Cancer Association of South Africa (CANSA)

Fact Sheet on Salt and Permissible Sodium Content in Certain Foodstuffs

Introduction

Salt, also known as table salt or rock salt (halite), is a crystalline mineral that is composed primarily of sodium chloride (NaCl), a chemical compound belonging to the larger class of ionic salts. It is absolutely essential for human and animal life, but can be harmful to humans, animals and plants in excess. Salt is one of the oldest, most ubiquitous food seasonings and salting is an important method of food preservation. The taste of salt (saltiness) is one of the basic human tastes.

[Picture Credit: Salt]

Chloride and sodium ions, the two major components of salt, are needed in small quantities by all known living creatures. Salt is involved in regulating the water content (fluid balance) of the body. The sodium ion itself is used for electrical signalling in the nervous system. Because of its importance to survival, salt has often been considered a valuable commodity during human history.

[Picture Credit: Halite]

However, as salt consumption has increased during modern times, scientists have become aware of the health risks associated with high salt intake, including high blood pressure in certain individuals. Because of this, some health authorities have recommended limitations of dietary sodium intake, although others state the risk is minimal for typical western diets. The United States Department of Health and

Researched and Authored by Prof Michael C Herbst
[D Litt et Phil (Health Studies); D N Ed; M Art et Scien; B A Cur; Dip Occupational Health; Dip Genetic Counselling; Diagnostic Radiographer; Dip Audiometry and Noise Measurement; Medical Ethicist]
Approved by Ms Elize Joubert, Chief Executive Officer [BA Social Work (cum laude); MA Social Work]

Human Services recommends that individuals consume no more than 1 500 to 2 300 mg of sodium (3 750 to 5 750 mg of salt) per day depending on age (this is the equivalent of one teaspoon of salt per day).

Halite, the natural form of salt, is a very common and well-known mineral. It is found in solid masses, and as a dissolved solution in the oceans and in salt lakes.

Intake of Too much Salt can be Fatal

Consumption of too much salt can be deadly – one only needs take about 1 gram of salt per kilogram of weight to die.

Different Types of Salt

Salt is a natural mineral made up of two elements on the periodic table – sodium and chloride. Salt occurs naturally in the sea, but can also be mined from salt mines on land. There are a variety of different kinds of salt that can be bought in a grocery store, e.g.:

- Iodated table salt which is rich in iodine.
- Sea salt - made by evaporating seawater.
- Pickling salt - has no additives and is generally used in brines to pickle foods.
- Kosher salt - salt commonly used when preparing kosher meat.
- Himalayan pink salt - harvested in the foothills of the Himalayan mountain range and is basically fossilised sea salt.
- Black salt - known as Kala Namak - it is actually a pinkish-grey colour. It is mined in India and has a strong sulphuric smell.

Both sea salt and table salt contain about 40% sodium

Maintaining a Balance Between Sodium and Potassium Intake

The World Health Organization recommends that a sufficient amount of potassium (K) should be consumed. The ratio between sodium (Na) to potassium (K) intake should be 1:1.

Human Salt Requirements

Sodium maintains the body's fluid and electrolyte balance, acid-base balance, muscle contractions, and nerve transmission. There is no recommended daily allowance (RDA) for sodium because the human diet has never lacked it. An adequate amount of sodium for adults is between 250 and 500 mg/day. The Tolerable Upper Intake Level (UL) for healthy adults is 2 300 mg/day.

For 'salt-sensitive' people, blood pressure will increases in direct proportion to increases in sodium intake. About 60% of adults with high blood pressure are salt sensitive.

Sodium deficiency is extremely rare. The kidneys conserve and release sodium as needed to maintain fluid balance. The amount of sodium lost in a day, in the form of urine and sweat, equals the amount of sodium eaten in the diet.

Iodated Salt

Iodine deficiency is the main cause of preventable brain damage and reduced IQ in children worldwide. It also negatively affects women's health, as well as economic productivity and quality of life. Most people need an additional source of iodine as it is found in relatively small amounts in the diet. The world Health Organization (WHO) recommends universal salt iodisation – the fortification with iodine of all salt used for human and animal consumption – as the main strategy for eliminating iodine deficiency.

