Research Paper

Identifying and Prioritizing Social Determinants of Population Health in Iran: A Mixed Method Research

Nafiseh Salehnia[1], Abbas Assari Arani[1*], Alireza Olyaeemanesh[2,3], Hossein Sadeghi Saghdel[1]

1. Department of Economic Development and Planning, Faculty of Management and Economics, Tarbiat Modares University, Tehran, Iran.
2. Health Equity Research Center (HERC), Tehran University of Medical Sciences, Tehran, Iran.
3. Department of Health Economics, National Institute of Health Research, Tehran University of Medical Sciences, Tehran, Iran.

ABSTRACT

Background and Purpose: In recent decades, research has shown that social determinants of health (SDH) affect population health more than medical care. Therefore, identifying the SDH has become a top priority.

Materials and Methods: It is an explanatory-sequential mixed-method study. We used the meta-synthesis method in the first step to identify and prioritize social determinants of population health in Iran. Then, the identified factors were shown in a semantic map. Afterward, we used fuzzy Delphi to screen and determine each factor's importance in Iran.

Results: A total of 172 factors were identified and classified into 4 levels: individual, local, national, and global. After screening items, parental competence, hope, addiction, types of pollution, inflation, and unemployment rate (the crisp value of defuzzification 9-10) are generally the most important determinants of population health at the individual and national levels in Iran.

Conclusion: The resulting semantic map of SDH demonstrates the substantial effect of non-health policies on the health of Iran's population. This finding proposes health as a complex and comprehensive system needing an interdisciplinary approach to address its multiple determinants. Specifically, the comparative analysis of this research shows that among the determinants of health in Iran, parental competence, individual behaviors such as addiction, and spiritual and mental health, including depression, suicide, and stress, are the most important SDH in Iran.

Keywords: Social determinants of health, Public health, Population health, Health policy

* Corresponding Author:
Abbas Assari Arani, Associate Professor.
Address: Department of Economic Development and Planning, Faculty of Management and Economics, Tarbiat Modares University, Tehran, Iran.
Tel: +98 (21) 82883630
E-mail: assari_a@modares.ac.ir

1. Introduction

According to the World Health Organization (WHO), the social determinants of health (SDH) refer to the circumstances effective in individuals' health outcomes, including the environmental, economic, social, and cultural factors that influence their experiences from birth to old age, as well as the societal structures and processes that shape these conditions [1]. These systems include economic system, culture and social values, governance, and policymaking, national policies and social environment [2], immigrant policies, laws, regulations, institutions, and agencies [3], economic stability, education, neighborhood, and living environment [4], perceived neighborhood crime [5], adjustable housing, sustainable employment, access to healthy food, and quality schools [6].

Public health focused on the physical environment in the late 19th and early 20th centuries. For example, people's life expectancy increased dramatically by improving the safe drinking water supply, sanitary housing, sewage system, workplace safety, and healthy eating. In the later decades of the 20th century, the focus on access to healthcare led to the further extension of lifespan. In recent decades, studies have increasingly shown how economic and social conditions determine health and how the heterogeneity of health status in various groups is more related to economic and social health factors than health services [7].

In recent decades, empirical and conceptual studies have mainly concentrated on proximal social determinants such as individual traits. Although studying these factors is relatively easy, they are far less critical and controllable for policymakers than macrosocial factors such as tax policies [8, 9]. Public health interventions should address social determinants of health (SDH) to improve population health. Public health has both direct and indirect effects (through social determinants) on population health [10]. Hence, with the emergence of public health, researchers in this field have been more interested in studying the role of social health factors, investigating how social conditions affect health and how to arrange them to improve population health [11]. It is promising for policymakers to identify the social factors affecting health outcomes as their interventions control and change these factors [8]. Many of these health determinants depend on the other sectors outside the health system [2]. Thus, the main issue is the other sectors' awareness of the effects of their decisions on health and the integration of health goals with other policies by addressing the health determinants in all sectors. Conceptual models can help policymakers

better understand the situation and make more appropriate interventions. Despite numerous studies on the health of Iran's population, they have insufficiently and inadequately examined health's social and economic determinants. Developing a comprehensive map of the SDH could facilitate a coordinated government response to address health issues and disparities in society. Determining the importance and prioritization of the determinants of population health can reveal the most important policy goals and help policymakers allocate resources optimally to promote population health. This study aims to answer the following two main questions:

What are the social determinants of population health?

What are the prioritizing social determinants of population health in Iran?

