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Dietary Policies Addressing Non-Communicable Diseases in Iran: Challenges and Policy Gaps

Elham Shareghfarid; PhD candidate[1], Ahmadreza Dorosty Motlagh; PhD *[1], Amirhossein Takian; MD, PhD [2] & Ahmad Esmaeilzadeh; PhD[1]

[1] Department of Community Nutrition, School of Nutritional Sciences and Dietetics, Tehran University of Medical Sciences (TUMS), Tehran, Iran; [2] Centre of Excellence for Global Health (CEGH), Department of Global Health and Public Policy, & Department of Health Management, Policy & Economics; Health Equity Research Center (HERC), Tehran University of Medical Sciences (TUMS); Tehran, Iran.

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Corresponding author
dorostim@tums.ac.ir
takian@tums.ac.ir
Professor of Nutrition Sciences, Department of Community Nutrition, School of Nutritional Sciences and Dietetics, Tehran University of Medical Sciences (TUMS), Tehran, Iran.

Postal code: 1417613151
Tel: +98 2188955742

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ABSTRACT

Background: In low and middle-income countries Non-communicable diseases (NCDs) remain a severe problem requiring attention. The present study aimed to evaluate dietary policies and compare them with best practices in European countries to analyze Iran's progress in NCD-related nutritional challenges. **Methods**: it was searched the National databases. To gain a deeper understanding of nutritional policies, the researchers interviewed with 27 individuals from various sectors of the food system. These semi-structured interviews were systematically transcribed and analyzed using a combination of inductive and deductive approaches within the NOURISHING framework and the Health Policy Triangle. **Results**: By analyzing documents and interviews, it was revealed that dietary interventions in Iran, compared to the NOURISHING framework, are classified into 3 main policy processes, which are: 30% of interventions in Iran have not been formulated; 15% were formulated but not implemented and 55% have been implemented. Challenges in policy implementation were analyzed across three main dimensions: Policy process, policy content**,** and policy context, as well as four sub-dimensions: dietary behavior, food environment, food system, and policy context. Actions requiring improvement include: Food environment (12%)**:** Measures like unhealthy food taxation, unhealthy food advertisements, food quality in retail outlets, and school canteen standards need revision; Dietary behavior (2%)**:** Nutrition education in schools and community education requires modifications and Food system (1%)**:** Cross-sectoral collaboration within the food system in Iran is weak. **Conclusion**: The authors found that Iran has made considerable efforts to mitigate NCDs. However, due to low attention to socio-economic factors in policy making, weaknesses in food system governance, environmental, and educational dietary policies have not reached their expected efficiency.

Introduction

The food system (FS) is the single biggest driver of global challenges, including malnutrition in all its forms, that causes non-communicable diseases (NCDs)(Panel, 2020). Iran faces a significant public health challenge with NCDs due to dietary risk factors (Murphy *et*

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al., 2020). The healthcare system's primary concerns are cardiovascular diseases, hypertension, diabetes, cancers, and mental health disorders. As a Middle Eastern nation with an aging population and shifting disease risk factors, Iran is currently confronting NCDs as a major health issue (Danaei *et al.*, 2019).

The complex interplay of diet, lifestyle, and social determinants requires multi-sectoral strategies for effective prevention and management (Azadnajafabad *et al.*, 2024). Transformation of such a dynamic, interconnected system requires holistic consideration for effective solutions through a diverse combination of hard and soft policies, including taxes, legislation, labelling, and education (Parsons *et al.*, 2019). To combat these challenges, Iran has been implementing various policies aimed at promoting healthier diets and lifestyles. These actions include public education campaigns, improving food labeling, and regulating the marketing of unhealthy foods, especially to children (Hosseini *et al.*, 2017, Karami *et al.*, 2012). Addressing NCD in Iran requires collaboration between government agencies, NGOs, and international partners to create policies and programs that effectively tackle the root causes of NCDs (Amerzadeh *et al.*, 2022, Waxman, 2004).

