Strategies and Opportunities Ahead to Reduce Salt Intake

Shahram Rafieifar MD1, Hamed Pouraram PhD2, Abolghassem Djazayery PhD2, Fereydoun Siassi PhD2, Zahra Abdollahi PhD1, Ahmad Reza Dorosty PhD2, Mitra Abtahi Msc3, Hossein Kazemeini MD4, Farshad Farzadfar PhD5

Abstract

In Iran, as in most countries, cardiovascular diseases are the leading cause of death (highest mortality rate), but rank third in terms of disease burden. On the other hand, the relationship between high salt intake, hypertension, and cardiovascular disease has been proven. Food consumption pattern in Iran shows that consumption of salt, pickled foods and salty snacks is common. Regarding the World Health Organization (WHO) target for salt intake (about 5 g per day), the evidence indicates that Iranian people consume 2–3 times more than the recommended amount of salt. Fortunately, serious attention has been paid to this matter since 2009 and along with arrangements for it, support of all relevant sectors (public and private) has been included in the agenda. At present, reduction of salt intake is among the major priorities of planners, policy makers, and experts of the Iranian health services system. On the other hand, many studies in EMRO have shown high levels of daily salt intake in these countries. In this review, the solutions used in the Islamic Republic of Iran at various levels were considered, including determination of salt intake measurement methods, revision in the amount of salt in processed food products, food labeling, promoting awareness of various social groups, gathering support from all relevant sectors, designing a regular public awareness campaign for reducing salt intake, and lessons learned in this regard, that can be helpful to countries in the region.

Keywords: Iran, Salt reduction, Strategies

Background

According to the World Health Organization (WHO) report, cardiovascular diseases cause approximately 17 million deaths per year worldwide.1 In total, 45% of deaths from cardiovascular diseases and 51% of fatal strokes have been linked to high blood pressure.2 However, 80% of heart diseases, stroke, type II diabetes, and 40% of cancers can be prevented through implementation of effective and inexpensive interventions.3 Recently, various studies have proven that high salt intake causes high blood pressure and thus, increases the risk of stroke, heart attacks, and kidney dysfunction.4–8 Therefore, the World Health Organization (WHO) recommended in the most recent guideline, that countries should reduce the amount of salt consumption by as much as 30% by the year 2025 and if possible bring it to 5 g per day.9 To sum up the experiences of countries, we used many keywords such as; salt, salt consumption reduction, salt reduction strategies, successful strategies in salt reduction and others to gather all available useful articles which were published inside and outside of Iran.

Iran is the second most populous country in the Middle East. Unfortunately, statistics show that in the Islamic Republic of Iran, like most countries, cardiovascular diseases cause the highest mortality rate but rank the third in terms of burden of disease.10 Blood pressure is a major risk factor for cardiovascular diseases, including myocardial infarction, stroke and congestive heart failure.11 The main reason for increased prevalence of hypertension in the country could be the daily growth in the elderly population, and increase in risk factors, such as unhealthy food habits (increased intake of salt, saturated fat, etc.), reduced physical activity, weight gain, and stress.12 One of the most important factors in unhealthy food habits is the intake of salt. According to FAO and WHO technical report, daily salt intake should be limited to 5 g (equivalent to about two grams of sodium). The report also showed that sodium (Na) intake in the diet from any source, including added during the preparation of meals or at the table, canned foods, and salted foods, affect blood pressure and thus must be limited so as to reduce the risk of cardiovascular diseases.13 It should be noted that some countries like the United States and Britain have recommended salt intake of less than 6 g daily.14,15

In most countries, such as Iran, salt intake is in the range of 8–12 g per day and reduction in daily salt intake has been proposed as one of the most economical strategies to promote public health.16–18 The results of a meta-analysis showed that reducing salt intake to about 2–2.3 g per day was linked with a 20%–30% reduction in the incidence of cardiovascular diseases.19

Review and Summary of Existing Studies in Iran

In the Iranian culture and food habits, consumption of salty food, pickles, salty nuts, salty snacks (chips, snacks, etc.), confectionary products and desserts, soft drinks, cheese, yogurt and yogurt drinks and a variety of sauces are common and form part of food habits in some areas.20 Table 1 presents the studies that have measured


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the amount of salt intake in Iran. As seen in Table 1, no united and national study has been conducted so far to determine the exact amount of salt intake\(^{29}\) and the majority of the existing studies are limited to some provinces and conducted in different age and gender groups.\(^{21–29}\) Based on the per capita amount of salt production in the country, experts believe that the average amount of salt consumed in the country is around 10-15g per day. Salt consumption is part of people’s lives, as its risks are hidden, and we repeatedly witnessed excessive consumption.\(^{30}\) This hidden risk, its slow harm, and general neglect have imposed a heavy burden on the community.