The iodisation of salt in South Africa is regulated by the Regulations Relating to Salt (Published under Government Notice No. R.239 of 16/3 /2001 - as corrected by: Government Notice No. R. 1102 of 9 /11/2001 - as amended by: Government Notice No. R. 1368 of 21/12/2001) under the Foodstuffs, Cosmetics and Disinfectants Act, 1972 (Act No. 54 of 1972).

The Heart Foundation's Five (5) Tips to Reduce Salt in One's Diet

1. Cut down on processed foods:
   Salt is found in almost every pre-prepared food, from processed meat to canned soup, to bottled dressings and packaged sauces, bread, and condiments such as tomato sauce and pickles.

2. Cook at home:
   By preparing and cooking your own meals means that you can control how much salt you are adding, as well as increasing how many vegetables you can add to dishes. Drain and rinse canned vegetables and beans, which could reduce your salt intake from these products by up to 50%.

3. Flavour your food rather than adding salt:
   Choose fresh or dried herbs, spices, garlic or lemon juice to ensure that your food doesn't taste bland.

4. Read the ingredients list:
   If sodium or salt is listed in the first 3 ingredients, the food is likely to be a high-salt product. Salt may also be 'hidden' on the ingredients list as table salt, sodium chloride, monosodium glutamate (MSG), sodium nitrate, sodium bicarbonate and soy sauce – these are all salt too.

5. Read the label:
   Some products may have a low salt, low sodium or no salt added version, but also be aware that these products may not necessarily be 'healthy' if they're also high in sugar or fat.

Total Permissible Sodium Content of Certain Foodstuffs

The Minister of Health published Regulations Relating to the Reduction of Sodium in Certain Foodstuffs and Related Matters in the *Government Gazette*.

Peters, S.A.E., Dunford, E., Ware, L.J., Harris, T., Walker, A., Wicks, M., van Zyl, T., Swanepoel, B., Charlton, K.E., Woodward, M. Webster, J. & Neal, B. 2017.

Background: In June 2016, the Republic of South Africa introduced legislation for mandatory limits for the upper sodium content permitted in a wide range of processed foods. We assessed the sodium levels of packaged foods in South Africa during the one-year period leading up to the mandatory implementation date of the legislation.

Methods: Data on the nutritional composition of packaged foods was obtained from nutrition information panels on food labels through both in-store surveys and crowdsourcing by users of the HealthyFood Switch mobile phone app between June 2015 and August 2016. Summary sodium levels were calculated for 15 food categories, including the 13 categories covered by the sodium legislation. The percentage of foods that met the government's 2016 sodium limits was also calculated.

Results: 11,065 processed food items were included in the analyses; 1851 of these were subject to the sodium legislation. Overall, 67% of targeted foods had a sodium level at or below the legislated limit. Categories with the lowest percentage of foods that met legislated limits were bread (27%), potato crisps (41%), salt and vinegar flavoured snacks (42%), and raw processed sausages (45%). About half (49%) of targeted foods not meeting the legislated limits were less than 25% above the maximum sodium level.

Conclusion: Sodium levels in two-thirds of foods covered by the South African sodium legislation were at or below the permitted upper levels at the mandatory implementation date of the legislation and many more were close to the limit. The South African food industry has an excellent opportunity to rapidly meet the legislated requirements.

For the latest information regarding the Timeline for the reduction of total Sodium (Na) content of certain foodstuffs, kindly refer to **ANNEXURE 1**:

Methodology for Testing of Total Sodium

(1) For all foodstuff categories, suitable sodium potentiometric method or elemental analysis, with wither AA (flame atomic absorption spectroscopy) or ICP (inductively coupled plasma), for determining typical total sodium content which shall be applied for monitoring and law-enforcement purposes; provided that these methods shall also be used for routine testing or for the purpose of nutritional information labelling of the typical total sodium content by manufacturers. The samples shall be digested with a microwave digester and not ashing.