Effective NCDs prevention requires multidimensional policy interventions across the food environment, dietary behaviors, and the food system (Hyseni *et al.*, 2017). In Iran, policies targeting sugar and salt reduction have been analyzed (Amerzadeh and Takian, 2020), but behavior change interventions for household diets remain a key gap (Zinab *et al.*, 2019). Comprehensive analyses integrating both food environment and behavior change interventions are needed to reduce NCD-related mortality. Identifying specific policy dimensions is essential for national implementation and actionable policy agendas.

The authors aimed to identify and evaluate the national food and nutrition interventions implemented in Iran compared to the best policy actions in the NOURISHING framework. They explored the policies executed, their impacts, and the gaps that persist within the nation's healthcare system. While some interventions have been successfully implemented and have yielded positive outcomes, these policies require regular evaluation and revision within the policymaking cycle. Therefore, the evaluation of previous policy reforms is especially critical for Iran, as a lower-middle-income country. Furthermore, the authors seek to address a question: why have some interventions been temporarily implemented but later discontinued or remained at the drafting stage without progressing to execution? The exploration of this issue sheds light on systemic challenges and highlights the importance of fostering robust and sustainable dietary policies to reduce the burden of NCDs in Iran.

Materials and Methods

The researchers chose a single case study design to investigate a complex, context-specific phenomenon - namely, the formulation and implementation of dietary reform policies aimed at reducing non-communicable diseases. This design enabled an in-depth exploration of a specific national policy framework within its unique socio-political and institutional environment. To comprehensively address the research objectives, a two-stage methodological approach was employed: first, a document content analysis to examine the formal structure and strategic intent of relevant policy documents; and second, semi-structured interviews with key experts to capture experiential insights, practical challenges, and interpretive perspectives. The combination of these methods provided both structural and contextual depth, enhancing the validity and richness of the findings.

The present study employs a conceptual framework that integrates multiple established models to guide the content analysis of food policy in Iran. Specifically, Walt and Gilson's Policy Triangle (Walt *et al.*, 2008) provides a comprehensive lens to examine the content, context, and actors involved in policy formulation and implementation. Complementing this, the NOURISHING framework (Vlad *et al.*, 2023)

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Offers a structured approach to assess the presence and scope of nutrition-related interventions within these policies. By combining these frameworks, the study establishes a coherent and logical structure that aligns with its objectives: to categorize policies based on their formulation and implementation status, and to analyze their characteristics, targets, and potential effectiveness. This integrated approach ensures that the methodology is both theoretically grounded and directly responsive to the research questions.

Sub study 1: Document analysis

Data collection: The authors searched official databases of the Ministry of Agriculture (www.maj.ir), the Ministry of Industry, Mine, and Trade (www.mimt.gov.ir), the Ministry of Health and Medical Education (www.behdasht.gov.ir), and the Research Center of the Islamic Consultative Assembly (www.rc.majlis.ir) to find relevant documents by keywords. Then they included relevant documents based on predefined inclusion criteria. To ensure that all relevant documents were extracted, the authors searched databases manually (ES). Relevant keywords are nutrition, food, food labelling, food standards, tax, subsidy, advertisement, reformulation, rule, education, skill, information, food chain, food choice, food preference, food environment, financial incentive, access, price, income, fruit, vegetable, red meat, legumes, fish, dairy products, oil, fat, grain, nuts, sugar, salt, trans fatty acid, policy, strategy.

Inclusion criteria: The documents needed to be in Farsi and related to Iran. They had to include general policies or keywords relevant to the research goals.

1.Full access to the documents was necessary.

2.Authenticated documents came from verified sources like the Parliament, government, and the Supreme Council of Health and Food Security (Kemper *et al.*, 2003).

3.Valid documents weren't misleading, biased, or conflicted by personal or organizational interests.

Exclusion criteria: Documents were excluded :

1.If the texts were published by non-governmental organizations, food industry groups, or campaigns.

2.If documents include speeches, announcements, or summaries.

3.If the content of the documents does not cover any policy interventions or actions.

