems in the country
5. Evaluating the progress of local organizations toward health improvement and reduction of inequality
6. Vision to the future and giving early warning about the future public health problems

To provide health services, monitor changes over time, and determine health problems, countries need a clear image of the status of health and disease in the society (5). Therefore, one of the most important factors in making decisions and policies is the availability of information and timely access to evidence. The information available, especially in developing countries, is not accurate enough and sometimes the information needed to make a decision is not available (8). Iranian health system is facing the lack of a cohesive system to implement the results of health surveys in a national scale. Also, there is no coordination among prioritization, duration, and intervals of these surveys (9).

Despite the considerable significance of health information and health observatory in monitoring changes over time, determining health problems, and assisting in solving them, the health information is inaccessible or unreliable in developing countries. In Iran, despite the large expenditures on national and subnational surveys and routine data collection, no website or system was found to provide a comprehensive information on health information for researchers, policymakers, and the public. In Iran, the websites that present brief information on health information and indicators include the websites of the Statistical Center of Iran (10), Non-Communicable Disease Risk Factor InfoBase (11), and the Ministry of Health and Medical Education. Yet, none of them present a comprehensive information.

Since 2009, with formation of the National Institute of Health Research, the observatory was set as its first function in the agenda. After performing the essential studies, the health observatory system was designed and disseminated as a charter by the Ministry of Health and Medical Education (6). The design of health indicators dashboard for public access has been performed as one of the observatory elements. In this regard, in this paper, it was aimed to design an Iranian National Public Health Dashboard.

Methods

The current study describes the stages for the design and the launch of the Iranian national health dashboard. This dashboard is a system aimed to provide the policymakers and researchers with important health related information. The study was conducted as a qualitative approach in 4 consecutive phases:

1. A steering committee was formed for the study. This committee consisted of health deputy ministers (or their representatives) and academic members of the health system's observatory secretariat. A consensus was reached on the conceptual model for the study by the steering committee (Diagram 1).
2. A conceptual model was designed to choose the indicators and prepare the metadata for each indicator.
3. A web application was programmed to design the dashboard system according to the results of the previous phase.

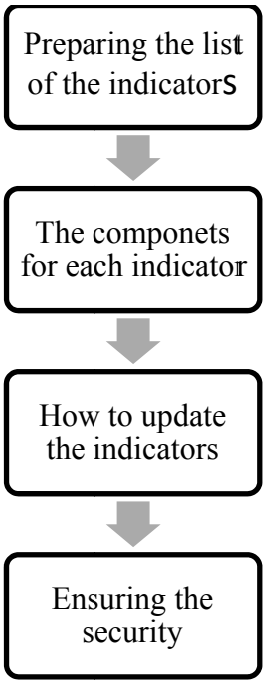

Diagram 1. The conceptual model of the study

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4. Data on indicators of choice were manually extracted from papers or published reports and were then used as an expected format for storage in the dashboard.

5. The updating and utilizations of the dashboard was done.

The "result chain" was considered in designing the model (12); therefore, the indicators were categorized into 2 groups: (A) impacts (death, diseases, harms); (B) outcomes (risky and protective behaviors, environmental conditions, social conditions, and health services). Then, for each group, the major indicators extracted by reviewing the related international and national documents included are as follows:

• The World Health Organization (WHO) core indicators (13), considered as the hub of the Iranian national public health dashboard

• Millennium development goal indicators (14)

• Health profile indicators in the Islamic Republic of Iran (15)

• Equity in health indicators in Iran (16)

• The death profile in the Islamic Republic of Iran (17)

In addition, Iran's commitments to provide indicators to the international organizations, such as the United Nations International Children's Emergency Fund and the WHO, were also considered.

A draft of the indicators list was prepared. Then, through interviews with 9 experts, including 3 epidemiologists, 2 medical specialists, 1 statistician, 1 management specialist, and 1 information technology specialist, the adequacy, reliability, the index ability of the indicators were reviewed. The intentional sampling method was used to select the experts, and the following criteria were applied: (1) participants had to be a faculty member of a university; (2) At least 10 years of experience; and (3) at least 1 related publication.

