12 "Use salt and foods high in salt sparingly": a food-based dietary guideline for South Africa

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Abstract

Increased salt intake leads to an increase in blood pressure and decreased sodium intake relative to the usual or increased intake results in lowered blood pressure in adults, with or without hypertension. Blood pressure is a strong proxy indicator for the risk of cardiovascular disease, coronary heart disease and strokes. Hypertension is estimated to have caused 9% of all deaths in South Africa in 2000. In 2008, 42% of men and 34% of women aged 35-44 years, and 60% of men and 50% of women aged 45-54 years, were hypertensive. More than 70% of both men and women older than 65 years of age were hypertensive in 2008. Multilevel and multisectorial strategies are required to lower salt intake at population level, including the legislation of food supply, clearer labelling and signposting of food packaging, and improved consumer education on behavioural change regarding salt usage practices. A comprehensive national strategy that focuses on salt reduction is needed to reduce national blood pressure levels in the future. Legislating the levels of salt in processed food is only one part of this national strategy. All health professionals and educators should also provide appropriate nutritional recommendations that will educate, motivate and enable consumers to change their nutritional behaviour to reduce salt intake to less than 5 g per day, as recommended. The aim of this review is to revise the current food-based dietary guideline for salt, the implementation of which would contribute to lowering population salt intake, and blood pressure and cardiovascular disease, in South Africa.

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Introduction

It is now well established that an increase in salt intake leads to an increase in blood pressure, and that decreased salt intake relative to the usual or increased intake leads to lowered blood pressure in adults, with or without hypertension.[1] Blood pressure is a strong proxy indicator for the risk of cardiovascular disease, coronary heart disease, stroke[1] and kidney disease.[2] Although sodium is an essential element, it is required in small amounts only. Comprehensive strategies that focus on salt reduction are needed to reduce national blood pressure levels in the future.

The previous food-based dietary guidelines (FBDGs), published in 2001, stated: "Use salt sparingly". The national working group responsible for the revision of the FBDGs agreed to change the wording to: "Use salt and foods high in salt sparingly". Thus, the aim of this paper is to provide an update on the evidence of the role of dietary salt intake on blood pressure.

The vast majority of sodium in the diet is provided by sodium chloride (NaCl), thus for the purpose of this review, it is assumed that this is the form that impacts on blood pressure and other outcomes. However, many of the studies cited in this review measure salt intake in terms of total dietary sodium intake or urinary sodium excretion. Therefore, it is not clear whether sodium is harmful to health only if it is in the form of NaCl, as compared to other sources, such as sodium bicarbonate, sodium aspartame or inherent sodium, which is naturally present in milk and other food.

Hypertension and disease

According to the World Health Organization (WHO), high blood pressure is the leading preventable risk factor for deaths in the world.[1,3] Worldwide, hypertension is the leading risk factor for mortality, accounting for almost 13% of deaths.[4] High blood pressure contributes to the considerable burden of cardiovascular disease in South Africa. It is estimated that approximately 6 million adults in South Africa are hypertensive, which is defined as blood pressure ≥ 140/90 mmHg.[5] Hypertension is estimated to have caused 9% of all deaths in South Africa in 2000. Fifty per cent of the stroke case burden, 42% of the ischaemic heart disease case burden, 72% of the hypertensive disease and 22% of other cardiovascular disease case burden in adult males and females is attributable to high blood pressure.[5] Ischaemic heart disease and strokes are

the leading causes of deaths after HIV infection in South Africa.[6] With the significant increase in hypertension over the past 10 years, as well as inadequate diagnosis and control of raised blood pressure, an increase in heart disease and strokes was inevitable. Between 1998 and 2008, the prevalence of hypertension doubled in men (22-42% in men aged 35-44 years, and 30-60% in men aged 45-54 years), and increased to a lesser extent in women (24-34% in women aged 35-44 years, and 38-50% in women aged 45-54 years). It is estimated that more than 70% of both men and women older than 65 years of age are hypertensive. The increasing prevalence in hypertension relates to trends in urbanisation; a shift in dietary patterns from reliance on traditional staples, such as maize meal, to more processed food that is high in salt; decreased physical activity levels; and increasing obesity, particularly in African women.[7]