The document checklist contained the title, date, and location of publication, along with items related to the NOURISHING and content, context, actors, and process of policies. For the document review, the Scott checklist was employed to screen and appraise the included policy documents. This approach ensured a systematic and transparent selection process, enhancing the rigor and reliability of the document analysis.

Document analysis: The authors analyzed the contents by an inductive approach to identify policies influencing dietary patterns, analysis, and then, conducted the mixed-method (inductive/ deductive) comparative analysis (Mogalakwe, 2006). The themes were developed based on the NOURISHING policy action framework (ES & AT) (World Health Organization, 2013). The identified policies were classified into three categories based on the framework introduced by (Amerzadeh and Takian, 2020): (1) policies not formulated, (2) policies formulated but not yet implemented, and (3) policies currently implemented in Iran. In the present study, the authors analyzed the policy content using Walt and Gilson's policy triangle, applying this classification to examine differences in formulation and implementation status. This approach allowed for a detailed assessment of how formulation and implementation status influence policy characteristics.

Sub study 2: Expert interviews

Data collection: The authors conducted a semi-structured interview to gain deeper insights into the research topic. The interview guide, which included open-ended questions designed by experts in community nutrition (ADM) and health policy (AT), was developed and is provided in the

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Appendix. Participants were selected using purposive sampling, which was subsequently extended through snowball sampling until qualitative data saturation was achieved.

Before the start of the interviews, the authors piloted the designed questions (ES). Subsequently, they invited participants and asked them to answer the questions in about an hour for deep reflection after a short explanation of research goals and methods. They also designed the questions to encourage descriptive responses and foster the generation of ideas.

Data analysis: Interviews were analyzed by Framework analysis (Smith and Firth, 2011). The authors identified and developed the themes using the health policy triangle (Walt *et al.*, 2008). The MAXQDA software (v. 12) facilitated the coding progress.

The researchers ensured the validity of the study using the triangulation method. Two researchers with different perspectives reviewed the study, multiple sources were used for data collection, and participants were asked to review the final themes and results to provide feedback. The autors ensure the reliability through a structured process for recording, documenting, and interpreting the data. Consensus on findings and evaluation of the research was conducted under the supervision of experts (AT).

Ethics considerations

The study method was designed according to the guidelines laid down in the Declaration of Helsinki, and all procedures involving human subjects/patients were approved by Human Ethics Committee of Tehran University of Medical Sciences. Following a full explanation of the study objectives, all participants from various sectors were asked to provide verbal informed consent to participate in the interviews. The personal information of participants remained confidential. Throughout all phases of the research—from inviting participants to gathering feedback on the analysis results - respect for and protection of participants' rights were upheld. Furthermore, participants were asked about their expertise or general capacity, not personal information. Before starting the research, the authors briefed participants about the main topic, general objectives, and the type of study. The participants were assured that their information would be kept confidential for three years.

Results

To evaluate Iran's policies aimed at enhancing dietary practices, the authors conducted a comprehensive content analysis of a total of 142 documents. These documents included parliamentary bills and proposals (n=15), agricultural sector (n=16), monthly reports from the food industry and trade sector (n=64), nutrition and health (n=3), government general policies (n=5), cooperation agreements (n=6), and the Secretariat of the Supreme Council for Health and Food Security (n=33). Additionally, the authors conducted semi-structured interviews with 27 stakeholders from 19 diverse sectors, both within and outside the health system.

In total, 31 potential participants were identified through publicly accessible channels as well as relevant organizations and industry networks. Among these, 27 individuals confirmed their participation by agreeing to the scheduled interview time and providing a signed consent form. The participant characteristics was mentioned in **Table 1**. One potential participant did not respond despite both initial and follow-up contact attempts. Furthermore, three individuals were unable to engage in the study due to constraints related to the project timeline.

Under the NOURISHING framework, 30% of interventions in Iran remain undrafted, 15% have been drafted but not implemented, and 55% have been successfully implemented.