The experts' opinions were extracted and analyzed, which resulted in removing some indicators and adding new ones. Then, it was decided about the information on the indicator placed on the dashboard.

For this purpose, health dashboards in other countries, including the Scottish National Health Observatory (18), the World Health Organization's Health Monitoring System (GHO) (19), and the World Bank, were reviewed. Two focus group discussions (FGDs) were held with the study's steering committee. These 2-hour FGDs were held with the participation of 10 selected experts and representatives in charge of producing health data and information, which were selected by purposeful sampling method from all deputies of the Ministry of Health. During this session, participants expressed their opinions freely, and the facilitator moderated and directed the discussion, taking into account the dynamism of the group. Criteria for completing the group discussion were information saturation and failure to provide new data. The interviews were recorded with the permission of the participants. Note taking was also used while recording conversations. Lincoln and Guba criteria, including credibility, transferability, dependability, and conformability, were used to achieve trustworthiness of the data (20-23). Data were analyzed using the content analysis method. The output was the components of the index identifier.

In the next phase, a web application was designed and developed using C#, ASP.NET, and JQuery languages. In order to facilitate processing and presentation of any health care index, a physical information model of a health care index was designed. An adaptor class based on the physical information model was used to assist in processing.

Then, it was decided on how to update the indicators. To this end, for each indicator, a responsible body for updating the index or the related department in the Ministry of Health was considered. After an interview with the relevant departmental experts, the update period for each indicator was determined.

To ensure the security of the dashboard, group discussions were conducted with the security experts of the Ministry of Health. Finally, it was decided that, in order to maintain the security of the system, according to the instructions of the Statistics and Technology Office of the Ministry of Health, specific certificates must be obtained from competent authorities (18). The core users who would benefit from the dashboard at this stage are the senior level health policymakers.

Results

The first page of the dashboard is the login page. According to the image, after entering the username and the password, the user can enter the dashboard.

The dashboard was developed in 3 stages, including the conceptual model of the indicators, a page for selecting the indicators, and metadata of each indicator.

1. Once entered into the system, the user enters the page for classification of indicators. This classification is based on the result chain conceptual model. The indicators have been classified based on the type of relationship with health subjects (Fig. 1), according to Table 1.

2. By selecting each class (Fig. 2), the user enters the page for selecting the indicators of that class. In this page, the indicators related to each class can be observed and selected. For example, by selecting population indicators in this section, all population indicators are demonstrated.

3. The indicator's metadata page: The information provided about each indicator in the dashboard (metadata) includes the following information: indicator's name, its definition, diagrams (including the indicator's trend, its provincial distribution, its international comparison, and other diagrams related to it), policy option related to the indicator, and the information source employed.

After preparing the list of indicators, the following components should be defined for each indicator:

1. The updating period of the indicator: To update the indicators that are obtained through national surveys, it was decided to act based on the calendar for national surveys. This means that the updating period should correspond to the survey implementation period. For the indicators that are obtained through routine data collection, the updating period is set by the relevant organization in the Ministry of Health and Medical Education. Generally, to determine the updating period of the indicator, the collection source of the indicator and requests of international