The role of a high sodium intake in disease

The causal relationship between sodium intake and high blood pressure was not widely accepted in the past, but with the growing body of evidence over the past decade, it has become firmly established.[1] Evidence from a wide variety of studies shows that there is a consistently direct relationship between sodium intake and hypertension. Blood pressure rises with increased sodium intake in the general population, and is reduced with decreased intake.[8,9] A meta-analysis of 19 cohort studies showed that high salt intake significantly increases the risk of strokes and total CVD.[10] Studies that include strokes as an outcome are considerably fewer than those investigating cardiovascular disease. However, one study in Taiwanese men demonstrated a 50% reduction in strokes over 31 months of intervention, where salt was replaced with a potassium-enriched salt substitute.[11] In addition to the effect on blood pressure, a high sodium intake has also been associated with other adverse effects, including vascular and cardiac damage, and an increased risk of kidney stones, renal disease, osteoporosis, stomach cancer and the severity of asthma.[9,12]

A meta-analysis of controlled trials has shown that the sodium intake in children also contributes to the development of hypertension later in life. It is speculated that a high sodium intake suppresses the salt taste receptors. It is likely that this results in children preferring saltier food in later life,[13] thus early intervention and the promotion of healthy eating habits from an early age is important. Chen and Wang (based on a systematic review and meta-regression analysis of the literature from diverse populations) concluded that elevated blood pressure in childhood was likely to predict adult hypertension, and that early intervention is important.[14]

Furthermore, the consumption of salt-preserved food and a high salt intake is associated with an increased risk of gastric[15] and nasopharyngeal cancer.[16] However, many of these cohort studies are limited to Asian populations who consume high amounts of Chinese-style salted fish, meat and vegetables.

Blood pressure is a function of cardiac output and peripheral vascular resistance. The kidneys, which excrete almost all ingested electrolytes and much of the water consumed daily, are responsible for managing the electrolyte and water content in the body. Volume content is tightly controlled by the regulation of sodium (and thereby chloride) excretion. Almost everyone living in societies that have access to processed food has a diet that provides quantities of salt that are far in excess of sodium requirements. However, not all individuals respond similarly to a high salt intake. A relationship between renal salt and water excretion and blood pressure can be created for any level of blood pressure and is termed the renal pressure-natriuresis or diuresis relationship, first described by Guyton.[17] According to this hypothesis, the pressure-natriuresis curve is always affected in hypertension, whatever the cause initiating the hypertensive process. All forms of hypertension in animal models tested to date feature a shift in the pressure-natriuresis relationship to the right, so that a higher level of pressure is required to excrete any given amount of salt and water. The relationships between salt and water intake and excretion are very steep in normotensive individuals, so that little change in blood pressure occurs when salt and water intake and excretion are modified over a large range. Conversely, a fairly flat pressure-natriuresis curve indicates a sensitivity to salt.

The concept of salt sensitivity in humans was first described by Kawasaki et al,[18] and later by Weinberger et al,[19] in an attempt to explain the heterogeneity of the blood pressure response to salt. Salt sensitivity was initially defined as an increase in mean arterial pressure > 10% when a high salt diet was administered, compared with a low salt diet.[20] The methodology exposed subjects to extreme changes in sodium intake (from 10-250 mmol/day) for a period of one week. Since there is no quick or easy way in which to predict whether or not an individual is sensitive to salt, the classification has remained in the research domain, rather than being of practical or clinical importance. However, despite seemingly arbitrary and varied definitions of salt sensitivity, several findings have consistently been observed. People with hypertension are more frequently sensitive to salt than normotensive subjects, and the prevalence of salt sensitivity increases in older individuals, black populations and people with low-renin hypertension, such as diabetics.[20]

Lifestyle factors other than salt which affect blood pressure

Although excessive dietary sodium intake is a key risk factor for the development of hypertension, other lifestyle variables, including obesity, excessive alcohol intake, poor diet and physical inactivity, are also important contributors. The Dietary Approaches to Stop Hypertension (DASH) diet has been shown to result in a substantial reduction in blood pressure, even when sodium intake is not decreased.[21] Nevertheless, evidence for the independent impact of sodium reduction on blood pressure was obtained from the findings of the follow-up DASH II study, which compared the effects of three levels of sodium and two dietary patterns on blood pressure. Sodium was found to have a significant effect on blood pressure in people following either a typical American diet or a DASH diet, and the combination of the DASH diet and reduced sodium intake achieved the greatest effect with regard to lowering blood pressure.[22]