So, first, by analyzing the available scientific sources, the determinants of health at all levels and sections were identified and categorized. It represents a comprehensive picture of these factors via semantic mapping from different perspectives and levels. This semantic mapping allows decision-makers to effectively identify the determinants of population health. In the next stage, experts used the fuzzy Delphi method to determine the most important social determinants of population health in Iran. Determining the most important factors can help policymakers invest appropriately and allocate resources optimally to promote population health.

2. Materials and Methods

This study employs an explanatory-sequential mixed-method study, combining and integrating quantitative and qualitative approaches in a single model [12]. This mixed approach offers a more revealing insight into the research issues and complicated phenomena than either method separately [13]. The mixed method approach is used in this research. The research process is shown in Figure 1.

Meta-synthesis

This research employs a meta-synthesis method to map the SDH. The meta-synthesis method is a qualitative research strategy that provides researchers with a systematic approach to combine study and identify hidden themes and analogies. Qualitative syntheses currently encompass a wide variety of methods without established guidelines since they are a relatively recent field of research [14]. We used Sandelowski and Barros's 7-step approach [15] as follows:
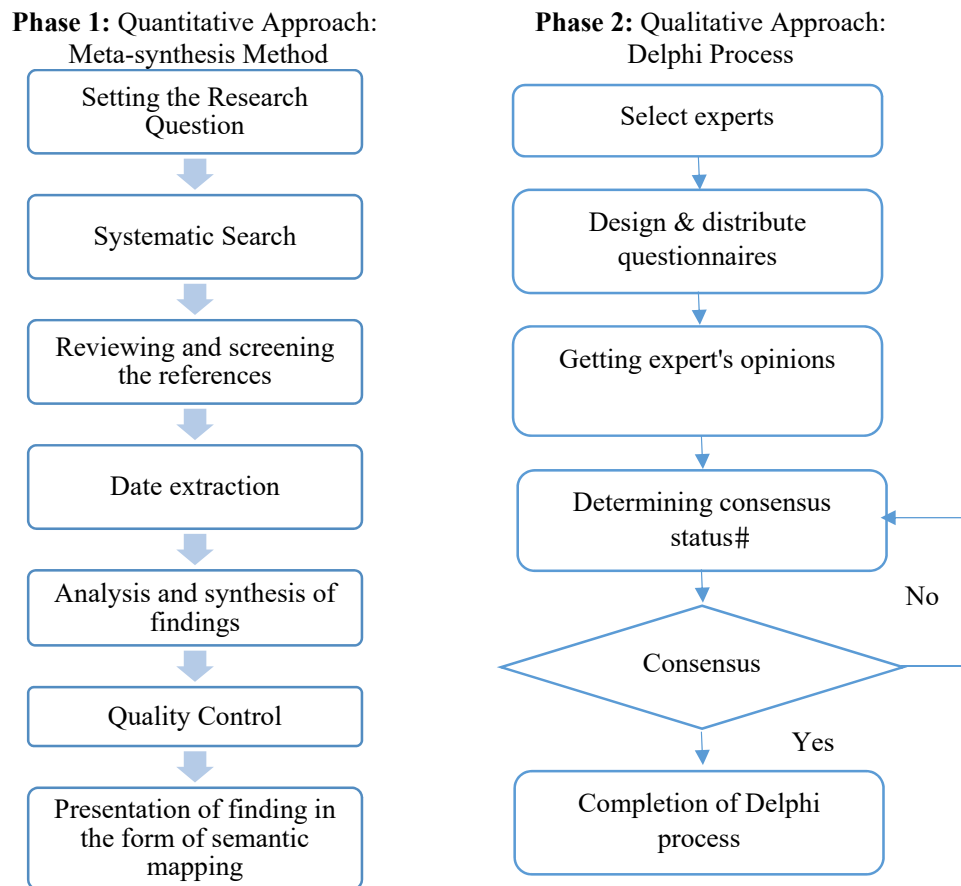
Phase 1: Quantitative Approach: Meta-synthesis Method

Phase 2: Qualitative Approach: Delphi Process

Figure 1. Research process

Step 1. Formulating the research question

What are the social determinants of population health?

Step 2. Systematic search

This step searches the keywords including "social determinant of health", "SDH", "determinant of health", and "socioeconomic factor" in the scientific databases, including Google Scholar, ScienceDirect, Springer, Emerald, PubMed, ProQuest, and Scopus published from 2000 to 2020. Searching the keywords offers us the first group of scientific sources, paving the way for searching other related references.