(2) The permitted tolerance for nutrient declaration in the nutrition labelling of sodium where not claim with a nutrition or health message is made, shall be in accordance with the Regulations Relating to the Advertising and Labelling of Foodstuffs; Provided that where a claim with any nutrition or health message is made, the sodium value shall be at or below the sodium targets set out in these Regulations.

Salt and Cancer

Research has shown that rates of nasopharyngeal cancer are high in areas where Chinese-style salted fish is very common. Other studies have linked eating large amounts of foods preserved by salting and pickling with an increased risk of stomach cancer. The incidence of stomach cancer is

greater in parts of the world (such as Japan) where diets traditionally include foods that are salt-preserved.

Risk factors in the general population for small intestine cancer include consumption of salted or smoked meats and fish.

D'Elia, L., Galletti, F. & Strazzullo, P. (2014).
"Humans began to use large amounts of salt for the main purpose of food preservation approximately 5,000 years ago and, although since then advanced technologies have been developed allowing drastic reduction in the use of salt for food storage, excess dietary salt intake remains very common.

"Gastric cancer is a common neoplasia, and dietary factors, including salt consumption, are considered relevant to its causation. A number of experimental studies supported the co-carcinogenic effect of salt through synergic action with Helicobacter pylori infection, in addition to some independent effects such as increase in the rate of cell proliferation and of endogenous mutations. Many epidemiological studies analyzed the relationship between excess salt intake and risk of gastric cancer. Both cross-sectional and prospective studies indicated a possibly dose-dependent positive association. In particular, a comprehensive meta-analysis of longitudinal studies detected a strong adverse effect of total salt intake and salt-rich foods on the risk of gastric cancer in the general population.

"Altogether, the epidemiological, clinical, and experimental evidence supports the possibility of a substantial reduction in the rates of gastric cancer through progressive reduction in population salt intake."

Shin, J.Y., Kim, J., Choi, K.S. Suh, M., Park, B. & Jun, J.K. (2016).
"Epidemiological studies have demonstrated an association between excessive salt intake and gastric cancer risk, and this potential risk increases the need for adequate gastric cancer screening in individuals with high salt intake. However, the association between salt intake and gastric cancer screening in the general population has rarely been investigated. We explored the association between salt preference and participation in gastric cancer screening among a nationally representative Korean population.

"The study population was derived from the Korean National Cancer Screening Survey (KNCSS) 2006-2007, an annual nationwide interview survey investigating cancer screening rates. Of 4,055 individuals who participated in the KNCSS 2006-2007, 3,336 individuals aged over 40 years were included in our analysis. The odds ratio (OR) and 95% confidence interval (CI) were estimated using polytomous logistic regression.

"Individuals with higher salt preference were less likely to participate in regular gastric cancer screening. After adjusting for age, sex, monthly household income, education, family history of cancer, and self-rated health status, ORs for undergoing regular gastric cancer screening were 1.00, 0.82 (95% CI, 0.61 to 1.12), 0.74 (95% CI, 0.54 to 1.00), 0.77 (95% CI, 0.56 to 1.05), and 0.38 (95% CI, 0.16 to 0.92) according to the level of salt preference (p for trend=0.048).

"Individuals with higher salt preference showed suboptimal gastric cancer screening adherence compared to those with a lower salt preference. These findings highlight the need for better delivery of educational messages to change risk perceptions regarding gastric cancer screening practice."

Amara, S. & Tiriveedhi, V. (2017).
"Chronic inflammation is known to play a critical role in cancer development and progression. High salt is known to mediate several chronic inflammatory diseases including hypertension, myocardial infarction, neurological ischemic attack, autoimmune diseases and cancers.