The effects of salt reduction

The benefits of reducing salt intake on health

The evidence consistently highlights the fact that dietary salt reduction can achieve health benefits, especially via a reduction in blood pressure.[22,23] Population-based intervention studies and randomised controlled clinical trials have indicated that it is possible to achieve a significant reduction in blood pressure with reduced salt intake in adults, both with and without hypertension.[1,8] A 4.6 g reduction in daily dietary intake of salt decreases blood pressure by approximately 5/2.7 mmHg (systolic/diastolic) in individuals with hypertension, and by 2/1 mmHg in normotensive people.[24]

Randomised controlled trials have consistently displayed dose-response effects.[25] The blood pressure-lowering effect of reducing salt intake is effective in men and women, in all ethnic groups, in all age groups, and at all starting blood pressure readings.[23,26]

The effect of dietary sodium reduction on blood pressure in subjects with resistant hypertension, defined as blood pressure that remains above the goal in spite of the use of three antihypertensive medications, was studied in a randomised trial.[27] The results indicated that patients with resistant hypertension were particularly sensitive to salt. It was concluded that a low dietary salt intake is an important part of the clinical management and overall treatment of hypertension that is resistant.

Consuming a diet that is low in sodium has also been shown to reduce blood pressure in children. A meta-analysis of 10 trials in children and adolescents determined that sodium restriction over a period of four weeks resulted in a significant reduction in blood pressure.[13] A recent meta-analysis confirmed that a reduction in sodium intake reduced blood pressure in children.[28]

Dietary salt reduction and the prevention of cardio-vascular disease

Evidence of a direct effect of sodium reduction on cardiovascular disease outcomes is the ideal. However, few such studies are available. A recent meta-analysis of six randomised trials indicated that dietary restriction 2 to 2.3 g of salt (half a teaspoon) per day was associated with a 20% reduction in cardiovascular events.[29] Other evidence was provided by the long-term follow-up (10-15 year) analysis of two randomised controlled Trials of Hypertension Prevention (TOHP I and II), which demonstrated a 25% reduction in cardiovascular disease events with sodium reduction.[30,31] The WHO,[1] in its newly published guideline on sodium intake for adults and children, concluded that the "evidence regarding the relationship between sodium intake and blood pressure was of high quality, whereas the evidence regarding sodium intake and all-cause mortality, cardiovascular disease, strokes and coronary heart disease was of lower quality". A more recent meta-analysis by He et al[32] reported that a modest reduction in salt intake for four or more weeks caused a significant and important decrease in blood pressure in hypertensive, as well as normotensive, individuals.

Furthermore, modest salt reduction over a longer term had no adverse effect on hormone or lipid levels. Aburto et al[28] reported that reduced salt intake had no adverse effect on blood lipids, catecholamine levels or renal function in their systematic review and meta-analysis. No associations were found between sodium intake and all-cause mortality in the various undertaken observational studies. However, significant effects on mortality, from strokes and coronary heart disease, were reported.

The cost-effectiveness of salt reduction

Bibbins-Domingo et al[33] projected that a regulatory intervention, designed to achieve a reduction in salt intake of 3 g per day in the USA, would save 194 000-392 000 quality-adjusted life years and $10-24 billion in healthcare costs annually. They calculated that even a modest reduction of 1 g salt per day between 2010 and 2019 would be more cost effective than using medication to lower blood pressure in persons with hypertension.

Asaria et al[34] modelled the effect of salt reduction on blood pressure in 23 developing countries. They determined that a 15% reduction in salt intake would avert 8.5 million deaths over 10 years, at a low cost of $0.40-1.00 per person per year.[34] A recent review concluded that there is significant evidence to suggest that modifying salt intake and promoting weight reduction may reduce cardiovascular risk relating to hypertension in urban, developing communities of African descent.[35] Bertram et

al reported on what the effect on cardiovascular disease in South Africa would be if the sodium content of bread, margarine, gravy and soup was reduced to recommended levels.[36] They calculated that the proposed reductions would result in 7 400 fewer cardiovascular deaths and 4 300 less nonfatal strokes per year, based on the 2008 information, with cost savings of up to R300 million.