Step 3. Reviewing and screening the references

This step reviews and filters the resources derived in the previous step based on our criteria, including title, abstract, and content (including citation information, the use of other models in the research and repetitive-

ness, non-clarification of the detected components, and the lack of access to the content).

Step 4. Extracting information from the resources using the qualitative content analysis method

This step uses the qualitative content analysis method to extract the social determinants of health from 58 resources. Since this study aims to identify and categorize all social determinants of health cases, it first investigates the whole text to mark those sections related to social determinants of health according to our initial perception. Then, our predefined codes encrypt the marked parts. Also, new codes are assigned to parts of the text not encrypted according to this marking. Accordingly, this step reviews all the studies and selects the codes related to the keyword to form categories, themes, and subcategories. A part of the qualitative content analysis checklist is shown in Table 1.

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Table 1. A Part of the qualitative content Analysis checklist

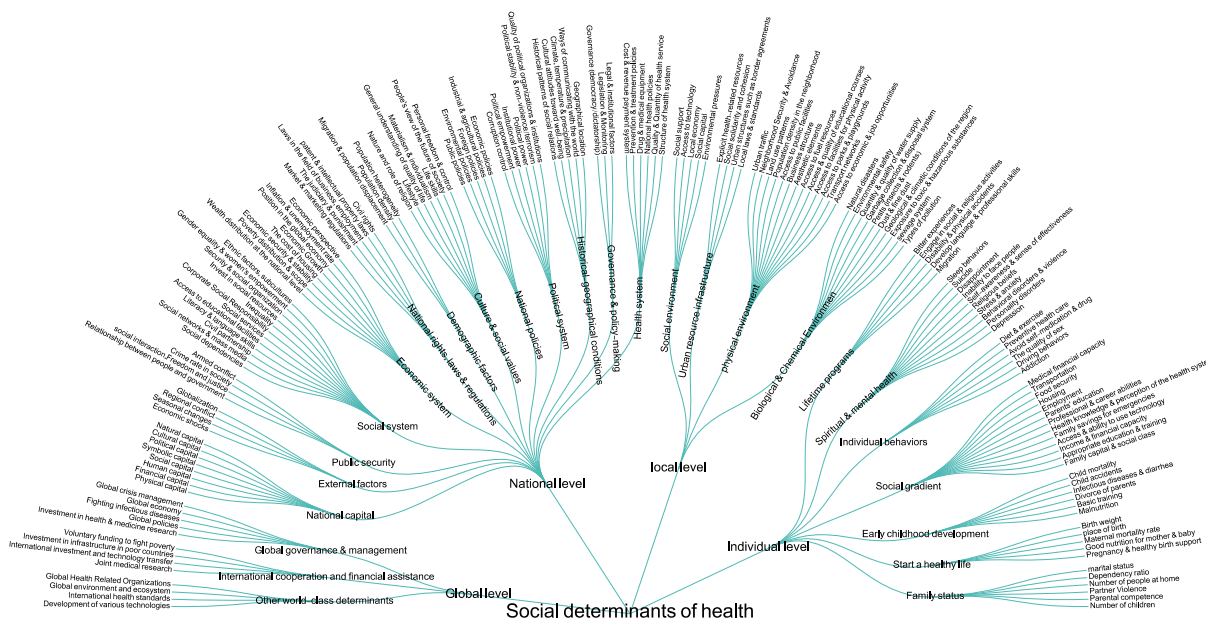| Author(s)	Social Determinants of Health
Elias et al., 2019 [6]	Housing, transportation, access to healthy food, and quality schools;
Steven et al., 2019 [3]	immigrant policies, laws, regulations, and court rulings, demographic, economic, and political factors at the state and national level; housing, the criminal justice system, labor market system, institutions & systems: (medical care, education, politics); State policy domains: health and welfare benefits, higher education, Labor and employment, driver's licenses & IDs, and immigration enforcement. Individuals: social-psychological impact of experiences, structured opportunities
Stefanacci & Riddle, 2018 [4]	Economic stability (employment, food insecurity, housing stability, poverty), Education (primary education, enrollment in higher education, high school graduation, language, and literacy) Health and treatment (access to health care, access to primary care, health literacy), Neighborhood and living environment (access to healthy food, crime, environmental conditions, housing quality, transportation and infrastructure, safety, physical activity, and lifestyle), social and communication contexts (civil participation, discrimination, imprisonment, social cohesion)
Hahn et al., 2018 [16]	Racial and ethnic, health care, education, employment, housing, rights of property, marriage, protection by the laws, freedom of contract, trial by jury, civil rights laws and their enforcement, elements of a society's organization and process, societal distribution of resources that in turn affect disease, injury, and health, pathogens and environmental toxins, resources for prevention and treatment, equal access to healthcare opportunities– likely to have greatest effects on lower-income families, including many racial and ethnic minority families, Equitable access to employment, living wages, and fair opportunity for promotion, location, and condition of housing affect occupants' safety, distance from polluted environments, access to community resources, including transportation, food, recreation, employment, and financial institutions, basic conditions of shelter, quality of educational opportunity, place of residence, home ownership
Bruner, 2017 [17]	Social gradient, health policy, food, transportation, employment (job security and job satisfaction), poverty, family savings/economic capacity to respond to emergencies, housing safety, stability, reasonable prices, stressful situations, feelings of anxiety, inability to meet people, stress at work, addiction, depression/mental health, bitter experiences, including violence and abuse, sense of personal effectiveness, resilience, hope, self-awareness, social relationships, and well-being, a good start in life means supporting mothers and young children; development and basic education, social exclusion, social support (friendship, good social relations, and support networks), Parental competence, social support engaging in positive activities, bitter experiences, environmental safety, home and neighborhood (housing free of environmental hazards and toxins, and safe neighborhoods)
Hauck et al., 2016 [18]	Equality from the beginning (childhood interventions), education, urban and rural living conditions, agricultural production, living environment, improved water source and improved sanitation, infrastructure investment, urbanization, investment in road infrastructure, particulate emissions, equitable employment, lifelong social support, dependency ratios, social security systems, global health care, private health expenditures, gross domestic product, health justice in all policies, systems, and programs and fair credit, global governance, quality of political institutions, market responsibility, support for the elimination of direct market restrictions and competition, trade openness, export and import pattern, foreign direct investment, gender equality, Women's empowerment, political empowerment, democracy/tyranny
Davis & Chapa, 2015 [19]	Economic conditions, politics, social and environmental factors such as education, housing, neighborhoods, family and race, limited choice of healthy foods and places to exercise, social disability or discrimination, distribution of money, power, and resources, social values, culture, government and social policies, income, employment, social class, gender and race/ethnicity, policies and practices that maintain a hierarchical structure of power, credibility, and access to resources, including discrimination, educational access, job opportunities, poverty, and racial segregation, psychosocial factors such as stressors and social isolation or social cohesion, behavioral factors, such as smoking, diet, and exercise. Health care system: access to care, preventive services, transportation and income, social structures promoting a healthy lifestyle
Chimed, 2014 [20]	Healthy lifestyle: alcohol consumption, smoking, diet, physical activity, overweight/obesity, low consumption of fruits and vegetables, physical inactivity, current job, education, fivefold wealth
World Health Organization, 2013 [21]	Experiences of early life, education, economic status, employment, housing and environment, and effective systems in preventing and treating ill health, eradicating hunger and poverty, ensuring food and food security, access to safe drinking water and health, social support, achieving equitable economic growth, better global governance, enhance international cooperation and development, participate in policymaking
Wolff, 2011 [22]	Poverty, poor living and working conditions, better education, especially in earlier years, encouraging lifestyle changes, health system strengthening and reform, exercise, school meals, and housing repairs, psychosocial facts: problems with sleep and digestion, stress, social networks, autonomy