Policy content: As shown in **Table 2**, several initiatives in Iran still require development. These include shelf and menu labeling, school-based fruit and vegetable programs, restrictions on vending machines, advertising limitations on non-broadcast channels, and prohibitions targeting children, collaboration between the government and the industry, voluntary industry

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commitments to the government, incentives for providing healthy food service, support for urban agriculture, and public awareness campaigns on unhealthy foods.

Table 1. Participant characteristics (n = 27).

Characteristic	n (%)
Years of experience	
10–19	10 (37.03)
20–29	13 (44.82)
30–39	4 (13.79)
Gender	
Male	14 (51.85)
Female	13 (48.14)
Organizational type	
Government	20 (74.07)
Non-governmental organization	1 (3.44)
Private sector	2 (6.89)
Academia/research	4 (13.79)
Job position	
Senior management	132 (44.44)
Mid-level management	6 (20.68)
Technical/professional	9 (31.03)

Additionally, some programs, despite being developed and implemented at some point, require content modification or reimplementation as participants mentioned. These include initiatives for food gardening for students, clear and interpretable warning front-of-package labelling, regulations on nutrient and health claims, voluntary guidelines for food accessibility in schools, voluntary health-related food taxes, targeted subsidies for healthy foods, restrictions on the availability of high-sugar food and beverage products, and unhealthy food restrictions in food retail.

Food environment policies

Prohibition of unhealthy food product advertisements: Although budgets are defined for public awareness via broadcast channels, allocation is inconsistent. This inconsistency has become an obstacle to implementing media-based public awareness. Another challenge in mass media is the lack of precise oversight on advertising content. One participant highlighted this issue: *"Diet soda enriched with calcium was introduced—how is it possible for carbonated soda to be enriched with calcium? At the start of the school year, what's the advertisement? Chocolate cake in your school backpack enriched with something. A chocolate cake with all those calories packed into a student's school backpack."* Informant 7, Academic section.

Policy process

School food standards: One of the school food standards is the guideline for school cafeterias. However, in practice, the sale of food products is a source of income for cafeteria operators. Since the cafeteria operator is usually one of the school staff, the supervision of distributed products is not strictly enforced by school principals. Instead, it is treated as a secondary job for additional income. Another issue is the lack of a designated space within schools to set up cafeterias that can be equipped according to health standards. *"The cafeteria vendor argues that without selling items like unhealthy food products, it would be difficult to generate sufficient income to sustain their livelihood."* Informant 21, Ministry of Education.

Food taxation and subsidies: So far, taxes have only been applied to the sweetened beverage industry in Iran. The primary reason for not implementing a taxation system for other unhealthy products is the lack of necessary infrastructure within the tax organization to manage and allocate funds. Regarding this issue, one participant explained: *"This requires all our stores to be connected to electronic systems so that 50 Rial is directly deducted from the store's account and deposited into national accounts, such as the Central Bank, as a tax on harmful products. The process of collecting and allocating taxes needs infrastructural support, which we currently lack."* Informant 9, Supreme council of health and food security.

Food system policies

Conflicts of interest between the policies of the Ministry of Health (MoH) and the Ministry of Industry, Mines, and Trade (MoIMT) have led to a lack of coordination in policy implementation. For example, regarding the

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prohibition of unhealthy food advertising, if MoIMT declares a ban on advertising such products, food industries may stop producing them. This, in turn, creates challenges related to unemployment and production in MoIMT. "*If he had been informed at the time that soft drink advertising would be restricted, he would not have invested billions in producing them. Instead, he would have focused on producing milk."* Informant 22, food industry.

A critical aspect of the food system is inter-sectoral collaboration at national and sub-national levels. The Supreme Council for Health and Food Security is responsible for facilitating this coordination. Each department assigns one senior manager and one expert to collaborate with the Council's Secretariat. However, challenges within the Secretariat include its shift from inter-sectoral coordination to parallel activities with other offices in the Ministry of Health. Another issue with Secretariat meetings is that representatives from non-health organizations are often low-ranking officials. Regarding this issue, one participant remarked: *"How many of the approved policies get implemented? They're invited to participate. We consult them when drafting documents and involve them in the process. We invite their representatives, but either they don't attend or they send their lowest-ranking officials. Sometimes they act defensively, or they show enthusiasm during meetings, but fail to implement anything afterward. Either they ignore the issue entirely."* Informant 29, ministry of health.