Salt intake patterns

Salt intake methodology

The "gold standard" of sodium intake is the measurement of 24-hour urine sodium excretion. This method does not identify dietary sources of salt. However, dietary methods used to assess sodium intake are not sufficiently sensitive and give an underestimation of sodium intake. Specific problems with these dietary methods are the quantification of added salt during food preparation and the addition of salt and other condiments during eating. The measurement of dietary sodium, either at population or individual level, is fraught with methodological difficulties because of high intra- and inter-subject variability, in both added salt use and in the dietary intake of processed food that is high in salt.[37,38] To estimate salt intake accurately by means of dietary intake studies is challenging. It has been proposed that 81 days of dietary recording would be required to gauge an individual's intake within 10% of the observed mean intake for sodium.[39] Furthermore, dietary surveys do not differentiate between naturally available sodium in food and that which is added as salt (NaCl) in processed food. However, since the vast majority of sodium in the diet is provided by NaCl, it is assumed that this is the form that impacts the most on blood pressure and other outcomes.

The WHO recommends that, assuming a standard deviation of 24-hour urinary sodium excretion of roughly 75 mmol/day, a minimum sample size of 120 participants (for either groups of men or women) is required to ensure sufficient power for a 24-hour urinary sodium excretion calculation to be generalisable to the study population.[40] However, because of the large day-to-day variability in urinary sodium excretion,[41] precision would be improved by obtaining more than one 24-hour urine collection from each individual. Only one South African study has included multiple 24-hour collections.[42]

Salt intake around the world

Worldwide, most people consume far more sodium than the recommended levels. Humans are genetically programmed to take in less than 100 mg of sodium or 0.25 g of salt per day.[43] Brown et al[44] studied estimates of sodium intake, based on data from both a 24-hour urinary sodium excretion analysis and a dietary intake methodology. They reported that the average salt intake in most countries around the world is approximately 9-12 g per day. Asian countries have a higher intake, of more than 12 g per day. It was also determined that salt intake is usually more than 6 g per day in children who are older than five years, and that it increases with age.

Data from countries such as the UK estimate that approximately three quarters of sodium intake is derived from eating processed food, about 15% is discretionary (half of which is contributed by table salt and half by added salt during cooking), 10-11% is naturally occurring (inherent) in food, while less than 1 % is provided by water.[45] It is estimated that in Canada more than 75% of sodium intake is from processed food, including food and meals that are served in restaurants.[46]

Sodium and salt intake in South Africa

In South Africa, current salt intake levels are similarly high, at roughly 6-11 g per day, using either the 24-hour urinary excretion or spot urine methodology.[47] These studies are summarised in Table I.

Table I: Daily salt intake as determined from urinary sodium excretion in three surveys

Study	African Programme on Genes in Hypertension, Gauteng[35]	Charlton et al study, Cape Town[42]			Assuring Health For All in the Free State, Mangaung (Bloemfontein)[48]		
Population	African ancestry	Black	White	Mixed ancestry	Black		
Method	24-hour urinary excretion	Average of three 24-hour urinary excretions			Spot urine		
n	640	110	103	112	318	71 males	247 females
Average sodium intake (mg), ± SD	2 415 ± 1679	3 112 ± 1 152	3 790 ± 2 093	3 393 ± 1 691	4 094 ± 1 219	3 643 ± 1 219	4 223 ± 1 189
Average salt intake (g), ± SD	6.04 ± 4.2	7.8 ± 2.88	9.5 ± 5.23	8.5 ± 4.23	10.2 ± 3.05	9.1 ± 3.05	10.6 ± 2.97

SD: standard deviation

Limited data are available from dietary surveys on the sodium intake of South Africans. The studies that are available are limited in comparability because of the use of different dietary methods, such as 24-hour dietary recalls and the quantified food frequency questionnaire. Older studies performed during the 1980s and 1990s showed a higher intake, of 2 733 mg sodium for males and 1 698 mg sodium for females, than later studies.[47] Average sodium intake ranged from 855-2 733 mg per day. Charlton et al[42] determined that discretionary salt intake is between 33% and 46% for the three ethnic groups that were studied. This means that, on average, an additional 40% should be added to take into account the amount of salt applied during food preparation and at the table. Based on the dietary methodology, it is estimated that salt intake is between 4 g and 11 g per day.[47]