Figure 2. Semantic map of social determinants of health

Step 5. Analysis and composition of findings

After identifying the SDH, these factors were classified into 4 levels: individual, local, national, and global.

Step 6. Quality control

This stage evaluates the reliability of the results by calculating Cohen's kappa coefficient. The results are reliable since the value of this index lies in the valid range (Equation 1, 2 and 3).

1. Agreements observed=(27+0)/31=0.87

2. Chance agreements=(27/31)×(31/31)×(4/31)×(0/31)=0.00

3. K=(0.87-0.00)/(1-0.00)=0.87

Step 7. Presentation of finding in the form of semantic mapping

The semantic mapping of social determinants of health is presented in Figure 2.

The first level is the individual, whose social determinants have 7 subcategories (family status, start a healthy life, early childhood development, social gradient, personal behaviors, spiritual and mental health, and lifetime programs). At the second level, which is local, these factors are in 4 subcategories (biological and chemical environment, physical environment, urban resource infrastructure, and social environment). At

the third level, SDH at the national level is categorized into 13 subcategories (health system, demographic factors, national rights, laws and regulations, national policies, economic system, governance and policymaking, historical-geographical conditions, political system, culture, and social values, social system, public security, external factors, and national capital). At the last level, these factors lie at the global level (global governance and management, international cooperation and financial assistance, and other world-class determinants).

