

Key Message 5



Eat plenty of fruits and vegetables everyday

Key Message 5



Key Message 5

Eat plenty of fruits and vegetables everyday

1. Terminology

Fruits

The term *fruit* is generally used to describe the sweet, fleshy edible portion of a plant that arises from the base of the flower and surrounds the seeds. Examples of fruits are bananas, papayas, apples, oranges and others. Most fruits are eaten fresh and raw when they are ripe which give them a sweet taste. In some cases, they are consumed before the fruits ripen, usually with a spicy or savoury dip. Some ripe and unripe fruits are used in cooking or incorporated into salads which can offer a tasty alternative. Fruits can also be consumed as canned fruits, dried fruits and fruit juice, preferably without added sugar and preservatives. There are true fruits, in a botanical sense, which are treated as vegetables in cooking, for example tomatoes and brinjals.

Plenty

Plenty is defined by frequency and quantity. Using frequency, it means as often as possible, or consumed at every meal. In terms of quantity, it implies at least two servings of fruits and three servings of vegetables everyday. In practice, it means having fruits and vegetables during meal times as well as for snacks.

Vegetables

Vegetables include all fresh, green leafy vegetables (such as spinach and lettuce), coloured vegetables (such as red spinach), fruit vegetables (such as gourd or melons, such as pumpkin, *loofah* (*petola*) and

cucumber), bean vegetables (such as long beans), cruciferous vegetables (such as cabbages and broccoli), *ulam-ulam* (such as *pegaga* and *ulam raja*) and edible plant stems (such as celery and asparagus).

Vegetables are also sometimes sold as canned or frozen. This definition does not include tubers (such as potatoes, tapioca and yam) (WHO, 2003). Some vegetables are eaten raw; others are cooked to make them more palatable and digestible, sometimes in combination with other food groups (such as eggs, meat, fish or legumes).

2. Introduction

It has always been widely accepted that fruits and vegetables are “good for you” and now substantial scientific data are available to support a close association between fruit and vegetable consumption with various health outcomes. The benefit of fruits and vegetables cannot be attributed to a single or mix of nutrients and bioactive substances. For example, green leafy vegetables are good sources of folate; yellow and orange fruit vegetables provide carotenoids; cruciferous vegetables are rich in dithiolthiones and isothiocyanates, fruits for bioflavonoids and citrus fruits for vitamin C.

Fruits and vegetables are also good sources of dietary fibre and other yet unknown substances which are beneficial to health. Frozen vegetables could also be used since good levels of nutrients are retained by freezing, particularly if they are frozen when fresh. For healthy populations, it is not

Key Message 5

advisable to replace fruits and vegetables with supplements.

Certain nutrients and phytochemicals in vegetables are damaged by cooking. Consumption of raw salads and *ulam-ulam* prevents such nutrient loss. When consumed raw, vegetables must always be properly washed. In some cases, cooking increases nutrient availability, for example, carotenoids from cooked tomatoes are absorbed better than from raw ones. When vegetables are cooked, they should not be overcooked since this will cause nutrient loss. Stir frying using a small amount of oil is an effective method of cooking vegetables. It provides a tasty dish with good texture and most importantly it minimises nutrient loss.

The small amount of oil used will enhance absorption of the fat-soluble vitamins (for example vitamins A and E) and other fat-soluble dietary components such as carotenoids. Stir frying should be the preferred cooking method compared to deep frying and prolonged boiling of vegetables.

3. Scientific basis

In developing the dietary guidelines for fruits and vegetables, it is important to recognise diet related public health problems in the country. Several chronic diseases such as diabetes mellitus type 2, cardiovascular diseases and certain cancers have been linked with low consumption of fruits and vegetables. Evidence shows that fruits and vegetables probably protect against certain types of cancer, prompting the World Cancer Research Fund to come up with public health goals and personal recommendations encouraging people to eat mostly foods of plant origin (WCRF, 2007). In certain communities in Malaysia, deficiency diseases

such as marginal vitamin A deficiency continues to exist in specific age groups. Inadequate intake of fruits and vegetables have been implicated as contributing factors (Khor, 2002).

It has always been widely accepted that fruits and vegetables are “good for you”. There has been an impressive increase in the number of high quality scientific studies on the specific health benefits of consumption of fruits and vegetables for coronary heart disease, hypertension and stroke in the last two decades (Liu *et al.*, 2000; Moore *et al.*, 1999; Law & Morris, 1998).

Although most studies show evidence of protective effects of fruits and vegetables against cancer, the recent World Cancer Research Fund report (2007) indicates only a probable protective effect. These studies are largely epidemiological and the nature of such studies is the presence of confounding factors which might potentially mask any convincing positive benefits of fruits and vegetables for cancer prevention.

