







The necessity of a comprehensive response to the number and composition of oral healthcare teams in Iran using the system dynamics approach

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Abstract

Background: Considering the limitations of analytical models, it is recommended that modelling methods be used to solve complex social issues. Dynamic modelling helps policymakers to have a better understanding of system behavior. In health systems, considering the available resources and impact of decisions plays a key role in improving health. The lack of a dynamic and systematic attitude sometimes ignores the impacts, and the results are not desirable despite the cost. Considering the current situation, in this article, it is strongly recommended that a system dynamics approach be adopted to improve the health of society.

Methods: Using different articles, the use of modelling with a system dynamics approach has been introduced and emphasized.

Results: Studies indicate the promising role of modelling with a system dynamics approach in the cost-effective improvement of oral health.

Conclusion: It is suggested that oral health decision-makers should focus on applying existing data and using them in system dynamics modelling to forecast and predict new policies before implementing them at the community level.

Keywords: System dynamics, Oral health, Health policy

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To Editor,

Futures research is an approach aiming not only to understand the possible future, but also prepare to make decisions for the future. Futures research begins with the identification of various alternatives for the future, investigates these alternatives, considers their probability, and examines them in terms of favorability.¹ Prediction in exploratory research – which includes modelling as one of its types – is built on valuable information from the present and past and is widely used by economists. In exploratory modelling, the problem is mapped from the real world and transferred to the world of models, which is a space for abstraction.² The changes in the system are perceived, analyzed, and optimized over time, and the solution obtained from the model is generalized to the real world. Dynamic models are used in addition to the status of the system's key variables at present, the state of the system in the past plays a significant role in the future of the system as well. This refers to the hysteresis properties, which means that the history of the system should be considered. Furthermore, when the relationships between the system variables are nonlinear,

the numerical simulations of the dynamic behaviors of the system help to predict the future.³

There is a need to estimate the future demand for oral health services in Iran. The acceleration in this demand or a mismatch between supply and demand could perpetuate the inequalities in oral and dental health.⁴⁻⁶ The problem of the oral health labor force has been a place of much debate in Iran, especially in recent years. The main problem is whether the current trend of dental education and the increasing number of dentists will actually positively affect dental healthcare indices at the national level or not? Is there a better solution that can effectively improve dental healthcare indices in the whole dental health system? The type, number, and specialization composition in the dental team and in the healthcare system can vary based on the orientation of the healthcare system, especially the dental health system. However, factors such as demographic changes, oral and dental problems specific to the country, socio-economic, geographic, and cultural conditions of the community, and laws and regulations play a significant part in determining the composition of this team.^{6,7} It should



also be noted that reducing dental problems would not necessarily reduce the need for oral and dental care and the community will still need educational and preventive measures.

System dynamics is an approach to studying the nonlinear behavior of complex systems over time considering stock and flow variables, internal positive and negative feedback loops, nonlinear dependencies, and time delays. It is a mathematical modelling technique and method for framing, understanding, and discussing complex issues and problems. System dynamics was originally developed in the 1950s to help corporate managers improve their understanding of industrial processes.⁸ It has been used to analyze population health issues since 1970s in the fields of (1) disease epidemiology, (2) addiction and drug abuse, (3) patient flows in healthcare systems, (4) healthcare capacity and delivery, (5) policy making in public health issues, and (6) dynamics of health-related behaviors, habits, etc.⁹

On the other hand, based on the present research team's experience indicating the use of system dynamics modelling in previous studies to predict health behaviors^{10,11} and the preference of this technique to estimate the size of the health service labor force, it is recommended that a model of system dynamics be established in Iran, so as to predict the suitable number and composition of the oral health workforce in the country. It must be mentioned that many countries are currently using this type of modelling to estimate labor force composition¹²⁻²⁷ as a solution to reduce the costs of field testing the policies, given the large number of variables influencing the composition of oral health teams. These variables include the level of oral health in the region, the ratio of dentists to the population in rural and urban areas, the number of visits to the dentist, the number of dentists in rural and urban areas, the number of hygienists in rural and urban areas, the number of students, the number of colleges, per capita treatment costs, and the distribution of dentists across the country. Exploratory futures research and dynamic modelling can be used to investigate the results of the implementation of past models in the healthcare system and manage and design an optimal response to modern challenges, such as the increased number of dental students, in the country.

Authors' Contribution

Conceptualization: Maryam Sadeghipour, Peyman Shariatpanahi.

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Competing Interests

The authors have no conflicts of interest to declare.

Ethical Approval

Not applicable.

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