Fuzzy delphi process

The Delphi method is an expert group decision-making model [23]. We used the fuzzy Delphi technique algorithm to screen social determinants of health and identify the most important determinants of population health in Iran.

Selecting experts is the first step of the Delphi technique. Based on various studies about the composition panel of the Delphi technique, an effective approach involves a mixture of individuals with diverse expertise [24, 25]. In this study, the expert group includes experts or professionals from the healthcare sector, academia, and government departments.

The panel size for the Delphi technique is a topic of some debate, with divergent views among scholars. Hogarth (1978) proposed that an optimal Delphi panel size ranges from 6 to 12 members, while Clayton (1997)

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suggested that a panel of 5 to 10 experts with diverse specialties can be adequate [24]. We selected 14 members for the Delphi technique.

Step 1. Collect and fuzzify expert opinions

Different types of Likert scales can be used for gathering experts' opinions; we used a 7-point scale on the significance of criteria. We display any expert's opinion as a triangular fuzzy number (l, m, u).

Step 2. Fuzzy aggregation of fuzzified values

In the second step, we calculate the fuzzy average of experts' opinions. Following the theoretical framework, once a consensus is reached among the panelists in the final round of the Delphi process, the items are evaluated and screened based on their average score.

Step 3. Defuzzification

Defuzzification methods can be complex and numerous, with some simpler techniques, such as averaging fuzzy triangular numbers, being available. This study employs a more sophisticated defuzzification technique, explained as follows [24] (Equation 4):

$$F_{ave} = (L, M, U)$$

$$4.\ x_m^1 = \frac{L + M + U}{3};\ x_m^2 = \frac{L + 2M + U}{4};\ x_m^3 = \frac{L + 4M + U}{6}$$

$$Crisp\ number = Z *= max(x_{max}^1, x_{max}^2, x_{max}^3)$$

Step 4. Screening criteria

A threshold should be calculated after the defuzzification of values for screening items. In this study, the threshold is 0.7. If the crisp value of defuzzification is larger than 0.7, the criterion is followed. If the criterion is less than 0.7, it is removed.

3. Results

After screening items, at the individual level: the number of children (0.625) and the number of people present at home (0.694); at the local level: access to fuel resources (0.669), aesthetic elements (0.67), local laws and standards (0.655), social solidarity and cohesion and collective efficiency (0.66), and urban structures such as border agreements (0.6); and at the national level: patent and intellectual property laws (0.694), legal and institutional factors (0.651), climate (0.67), the nature and role of religion (0.673), corporate social responsibility (0.691) and invest in social resources (0.697) are removed. For other items, if the crisp value of defuzzification is larger than 0.7, the criterion is conformed.
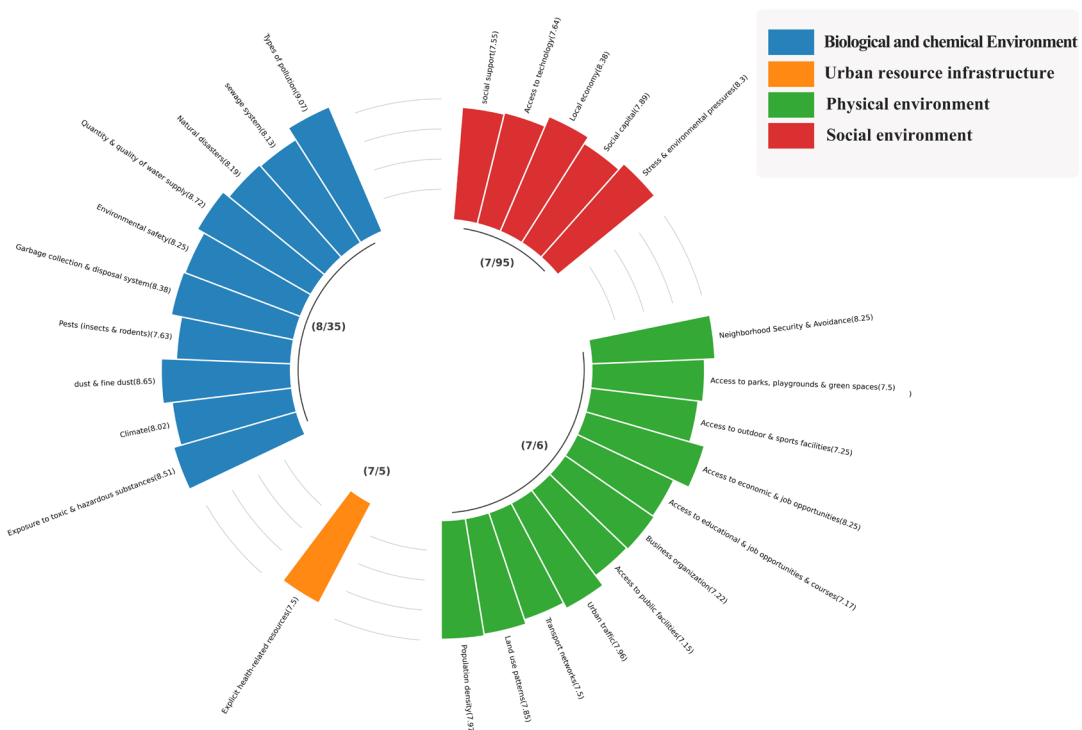