Plausible new evidence continue to be published on the potential chemopreventive properties of fruits and vegetables (Cooke *et al.*, 2005). Recently new evidence has emerged on the protective effects of fruits and vegetables in pulmonary (Tabak *et al.*, 2001) and bone health (Prynne *et al.*, 2006). There are new data suggesting potential mechanisms by which fruits and vegetables, together with diet and lifestyle, might positively influence eye health (Moeller *et al.*, 2008; Brown *et al.*, 1999) and aging (Tomey *et al.*, 2008).

A prospective investigation of women aged 42 to 52 years from the Study of Women’s Health Across the Nation (SWAN) showed that subjects with lower fruit,

Key Message 5

vegetable and fibre intakes reported greater physical functional limitations in activities such as bathing, dressing, carrying groceries, bending, moderate and vigorous athletic activities, walking and climbing stairs (Tomey *et al.*, 2008).

The prevalence of moderate and substantial functional limitations was 31% and 10% respectively. Women in the highest quartile of cholesterol intake had 40% greater odds (odds ratio = 1.4, 95% confidence interval : 1.1, 1.8) of being more limited versus those in the lowest quartile. Women in the highest quartile of fat and saturated fat intakes were 50% and 60% more likely to be more limited, with respective odds ratio of 1.5 and 1.6 (95% confidence intervals : 1.2, 2.0 and 1.2, 2.1) versus those in the lowest quartiles. Lower fruit, vegetable and fibre intakes were related to reporting greater functional limitations. Modifying dietary practices could be important in minimising physical limitations.

3.1 Cardiovascular disease

Fruits and vegetables contribute to cardiovascular health through the variety of phytochemicals (antioxidants, flavanoids, folate), potassium and fibre contained in them. The WHO Technical Report Series 916 (WHO, 2003) considered the evidence for fruits and vegetables as convincing for decreasing risk of developing cardiovascular disease (CVD). It recommends intake of 400 to 500 g of fresh fruits and vegetables a day to reduce risk of coronary heart disease, stroke and high blood pressure.

Data from several prospective studies indicated an inverse association of dietary flavonoids with coronary heart disease (Keli *et al.*, 1996; Hertog *et al.*, 1993). Older women who ate five to ten servings of fruits and

vegetables per day had 30% less risk of arteriosclerotic disease compared to those who ate two to five servings per day (Liu *et al.*, 2000). A higher intake of vegetables is associated with reduced risk of death from CVD for Japanese women (Nakamura *et al.*, 2008).

3.2 Hypertension

Findings from the Nurses' Health Study are compatible with the possibilities that a diet richer in fruits and vegetables, in combination with magnesium and fibre intakes, may reduce blood pressure levels (Ascherio *et al.*, 1996). The effects of increased fruit and vegetable consumption on blood pressure alone and in combination with a low fat diet, were assessed in the Dietary Approaches to Stop Hypertension (DASH) trial (Appel *et al.*, 1997). While the combination diet was more effective in lowering blood pressure, the fruit and vegetable diet also lowered blood pressure by 2.8 mmHg systolic and 1.1 mmHg diastolic, in comparison to the control diet.

3.3 Cancer

One of the most important outcomes from recent nutrition research is that a diet rich in fruits and vegetables protects against cancer. There are many mechanisms by which fruits and vegetables are protective. Studies have shown that phytochemicals (plant chemicals) can prevent and interrupt the development of cancer. Some phytochemicals protect the body by preventing carcinogens (cancer-causing substances) from becoming active. Other phytochemicals reduce the effects of free radicals or trigger cancer cell apoptosis.

Studies from the 1980s to 1990s showed a small but statistically significant

Key Message 5

protective effect of fruits and vegetables in 128 of 156 studies that gave relative risks between 1 and 3 (Block, Patterson & Subar, 1992). For most cancers, people who ate the least amount of fruits and vegetables (in the lower quartile of intake) had about twice the risk of cancer compared to those who ate the most fruits and vegetables (in the upper quartile). Even in lung cancer, after accounting for smoking, increasing intake of fruits and vegetables correspond to an estimated 20% to 33% reduction in lung cancers (WCRF, 1997). The UK Department of Health Committee on the Medical Aspects of the Food Supply (COMA) noted a moderate association for potential protection against cancers of the stomach, colon and rectum (UK Department of Health, 1998).

However, the World Cancer Research Fund, after meticulously reviewing all the relevant research, concluded that based on cohort studies conducted since mid-1990s, the overall evidence that vegetables or fruits protect against cancers are somewhat less impressive (WCRF, 2007). Nonetheless, this expert report also concluded that there is evidence that some types of vegetables and fruits, in general, probably protect against a number of cancers.

Based on this landmark report, individuals are advised to eat at least five portions or servings, which amount to at least 400 g of a variety of non-starchy vegetables and fruits every day.

Non-starchy vegetables probably protect against cancers of the mouth, pharynx, larynx, oesophagus and stomach. There is limited evidence suggesting they may also protect against cancers of the nasopharynx, lung, colorectum, ovary and endometrium. Fruits in general probably protect against cancers of the mouth, pharynx and larynx, oesophagus, lung and stomach. There is limited evidence suggesting that fruits also protect

against cancers of the nasopharynx, pancreas, liver and colorectum (WCRF, 2007).

