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Choose and prepare foods with less salt and sauces

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1. Terminology

Iodised salt

It is a form of salt that has been fortified with iodine. It contains 20 to 30 ppm or 20 to 30mg iodine per kg of salt (FAO, 1995).

Low salt, very low salt and salt-free food

Low salt, very low salt and salt-free foods are defined as foods with sodium concentration not more than 0.12g/100g, 0.04g/100g and 0.005g/ 100g of food respectively (MOH, 2006).

Salt and sodium

Salt is an inorganic compound consisting of sodium and chloride ions i.e. NaCl. 1 g sodium is equivalent to 2.55 mg NaCl whilst 1 mmol Na is equivalent to 23 mg Na (NaCl consists of Na at 40%). Thus, 1 teaspoon or 5 g salt provides 2000 mg or 88 mmol sodium. In addition to NaCl, sodium may also be present in other forms, such as monosodium glutamate, sodium nitrate and sodium benzoate.

Salt substitutes

It is referred to as light salts, typically replace all or some of the sodium with another mineral, such as potassium or magnesium.

Sauce

A sauce is liquid or sometimes semi solid food served on food as a relish (served as an accompaniment to food) or used as a flavourful seasoning in preparing other foods. This includes soya sauce (fermented soya bean), oyster sauce, tomato and chili sauces, fish sauce (made from fermented fish), prawn sauce *(cencaluk)*, teriyaki sauce and Worchester sauce.

Table salt

It is a fine-grained salt that often contains an anti-caking ingredient, such as calcium silicate, to keep it free-flowing. It is available iodised or non-iodised. This type of salt is mainly used in cooking and at the table.

2. Introduction

The prevalence of high blood pressure has increased in the country in the past decade. Results from the Second National Health and Morbidity Survey, indicated 33% of adults aged 30 years and above had hypertension with a higher percentage among women (Lim & Morad, 1996). The figure has increased to 42.6% in the recent Third National Health and Morbidity Survey (IPH, 2008). It is a major risk factor for cardiovascular disease and premature death. Heart diseases and diseases of pulmonary circulation and cerebrovascular diseases (23.5%) is the major

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cause of deaths in the Ministry of Health hospitals. Dietary salt has been associated with high blood pressure and its related co-morbidity. Therefore, reducing the average salt intake of the population is likely to decrease the health burden associated with high blood pressure and improve public health.

Sodium is an essential mineral that is required daily in a minute amount of approximately 500 mg/day (22 mmol/ day) for adults. However, excessive intake or more than the Tolerable Upper Intake Level (UL) (2300 mg sodium/day or 101 mmol/day) can increase risk of adverse effects (IOM, 2004). Salt is the major source of sodium in the Malaysian diet. One teaspoon or 5 g salt provides 2000 mg (88 mmol) sodium.

The previous edition of the Malaysian Dietary Guidelines (NCCFN, 1999) has recommended the use of salt sparingly based on the WHO Expert Committee on prevention of coronary heart disease (CHD) (WHO, 1982).

The recommendation was that individuals should not eat more than 6 g of salt per day (2400 mg sodium). The present document has been prepared to review the recommendation made in 1999, taking into consideration recent evidences or recommendations on salt intake in the population.

3. Scientific basis

Since 1994, the evidence of an association between dietary salt intake and blood pressure has increased, with the greatest reduction in blood pressure observed when a diet rich in fruits, vegetables and low fat dairy foods and reduced in saturated and total fat, is combined with a low salt diet (SACN, 2003). It is well accepted that a reduction in dietary sodium intake will decrease the mean population blood pressure and reduce the prevalence of hypertension. In fact, high salt intake causes left ventricular hypertrophy, a strong risk factor for cardiovascular disease, independently of blood pressure effects (Tuomilehto *et al*., 2001; Hooper *et al*., 2002).