**Actions conducted in Iran**

A report by the Institute for Health Metrics and Evaluation in the field of information in Iran, reported hypertension as the second largest risk factor among ten major risk factors that increased DALYs in 2010. This report also showed that high blood pressure is the most important component of cardiovascular diseases.\(^{31}\)

Comprehensive and consistent thought to reduce salt consumption in the Islamic Republic of Iran began by the Ministry of Health and Medical Education about seven years ago (around 2009). Following that, by inviting all relevant departments of the Ministry (Nutrition Department, Food and Drug Administration, Health Promotion and Education Department, etc.) to the project and regular meetings, the important role of reducing salt intake was defined in promoting public health and the short and long-term tasks of the relevant agencies and departments were mentioned and an executive plan was designed with their cooperation. Among the key issues discussed in these meetings was understanding the various aspects of this problem for better planning, as well as more effective and purposeful projects. For this purpose, the strategic planning analysis model of SWOT was used and summarized in Table 2.

One of the important points discussed with special attention in the sessions was to identify weaknesses in information and performance of the country.

The following strategies and methods have been considered in Iran:

1. **A review of the practices of successful countries**

   The UK experience was very helpful in this field, because similar to the United Kingdom, an important part of salt intake in Iran comes from bread and thus, reducing the amount of salt in bread was among the key objectives in reducing salt intake, which actually yields good results.\(^{32}\) Bread is one of the main foods in Iran and since a significant proportion of salt intake in diet comes from bread and cheese,\(^{39}\) measures were designed to reduce the amount of salt used in bakeries. Some of these activities included coordinating meetings with stakeholders of the bread industry, modification of bread formulation, and encouraging low-salt production of bread. Of course, to achieve the desired result, actions should be swift. Currently, action is being taken to revise salt content of food products with objective of reducing salt contents of processed food. Countries in the region such as Kuwait, the UAE, Qatar, and Bahrain have also begun activities to reduce salt in bread\(^{32}\) and countries such as Tunisia, Syria, Palestine and Turkey have also done studies on its cost effectiveness.\(^{33}\)

   In general, according to the studies, it can be concluded that in most developing countries, almost 75% –80% of salt intake is due to salt added to food during cooking and at the table (e.g., China, which is similar to Iran).\(^{34}\) For this reason, a key strategy in Iran should be to reduce the amount of salt added to food during cooking and concentration of salt in bread.