Much of the research on the fruits and vegetables and cancer risk has focused on specific dietary constituents in these foods, or else on specific groups of vegetables and fruits. Fruits and vegetables are rich in vitamins, minerals and other bioactive compounds compared to other foods. They are generally good sources of fibre, vitamin C, carotenoids, folate and potassium. Different fruits and vegetables have different amounts of these various vitamins and minerals. Some groups are good sources of the B vitamins, calcium or iron. However, the message remains with the preference of whole food items over supplements. Vitamin A, vitamin C, iron and potassium content in some fruits and vegetables can be referred in Appendix 2-7.

There are many substances in fruits and vegetables that are protective. Beneficial effects are not very likely to be due to any single nutrient or phytochemical. Potter and Steinmetz (1996) listed possible protective elements which include dithiolthiones, isothiocyanates, indole - 3 - carbinol, allium compounds, isoflavones, protease inhibitors, saponins, phytosterols, inositol hexaphosphate, vitamin C, D-limonene, lutein, folic acid, beta carotene (and other carotenoids), lycopene, selenium, vitamin E, flavonoids and dietary fibre.

3.4 Diabetes

Increased intake of whole grain cereals, fruits and vegetables was associated with a reduced risk of progression of impaired glucose tolerance to type 2 diabetes in a six-year intervention trial. Subjects were also given detailed advice to achieve a healthy diet and at least moderate exercise (Tuomilehto *et al.*, 2002). An inverse association between the

Key Message 5

risk of type 2 diabetes and frequent consumption of vegetables was observed in a cross-sectional study in the United Kingdom (Williams *et al.*, 1999).

The protective effect from fruits and vegetables against diabetes is usually observed in the presence of dietary fibre, such as in the Health Professionals Follow-up Study of men aged 40 to 75 years (Fung *et al.*, 2002). Several studies have reported an association between increased consumption of vegetables and lower incidence of obesity, which is a risk factor for diabetes (Steinmetz & Potter, 1996).

Vegetables are likely to be beneficial in the dietary control of type 2 diabetes because of their fibre content, low-energy density carbohydrate and possible hypoglycaemic activity (Platel & Srinivasan, 1997; Steinmetz & Potter, 1996).

3.5 Obesity

A significant inverse association between fruit or vegetable consumption and weight gain was reported in Mediterranean men from a multi-purpose cohort (Bes-Rastrollo *et al.*, 2006). The mechanism for this association are uncertain. It is plausible that dietary fibre induces greater satiety (Pereira & Ludwig, 2001; Burton-Freeman, 2000). Bes-Rastrollo (2006) showed that this association was more evident among those with a high intake of total fibre. The study, which was conducted over a five-year period, also found that the benefit of total fibre was more evident among those with a high consumption of fruits and vegetables.

An analysis of the food consumption data obtained from the Nurses' Health Study of women aged 40 to 65 years showed that increasing intake of fruits and vegetables may

reduce long-term risk of obesity and weight gain (He *et al.*, 2004). Fruits and vegetables are low energy density foods that may be responsible for mediating energy intake rather than dietary composition per se (Bell *et al.*, 1998). Further studies are needed to determine other possible biological and physiological mechanisms.

4. Current status

The FAO food balance sheets showed that Malaysian consumption of fruits and vegetables have remained stable from 1961 to 1997 (Tee, 1999). Table 5.1 shows the frequency of consumption of common fruits and vegetables found in the Malaysian Adult Nutrition Survey in 2003 (MOH, 2007). The most frequently consumed item are bananas, apples, oranges, green leafy vegetables, bean vegetables and cabbages. Nearly 40% of the adult population eat green leafy vegetables daily. The survey showed that Malaysians eat an average of six servings of fruits and vegetables daily (MOH, 2007). However, without biomarker measurements, these findings cannot be validated as there is a tendency for over-reporting of these food items. Previous studies in adults aged 25 to 64 years showed 70.3% of men and 75.5% of women did not meet the dietary guideline for fruit and vegetable intakes. Thus, it was estimated that about 8.7 million Malaysians did not meet this guideline (MOH, 2006).

Key Message 5

Table 5.1. Consumption pattern of common fruits and vegetables by Malaysian adults

Item	Percentage of population who consumed the fruits/vegetables daily	Mean serving size per intake	Mean frequency of consumption in a day	Total daily intake (g)
Bananas	5.2	2.0	1.2	103
Apples	5.1	1.0	1.0	174
Oranges / mandarins	4.5	1.1	1.0	137
Papaya	2.4	1.4	1.1	218
Green leafy vegetables	39.9	0.8	1.5	93
Bean vegetables	6.9	0.7	1.3	66
<i>Ulam-ulam</i>	6.2	0.8	1.3	17
Cabbage	4.7	0.8	1.2	92

Source: Malaysia Adult Nutrition Survey 2003 (unpublished data)

5. Key recommendations

Key recommendation 1

Eat a variety of fruits everyday.