Many epidemiological studies have demonstrated that high salt intake is associated with an increased risk of high blood pressure. In the INTERSALT study involving 52 communities (INTERSALT Cooperative Group, 1988), there was a positive relationship between salt intake and blood pressure. The efficacy of reduced sodium intake in lowering blood pressure is also well established. A meta-analyses study by Law (1997) has found that the full effect of dietary sodium reduction on blood pressure is not seen for at least five weeks after the dietary change. The extent to which a reduction in dietary sodium intake reduces blood pressure depends on age and initial blood pressure; it is greater with age and at higher blood pressures (Graudal, Galloe & Garred, 1998; Law, Frost & Wald, 1991).

In a Cochrane systematic review, a modest reduction in salt intake for four weeks or more among individuals with normal or elevated blood pressure had a significant effect on blood pressure (He & MacGregor, 2004). This modest reduction to a 6 g/day would lead to an average reduction in systolic pressure in the adult population of 5 mmHg. This would cause a 24% reduction in strokes and an 18% reduction in coronary heart disease (He & MacGregor, 2003). Another meta-analysis (Hooper *et al*., 2002) on unconfounded randomised trials focusing in reducing sodium intake in adults for at least

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six months indicated reduction in systolic and diastolic blood pressure. Cook *et al*., (2007) showed that individuals with high-normal blood pressure who significantly reduced dietary salt intake for 18 months or 36 to 48 months after a nutrition intervention programme had a decrease risk of cardiovascular disease by 25% over the following 10 to 15 years. Further more, their risk of dying from cardiovascular disease is reduced by 20%. (Cook *et al.,* 2007). Although the understanding of long term effects of reducing dietary salt intake on cardiovascular morbidity and mortality can be improved by further studies, the currently available scientific evidence is strong enough to justify reducing sodium intake in the whole population through cost-effective public health approaches (WHO, 2007).

Excess sodium intake has also been associated with a number of health conditions other than raised blood pressure (MacGregor, 1997). These include conditions exacerbated by water retention (including heart failure, cirrhosis, nephrotic syndrome and idiopathic and cyclical oedema), stroke (independently of blood pressure), gastric cancer and left ventricular hypertrophy. Excess sodium intake also increases the rate of deterioration in kidney function in patients with renal disease, is associated with urinary stones and may aggravate asthma (Carey, Locke & Cookson, 1993) and osteoporosis. Excretion of sodium is associated with an obligatory loss of calcium as a result of interference with the tubular reabsorption of calcium. Calcium is conserved on low salt intakes and wasted on high salt intakes. This has relevance to calcium stones of the urinary tract (the commonest variety of stone) and osteoporosis. According to Nordin *et al*., (1993), urinary calcium levels increase by approximately 1 mmol per 100 mmol sodium intake, thus leading to bone loss and it has been hypothesised that this may contribute to osteoporosis. However, reports on the effects of salt on bone biomarkers are inconsistent, with most of the studies in this area having involved small numbers of subjects and the interventions have been of very short duration (SACN, 2003).

Reducing the average population salt intake would proportionately lower population average blood pressure levels and reduce risk of cardiovascular diseases. This would be best achieved by substantially reducing the salt intake from the average salt intake of the population. Individuals used to a higher salt intake will at first miss the taste of salt when they begin a lower salt intake, but the palate adapts to lower sodium levels and people will find that the intensity of salt in food increases and their 'preferred saltiness' of food reduces (Blais *et al*., 1986; Bertino, Beauchamp & Engelman, 1982). Changes will be noticed within a week and taste change will continue for many months. Most people attempting to limit their salt intake are satisfied with many other ways of adding flavour to their foods and do not miss salt after their palates have adapted.

The recommendation by WHO (2007) of one teaspoon or 5g salt or sodium chloride (or 2000 mg sodium per day) is adopted as a population nutrient intake goal for Malaysians. This level was also previously recommended by WHO (1983) and WHO (2003) reports. Although it is important to advise people to consume less salt and to choose low salt foods, the widespread use of salt in processed foods and foods prepared away from home or eaten outside is a major barrier to achieving any meaningful reduction in dietary sodium intake. Therefore, there is a need to reduce the salt content of processed foods and drinks, with the co-operation of food manufacturers,

retailers and caterers. Consumers should also be encouraged and educated to read food labels and the manufacturers themselves should produce a consumer-friendly labelling showing the sodium content of foods. Information on sodium content is now included on food labels (in terms of density or standard serve), but it is easy to confuse salt and sodium and consumers may not be aware of the definition of a low salt food. The Malaysian Food Regulations 1985 and Food Act 1983 defines a low salt food as a food with a sodium concentration of up to 120 milligram per 100 gram (MOH, 2006).

