

# Significance and Strategies to Reduce Sodium in Processed Foods

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Sodium chloride is used as a food additive in food processing from long period. In addition to its influence on the taste of products, it has a significant role with regard to texture and storage. It is an essential nutrient for the maintenance of human health. Less than 5 grams per day salt intake has been recommended by the World Health Organization (WHO), which is equivalent to 2 grams of sodium. Recent report in Brazil has shown that most sodium source is derived from the table salt (NaCl) (Collucci, 2013). Though it is a vital nutrient for maintenance of health (regulates extracellular volume, maintains acid-base balance, neural transmission, renal function, cardiac output and myocytic contraction), but the excessive intake is associated with the cardiovascular diseases, hypertension, neurological diseases, osteoporosis, gastric cancer, kidney disease, asthma, and obesity (Doyle and Glass, 2010). WHO recommendations indicate that, in order to prevent chronic diseases, an adult upper daily limit intake of sodium should be less than 87 mmol Na/day (<5 g NaCl/day). Accordingly, there is a great interest in producing low-sodium foods.

Despite low-sodium products have been found in some markets, the production of these items with satisfactory sensory acceptance and technological performance is still a challenge. Several alternatives enable to keep the same functionality, but with a partial decrease or even total elimination of sodium from formulations.

## Low Sodium Foods

The food that has 140mg or less sodium in one serving is considered “low-sodium” product. A “very low-sodium” product has 35 mg or less per serving, and any food that supplies fewer than 5 milligrams per serving is “sodium-free”. Table 1 represents the list of low sodium foods and Table 2 represents the nutrient content claims for sodium.

**Table 1. List of low-sodium foods**

Sources of low sodium foods	Examples
Fresh and frozen vegetables	Greens, broccoli, cauliflower, peppers, etc.
Fresh, frozen or dried fruits	Berries, apples, bananas, pears, etc.
Starchy vegetables	Potatoes, sweet potatoes, butternut squash and parsnips.
Fresh or frozen meat and poultry	Chicken, turkey, beef or pork.
Fresh or frozen fish	Cod, sea bass, tuna, etc.
Eggs	Whole eggs and egg whites.
Healthy fats	Olive oil, avocado and avocado oil.
Low-sodium snack foods	Unsalted pretzels, unsalted popcorn and unsalted tortilla chips.

### Health benefits of low sodium foods

- Controls blood pressure
- Reduces cardiovascular diseases
- Certain medications work more efficiently with a low sodium diet
- Reduces or prevents swelling of the extremities, such as the legs
- Decreases the risk of kidney stones
- Decreases the risk of developing Osteoporosis.

### Strategies for reducing salt in processed foods

Nowadays Sodium reduction is a priority for public health because of negative health consequences and associated health care costs of high sodium consumption. For this reason, a range of strategies to reduce sodium in different foods have been applied. The technological or strategic approach to the reduction of salt in food products are affected by various factors (Mitchell, 2019), but the basic strategies that uses ingredient solutions for sodium reduction are discussed below.

**1) Remove:** This strategy involves the removal of sodium chloride without replacement or compensation from a formulation and it does not require much investment but applies to a limited number of processed food products. Sometimes, salt concentration in a formulation exceeds the amount required to meet its function (taste, preservation, texture, or appearance). Where salt concentration exceeds the quantity required to meet its functions, salt can be removed.

**2) Reduce:** This strategy involves two methods for reduction of sodium chloride content in processed foods.

- i. **By stealth:** Some food manufacturers demonstrated that reducing salt in formulations by small steps over time is a feasible approach. When small salt reductions are made, by stealth

over time, large reductions can be achieved as long as there are no changes in product quality or microbiological safety. It has been demonstrated that 15 to 20% of salt can be reduced this way.

- ii. **By using taste enhancers or modifiers:** Using taste enhancers or modifiers, salt content can be reduced without changing taste profile, when used in combination with other salts. In this way, it is possible to reduce 30-50% reduction in sodium. A taste enhancer is a substance that does not modify the taste but increases the intensity of how the taste is perceived and works by activating receptors in the mouth and through stimulating receptors linked to umami taste. In practice, there are several types of salt enhancer available including mineral salts, yeast extracts, hydrolysed vegetable proteins, autolysed dry yeast, monosodium glutamate, guanylate or inosinate, peptide-based compounds, etc. are used to accumulate taste profile based on either primary taste, enhancement of taste or specific flavour.

**3) Replace:** Complete replacement of added salt is possible through the use of commercially available salt substitutes. Use of physically modified sodium chloride crystals, mineral salts (potassium chloride, magnesium chloride, calcium chloride, etc.), phosphates, or mixtures of taste enhancer/modifier ingredients and mineral salts are used to replace the salt. These salt substitutes may not necessarily completely replace sodium chloride, but salt reductions of 50–60% are possible when using this method.

### Conclusion

Low sodium foods possess various health benefits in reducing or preventing swelling of the extremities, decreasing the risk of kidney stones, decrease the risk of developing osteoporosis. Changing

the dietary sodium content of a population that has adapted to a high sodium diet will not be easy, and will entail a number of strategies. Currently, the best success is achieved, when multiple approaches based on a wide range of ingredients and technologies are used to reduce the sodium in processed foods.

### References

Collucci, C. (2013). A quarter of the sodium ingested in the country comes from processed food. Newspaper

Doyle, M. E., & Glass, K. A. (2010). Sodium reduction and its effect on food safety, food quality, and human health. *Comprehensive reviews in food science and food safety*, 9(1), 44-56.

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**Table 2. Nutrient content claims for sodium**

Nutritional claim for sodium	India (As per FSSAI)	United States	European Union
Sodium free	Product contains not more than 0.005g of sodium per 100 g for solids or 100 ml for liquids.	<5 mg serving	≤5 mg/100 g
Very low sodium	Product contains not more than 0.04 g of sodium per 100 g for solids or 100 ml for liquids.	≤ 35 mg/serving	≤40 mg/100 g
Low sodium	Product contains not more than 0.12 g of sodium per 100 g for solids or 100 ml for liquids.	≤140 mg/serving	≤120 mg/100 g
Lightly salted	-	At least 50% less sodium (than the regular product) / At least 25% less sodium (than a similar product)	At least 25% less sodium (than a similar product)
No salt added	-	No salt added during processing	No salt added
Reduced sodium	-	At least 25% less sodium (than the original product)	At least 25% less sodium (than a similar product)

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