Food behavioral programs

One of the major challenges in educational programs is the lack of alignment between training content and its intended audience due to social, cultural, or educational levels. Additionally, the frequency of training sessions for healthcare staff is excessive, while the quality of these programs remains low. Another skill gap among nutrition sector employees is their ability to highlight the importance of their work. As one participant stated: *"Our experts haven't received adequate training; they can't properly introduce themselves to the community or deliver appropriate nutrition education. Meanwhile, people involved in economic activities come forward confidently."* Informant 4, academic sector.

Figure 1 illustrates the trends in contextual factors influencing the dietary patterns of Iranian households over the past three decades. It highlights the aging of the Iranian population and the impact of the Iran-Iraq war around 1991. Moreover, public nutritional awareness in Iran has been shaped by various developments, including the introduction of traditional medicine into university curricula, the Health Transformation Plan, and the rise of social media platforms. Additionally, the inflation rate in recent years has doubled compared to the previous decades, negatively affecting overall societal welfare.

Actors

A diverse range of stakeholders, both within and beyond the nutrition sector, play roles in shaping Iran's food system. Their influence varies across policy formulation, implementation, and public engagement.

Ministry of interior: According to a directive issued by the Supreme Council in 2015, governors, mayors, and district heads are required to be evaluated based on their health-oriented performance and report biannually to the Council's secretariat. Additionally, the Health Department within municipalities -particularly in Tehran's 22 districts and 323 neighborhoods - plays a pivotal role in expanding access to health services. One participant explained: *"When the Health Department receives directives from the Ministry of Health, it implements them across all districts and neighborhoods. Citizens have full access. Urban planning is shaped by these policies, and programs promoting healthy diets and wellness include food festivals, educational sessions, and parent-teacher associations"* Key informant 14, Municipality.

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Table 2. Dietary policies content based on the NOURISHING framework.

Policy domain	Phases of the policy cycle	Policy options
Food environment	Implemented	• Mandatory implementation of nutritional value labels on packaged food products, with nutritional labeling including trans fatty acids • Mandatory standards for foods available in schools, including restrictions on unhealthy foods, standards for social support programs, and standards for specific locations. • Increasing import tariffs on specific unhealthy foods, and reducing import tariffs on specific healthy foods • Mandatory regulations for food advertising across all media, mandatory regulations for the marketing of specific food and beverages, and mandatory regulations for food marketing in schools • Voluntary reformulation of food products, mandatory restrictions on the amount of salt in food products, and mandatory removal of trans fats from food products • Initiatives to increase the availability of healthy foods in stores and food service centers, as well as incentives and regulations to reduce trans fats and salt in food service centers
	Documented	• Labeling should be interpretable and warning-based, regulations on nutrient and health claims, and voluntary guidelines for food accessibility in schools. • Voluntary health-related food taxes, targeted subsidies for healthy foods, restrictions on the availability of high-sugar food and beverage products. • Planning for unhealthy food product accessibility restrictions in food retail centers.
	Not mentioned	• Shelf labelling, energy and nutrient labeling on menus, and warning labels on menus. • Fruit and vegetable initiatives in schools, mandatory standards for food accessibility in schools and nearby areas, and specific restrictions for vending machines in schools. • Mandatory regulations for broadcasting food advertisements for children, mandatory regulations for food advertisements in non-broadcast communication channels, mandatory regulations for specific marketing techniques, and a mandatory requirement for advertisements to include health messages or warnings. • Government engagement with industry to establish self-regulation aimed at restricting food marketing to children, with the government supporting voluntary commitments developed by the industry. • Voluntary commitments to reduce food portion sizes and restrictions on the availability of high-fat meat products. • Incentives and regulations for stores to establish themselves in underserved neighborhoods, and incentives and regulations to provide healthy food options as defaults in food service centers.
Food system	Implemented	• Collaboration with food suppliers to provide healthier food options. • Nutritional standards for the procurement of goods and services by the government. • Government procurement of goods and services through "short" supply chains (e.g., local farmers). • Incentives for the supply chain aimed at food production. • Community-based food production. • Governance structures for multi-sectoral/stakeholder participation.
	Documented	-
	Not mentioned	• Support for urban agriculture.