3.1 Special consideration for children

Studies of the association between sodium intake and blood pressure are more common in adults than children. The presence and tracking of high blood pressure in children and adolescents occur due to unhealthy lifestyle, including excessive intake of salt (Lawlor & Smith, 2005; Dekkers *et al*., 2002; Bao *et al*., 1995). One study suggests that early exposure to dietary sodium may have lasting effects. In a six-month randomised trial of almost 500 bottle-fed newborns, the group whose sodium intake was reduced by 50% had a 2.1mmHg lower systolic blood pressure than the control group (Hofman, Hazebroek & Valkenburg, 1983). Out of the 35% of subjects who could be traced 15 years later, those originally receiving the low-sodium formula had a blood pressure that was on average 3.6mmHg (systolic) and 2.2mmHg (diastolic) lower (Geleijnse, Hofman & Witteman, 1997) suggesting an effect persisted into adolescence. There is ample evidence showing that breastfeeding in infancy is associated with lower blood pressure in later childhood (Martin *et al*., 2004; Wilson *et al*., 1998).

Adolescents are particularly prone to an increased sodium intake because their energy needs increase greatly, resulting in a commensurate increase in food intake. Their increased independence and disposable income also encourage a greater intake of foods prepared outside the home, which may be more heavily salted. Increased excretion of calcium in response to a higher intake of sodium may be more important in childhood and adolescence than in adulthood because of the need to develop the highest possible peak bone mass during adolescence. Peak bone mass is one of the determinants of the development of osteoporosis in later life (Loro *et al*., 2000).

Higher blood pressure in childhood (in combination with other risk factors) causes target organ and anatomical changes that are associated with cardiovascular risk, including reduction in artery elasticity, increased ventricular size and mass, haemodynamic increase in cardiac output and peripheral resistance (Bao *et al*., 1995; Nicklas *et al*., 1988). Hence, efforts to reduce blood pressure and to prevent the age-related rise in blood pressure in childhood are prudent. This age group should not be neglected in terms of salt consumption recommendations when nutrition policies are being developed. However, data pertaining to the prevalence of hypertension and the level of salt intake among infants, children and adolescents in Malaysia are scarce. Institute of Medicine (IOM) 2004 has published recommendation for sodium intake according to age group (Table 9.1).

4. Current status

The Malaysian Adult Nutrition Survey (MANS 2003) (Mirnalini *et al*., 2008)

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Table 9.1. Dietary reference intakes of sodium for children

Life stage/age	Adequate Intake (AI)[1] (milligrams/day)	Tolerable Upper Intake Level (UL)[2] (milligrams/day)
1 - 3 yr	1,000	1,500
4 - 8 yr	1,200	1,900
9 - 13 yr	1,500	2,200
14 - 18 yr	1,500	2,300

[1] AIs may be used as a goal for individual intake. For healthy, breastfed infants, the AI is the mean intake. The AI for other life stage and gender groups is believed to cover the needs of all individuals in the group, but lack of data prevent this from being able to specify, with confidence, the percentage of individuals covered by this intake.

[2] UL is the maximum level of daily intake that is likely to pose no risk of adverse effects. Unless otherwise specified, the UL represents the total intake from food, water, and supplements.