### Table 1. Studies that have measured the amount of salt intake in Iran.

<table>
<thead>
<tr>
<th>Place of study</th>
<th>Authors</th>
<th>Participants</th>
<th>Measurement method</th>
<th>Mean salt or sodium intake</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isfahan</td>
<td>Rafiei et al.,(2008)</td>
<td>Adult 20-60 yr (912)</td>
<td>Sodium in 24 h urine collections</td>
<td>11.1 (g/d) in men and 9.6 (g/d) in women</td>
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<tr>
<td>Isfahan (healthy heart Program 1999–2007)</td>
<td>Khorvaci et al.,(2012)</td>
<td>Adult 19-55yr (1059)</td>
<td>Sodium in 24 h urine collections, 24 hour dietary record and Food Frequency Questionnaire (49 items)</td>
<td>11.37 (g/d) in men and 9.936 (g/d) in women</td>
</tr>
<tr>
<td>Isfahan (Urban &amp; Rural)</td>
<td>Kelishadi et al.,(2013)</td>
<td>Children 3-10 yr (220)</td>
<td>Spot urine test and Three days dietary recall</td>
<td>2017 mg (sodium/d)</td>
</tr>
<tr>
<td>Iran</td>
<td>Fahimi et al., 2012</td>
<td>Review article</td>
<td>Sodium in 24 h urine collections</td>
<td>9.4 salt(g/d)</td>
</tr>
<tr>
<td>Yazd</td>
<td>Motlagh et al.,(2011)</td>
<td>Adult 18-45 yr (247)</td>
<td>Urine sodium according to Kawasaki formula</td>
<td>10.09 g (sodium/ d)</td>
</tr>
<tr>
<td>Rasht</td>
<td>Azizi et al.,(2001)</td>
<td>2-79 yr (340)</td>
<td>Food Frequency Questionnaire</td>
<td>7.2 g</td>
</tr>
<tr>
<td>Sari</td>
<td>Azizi et al.,(2001)</td>
<td>2-79 yr (343)</td>
<td>Food Frequency Questionnaire</td>
<td>7.7 (g/d)</td>
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<tr>
<td>Ilam</td>
<td>Rahmani et al.,(2001)</td>
<td>2-79 yr (644)</td>
<td>Food Frequency Questionnaire</td>
<td>10.3 (g/d)</td>
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<tr>
<td>South of Tehran</td>
<td>Nazeri et al.,(2010)</td>
<td>Household (383)</td>
<td>Sodium in 24 h urine collections and Weighing method</td>
<td>9.1 (g/d)</td>
</tr>
<tr>
<td>Tehran</td>
<td>Houshiarrad et al.,(2014)</td>
<td>Adult 20-65yr (155)</td>
<td>Sodium in 24 h urine collections, Weighing method, 24 hours dietary intake</td>
<td>9.00 (g/d) in men and 6.87 (g/d) in women</td>
</tr>
</tbody>
</table>
well and is therefore applicable. Regarding the second group, is undetectable by taste and does not affect product quality as that 10%–20% reduction in the amount of salt in food products does not adversely affect the product quality. Experts believe salt in their formulation should be reduced to the extent that which salt acts as a preservative and food in which salt acts as foods containing salt. It was also decided that foods containing the aim of presenting feasible strategies to reduce salt consumption. meetings were held with participation of all relevant units with the cooperation of all relevant stakeholders is essential, especially the industrial sector. According to the national KAP study in south of Iran that 40% reduction of salt in bread, which was acceptable to people, significantly reduced urinary sodium and systolic blood pressure. In countries where much of the salt comes from processed and prepared foods, reducing the amount of salt in these products is the first interventional priority and the food industry in these countries can play a crucial role. A recent study in south of Iran showed that 40% reduction of salt amount should be performed through short and long-term approach and the amount of salt consumed in household food products should be reviewed and re-targeted every three years. So far, national standards of several food items such as cheese, ketchup, canned fish, and bulky cereals have been revised with the aim of reducing their salt contents.

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**Table 2. SWOT Analysis.**

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
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<tbody>
<tr>
<td>-Availability of professional specialists to train and raise the awareness, health and nutrition literacy of the community</td>
<td>-Lack of systematic planning in this regard</td>
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<td>-Attention of Experts and planners to this problem</td>
<td>-Lack of awareness of the harmful effects of a high intake of salt</td>
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<td></td>
<td>-Accurate estimation regarding the amount of salt intake in Iran</td>
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<td>-Food labels without salt information</td>
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<td></td>
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<tr>
<td>Opportunities</td>
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<td></td>
<td>-Special attention of public about health</td>
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<td>-Higher health literacy in recent years</td>
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<td>-Self-care</td>
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<td>-Existence of high council for health and food security presided by the president of the republic</td>
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<td></td>
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<td>Threats</td>
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<td></td>
<td>-Difficult and costly measurement of salt intake with standard procedures (24hours urine collection)</td>
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<td></td>
<td>-Salty food consumption habit</td>
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<td>-The taste of salt in most traditional dishes</td>
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<td></td>
<td>-High consumption of fast foods and soft drinks</td>
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<td></td>
<td>-Inadequate intake of fruit and vegetables as a source of potassium</td>
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<td></td>
<td>-Producing and offering high salt products</td>
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</tbody>
</table>

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Revision of salt content in food production