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Food behavior	Implemented	• Development and dissemination of food-based dietary guidelines. • Formulation and dissemination of guidelines for specific food groups. • Public awareness campaigns, mass media, and information and social marketing programs on healthy nutrition. • Public awareness campaigns specifically for fruits and vegetables. • Public awareness campaigns on salt consumption. • Guidelines and programs to support preventing overweight and obesity in primary care. • Nutritional counseling in primary health care. • Training programs for healthcare professionals. • Nutrition education in school curricula. • Community nutrition education. • Workplace or community health initiatives, cooking skills programs.
	Documented	• Food production skills in education curricula
	Not mentioned	• Public awareness campaigns about specific unhealthy foods and beverages.

Supreme council for health and food security: This council is tasked with intersectoral coordination within the food system. However, it lacks the authority to enforce collaboration and is primarily involved in research and policy drafting. One participant emphasized the need for stronger leadership: *"We need a higher-level management structure. If the Ministry of Health is instructed to act and fails, there should be accountability. Without leadership to apply findings, research is useless. We don't lack research—we lack a body to integrate risk factors and oversee the entire process. It needs leverage. The Ministry of Health doesn't have it."* Key informant 6, Ministry of Health.

Policy context

The context of dietary reform policies encompasses a complex interplay of social, cultural, and economic factors that directly or indirectly influence public health outcomes.

Demographic shifts and social change: Over the past three decades, Iran's population pyramid has shifted from a predominantly young population in the 1990s to a growing middle-aged demographic. This transition has contributed to a rise in NCDs. Another change was following the Health Transformation Plan, that public and institutional awareness of nutrition. In the food production sector, industrialization has also reshaped food systems, with a focus on efficiency and reduced waste, though often at the expense of quality, but now moved beyond the initial resistance phase to industrialized food production.

Economic conditions: Food prices - often tied to global market trends - play a critical role in shaping consumption. Bread remains a staple due to its affordability, often replacing healthier grains like rice or whole wheat pasta. This leads to a disproportionate reliance on refined white bread. As one participant noted, *"If you reduce the inflation rate of healthy foods, people will naturally shift their preferences. In Tehran, people endure 46% inflation, while in the U.S., it's 4%. With low inflation, Americans can choose healthier options like squash, lettuce, or spinach. It's easier for them to make nutritious decisions."* Key informant 8, academic sector.

Discussion

The authors aimed to examine the implementation of interventions within the NOURISHING framework. The findings underscore the critical need for policy measures that promote healthy dietary patterns in Iran's food environment. Food environment interventions are the most effective when targeted toward the adult population, which constitutes approximately half of Iran's population.

One significant food environment action that influences public awareness is the prohibition of advertising unhealthy food products. In Iran, the issue lies in the lack of coordination and consensus within the food system for budget allocation and insufficient oversight on the content of food

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advertisements. Studies have revealed that advertisements for unhealthy foods are prevalent around schools and in socioeconomically disadvantaged areas. The emergence of new technologies, such as social media, poses additional challenges, such as no restrictions on food advertising that is popular among young people (Demers-Potvin *et al.*, 2022). For example, Instagram has been identified as the most popular social media platform (with 52% to 68% usage rates in Australia, Canada, the U.S., and the UK). In Iran, approximately 40% of participants active in the dairy sector on social media were laypersons without professional expertise in the production, distribution, or consumption of dairy products (Esbati *et al.*, 2023). Consistent with the findings of this study, policy implementation is often impeded by lobbying efforts from food industries and media organizations. In China, the effectiveness of the program is enhanced when legislation and regulations support voluntary initiatives and self-regulation within the industry (Hawkes, 2008). Research indicates that effective collaboration and active participation are essential to implementing advertising bans successfully (Chung *et al.*, 2022).