Source : Institute of Medicine (2004)

reported that the mean sodium intake of Malaysian adults was about 2575 mg/day, with small differences between rural (2538 mg sodium/day) and urban (2601 mg sodium/day) population. Orang Asli had the lowest intake of sodium (945 mg sodium/day), while Sabah Bumiputera (2929 mg sodium/day), Sarawak Bumiputra (2707 mg sodium/ day) and Chinese (2916 mg sodium/ day) had the highest intakes. It is important to note that the level of sodium intake from this study might be underestimated as the intake was assessed using a single 24 hour dietary recall and half of the subjects were reported to under-report their energy intake. Dietary intake methods could not be considered as reliable since salt added during cooking or at the table is not always taken into account, and there are measurement errors associated with these methods. A 24 hour urine collection is considered to be the "gold standard" to measure sodium intake as it can capture 85 to 90% of the ingested sodium and is not affected by subjective reporting of dietary intakes (WHO, 2007).

In the INTERSALT study of 52 communities in 32 countries, 10,079 adults aged 20 to 59 years (INTERSALT Cooperative Research Group, 1988; Elliott *et al*., 1996), more than 50% of men had an average consumption of sodium ranging from 150 to 199 mmol/day (3450 to 4577 mg sodium/day or 8.8 to 11.7 g of salt/day) and about 50% women consumed 100 to 149 mmol/day (2300 to 3427 mg sodium/day or 5.9 to 8.8 g of salt/day).

The study locations in northern Japan and the People's Republic of China were among those with the highest sodium intakes. In the subsequent INTERMAP study (Stamler *et al*., 2003) involving China, Japan, UK and USA, the vast majority of people in each of the countries had urinary excretion values in excess of 100 mmol/day (2300 mg/day), with the highest consumption was in China.

In industrialised countries, about

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75% sodium consumed comes from processed foods and food eaten away from home. It has become apparent that the source of most dietary sodium in Western countries is not discretionary salt (salt added to food during cooking and at the table) but contributed from manufactured foods (Mattes & Donnely, 1991; James, Ralph & Sanchez-Castillo, 1987). For example, in the United Kingdom about 65% to 70% dietary sodium are contributed from manufactured foods, followed by 15% to 20% of total dietary sodium intake from discretionary sources and approximately 15% was naturally occurring sodium in unprocessed foods (British Nutrition Foundation, 1994).

In Asian countries, the salt added in cooking and present in sauces and seasonings represent the major sources of sodium in the diet (WHO, 2007). Asian dishes use ingredients such as soya, oyster and fish sauces and also prawn paste, which are high in sodium. Consumers should be reminded, for example, that one teaspoon (or 5g) of salt is contained in six teaspoons of light soya sauce, six and a half teaspoons of oyster sauce (51g) or *cencaluk* (45g), eight teaspoons of *budu* (32g), 15 teaspoons of thick soya sauce (71g) or chilli sauce (174g) and 21 teaspoons of tomato sauce (208g). Hence, Asian-style dishes have been found to result in a 15% higher sodium content compared to a standard Western diet (INTERSALT Cooperative Research Group, 1988).

In Malaysia, consumption of highly salted fish, egg and vegetables are also not uncommon. Malaysians also like to use flavour enhancers such as monosodium glutamate (MSG) and flavouring cubes in cooking. MSG is also used as additives in processed foods. These are hidden sodium food sources. Sodium nitrate is another type of hidden sodium that is frequently used to preserve food.

Malaysians also like to eat outside foods either as take aways or eaten at the food premise itself. The Malaysian Adult Nutrition Survey (MANS, 2003) had reported the consumption of breakfast bought at food premises (Wan Manan *et al*., 2008). It was found that 40.9 % of Malaysian adults who lived in urban areas bought their breakfast from food premises as compared to their counterparts in rural areas (36.6%). 48.3% men and 32.2% women consumed outside foods for their breakfast. By ethnic group, 49.1% of Chinese, followed by 41.7% Malays and 40.2% Indians bought their breakfast from food premises. Outside foods are quite often salty and frequently added with MSG. Fast food which are known to be high in sodium are also popular entrees among Malaysians (Lew & Barlow, 2005; Anuar Zaini *et al*., 2005). Thus, it is expected that Malaysians consume more sodium than those reported in local dietary surveys (Mirnalini *et al*., 2008).

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5. Key recommendations

Key recommendation 1

Limit salt intake to 1 teaspoon a day.