The contribution of food to sodium intake

Additional analysis of dietary data, collected as part of various studies performed in South Africa since the 1980s in different cultural groups, indicates that the main contribution to total sodium intake, excluding discretionary salt, is provided by white and brown bread. Bread contributes to between 5% and 35% of sodium intake, depending on the ethnic group being studied. Hard or block margarine supplies up to 13% in some groups. Soup and gravy powder adds up to 17% of total sodium intake in some populations, while atchaar contributes more than 5% to the sodium intake of the Indian population.[47]

Public health strategies

Salt intake recommendation

In 2003, as a result of high salt intakes globally, the WHO set a worldwide target of ≤ 5 g of salt (< 2 000 mg sodium) per day per person. This level of intake was again confirmed in 2012 by the WHO.[1] Although Canada has a relatively low hypertension rate, with only approximately 20% of adults having hypertension, the country has embarked on a sodium reduction strategy, with the aim of reducing sodium intake to 2 300 mg/day by 2016.[46] Targets set at the South African Non-Communicable Disease Summit in September 2011 were to reduce the mean population intake of salt to < 5 g per day by 2020. The current South African Hypertension Guidelines recommend a maximum salt intake of 6 g (2 400 mg sodium) per day.[49] Table II provides an overview of current guidelines on salt or sodium intake around the world.

Policies

Regardless of limited available data on specific disease end-points, policy-makers consider blood pressure to be one of the few surrogate outcomes that is sufficiently robust to guide health promotion policy. He and MacGregor[8] advocate the reduction of salt intake at population level because "a modest reduction in salt intake at the population level worldwide will result in a major improvement in public health". In September 2011, a United Nations high-level meeting on noncommunicable diseases was held, at which influential political leaders reached consensus on the global priority action needed to prevent and treat these conditions. *The Lancet* Noncommunicable Disease Action Group and the Noncommunicable Disease Alliance proposed the reduction of salt intake as one of five overarching priority actions.[53]

Population-based interventions aimed at reducing sodium intake are being successfully implemented in various countries worldwide, and have the potential to reduce the prevalence of hypertension and cardiovascular disease. Not only is sodium reduction one of the easiest ways in which to potentially reduce the global burden of cardiovascular disease, it can also help to lessen the burden on healthcare services and is highly cost effective.[34,44]

There is clearly a need to give priority to the implementation of national strategies, policies and programmes aimed at the reduction of dietary salt consumption. A

Table II: Salt and sodium intake recommendations for adults

Country or organisation	Salt recommendation (g per day)	Sodium recommendation (mg per day)
American Heart Association[50]	-	< 1 500
Australia and New Zealand[51]	-	1 600-2 300
Canada[46]	-	< 2 300 by 2016
Dietary Guidelines for Americans[2]	-	< 1 500
Scientific Advisory Committee on Nutrition (UK)[52]	6	2 400
South African Hypertension Society[49]	< 6	< 2 400
World Health Organization[1]	*Adults:* < 5	< 2 000
World Health Organization[1]	*Children:* The recommended maximum level should be adjusted downwards, based on the energy requirements of children	*Children:* The recommended maximum level should be adjusted downwards, based on the energy requirements of the children

comprehensive national strategy is needed to strengthen the drive for the South African public to consume less salt. The South African government published regulations for the gradual reduction of salt over a period of six years in eleven different food categories in March 2013.[54] However, legislating salt levels in processed food is only one part of a national strategy. Therefore, it is important for health professionals and educators to also provide appropriate nutritional recommendations that will educate, motivate and enable consumers to change nutritional behaviour.

Food-based dietary guideline

The existing South African FBDG, "Use salt sparingly", highlights limiting discretionary salt added during food preparation and at the table, but is not explicit with regard to limiting hidden salt from processed food.[55] Table III provides a summary of the sodium/salt guideline in other FBDGs around the world. Many countries include guidelines on how to choose low-salt food or on how to limit high-salt food. As a large amount of salt intake in the South African population is provided by processed food, the FBDG should be changed to include this.