"High salt level is shown to induce angiogenesis and immune-dysfunction, both of which play a direct role in cancer proliferation. Furthermore, salt has been suggested to enhance Warburg-like metabolic phenotype in cancer cells and at the same time also induce pro-tumor MΦ2-macrophage phenotype. Recent studies have identified several molecular targets such as tonicity specific transcript factor NFAT5/TonEBP, sodium ion channel γENaC, and vascular endothelial growth factor, VEGF, which are upregulated under high salt external environment. These molecular targets offer futuristic therapeutic application in precision medicine.

"In this review, we discuss the current understanding of the salt mediated metabolic and immune dysfunctions playing a potential role in cancerous changes."

Salt and Other Non-Communicable Diseases
Many lines of investigation provide evidence for the causal relationship between sodium (salt) intake and cardiovascular disease (CVD), which is the leading cause of death and disability worldwide. Raised blood pressure, cholesterol and smoking, are the major risk factors for CVD. Among these, raised blood pressure is the most important cause, accounting for 62% of strokes and 49% of coronary heart disease.

Pääkkö, T.J.W., Perkiömäki, J.S., Silaste, M.L., Bloigu, R., Huikuri, H.V., Antero Kesäniemi, Y. & Ukkola, O.H. 2018.
"The association between dietary salt intake and hypertension has been well documented. We evaluated the association between dietary sodium intake and the incidence of new-onset atrial fibrillation (AF) during a mean follow-up of 19 years among 716 subjects from the Oulu Project Elucidating Risk of Atherosclerosis (OPERA) cohort.

"Our findings indicate that sodium intake is associated with the long-term risk of new-onset atrial fibrillation. Further confirmatory studies are needed. Key messages Sodium consumption correlated positively with CV risk factors: age, smoking, SBP, BMI and LDL-cholesterol. When quartiles of sodium consumption were considered, the AF incidence was higher in the highest quartile compared to lower quartiles. Sodium consumption as a continuous variable was independently associated with AF events when age, BMI, smoking, SBP, LAD, LVMI and the use of any antihypertensive therapy were considered."

Rust, P. & Ekmekcioglu, C. 2017.
"Excessive dietary salt (sodium chloride) intake is associated with an increased risk for hypertension, which in turn is especially a major risk factor for stroke and other cardiovascular pathologies, but also kidney diseases. Besides, high salt intake or preference for salty food is discussed to be positive associated with stomach cancer, and according to recent studies probably also obesity risk. On the other hand a reduction of dietary salt intake leads to a considerable reduction in blood pressure, especially in hypertensive patients but to a lesser extent also in normotensives as several meta-analyses of interventional studies have shown.

"Various mechanisms for salt-dependent hypertension have been put forward including volume expansion, modified renal functions and disorders in sodium balance, impaired reaction of the renin-angiotensin-aldosterone-system and the associated receptors, central stimulation of the activity of the sympathetic nervous system, and possibly also inflammatory processes. Not every person reacts to changes in dietary salt intake with alterations in blood pressure, dividing people in salt sensitive and insensitive groups. It is estimated that about 50-60 % of hypertensives are salt sensitive. In addition to genetic polymorphisms, salt sensitivity is increased in aging, in black people, and in persons with metabolic syndrome or obesity. However, although mechanisms of salt-dependent hypertensive effects are increasingly known, more research on measurement, storage and kinetics of sodium, on physiological properties, and genetic determinants of salt sensitivity are necessary to harden the basis for salt reduction recommendations.

"Currently estimated dietary intake of salt is about 9-12 g per day in most countries of the world. These amounts are significantly above the WHO recommended level of less than 5 g salt per day. According to recent research results a moderate reduction of daily salt intake from current intakes to 5-6 g can reduce morbidity rates. Potential risks of salt reduction, like suboptimal iodine supply, are limited and manageable. Concomitant to salt reduction, potassium intake by higher intake of fruits and vegetables should be optimised, since several studies have provided evidence that potassium rich diets or interventions with potassium can lower blood pressure, especially in hypertensives. In addition to dietary assessment the gold standard for measuring salt intake is the analysis of sodium excretion in the 24 h urine. Spot urine samples are appropriate alternatives for monitoring sodium intake. A weakness of dietary evaluations is that the salt content of many foods is not precisely known and information in nutrient databases are limited. A certain limitation of the urine assessment is that dietary sources contributing to salt intake cannot be identified. Salt reduction strategies include nutritional education, improving environmental conditions (by product reformulation and optimization of communal catering) up to mandatory nutrition labeling and regulated nutrition/health claims, as well as legislated changes in the form of taxation.