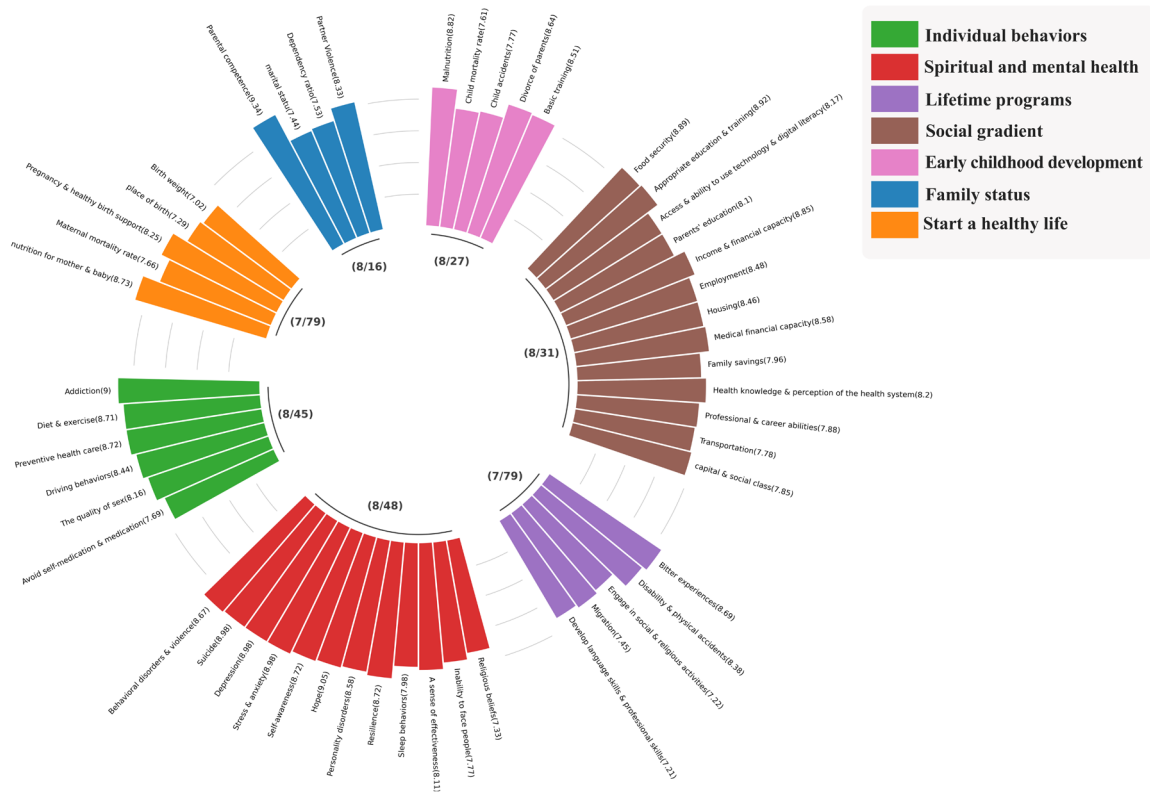**Figure 4.** The crisp value of defuzzification social determinants of health at the local level

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Figure 3. The crisp value of defuzzification social determinants of health at the individual level