Table III: Sodium/salt guidelines within the overall food-based dietary guidelines worldwide

Country	Sodium/salt guideline
South Africa	Use salt sparingly
Namibia	Use only iodised salt, but use less salt
Nigeria	Limit the intake of salt and bouillon cubes
Australia	Limit the intake of foods that contain saturated fat, added salt, added sugars and alcohol
New Zealand	Choose pre-prepared foods and snacks that are low in fat, salt and sugar
Bangladesh	Avoid eating too much salt and salty foods. Limit salt intake to 5-10 g per day.
China	Choose a light diet, that is also low in salt
India	Salt should be used in moderation. Processed and ready-to-eat foods should be used judiciously
Indonesia	Use only iodised salt
Japan	Avoid eating too much salt. Aim for a salt intake of less than 10 g per day.
Philippines	Use iodised salt, but avoid the excessive intake of salty foods
Singapore	Reduce salt intake to less than 5 g a day
Bulgaria	Reduce the intake of salt and salty foods
Netherlands	Be careful with salt
Ireland	Try not to always rely on salt to flavour foods
UK	Nothing specific
USA	Consume less than 2 300 mg sodium per day. Choose and prepare foods with little salt. At the same time, consume potassium-rich foods, such as fruits and vegetables.

Recommended new food-based dietary guideline for salt

At a consultative meeting on reducing salt in food, held on 21 July 2011 and organised by the Department of Health, the following guideline was suggested: **"Use salt and foods high in salt sparingly".**

Barriers to reducing salt intake

Taste

Taste is an important consideration in food preparation and food choices. One of the potential barriers to lowering salt intake is the concern that food may taste bland. When encouraging individuals to not add salt or to add less salt to their food, they should be made aware of the fact that taste adapts to lower levels of sodium. As salt intake falls, the salt taste receptors in the mouth adapt and become more sensitive to lower concentrations of salt within 1-2 months.[56] Once salt intake is reduced, people prefer the taste of food with less salt and reject more salty food.[57] The use of other flavourings, such as herbs and salt-free spices, should also be encouraged and emphasised in education materials. Salt reduction in bread has been shown to be acceptable to consumers in terms of flavour.[58,59] Sudden, large reductions in salt content are less acceptable to consumers[60] than small to moderate changes,[61] which may lead to a preference for a diet that is lower in salt.[62,63] An Australian study demonstrated that a gradual one quarter reduction in the sodium content of bread was not detected by consumers.[60] Lowering the sodium content of bread by approximately one third, accompanied by a two- to threefold increase in the nutritionally favourable potassium and magnesium, can produce an acceptable dark European-type bread.[64,65] A South African study[66] reported on substitution in the diet with a similar sodium-reduced brown bread, with high consumer acceptance in terms of taste, flavour and texture. Importantly, inclusion of this reduced sodium bread, together with other diminished sodium variants of commonly consumed food items for eight weeks, resulted in a clinically significant blood pressure reduction in older South Africans with hypertension.

Does salt addiction exist?

New information, based on animal studies, suggests that sodium could possess addictive qualities. Morris et al suggest that "hedonic and/or affective consequences of major fluctuations in sodium balance, together with neural plasticity that follows disturbed sodium homeostasis, may play a role in promoting excessive sodium intake".[67] The Salted Food Addiction Hypothesis proposes that salted food acts in the brain like an opiate agonist and results in a hedonic reward, perceived as flavourful, tasty or delicious.

With withdrawal of the stimulus of an opiate receptor, the body perceives it as "urges", "cravings" and "hunger".[68]

Currently, bread is the major contributor to salt intake in South Africa. Legislation has been introduced to gradually decrease the sodium content of bread. Bolhuis et al[69] conducted a study in the Netherlands to examine the effects of gradually reducing the salt content of bread on bread consumption and sodium intake. They reduced the salt content of brown bread over four weeks by 31%, 52% and 67%. The results showed that reducing salt in bread up to 52% did not lead to lower consumption of bread, in comparison to controls. In addition, they found that the participants in the study did not induce compensation of sodium intake. A study by Lucas et al[70] indicated that there is no association between sodium concentration and liking, and the consumption of hash browns. A recent study also showed that salt reduction of up to 48% is possible in commercial vegetable soup samples, without affecting consumers' liking of the meal.[71]

Food labelling and consumer education

The ingredient list, nutrition information table and health logos on food products are labelling tools which can help consumers make informed purchasing decisions. However, reading labels is often perceived as being complicated. Adequate education is necessary to assist consumers in understanding nutrition labelling. Labels reflect the sodium content, and not the salt content, of food as per the current labelling regulations, which often results in difficulties in consumer understanding. Consumer education is needed to address misunderstanding by consumers. Sodium chloride is approximately 40% sodium and 60% chloride. To calculate the salt content of food (in g), the sodium value (in g) should be multiplied by 2.5. By listing the sodium value, rather than the salt value, the information provided includes sodium from all sources, not only salt.