Another crucial aspect of a healthy food environment is ensuring standards for food accessible to school-age children. In Iran, the issue of non-standard school canteens stems from the fact that canteen vendors are often staff members at the school itself, and school management tends to support these employees regardless of the substandard practices. In Japan, standards and regulations for food in schools and kindergartens, specifically for lunch meals, are established. Additionally, vending machines that sell food are prohibited in schools in Japan and Turkey (World Health Organization, 2018). Programs such as Health-Promoting Schools and Nutrition-Friendly Initiatives are also implemented in Turkish schools. Studies in the U.S. and the UK highlight that, in addition to the school environment, strong program leadership, the inclusion of healthy nutrition in the curriculum, and the home environment significantly influence effective program implementation by fostering changes in children's eating behaviors (Devi *et al.*, 2010)

Another impactful intervention targeting market demand through financial accessibility is the imposition of taxes on unhealthy food products. Traditional economic theory justifies that consumer concern about food consumption is determined by price and the consumer's level of income (Samuelson, 2018). Studies highlight several barriers, including weaknesses in decision-making, planning, and execution; issues related to production; smuggling and weak monitoring systems; increased demand for unhealthy food products; and conflicts of interest.

The food system engages multiple stakeholders across both health-related and non-health-related sectors; effective coordination among these entities is vital for sustainable policy implementation. In Iran, inter-sectoral coordination is assigned to councils, but the directives issued lack enforceability (Damari *et al.*, 2017). Consistent with this research, evidence suggests that promoting healthy diets largely depends on fostering strong relationships within agri-food systems (FAO Regional Office for Europe and Central Asia, 2014). Another initiative in Turkey is providing financial support for nutrition-related programs in non-health sectors, such as transportation, trade, urban planning, employment, sports, and agriculture (FAO Regional Office for Europe and Central Asia, 2014) .

Educational interventions face significant shortcomings that must first be addressed. One major issue lies in the misalignment of educational programs with their target audiences. Notably, research on food education often focuses on short-term or static interventions outside the formal curriculum, unlike subjects such as mathematics, where learning progresses continuously throughout early education. While integrating food education into the formal curriculum is essential, current recommendations emphasize a shift from temporary measures toward a more consistent, sequential, and developmentally appropriate approach. Such programs should be taught by specialized educators as part of a structured

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subject, such as home economics, to ensure continuity and effectiveness (Smith *et al.*, 2022).

The first notable limitation of this study was the limited access to certain key stakeholders, especially in non-health sectors, due to their reluctance to participate in the research process. The second one is the inherently subjective nature of the methodology that may have introduced a degree of researcher interpretation into the findings, which should be considered when assessing the results. The third one is that this study was specifically designed to inform policy development within the context of Iran. While this enhances the precision of policy analysis tailored to the country's sociopolitical and health system characteristics, its findings may also offer insights for other low- and middle-income countries. The document analysis revealed significant gaps in existing dietary policy frameworks, particularly in their alignment with NCD disease prevention goals. Expert interviews further underscored these shortcomings, highlighting both implementation challenges and stakeholder misalignment. These insights validated the necessity of conducting two complementary sub-studies: one to systematically assess policy coherence, and another to capture stakeholder perspectives on reform priorities. Together, these approaches provided a more nuanced and triangulated understanding of the policy landscape, thereby enhancing the reliability and relevance of our conclusions.

Policy recommendation

1.Introduction of Reliable Government Platforms and revise educational content: The findings revealed that to prevent misinformation and societal confusion, credible government platforms should be established by the Ministry of Health aimed at clarifying contradictions between traditional medicine and nutrition. Additionally, nutrition education content needs to be revised and tailored to suit the needs of the target audience effectively by programming the social marketing framework educational interventions based on cultural and local situations.