How to achieve

1. Reduce the amount of salt in cooking and the addition of other flavour enhancers such as monosodium glutamate (MSG), sauces (such as soya sauce, oyster sauce, tomato sauce) and flavouring cubes.

2. Enhance the flavour of food using natural herbs and condiments such as garlic, onion, curry spices, white pepper, lemon grass, vinegar and lemon.

3. Limit fast food consumption and request for low salt and less sauces dishes or no MSG-added meals when eating out.

4. Learn to enjoy natural flavour of foods without salt.

5. Parents should inculcate for low saltiness taste food to their children from childhood.

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6. Salt substitutes containing potassium chloride can be one way of reducing sodium intake. However, these substitutes may be harmful to individuals with certain medical conditions such as kidney and heart problems. These individuals should consult a medical doctor before trying such salt substitutes.

7. Iodised salt is one way that has been used in Iodine Deficiency Disorder (IDD) programme in specific areas and high risk group. However, the consumption of iodised salt should not be more than one teaspoon or 5 g daily.

Key recommendation 2

Reduce consumption of highly salted foods and condiments.

How to achieve

1. Reduce intake of salty foods such as salted fish, salted eggs, salted vegetables, high-sodium snacks (such as potato crisps and fish chips) and processed foods (such as sausages, chicken nuggets, meatball and burger).

2. Choose more often foods with low sodium content instead of foods with medium and high sodium content within the same food group. As a guide, use Table 9.2, which shows the sodium or salt content of commonly consumed foods according to major food groups.

3. Choose fresh fruits and vegetables instead of preserved and processed foods.

4. Soak preserved foods such as dried anchovies and prawns in water to reduce sodium content.

5. Note the sodium content of a food in the Nutrition Information Panel, compare with other available brands of the same product and choose the ones with the lower sodium content. Choose brands with “low” or “lower” claims on the label, if available.

6. Read the ingredient list on the food label and take note of all sources of sodium, such as monosodium glutamate and sodium nitrate.

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Additional recommendations: Infants and Children

Breastfeed babies exclusively at least up to six months. After a child reaches six months of age, mothers can feed the baby with home-made complementary foods with no added salt. If mother chooses to feed baby with commercially prepared complementary foods, read labels for sodium content when purchasing.

Children should limit the intake of high sodium snacks and fast foods. Instead, choose fresh fruits and low sodium foods as snacks. Consumption of processed foods such as chicken nuggets, meatballs and meat burgers which contain high sodium should be limited. It is advisable to choose low salt options or home-made processed foods with less salt.

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Table 9. 2. Sources and content of sodium in selected foods [1]

LOW < 120 mg Sodium [2]	MODERATE 120 - 480 mg Sodium	HIGH > 480 mg Sodium [3]
Cereal & cereal products		
Rice, plain, cooked	Rice porridge, instant (1 packet)	
	Bihun, kuey teow, laksa, mi (< 2 cups)	Noodle, instant (> ¼ packet) Noodle snack, flavoured (>1 medium packet)
Bread, white (1 slice) Bread, wholemeal	Bread, white (2-4 slice) Bread, wholemeal (2-3 slice)	
Biscuit, soda/plain (< 3 pieces) Biscuit, cream crackers (< 7 pieces) Crackers, low-salt (< 12 pieces)	Biscuit, soda/plain (3 -12 pieces)	Biscuit, soda/plain (>12 pieces)
Starchy roots, tubers & products		
Potato (< 2 whole)	Potato chips (1 small packet)	Potato chip (> ½ big packet)
Legumes & legumes products		
Soya bean, white (< 1½ cup) Soya bean cake, fermented (*Tempe*)	Soya bean paste, fermented (*Taucu*) (1 tablespoon)	Soya sauce "thick" (>1 tablespoon) Soya sauce "thin" (> ¼ tablespoon Baked bean, canned (> ¾ cup)
Nut, seeds & products		
Mixed nuts, without salt added (< 7 cups)	Peanut butter (3 tablespoon) Watermelon seeds, dried, black (3 cups)	Mixed nuts, salt added (> ⅓ cup)
Vegetable & vegetable products		
Fresh vegetables	Seaweed, dried (Hai-tai) (½ cup)	Canned vegetables (> ½ cup) Pickled vegetables(> ½ cup) Cabbage, Chinese, salted (*Humchoy*) (> 1 tablespoon) Tomato soup,canned (> ½ cup Peas, salted, fried (> 1 cup)