"Regarding dietary interventions for the reduction of blood pressure the Dietary Approaches to Stop Hypertension(DASH) diet can be recommended. In addition, body weight should be normalized in overweight and obese people (BMI less than 25 kg/m^2), salt intake should not exceed 5 g/day according to WHO recommendations (<2 g sodium/day), no more than 1.5 g sodium/d in blacks, middle- and older-aged persons, and individuals with hypertension, diabetes, or chronic kidney disease, intake of potassium (~4.7 g/day) should be increased and alcohol consumption limited. In addition, regular physical activity (endurance, dynamic resistance, and isometric resistance training) is very important."

DiNicolantonio, J.J., Mehta, V. & O'Keefe, J.H. 2017.
For decades the notion that an excessive consumption of salt (NaCl) leads to hypertension has persisted. However, this idea is based on opinion, not scientific proof. Despite this, every health organization, agency, and clinicians around the world have been advising salt restriction, especially to hypertensive patients. The present review article suggests that the consumption of a high-salt diet is not the cause of hypertension and that there are other factors, such as added sugars, which are causative for inducing hypertension and cardiovascular disease.

Foods Rich in Sodium

Foods in their natural state contain very little sodium. Fast foods and processed foods are highest in sodium. Processed foods include snack foods, deli items, bakery products, canned foods and prepared foods like salad dressings and spaghetti sauce. Table salt, soy sauce and other condiments are high in sodium. Ordinary salt (table salt) is 40% sodium and 60% chloride.

More than 40% of the sodium comes from the following foods:

- Breads and rolls
- Cold cuts and cured meats (such as deli or packaged ham or turkey)
- Processed meats (such as sausages, bacon and ham)
- Pizza
- Fresh and processed poultry
- Soups
- Sandwiches and similar foods (such as hot dogs and hamburgers)
- Cheese (natural and processed)
- Mixed pasta dishes (such as lasagne, spaghetti with meat sauce, and pasta salad)
- Mixed meat dishes (such as meat loaf with tomato sauce, beef stew and chili)
- Snacks (such as chips (crisps), pretzels, popcorn, and crackers)

Sodium content can vary significantly within food categories – it is, therefore, necessary to make use of the Nutrition Facts Labels on products to compare the amount of sodium in different products of similar volume or weight. Always select products with the lowest sodium content.

Steps to Cut Down on Sodium Intake

Learning about the sodium in foods and new ways to prepare foods will help to achieve the desired sodium reducing goal.

- Read the Nutrition Facts Label to see how much Sodium is in the food
- Check the Nutrition Fact Label for lower Sodium choices and compare Sodium in different brands of foods — like frozen meals, packaged soups, breads, dressings/sauces and snack foods — and select those products with the lowest Sodium content
- Prepare own food whenever possible. Do not salt foods before or during cooking and limit salt shaker use at the table
- Add flavour without adding Sodium. Use herbs and spices instead of salt to add flavour to foods. Try rosemary, oregano, basil, curry powder, cayenne pepper, ginger, fresh garlic or garlic powder (not garlic salt), black or red pepper, vinegar or lemon juice, and no-salt seasoning blends
- Buy fresh or frozen (not processed) lean meat rather than canned, smoked or processed meats like luncheon meats, sausages, bacon and corned beef. Check the package on fresh meat and poultry to see if salt water or saline has been added
- Buy fresh, frozen (without sauce), or low Sodium or no-salt-added canned vegetables
- Rinse Sodium-containing canned foods, such as tuna, vegetables, and beans before using. This removes some of the Sodium
- Choose fat-free or low-fat milk and milk products, such as milk, yogurt, cheese and fortified soy beverages (often called soymilk) in place of processed cheese products and spreads, which are higher in Sodium