Other useful conversions are as follows:

- 2 300 mg of sodium is equivalent to 100 mmol of sodium and is the amount of sodium in 5.84 g of salt, which is approximately one teaspoon of salt.
- 1 500 mg of sodium is equivalent to 65 mmol of sodium and is the amount of sodium in 3.8 grams of salt, which is roughly two thirds of a teaspoon of salt.

Consumers should be made aware that if the words "salt" or "sodium" appear in the first few words of the ingredient list, it is likely that the product is high in salt, and should be used sparingly, if at all. Food with a sodium content of more than 600 mg per 100 g (1.5 g salt) in the nutrition information table may be considered to be high in sodium. Examples of highly salted food include stock cubes, soup powders, salty seasonings, processed meats or sausages, fast food or takeaway food, as well as salty snacks.

Although the Department of Health is legislating the maximum sodium content that will be allowed in certain food, it will be a number of years before the food industry will have to react, i.e. when the targets are implemented. In the interim, consumers should be encouraged to choose alternatives containing lower salt than the processed food that they consume, including bread, cereals, margarine and fat spreads. Consumer education is needed to empower the public to be able to make informed food choices at the point of purchase, by comparing the sodium content per 100 g of similar products. For many consumers, signposting of products with health logos, such as the Heart Mark of the Heart and Stroke Foundation South Africa, may be an easier and more useful tool with which to identify lower sodium alternatives.

In addition, food labelling legislation can help to guide lower sodium choices. The following categories could apply to sodium content claims that are made on food packaging, as currently outlined in Regulation 146: Regulations Relating to the Labelling and Advertising of Foodstuffs:[72]

- Low in sodium: Not more than 120 mg per 100 g.
- Very low in sodium: Not more than 40 mg per 100 g.
- Free of sodium: Not more than 5 mg per 100 g.

Iodisation

A potential concern of reducing salt intake within the population is that it could interfere with the national iodisation fortification programme. However, if salt is sufficiently iodated, salt intake as low as 5 g per day would provide an adequate amount of iodine. In South Africa, salt is sufficiently iodated to a concentration of 40-60 ppm, so the salt-lowering message would not interfere with the nutritional requirements for iodine intake in the population.[73]

Conclusion

There is conclusive evidence of the adverse effects of excessive dietary salt consumption on health, particularly on blood pressure, leading to cardiovascular disease. In view of the significant increase in hypertension in the South African population over the past decade, predisposing factors, such as a high salt intake, need to be curtailed in order to reduce blood pressure in the future.

Current recommendations indicate that to prevent chronic disease, the average consumption of salt for the population should be < 5 g per day, i.e. 2 g per day of sodium.[1] As population-based reductions in dietary sodium consumption are highly cost effective, there is clearly a need for the government to invest in this high priority. In South Africa, national strategies are in place to achieve this via regulation of the sodium content of certain

categories of processed food and the reformulation of this food by the food industry. However, these policies will take a number of years to be implemented and need to be supported by concurrent changes in the environment which will empower consumers to make healthier food choices, e.g. by clear labelling of processed food, as well as active health promotion and consumer education. In South Africa, the main sources of salt have been identified and include certain categories of processed food. Discretionary salt that is added at the table and during cooking remains an important contributor to dietary salt intake. However, it is important that these categories of processed food are also reduced.

Importantly, salt is sufficiently iodated in South Africa. Therefore, a salt-restricted diet of 5 g per day will not compromise iodine status. The South African FBDGs have been developed to help guide healthier food choices by the population, which includes a reduction in sodium intake. Practically, this guideline translates to a daily diet that includes plenty of vegetables and fruit, a regular intake of legumes, and a moderate intake of minimally processed wholegrain starchy food, as well as the inclusion of low-fat dairy products and fish, lean meat or chicken. Adoption of the revised South African Food Based Dietary Guideline, which states: "Use salt and foods high in salt sparingly", strengthens the drive to lower national levels of salt intake, which will ultimately contribute to reducing the burden of hypertension and cardiovascular disease in South Africa.

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