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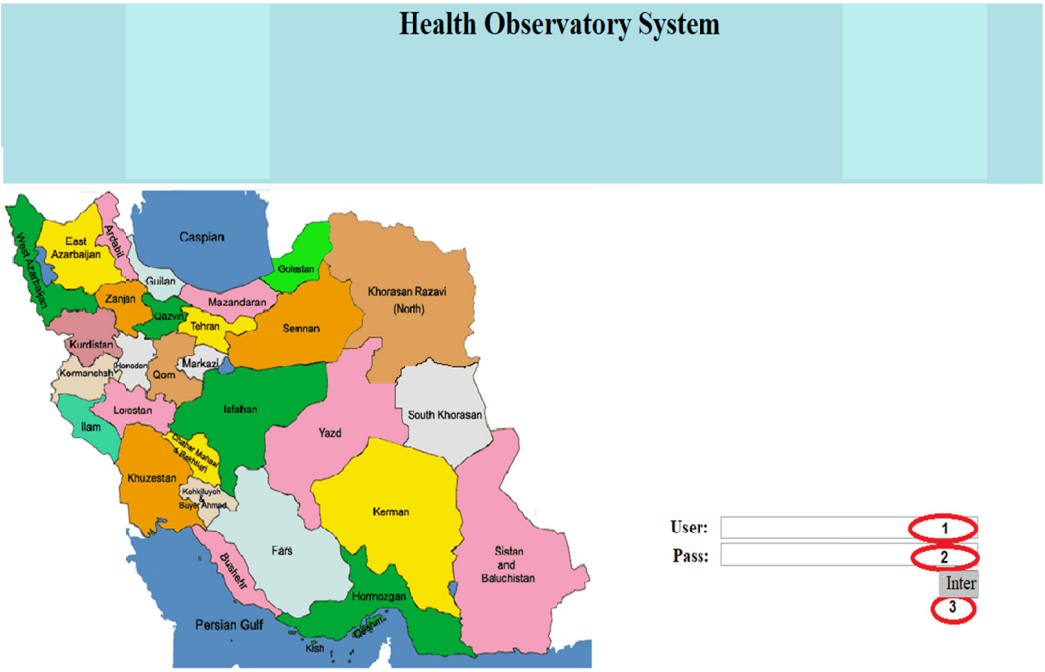

Fig. 1. The Figure of the first page of the National Public Health Dashboard: by entering (1) a username and (2) a password prepared for the users and then clicking on (3) the confirmation button, the user can enter the system.

Table 1. Classifying the Extracted Indicators to be Placed in the National Public Health Dashboard

Classification based on the conceptual model of result chain	Class	Indicators
Input	Financial supply	Per capita total expenditure on health, Out-of-pocket expenditure as % of total health expenditure, Private expenditure as % of total health expenditure, General government expenditure on health as % of general government expenditure, per capita of public health expenditure, the share of the cost of public health services and prevention to the total health expenditure, the share of public health expenditure to the total health expenditure, the public health expenditure to the gross national product, total health costs to the gross national product
	Human resources	Number of physicians, nurses, midwives, dentists, and pharmacists per 10000 population, Registered recent graduates of health profession educational institutions per 100 000 population (Physicians, Nursing and midwifery, Dentists, Pharmacists)
	Infrastructures	Number of hospitals per 1000 people, number of hospital beds per 1000 people, number of healthcare centers per 1000 people, number of imaging techniques per 1000 people
Output	Benefiting from health services	Number of visit for outpatient services by each type of service, Number of visit for hospitalization services by each type of service, the waiting time for receiving services, percentage of people with the need to services who have visited, percentage of clients who have received services
	Childhood risk factors	Vaccination coverage, prevalence of low birth weight, prevalence of Stunting, Wasting, underweight, overweight and obesity, exclusive breastfeeding
	Risk factors after childhood	Prevalence of smoking, inadequate physical activity, prevalence of overweight and obesity, hypertension, high blood glucose levels, high blood pressure
	Social factors affecting health	Divorce, Happiness, social capital, health literacy, internet penetration factor
Impact	Financial protection	Out of Pocket, Population with catastrophic health expenditure, Population impoverished due to out-of-pocket health expenditure
	Morbidity	Communicable diseases (prevalence of hepatitis, malaria, tuberculosis, cutaneous leishmaniosis and rabies, animal bites, non-communicable diseases (neurological and psychological diseases, cardiovascular diseases, cancer, diabetes, hypertension)
	Mortality	Life expectancy at birth, raw mortality rate, Maternal mortality in 100000 live births, infant mortality rate (0-28 days) per 1000 births alive, Under 1 year mortality per 1000 births alive, Under 5 years mortality rate per 1000 live births
	Satisfaction with Health services	The extent of satisfaction with hospitalization services, extent of satisfaction with outpatient services, satisfaction of the healthcare providers

organizations were taken into account.