How to achieve

1. Eat different types of fruits for every meal.
2. Fruits can be fresh, canned, naturally dried and unsweetened and 100% fruit juice without added sugar and preservatives.

Key Message 5

Key recommendation 2

Eat a variety of vegetables everyday.

How to achieve

1. Eat dark green leafy vegetables such as *sawi* and *kailan* and their edible stems several times a week, preferably everyday.
2. Have different coloured vegetables for lunch and dinner.
3. Eat non-leafy vegetables such as capsicum, *peria* and *petola* several times a week.
4. Vegetables can be fresh green leafy vegetables, other fresh vegetables including various coloured vegetables, fruit vegetables, bean vegetables, *ulam-ulam*, canned and frozen vegetables.

Key recommendation 3

Eat at least five servings of fruits and vegetables everyday.

How to achieve

1. Eat at least three servings of vegetables and at least two servings of fruits a day.
2. Eat at least one serving of fruit and one serving of vegetables at every meal.
3. Fruit juices may replace not more than one serving of fruit.



Key Message 5

References

- Appel LJ, Moore TJ, Obarzanek E, Vollmer WM, Svetkey LP, Sacks FM, Bray GA, Vogt TM, Cutler JA, Windhauser MM, Lin PH & Karanja N (1997). A clinical trial of effects of dietary patterns on blood pressure. DASH Collaborative Research Group. *New Eng J Med* 336(16):1117-1124.
- Ascherio A, Hennekens C, Willett WC, Sacks F, Rosner B, Manson J, Witteman J & Stampfer MJ (1996). Prospective study of nutritional factors, blood pressure and hypertension among US women. *Hypertension* 27:1065-1072.
- Bell EA, Castellanos VH, Pelkman CL, Thorwart ML & Rolls BJ (1998). Energy density of foods affects energy intake in normal-weight women. *Am J Clin Nutr* 67:412-420.
- Bes-Rastrollo M, Martinez-Gonzales MA, Sanchez-Villegas A, de la Fuente Arrillaga C & Martinez A (2006). Association of fibre intake and fruit/vegetable consumption with weight gain in a Mediterranean population. *Nutrition* 22:504-511.
- Block G, Patterson B & Subar A (1992). Fruit, vegetables, and cancer prevention: A review of the epidemiologic evidence. *Nutr Cancer* 18:1-29.
- Brown L, Rimm EB, Seddon JM, Giovannucci EL, Chasen-Taber L, Spiegelman D, Willett WC & Hankinson SE (1999). A prospective study of carotenoid intake and risk of cataract extraction in US men. *Am J Clin Nutr* 70(4) : 517-524.
- Burton-Freeman B (2000). Dietary fiber and energy regulation. *J Nutr* 130(2) : 272-275.
- Cooke D, Steward WP, Gescher AJ & Marczyklo T (2005). Anthocyanins from fruits and vegetables—does bright colour signal cancer chemopreventive activity? *Eur J Cancer* 41(13): 1931-1940.
- Fung TT, Hu FB, Pereira MA, Liu S, Stampfer MJ, Colditz GA & Willett WC (2002). Whole-grain intake and the risk of type 2 diabetes: a prospective study in men. *Am J Clin Nutr* 76:535-540.
- He K, Hu FB, Colditz GA, Manson JE, Willett WC & Liu S (2004). Changes in fruits and vegetables in relation to risk of obesity and weight gain among middle-aged women. *Int J Obes* 28(12):1569-1574.
- Hertog MG, Feskens EJ, Holman PC, Katan MB & Kromhout D (1993). Dietary antioxidant, flavonoids and risk of coronary heart disease : the Zutphen elderly study. *Lancet* 342 (8878):1007-1011.