- Choose unsalted nuts and seeds, as well as snack products such as potato crisps and pretzels, that are marked 'low sodium' or 'no-salt-added' – or, better still, have a carrot or celery stick instead
- Sodium in soy sauce, ketchup, salad dressings, and seasoning packets can add up. Choose 'lite' or 'reduced sodium' soy sauce and 'no-salt-added' ketchup/tomato sauce, add oil and vinegar to a salad rather than bottled salad dressings and use only a small amount of seasoning from flavouring packets instead of the entire packet
- Ask to see the nutrition information in restaurants and choose a lower-sodium option. Ask for the meal to be prepared without salt and request that sauces and salad dressings be served 'on the side', to ensure less usage.

Medical Disclaimer

This Fact Sheet is intended to provide general information only and, as such, should not be considered as a substitute for advice, medically or otherwise, covering any specific situation. Users should seek appropriate advice before taking or refraining from taking any action in reliance on any information contained in this Fact Sheet. So far as permissible by law, the Cancer Association of South Africa (CANSA) does not accept any liability to any person (or his/her dependants/ estate/heirs) relating to the use of any information contained in this Fact Sheet.

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ANNEXURE 1

REDUCTION OF TOTAL SODIUM (NA) CONTENT OF CERTAIN FOODSTUFFS

	Foodstuff category	Maximum Total Sodium per 100 g foodstuff	Dates on which the total Sodium reduction becomes effective
1.	Bread	400 mg Na 380 mg Na	30 June 2016 30 June 2019
2.	All breakfast cereals and porridges, whether ready-to-eat, instant or cook up, hot or cold	500 mg Na 400 mg Na	30 June 2016 30 June 2019
3.	All fat spreads and butter spreads	550 mg Na 450 mg Na	30 June 2016 30 June 2019

4.	Ready-to-eat savoury snacks, excluding salt-and-vinegar flavoured savoury snacks	800 mg Na 700 mg Na	30 June 2016 30 June 2019
5.	Flavoured potato crisps, excluding salt and- vinegar flavoured potato crisps	650 mg Na 550 mg Na	30 June 2016 30 June 2019
6.	Flavoured, ready-to-eat, savoury snacks and potato crisps – salted and salt-and-vinegar only	1000 mg Na 850 mg Na	30 June 2016 30 June 2019
7.	Processed meat (classes 1, 4 and 5), where products in category 5 relates to cured as per Annexure 1	1300 mg Na 1150 mg Na	30 March 2017 30 April 2020
8.	Processed meat (classes 2, 3 and 5) where products in category relates to uncured as per Annexure 1	850 mg Na 650 mg Na	30 June 2016 30 April 2020
9.	Raw-processed meat sausages (all types) and similar products	800 mg Na 600 mg Na	30 April 2020 30 April 2020
10.	Dry savoury powders (not the instant type) Includes dry soup /stew powders intended to be reconstituted, cooked up and consumed as a soup /stew and /or used to thicken and /or add flavour to any type of savoury dish, where a thickener is a significant ingoing ingredient.	5500 mg Na 3500 mg Na	30 June 2016 30 June 2019
11.	Dry gravy powders and savoury sauce powders, including all dry savoury gravy /sauce powders that require cooking or which are of the instant type, used as an accompaniment to a meal.	3500 mg Na 2000 mg Na	30 June 2016 30 June 2019
12.	Dry savoury powders with dry instant noodles to be mixed with a liquid Includes quick cooking Asian style noodles composed primarily of dry noodles	1500 mg Na 800 mg Na	30 June 2016 30 June 2019

	with a seasoning sachet		
13.	Stock cubes, Stock powders, stock granules, stock emulsions, stock pastes or stock jellies Includes concentrated stocks / stew products in various formats used primarily to flavour savoury dishes	18000 mg Na 15000 mg Na	30 June 2016 30 June 2019

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Salt
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