2. A focal point person for each indicator: This person who can also be a faculty member should have complete mastery over the subject and indicator of interest. The focal point should be liable for updating the indicator in the dashboard as well as presenting or verifying the in-

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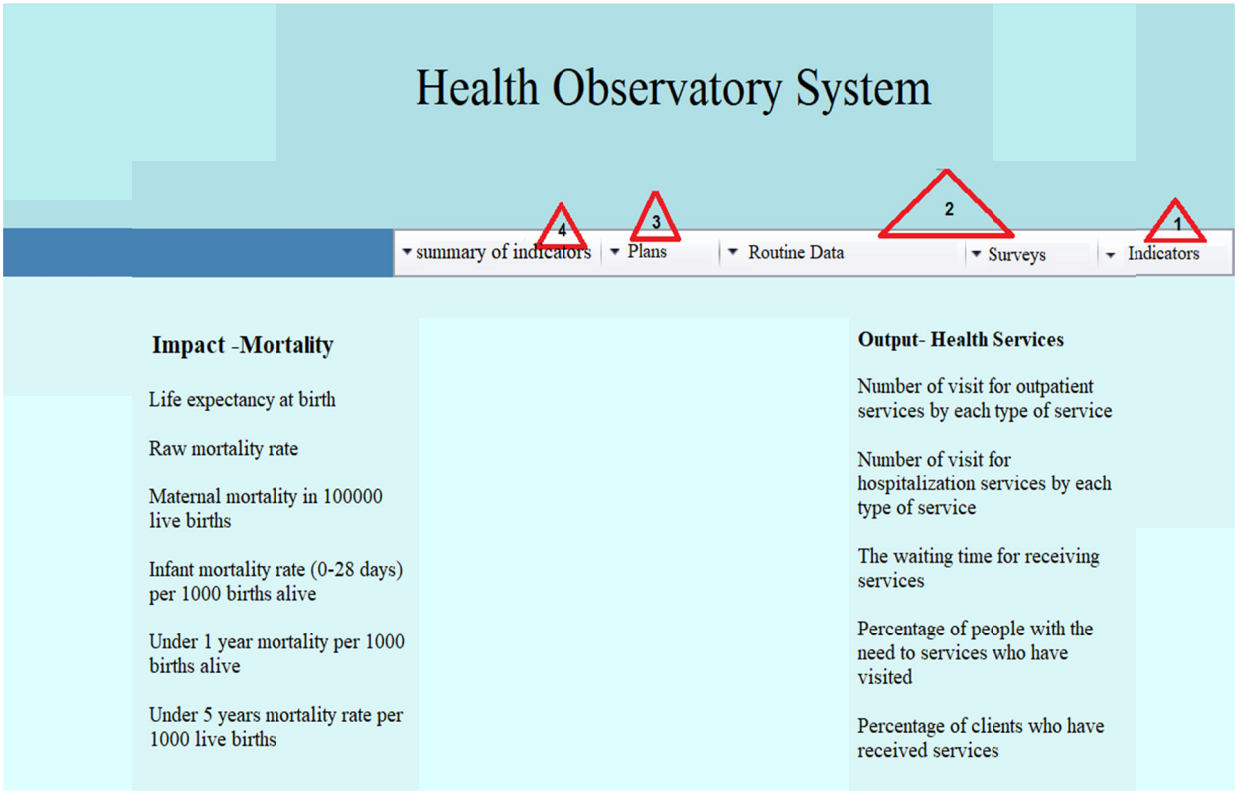

Fig. 2. The indicator selection page: In this page, the indicator of interest is selected and by clicking on it, the user can enter the metadata page of that indicator. As can be seen in the image, the indicators have been demonstrated in the general classes called (1) indicators, (2) surveys, routine data, and (3) plans. In the "indicators" section, classification in the "plans" part (3), the indicators related to the executive policies and plans, including the Health Reform Plan, have been presented. Another page called "summary of indicators" (4) has also been uploaded.

formation to be presented to international and domestic organizations.

3. The responsibility for the qualitative control of data and information entered into the dashboard: considering the nature of the indicators, the responsibility for quality control of each indicator was relegated to one of the groups or departments of the National Institute of Health Research.

The information related to updating period, the focal point responsible for the indicator, and the person in charge of qualitative control of data will be added to the indicator's metadata in the future. It has not been provided in this paper because of the names of these people.