Key Message 5

- Khor GL (2002). Micronutrient deficiency and its alleviation: the case of Malaysia. *Asia Pac J Clin Nutr* 11 (Suppl.) : S377-S381.
- Keli SO, Hertog MG, Feskens EJ & Kromhout D (1996). Dietary flavonoids, antioxidant vitamins and incidence of stroke: the Zutphen study. *Arch Int Med* 156(6) : 637-642.
- Law MR & Morris JK (1998). By how much does fruit and vegetable consumption reduce the risk of ischaemic heart disease? *Eur J Clin Nutr* 52 : 549 – 556.
- Liu S, Manson JE, Lee IM, Cole SR, Hennekens CH, Willett WC & Buring JE (2000). Fruits and vegetables intake and risk of cardiovascular disease: the Women's Health Study. *Am J Clin Nutr* 72 : 922-928.
- Moeller SM, Volland R, Tinker L, Blodi BA, Klein ML, Gehrs KM, Johnson EJ, Snodderly DM, Wallace RB, Chappell RJ, Parekh N, Ritenbaugh C & Mares JA (2008). The CAREDS Study Group. Association between age-related nuclear cataract and lutein and zeaxanthin in the diet and serum in the carotenoids in the age-related eye disease study (CAREDS), an Ancillary Study of the Women's Health Initiative. *Arch Opht* 126(3) : 354-364.
- MOH (2006). MyNCDS-1. Malaysia NCD Surveillance–1 2005/2006. NCD Risk Factors in Malaysia. Ministry of Malaysia, Putrajaya.
- MOH (2007). Seminar on Findings of The Malaysian Adult Nutrition Survey (MANS) 2003. Nutrition Section Family Health Development Division. Ministry of Health Malaysia, Putrajaya.
- Moore TJ, Vollmer WM, Appel LJ, Sacks FM, Svetkey LP, Vogt TM, Conlin PR, Simons-Morton DG, Carter-Edwards L & Harsha DW (1999). DASH Collaborative Research Group. Effect of dietary patterns on ambulatory blood pressure. Results from the Dietary Approaches to Stop Hypertension (DASH) Trial. *Hypertension* 34 : 472-477.
- Nakamura K, Nagata C, Oba S, Takatsuka N & Shimizu H (2008). Fruit and vegetable intake and mortality from cardiovascular disease are inversely associated in Japanese women but not in men. *J Nutr* 138 : 1129-1134.
- Pereira MA & Ludwig DS (2001). Dietary fiber and body-weight regulation. Observations and mechanisms. *Pediatr Clin N Am* 48:969-980.
- Platel K & Srinivasan K (1997). Plant foods in the management of diabetes mellitus: vegetables as potential hypoglycaemic agents. *Nahrung* 41 : 68-74.
- Potter JD & Steinmetz K (1996). Vegetables, fruit and phytoestrogens as preventive agents. In: *Principles of chemoprevention*. Stewart BW, McGregor D & Kleihues P (eds). Lyon, International Agency for Research on Cancer, 61-90 (IARC Scientific Publications, No. 139).

Key Message 5

- Prynne CJ, Mishra GD, O'Connell MA, Muniz G, Laskey MA, Yan L, Prentice A & Ginty F (2006). Fruit and vegetable intakes and bone mineral status: a cross sectional study in 5 age and sex cohorts. *Am J Clin Nutr* 83(6) : 1254-1255.
- Steinmetz KA & Potter JD (1996). Vegetables, fruit and cancer prevention: a review. *J Am Diet Assoc* 96 : 1027-1039.
- Tabak C, Smith HA, Heederik D, Ocke MC & Kromhout D (2001). Diet and chronic obstructive pulmonary disease: independent beneficial effects of fruits, whole grains, and alcohol (the MORGEN study). *Clin Exp Allergy* 31(5) : 747-755.
- Tee ES (1999). Nutrition of Malaysians: where are we heading? *Mal J Nutr* 5:87-109.
- Tee ES & Lim CL (1991). Carotenoid composition and content of Malaysian vegetables and fruits by the AOAC and HPLC methods. *Food Chem* 41:309-339.
- Tee ES, Ismail MN, Mohd Nasir A & Khatijah I (1997). Nutrient composition of Malaysian foods. 4th edition. Kuala Lumpur : Malaysian Food Composition Data base Programme. Institute for Medical Research.
- Tomey KM, Sowers MR, Crandall C, Johnston M, Jannausch M & Yosef M (2008). Dietary intake related to prevalent functional limitations in midlife women. *Am J Epidemiol* 167(8) : 953-943.
- Tuomilehto J, Lindström MS, Eriksson JG, Valle TT, Hämäläinen H, Ilanne-Parikka P, Keinänen-Kiukaanniemi S, Laakso M, Louheranta A, Rastas M, Salminen V & Uusitupa M (2002). The Finnish Diabetes Prevention Study Group. Prevention of type 2 diabetes mellitus by changes in lifestyle among subjects with impaired glucose tolerance. *New Eng J Med* 344 : 1343-1350.
- UK Department of Health (1998). Nutritional aspects of the development of cancer: report of the Working Group on Diet and Cancer of the Committee on Medical Aspects of Food and Nutrition Policy. Norwich, UK : The Stationery Office, Norwich,UK.
- WCRF (1997). Food, nutrition, physical activity, and the prevention of cancer: a global perspective. American Institute for Cancer Research, World Cancer Research Fund/ American Institute for Cancer Research, Washington DC.
- WCRF (2007). Food, nutrition, physical activity, and the prevention of cancer : a global perspective. Chapter 4. pp 75-77. World Cancer Research Fund / American Institute for Cancer Research, Washington DC.

Key Message 5

WHO (2003). Diet, nutrition and the prevention of chronic diseases. Report of a joint WHO/FAO Expert Consultation. WHO Technical Report Series 916. World Health Organization, Geneva.

Williams DE, Wareham NJ, Cox BD, Byrne CD, Hales CN & Day NE (1999). Frequent salad vegetable consumption is associated with a reduction in the risk of diabetes mellitus. *J Clin Epidemiol* 52:329-335.

Key Message 5

Appendices

Appendix 1. Serving size and weight of selected fruits and vegetables

The portions given here are based on one serving of fruits and vegetables. The servings for vegetables which are usually consumed as cooked are given as one cup raw vegetable.