In most developed countries, more than 75% of salt is added to food during its production, processing, and storage, while only 15% of the total intake of salt is added during cooking or at the table, and 5% occurs naturally in food. In countries where much of the salt comes from processed and prepared foods, reducing the amount of salt in these products is the first interventional priority and the food industry in these countries can play a crucial role. A recent study in south of Iran showed that 40% reduction of salt in bread, which was acceptable to people, significantly reduced urinary sodium and systolic blood pressure. According to available reports, 38 countries have so far included reduction of salt in food products in their strategies, among which nine have even passed a law for this purpose. Also in England, 80% of salt enters the daily food program through processed food and thus, close cooperation of the industry and production managers is crucial for the country. England’s experience has shown that salt reduction programs, despite their operational success, are only one example of the most complicated interventional programs and, thus, close cooperation of all relevant stakeholders is essential, especially the industrial sector. According to the national KAP study in Iran, about 50% of the daily salt intake comes from salt used in cooking food and that added to food at the table. In Iran, regular meetings were held with participation of all relevant units with the aim of presenting feasible strategies to reduce salt consumption. The result of these meetings was modification of formulation of foods containing salt. It was also decided that foods containing salt in the country should be divided into two groups: foods in which salt acts as a preservative and food in which salt acts as a flavoring. In the first case, it was decided that the amount of salt in their formulation should be reduced to the extent that does not adversely affect the product quality. Experts believe that 10%-20% reduction in the amount of salt in food products is undetectable by taste and does not affect product quality as well and is therefore applicable. Regarding the second group, it was decided that reduction in salt amount should be continued, as long as it does not affect the products’ acceptance and the salt in the formulation should be replaced with other flavorings with less harmful effects (if salt elimination and replacement by other flavors is possible). Meanwhile, reduction in the amount of salt should be performed through short and long-term approach and the amount of salt consumed in household food products should be reviewed and re-targeted every three years. So far, national standards of several food items such as cheese, ketchup, canned fish, and bulky cereals have been revised with the aim of reducing their salt contents.

**Encouraging the food industry to devote part of their products to low-salt diet food**

The experience of successful countries shows that an essential and effective method for reducing salt intake is to declare the salt content, so that consumers can make the right decision when buying food products based on the amount of salt. In different countries, different methods are used for labeling food products, the most effective of which is the use of the traffic light. “Traffic light” usage in the country begun last year and has been operational. In fact, one of the things that can be a good incentive for the food industry to reduce salt intake in food products is using the tips. The traffic light has been designed with three colors of orange, red, green for five important food constituents affecting/endangering the consumers’ health, one of which is salt. Using the Traffic Light helps people to evaluate the foodstuff at a glance. For example, the “red color” means that the product is high in salt. So, since people are advised to choose the less salty product, they will be more inclined to buy products with a low salt content, and food companies offering low-salt foods have been more successful in marketing/selling their products. It should be noted that paying attention to the product label persuades manufacturers to dedicate a part of their productions to low-salt foods according to the market demand.

One of the practical regulation strategies for industry holders is the setting of rules, so that producers receive reward or healthy product certificate when this rule is adhered to or receive heavy fines if they disobey the rules. In this way, it can be expected that the salt content of food products will be reduced in a competitive market. Meanwhile, the Ministry of Health in its annual evaluation encourages the companies whose products are designed with compliance to the recommendations and rules.

Rise in awareness of the society by designing and implementing
the latest KAP study in Tehran showed that 90% of participants knew that salt is one of the risk factors of non-communicable
diseases, and almost half of the participants believed that the
amount of salt intake should be reduced to have a healthy lifestyle.
In addition, 57% started reducing their salt intake and only 6%
of them had reduced salt intake during cooking.47 According to
the literature review of studies, Britain, Finland, and Japan are
the most successful countries in the reduction of salt intake.38,44
The reasons for the success of these countries are the implementation
of systematic awareness campaigns, attracting support of policy
makers, and cooperating with the food industry.45 However, the
UK, unlike the two other countries (Japan and Finland) that have
benefited from government support to implement educational
campaigns, has designed and started the salt reduction strategies
through the private sector and by organizing awareness campaigns
proved a very successful pattern. It should be noted that, among
the developed countries, England has one of the lowest rates
of salt intake (8.1 g per day in 2011, based on a random sample
of adults in the UK).46 As we said before, the salt reduction
strategy in this country started by focusing on improving the
awareness of the people, regarding salt intake reduction methods
by regular educational campaigns, and connecting with industry
and parliament in this country.29 Careful planning and regular
follow-up of this program were driven by the non-governmental
organization, which caused reduction of salt intake from 9.5 to 8.1
g per day in 7 years.14 However, in the beginning, unlike the World
Health Organization recommended level of salt consumption,
National Institutes of Health in England determined the amount
as 6 g per day in 2015. Currently, the ultimate goal for salt intake
amount has been limited to 3 g per day by 2025.18 The United
States, Canada, and Australia are now a follower of the UK
pattern to reduce their salt intake.47 Turkey, which is one of Iran’s
neighbors, has begun measures to raise awareness of the society
since 2013, which is far from reaching results and formation of a
full awareness campaign.48