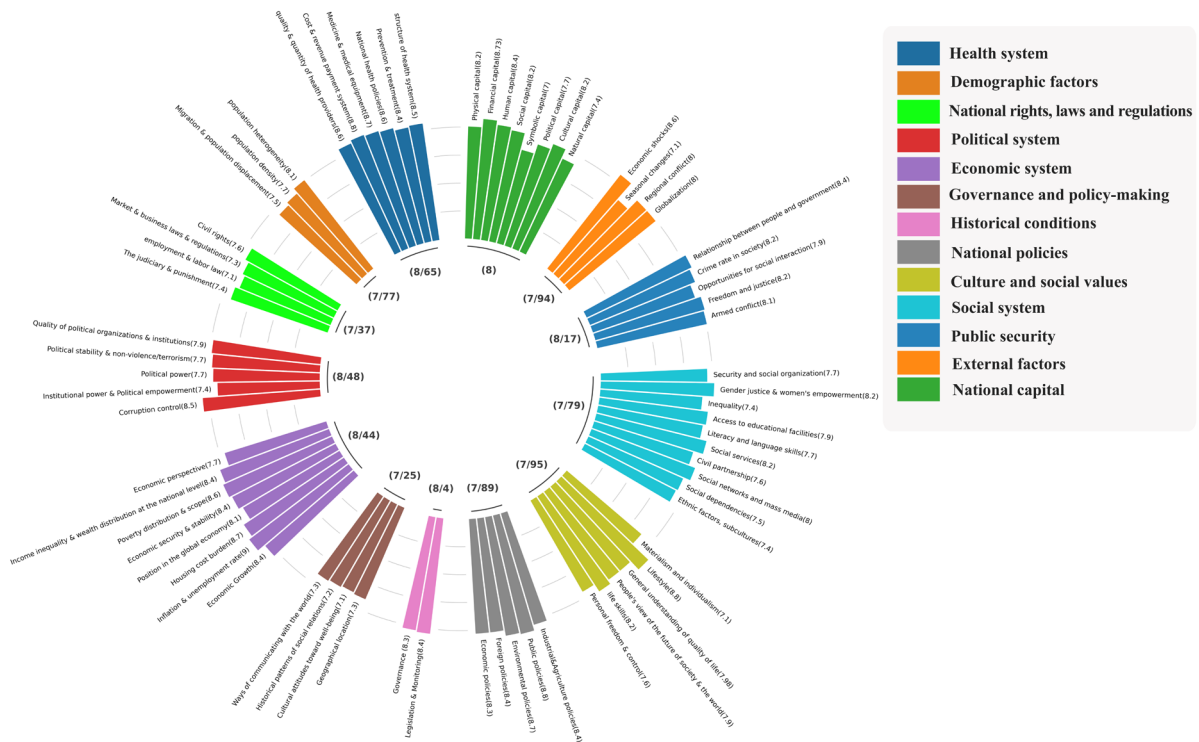**Figure 5.** The crisp value of defuzzification social determinants of health at the national level

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Table 2. Twenty of the most Important social determinants of health in Iran

No.	Level	Category	Factor	Value
1	Individual level	Family status	Parental competence	0.934
2	Local level	Biological & chemical	Types of pollutions	0.907
3	Individual level	Spiritual & mental health	Hope	0.905
4	Individual level	Individual behaviors	Addiction	0.9
5	National level	Economic system	Inflation and the unemployment rate	0.9
6	Individual level	Spiritual and mental health	Depression	0.898
7	Individual level	Spiritual and mental health	Suicide	0.898
8	Individual level	Spiritual and mental health	Stress and anxiety	0.898
9	Individual level	Social gradient	Appropriate education and training	0.892
10	Individual level	Social gradient	Food security: access to food, food quality	0.889
11	Individual level	Social gradient	Income and financial capacity	0.885
12	National level	Health system	Cost and revenue payment system	0.884
13	Individual level	Early childhood development	Malnutrition	0.882
14	National level	Cultural and social values	Lifestyle	0.879
15	National level	Health system	Medicine and medical equipment	0.878
16	Individual level	Start a healthy life	Good nutrition for mother and baby	0.873
17	National level	Economic system	Housing cost burden	0.873
18	National level	National capital	Financial capital	0.873
19	Individual level	Individual behaviors	Preventive health care	0.872
20	Individual level	Spiritual and mental health	Self-awareness	0.872

Figures 3, 4 and 5 show the priority of each social determinant of population health in Iran. As seen, social determinants at the individual level (8.2) and national level (8) are more important than the local and global levels. At the individual level, spiritual and mental health (8.48) and individual behaviors (8.45), and at the national level, health system (8.65), national policies (8.48), and economic system (8.44) have the largest crisp value of defuzzification.