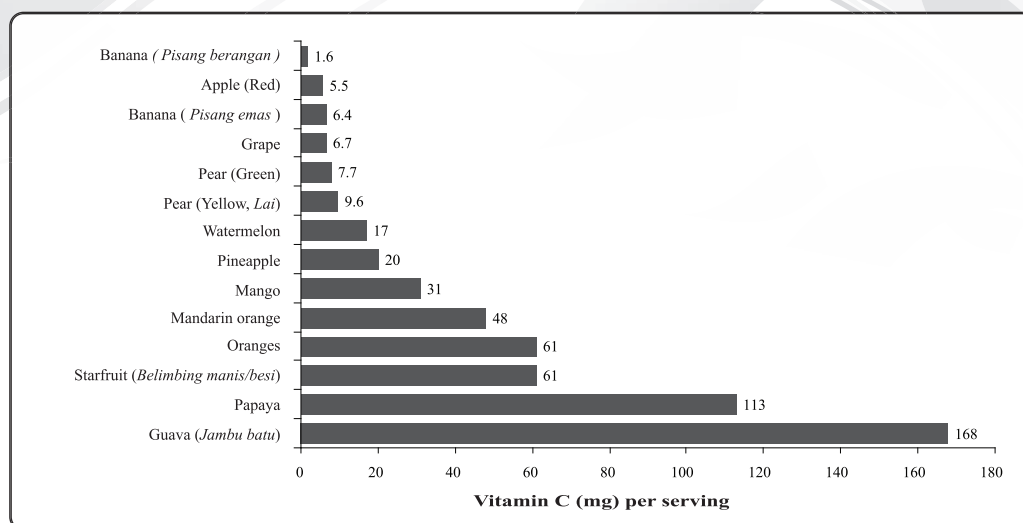
Fruits	One Serving	Weight (g)
Apple (Red)	1 medium	128
Banana (<i>Pisang emas</i>)	2 medium	100
Banana (<i>Pisang berangan</i>)	1 medium	93
Grape	8 fruits, whole	93
Guava (<i>Jambu batu</i>)	1 slice, big, without skin and seeds	111
Mandarin orange	2 whole, medium	232
Mango	1 whole	232
Oranges	2 whole, medium	268
Papaya	1 slice without skins and seeds	159
Pear (yellow, <i>lai</i>)	1 whole medium	169
Pear (green)	½ whole medium	104
Pineapple	1 slice without skins and core	130
Prune	4 whole	26
Starfruit (<i>Belimbing manis/besi</i>)	1 whole, medium	261
Watermelon	1 big slice, without skin	311

Key Message 5

Vegetables	One Serving	Weight (g)
Bell pepper (green) (<i>Lada hijau besar</i>)	1 cup raw (chopped)	129
Bittergourd (<i>Peria</i>)	1 cup raw (diced)	125
Brinjal (<i>Terung</i>)	1 cup raw (diced)	86
Cabbage	1 cup raw (shredded)	69
Carrot	1 cup raw (diced)	129
Cashew leaves (<i>Pucuk gajus</i>)	1 cup raw (chopped)	45
Cekor manis	1 cup raw (chopped)	34
Daun kelor	1 cup raw	26
Daun selom	1 cup raw (chopped)	42
Daun turi	1 cup raw (chopped)	34
Kailan (Chinese kale)	1 cup raw (chopped)	63
Kangkung	1 cup raw (chopped)	78
Long beans (dark green) (<i>Kacang panjang</i>)	1 cup raw (diced)	118
Petola	1 cup raw (chopped)	141
Pegaga (Indian pennywort)	1 cup raw (chopped)	42
Pucuk paku	1 cup raw (chopped)	84
Sawi (<i>Choy sum</i>)	1 cup raw (chopped)	86
Spinach (red)	1 cup raw (chopped)	47
Tapioca Shoots (<i>Pucuk ubi kayu</i>)	1 cup raw (chopped)	40
Tomato	2 whole, medium	110
Ulam raja	1 cup raw (chopped)	34