The latest research regarding effective strategies in reducing
salt intake showed that most people fail to correctly estimate the
concentration and amount of salt consumed.49 There are also
useful experiences in this field. For example, in Beijing, China,
plastic spoons with a capacity of 2 g were distributed among 5
million households to help reduce the amount of salt intake and
introduce the appropriate amount of salt for daily use, and thus
about 15 million people were covered.34 In practice, to introduce
the appropriate amount of salt, everyone should know is the
amount of salt contained in one teaspoon or a pinch. These will be
effective by holding constant campaigns for all ages, especially
students, and development of food product labels as mentioned.
Reducing salt intake requires a comprehensive and long-term
planning with participation of all government agencies, the
private sector, and industry. The experience of the aforementioned
countries has shown that holding regular and accurate
informational campaign has an essential role in improving
people’s awareness and is one of the most important strategies in
successful countries.50

Advocacy strategies
There is an article with the same title which has been published
before.39 In this paper, a summary of the methods for obtaining
support from different sectors, authorities, etc. of the Islamic
Republic of Iran has been mentioned generally, so there is no
need to repeat it. The experience of successful countries has
shown that absence of proper and targeted planning will cause
food trade and industry of government to oppose the reduction
of the amount of salt in their food products.51 In order to identify
methods to attract support of different sectors of the country, a
comprehensive and appropriate model of inclusive support was
defined to reduce salt intake in the community. At the first level, it
is necessary to identify who plays a key role (mass media, doctors,
health personnel, popular people including artists, athletes;
school health educators, teachers, kindergarten educators, and
health professionals). Attracting the support of policymakers and
sensitizing them must be done by explaining the expensiveness
of diseases caused by salt overuse. For food producers, the most
effective method of attracting their support is through debate and
discussion; however, by raising awareness, modifying views and
changing public’s demand, food manufacturers are forced to
produce low-salt food.

Recommendation
Reducing the amount of daily salt intake is one of the cheapest
and most effective strategies to reduce cardiovascular diseases in
the world.33,35,53 Improving community’s awareness by organizing
national campaigns as well as, ongoing monitoring and evaluation
can play a key role in guiding national programs; it is also
recommended to use encouraging policies at the beginning and
according to the current situation.12,32,44,53 Actions that have been
carried out in Iran so far have placed our country among the few
in the region which have a strategic plan to reduce salt intake.54
Finally, a summary of measures that countries should consider
regarding the reduction of salt intake is presented below:
• Using SWOT analysis method to identify the current situation
is extremely efficient and helpful.
• It is necessary to establish a committee made up of specialists
of relevant sectors with necessary and sufficient executive
power.
• Development of national and practical policies in the country
regarding cultural considerations with a focus on the major
sources of salt in the diet is essential.
• Policies to reduce salt consumption should be developed in
close association with other related policies in the country.
• Attracting participation of the private sector (salt producers
and manufacturers of food products containing salt) is very
important and crucial.
• Sustainability of the developed policy is subject to permanent
and annual credit and funding of reduction in salt consumption
in the country.
• Defined strategies should be based on available resources
and facilities.
• Strategies should cover all sectors and groups of society.
• Defined strategies should have no conflict with other
developed strategies in other sectors.
• Public campaigns to reduce salt intake should be held and
evaluated every year.
• Continuous evaluation and monitoring of the program is
necessary.
• In revision and development of food standards, special
attention should be paid to reduction of the amount of salt
and sodium of food products.
• Developing standards for salt substitutes as a flavoring in the
production of products for manufacturers is necessary.
Social marketing is necessary to affect the behavior of consumers in reducing salt intake.

In countries where salt is enriched with micronutrients, like iodine, reviewing the amount of iodine in salt is necessary when advertising to reduce daily salt intake.

Author contributions
HP and ADJ designed the review; searches were carried out by SR, HP, MA, ADJ, ARD, ZA, and HK; SR and HP wrote the first draft of the paper; HP, ADJ, FF, FS, ZA revised the paper. Final approval was given to the final manuscript by all authors.

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Declaration of interest
We have no conflicts of interest to disclose.

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References
17. WHO. Mapping salt reduction initiatives in the WHO European Region. Copenhagen, Denmark; 2013.