2.Tailored Interventions Based on Evaluations: The authors recommend that the Ministry of Health should solve the problems in dietary policies implementation, execute interventions aligned with evaluation findings and evidence-informed policy making, and give special attention to socio-economic factors associated with health outcomes.

3.School Nutrition Program: The Ministry of Education, in collaboration with the Judiciary, should intensify supervision of school canteens to promote healthier food environments and address conflicts of interest. Furthermore, a sustained approach to nutrition education in schools should be maintained, whereby healthy dietary patterns are integrated and taught to students and their parents through various subjects

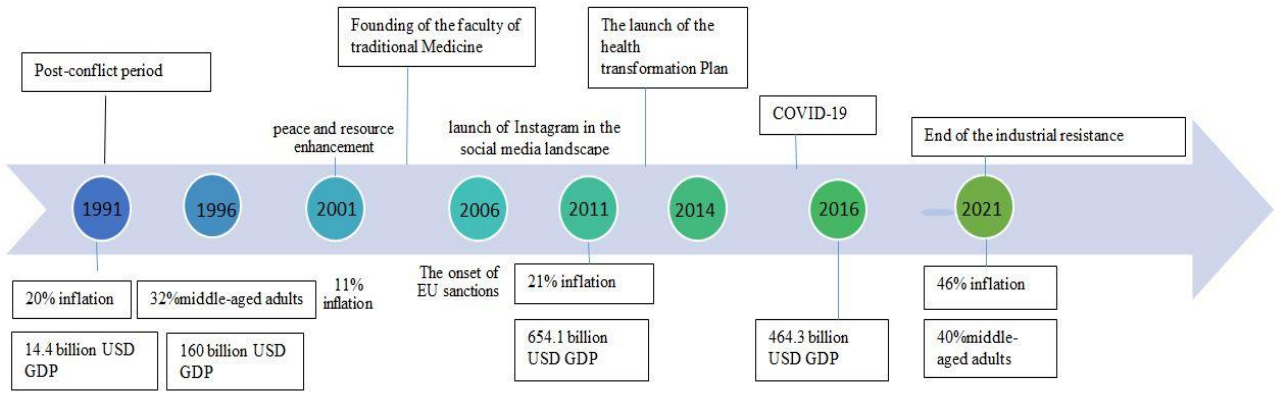

Figure 2. Contextual event trends influencing the Iranian dietary patterns from 1991 to 2021(Iran government) .

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4 Food system engagement for healthy diet: The authors suggest strengthening synergistic collaboration in the implementation phase of regulatory and educational policies related to healthy and unhealthy foods between the Food and Drug Administration and the Deputy for Health Affairs of the Ministry of Health.

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Conclusion

The findings highlight the necessity of further research within the food system. In this research, the researchers found that Iran has made considerable efforts to mitigate NCDs. They recommend that food environment policies be developed in Iran. These interventions must be scrutinized and discussed at the policymaking level. As mentioned, all interventions are significantly impacted by macroeconomic factors.

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Authors' contributions

C*onceptualization:* The core research idea was conceptualized and developed by Takian A. *Methodology:* The interview guide was developed by Shareghfarid E in collaboration with Takian A. Takian A was responsible for selecting the sampling method, choosing the analytical frameworks, and determining the content analysis approach. The overall study design was developed collaboratively by all authors. *Validation:* Takian A contributed to the identification and finalization of the key dimensions. *Investigation:* Shareghfarid E collected data (interviews and document extraction) and analyzed them. *Supervision:* Takian A and Dorosty Motlagh A supervised and conceived the study. *Writing original draft:* Shareghfarid E drafted the manuscript. *Writing review and editing:* Takian A critically reviewed the manuscript and suggested revisions and approved the final draft. The revisions were implemented by Shareghfarid E.

Competing interests

The authors declared no conflict of interest.

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