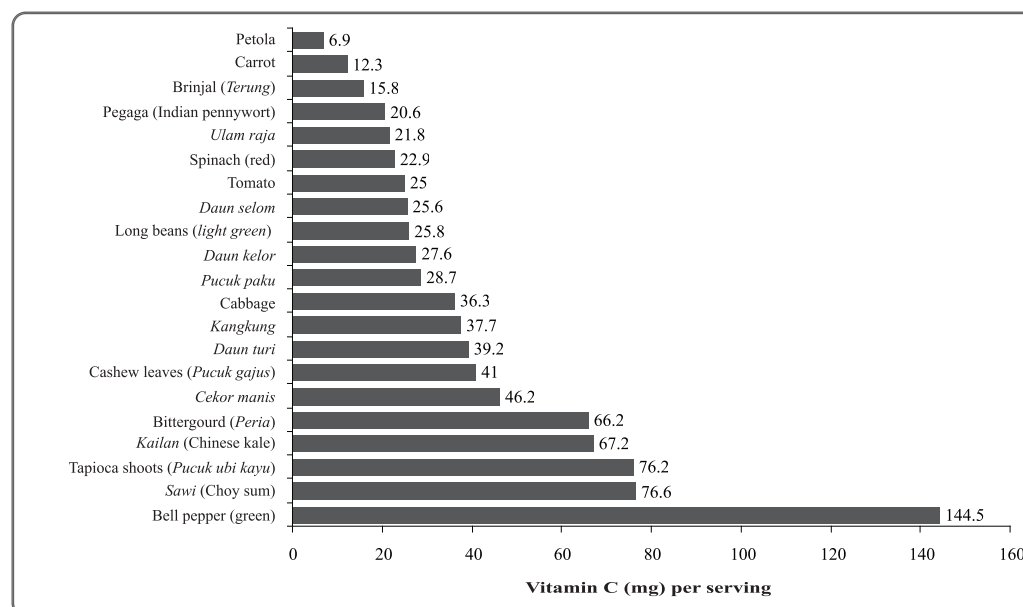
Key Message 5

Appendix 2. Vitamin C content in one serving of commonly consumed fruits



Source : Tee *et al.*, (1997)

Appendix 3. Vitamin C content of one serving of commonly consumed vegetables.

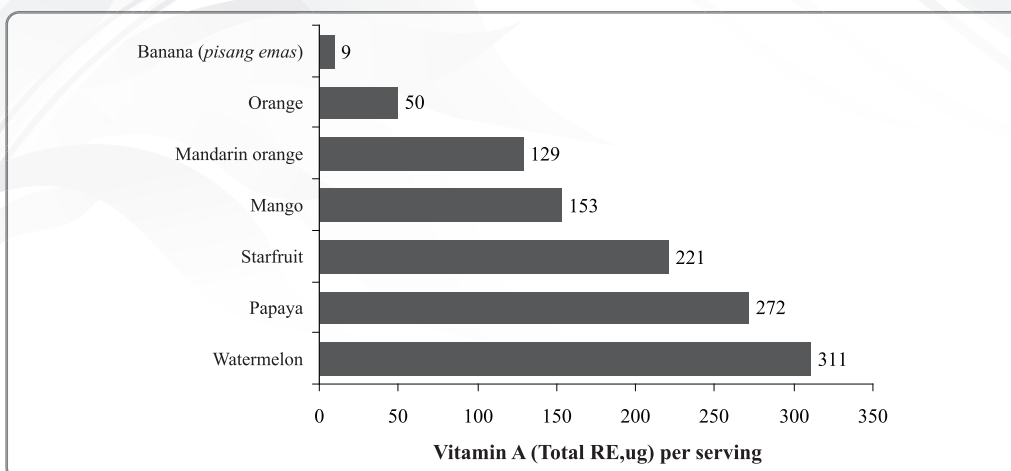


The values are for one cup of raw vegetables for those usually consumed as cooked.

Source: Tee *et al.*, (1997)

Key Message 5

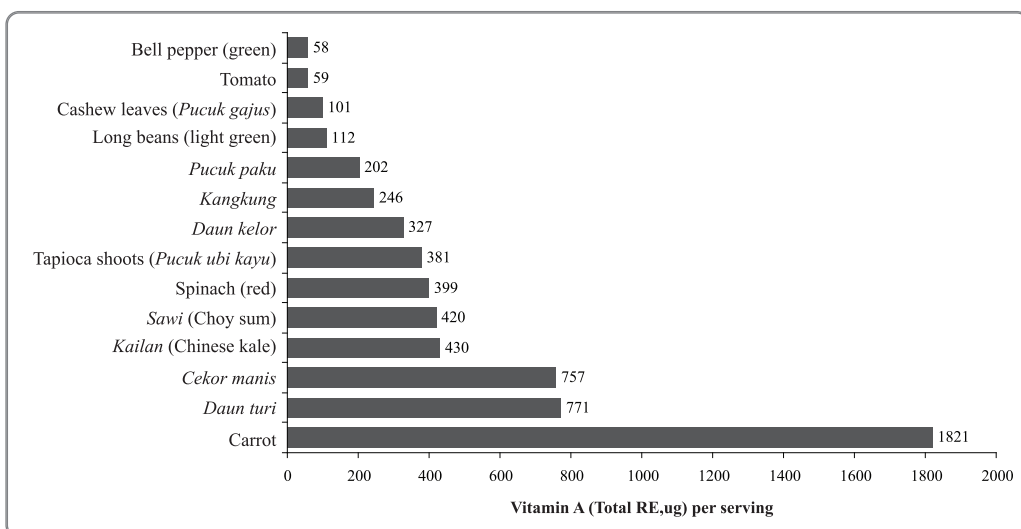
Appendix 4. Vitamin A (expressed as Total RE) content of one serving of commonly consumed fruits.