Twenty of the most important social determinants of health in Iran are shown in Table 2.

4. Discussion

This study aims to identify the most important determinants of health in Iran. The health system, with its social determinants, is complex due to the many factors and causal relationships between them. In previous studies, qualitative research has been the predominant approach for mapping social determinants of health [26, 27]. Moreover, the complexity of analyzing a multitude of factors in a complex system has limited the scope of many quantitative studies to a single factor, such as immigration policies [5], human environment and habitat [28], and conflict [29]. This article has identified Iran's most important social determinants of health by combining quantitative and qualitative methods. The results showed that the most important social determinants of health in Iran are as follows: family status (e.g. parental competence), biological and chemical (e.g. types of pollution), spiritual and mental health (e.g. hope, depression, suicide, stress, and anxiety), and social gradient (e.g. economic conditions, education, and training, food

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security: access to food, food quality). Many studies have been conducted on the influence of individual behaviors on health, and the results show that individual behaviors, such as addiction, diet and exercise, driving behaviors, and the quality of sexual relations, etc., are important factors that determine health [30, 31]. Iranian Legal Medicine Organization stated that addiction deaths in 2022 faced a 15.2% growth compared to the previous year; this year, 5342 people died due to addiction. In a study of 107 addicts whose death information was received, more than 70% had less than a diploma, and almost three-quarters were unemployed. About the housing situation, nearly one-fifth of these people were homeless. About 76% of these people were examined for other diseases during admission, more than half of them (70.4%) had no history of any physical illness, and 91% had no record of any mental illness [32]. Thus, addiction was the main reason for their death. According to the World Health Organization's report, Iran has many deaths caused by traffic accidents. In general, 186146 people were killed in traffic accidents in the country during 2018-2019. Although the death rate due to traffic accidents has decreased during the study period, it is still unsuitable compared to the global average [33]. According to Erfanpour et al.'s study [34], most accidents leading to death happen to males aged 15-35 years, with low education, and illiterate. Therefore, a large part of traffic accidents occurs due to the individual behavior of drivers. Other factors identified in this research, such as social gradients (employment, housing, income, etc.), spiritual and mental health, and life-long plans (immigration, divorce, etc.), are also consistent with the results of previous studies [11, 35-37]. In the research of Zablei and Sanai Nasab [38], employment, psychological and community support, environmental factors such as urbanization and social gradients, and in another study by Zablei et al. [39], psychological factors, social environment, behavioral factors, and social gradients were identified as some of the most important determinants of health inequality.

In the field of environmental and chemical factors, previous research confirms the results of this study. For example, Moradi-asl et al. studied the poisoning and mortality rate using poisons, drugs, and chemicals in Meshkinshahr City, Iran. This study showed that more than 70% of mortality was due to pesticides, indicating their toxicity [40].

Identifying the determinants of population health can reveal the most important policy goals and help policymakers allocate resources optimally to promote population health. With the identification of the most

important social determinants of health in this research, future research can assess the status of the social determinants of the population's health in the model presented in this study, measure the gap between the desired situation and the current situation and identify the desired priorities to improve the situation.

5. Conclusions

Our review shows a considerable increase in the studies focusing on economic and social factors as health determinants. Policies and interventions in various sectors directly and immediately affect social determinants of health. Reviewing the literature on social determinants of health indicates the lack of focus on the effects of policies in different sectors at all levels on health. Thus, mapping the social determinants of health in this study provides policymakers with a comprehensive view of policy interventions that improve population health. The proposed mapping categorizes the most important social and economic determinants of population health into 4 levels (individual, local, national, and global) with different subcategories for each level to reveal the impact of other government sectors on the health sector.

Public health affects the population through social determinants of health, and policymakers can improve the health status by controlling and regulating these factors. Furthermore, identifying the determinants of population health can reveal the most important policy goals and help policymakers allocate resources optimally to promote population health. In this article, 20 factors were identified as the most important determinants of population health in Iran. Considering that the health condition and its determinants are different in each country, the determinants specified in the semantic mapping can be measured for other countries, and based on this, the social determinants with priority for policymakers can be determined.

Study limitations

Determining the importance of social determinants of health by experts can be one of the limitations of the present study. Some errors in data collection, registration, and reporting may have affected the finding, which could not be detected despite quality control efforts. Another serious issue is that an extensive list of factors can lead to longer sessions, potentially reducing participant engagement. This challenge is more significant when multiple participants are involved.

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