For purposes of data security, currently this system can only be used specifically by the health minister, his deputies, and the presidents of medical sciences universities through a username and a password. To create access for these individuals, their names and email addresses should have been collected. For this, the necessary correspondence was done and for those who had sent the requested information, a username and a password were created.

Discussion

The dashboard has been developed in 3 sections, including conceptual model of the indicators, page for selecting the indicators, and metadata for each indicator. The indicators have been displayed in 3 classes based on data sources (surveys and routine data collection), health effects (death, disease, risk factors, coverage of services, social factors affecting health, health system functions, financial protection, population indicators and macro indicators), and a plan, including the Health Reform Plan. The page for selecting the indicators includes 190 main indicators encompassing the 3 mentioned areas. The metadata of each indicator includes the indicator's name, its definition, its last figure, its source, as well as the section for descriptive and comparative diagrams (the indicator's trend, provincial distribution, and its international comparison), and finally policy option. The page for selecting the indicators contains 190 main indicators encompassing the 3 mentioned areas. The metadata of each indicator includes its name, its definition, its last figure, its source, a section for descriptive and comparative diagrams (the indicator's trend, provincial distribution, and its international comparison), and policy option.

Compared with the dashboards of other countries, including Scotland (18) as well as the health indicators dashboard of Indiana State, USA (24), the National Institute of Health Research dashboard covers fewer indicators, although it covers many of the important and key indicators. In a comparison made with Core Indicator indicators of the East Mediterranean region (25), it was found that over 95% of these indicators were covered in the National Public Health dashboard. In terms of the indicator's metadata, the health information dashboard of the National Institute of Health Research offers more in-

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formation about an indicator. Another notable point observed when compared with the mentioned dashboards was the fact that receiving Excel output from the indicators and placing downloadable text files by users are not possible in this dashboard. Comparison of the extracted indicators with EMRO indicators reveals that the indicators extracted for the dashboard cover all EMRO indicators.

Regarding some of the indicators, the time of start of the project until presenting a relevant report is very long. Further, by the time the results of surveys whose implementation has been costly, the figures that are presented are related to several years ago. An example is the information associated with mortality, where the last report published on mortality profile in Iran goes back to 2011 (16), which has been published recently. The dashboard web application assists users to search for health care indices and visualized their trend. If users will require placing comment in relation to a particular health care index or the working of the content, they can refer to the forum module inside the dashboard web application and place their comments there.

As for future development, when a new health indicator is put forward, then a mechanism of online review and document for acceptance or rejection of that indicator requires to be implemented. Furthermore, a user with different educational or professional background may require customized views of the content presented. Therefore, customized views of the content are required to be implemented base on the user personal details. Another future development is adding downloadable text file and data file.

Limitations of the Study

Unfortunately, access to indicators to be displayed on the observatory system is not easily possible, and other sectors and organizations that generate information do not put much effort into this matter in spite of the minister's command. The principles of intersectoral collaboration in updating data should be considered. For this reason, the technical committee should consist all groups involved in updating, and financial and incentive resources should be provided for them. In this regard, the experience of other countries should also be used. Another important point is public participation in this process. Over time, public access should be available and understandable, for which the system needs further improvement.

Conclusion

The health observatory dashboard can assist in promoting the quality of academic and governmental services by generator high-quality information and relevant to those in need of that information. The Health Observatory System of Islamic Republic of Iran has been launched. In the future, completing and updating the dashboard require the collaboration and coordination of all sectors covered by the Ministry of Health and Medical Education. It has been suggested that the users' comments be constantly collected and applied. The credibility of this system and user satisfaction depends on the implementation of other components of the observatory system, including the implementation of the health observatory calendar, qualitative control of the path of the recorded data, and national determination of policymakers. Moreover, it is recommended to develop a monitoring hall to introduce data in a visual form specifically for policymakers.

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Ethical Approval

This study was approved by the Ethics Committee of Tehran University of Medical Sciences with ethics code 15/1401428.

Conflict of Interests

The authors declare that they have no competing interests.

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