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LOW < 120 mg Sodium [2]	MODERATE 120 - 480 mg Sodium	HIGH > 480 mg Sodium [3]
Fruits & fruits products		
Fresh fruits	Durian, fermented (*Tempoyak*) (2 tablespoons)	Fruit, mixed, spicy pickled (>1 tablespoon)
Meat & poultry products		
Chicken, breast meat (<1 cup) Chicken, thigh (< 2 medium)	Chicken, fried (1 piece) Chicken frankfurter (2 pieces)	Chicken, fried, fast food franchise (>1 piece (140g) Chicken curry, canned (>1 can) Chicken, broth cubes, flavouring/ seasoning (*pati ayam*) (> 1/3 cube)
Beef, lean (< ½ cup)	Beef burger, regular (1 whole) Beef frankfurter (12.0 x 2.0 cm) (2 pieces)	Beef burger with cheese (1 whole) Beef rending, canned (> ½ cup)
Mutton, lean, raw (<1 cup)	Mutton, lean, raw (1 cup)	Mutton curry, canned (> ½ cup)
	Pork, raw (1 cup)	
Eggs		
Hen egg, whole (<2 eggs)	Duck egg, salted, whole (1 egg)	
Fish, shellfish & products		
Fresh fish (except stated in the moderate column)	Fish ball (5 whole small, 2 cm) Bream, threadfin, Japanese (*Kerisi*) (1 whole) Carp, big, head (1 slice) Carp, common (*Lee Koh*) (1 piece medium) Mackerel, Spanish (1 slice) Snapper, red (1 slice) Fish crackers, fried (5 pieces)	Fish ball (2 ½ , large) Fish, dried, salted (1 piece, 25g) Fish sauce (Budu) (> ¼ tablespoon) Anchovy, dried, without head and entrails (> ¼ cup) Sardine, canned (>1 small can)
Fresh prawn	Prawn, salted, dried (1 tablespoon) Prawn crackers (1 small packet) Prawn paste (*Hay-Ko*) (1 tablespoon)	Shrimp, fermented (*Cencaluk*) (> ½ tablespoon) Shrimp paste (*Belacan*) (> ½ piece)
Cuttlefish, fresh (<2 whole, medium)	Cuttlefish, dried (1 whole, small)	Cuttlefish crackers (1 large packet)

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LOW < 120 mg Sodium [2]	MODERATE 120 - 480 mg Sodium	HIGH > 480 mg Sodium [3]
	Milk & milk products	
Low sodium cheese, cheddar (<5 slices)	Cheese, processed, cheddar (1 slice)	Cheese burger (1 whole)
	Oil & fats	
Margarine, reduced salt (<2 tablespoons)	Margarine (3 tablespoons) Butter (2 tablespoons)	
	Beverages	
Carbonates beverage, cream soda (<2 bottles of 500ml) Carbonated beverage, isotonic sports drink (<1 ½ bottles of 500ml)	Carbonated beverage, isotonic sports drink (1 bottle of 1500ml)	
	Condiments & spices	
All natural condiments (such as cloves, cinnamon, anise seeds, cumin seeds, *asam gelugor,* cardamom, dried chilli)	Chilli sauce (1 tablespoon) Tomato ketchup (sauce) (1 tablespoon)	All types of instant flavouring or seasoning (1 ½ teaspoons or > ¼ cube) Oyster, sauce (> ½ tablespoon) Tamarind, paste (> ½ tablespoon)

[1] Value without discretional source of food; 1 tablespoon = 20 ml/mg = 1 heap dessert spoon
[2] The amount in ( ) indicates upper limit value for respected category
[3] The amount in ( ) indicates lower limit value for respected category

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