Total RE = $[(\mu\text{g } \beta\text{-carotene})/6] + [(\mu\text{g other carotenoids})/12]$; other carotenoids = α -carotene, γ -carotene and cryptoxanthin.

Source: Tee & Lim (1991)

Appendix 5. Vitamin A (expressed as Total RE) content in one serving of commonly consumed vegetables



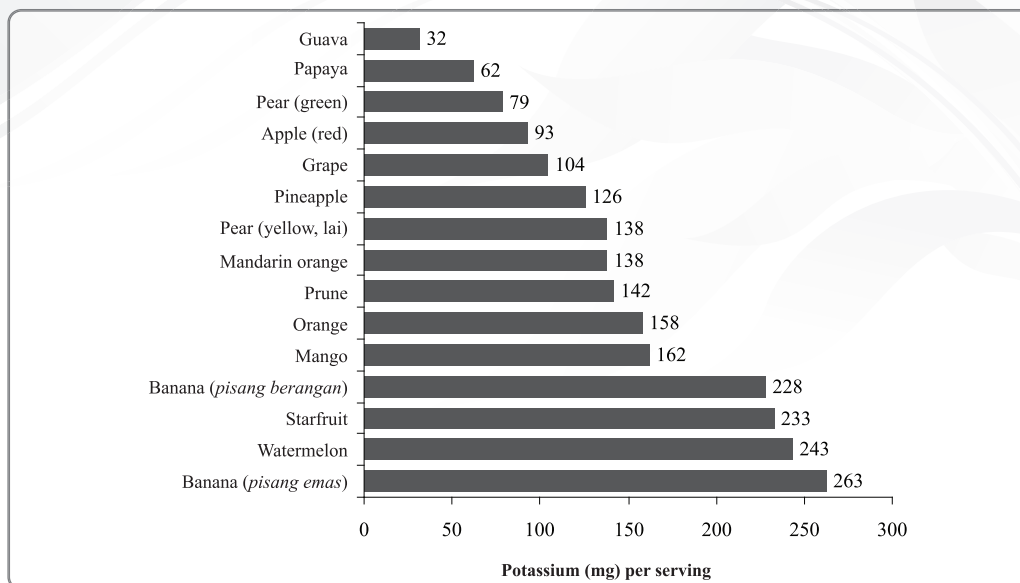
Total RE = $[(\mu\text{g } \beta\text{-carotene})/6] + [(\mu\text{g other carotenoids})/12]$; other carotenoids = α -carotene, γ -carotene and cryptoxanthin.

The values given are for one cup of raw vegetables for those usually consumed as cooked.

Source: Tee & Lim (1991)

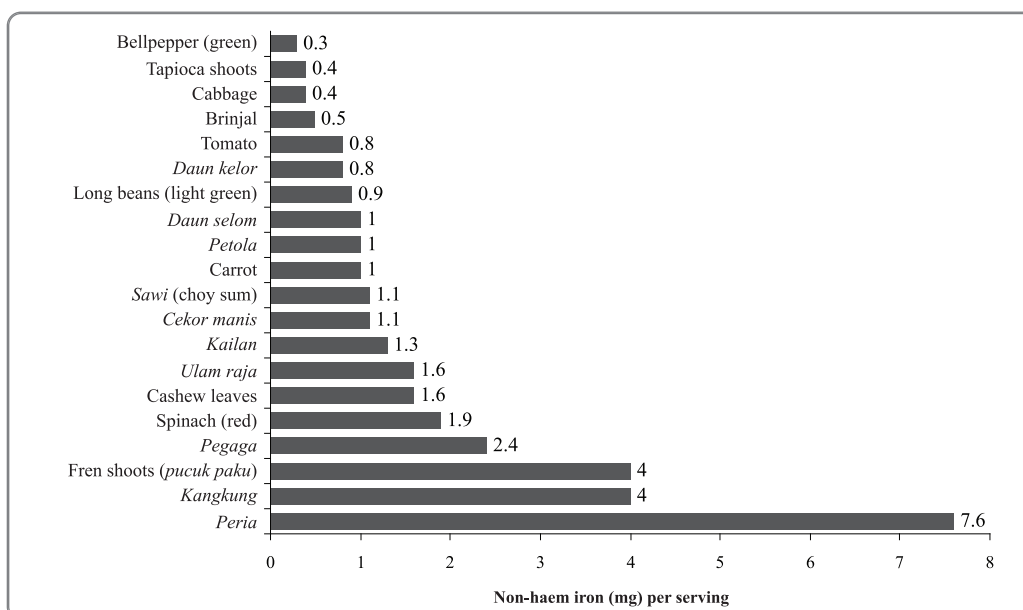
Key Message 5

Appendix 6. Potassium content of one serving of commonly consumed fruits



Source : Tee *et al.*, (1997)

Appendix 7. Iron content of one serving of commonly consumed vegetables



The values given are for one cup of raw vegetables for those usually consumed as cooked.

Source : Tee *et al.*, (1997)