

Fruits & vegetables are the actual fast foods

Abstract

The burden of non-communicable diseases has been rapidly increasing all around the world. In year 2001 non-communicable disease accounted for 60 percent of the 56million deaths worldwide and 47 percent of the global burden of disease. Underlying determinants for non-communicable diseases includes increased consumption of energy-dense, nutrient-poor foods that are high in fat, sugar and salt; reduced levels of physical activity; and of particular concern are the increasingly unhealthy diets and reduced physical activity of children and adolescents. Decreasing the prevalence of non-communicable diseases is therefore still an important goal in the public health strategy. For this purpose, consumption of fruit and vegetables is generally considered to be beneficial to health, and there is now a comprehensive body of evidence recognizing the protective effects of high fruit and vegetable consumption on cardiovascular disease and certain cancers, particularly epithelial cancers. Fruits & vegetables should be called as fast food. They can be consumed fresh, cooked, hot or cold, canned, pickled, frozen or dried. Fruits and vegetables are consumed at all times, and due to their convenient size; they are an excellent between-meal snack. They are relatively low in calories and fat (avocado and olives being the exceptions), they have no cholesterol, they are rich in carbohydrates and fiber, they contain vitamin C and carotene, and some are a good source of vitamin B complex. Because of all these characteristics, fruits and vegetables have a unique role in a healthy diet.

Keywords: fruits, vegetables, non-communicable diseases, fast food

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Introduction

It's a popular saying "Eat healthy & stay healthy". But, unfortunately now-a-days, the food consumed by most of people has great health hazards. With changes in lifestyle concepts & relationships no one has enough time to think that what's good for the health & what's not. With increasing globalization & urbanization, people have started consuming high calorie foods known as fast food. Many health hazards have been related on consumption of such foods. Through health education, good eating practices can be adapted.¹ Eating well helps people stay healthy and active and thus improves the quality of life. Good diet and eating habits are fundamental for proper growth and development and for the prevention of disease.²

Food provides not only essential nutrients needed for life but also other bioactive compounds for health promotion and disease prevention. Diet plays a crucial role in the prevention of chronic diseases. Consumption of fruit and vegetables has been strongly associated with reduced risk of cardiovascular disease, cancer, diabetes, Alzheimer disease, cataracts, and age-related functional decline. This evidence suggests that a change in dietary behavior such as increasing consumption of fruit, vegetables, is a practical strategy for significantly reducing the incidence of chronic diseases.³

In plant taxonomy fruits & vegetables are defined as

The botanical term 'vegetables' refers to the edible part of a plant. Thus, fruits are actually a subclass of vegetables. The botanical term 'fruit' refers to the ripened ovary of a flower that contains seeds. This implies that plant foods, such as cereals, legumes, nuts, cucumbers

and tomatoes, are all fruits. All other parts of the plants, such as stems, roots, and leaves, can be biologically considered as vegetables.⁴

Fruits and vegetables are both edible plant products that are good for health. Fruit and vegetables are rich sources of micronutrients and bioactive compounds. That's why they are called nutrient rich foods. The importance of a high fruit and vegetable intake as an essential part of a healthy lifestyle has received an increasing amount of attention during the last decade. It is well known that an adequate intake of fruit and vegetables promotes health as it is important in the prevention of non-communicable diseases which today are large public health problems. They are excellent sources of fiber, complex carbohydrates and numerous vitamins and minerals. Fruits and vegetables provide varying amounts and types of nutrients, therefore variety is essential. It is recommended we eat at least five fruits and vegetables every day.⁵

Owing to the health benefits & all the nutritional significance, fruits & vegetables should be recommended as actual fast foods because they are convenient - handy size, can be eaten fresh, can be eaten on the go - can be taken as a snack, can be prepared quickly - wash and eat or peel and eat, provide quick energy - carbohydrates for our bodies, can be prepared quickly in a pan (stir-fried) or microwave (steamed).⁶

Review of literature

Fruits & vegetables are important components of a healthy life style & recent studies have suggested that regular consumption in adequate amounts could help prevent major chronic diseases such as CVDs & some cancers.⁷

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Eating a diet high in fruits and vegetables is associated with a decreased risk of many chronic diseases, including heart disease, stroke, high blood pressure, diabetes, and some cancers. Research also has found that replacing foods of high energy density (high calories per weight of food) with foods of lower energy density, such as fruits and vegetables, is an important part of a weight-management strategy. In addition, fruits and vegetables are good sources of many important nutrients, including potassium, vitamin C, folate, fiber, and numerous phytochemicals. The importance of fruits and vegetables as part of healthy diets is illustrated by the Dietary Guidelines for Americans 2010, in which two of the four recommended food groups are fruits and vegetables.⁸

Approximately 16.0million (1.0%) disability adjusted life years (DALYs, a measure of the potential life lost due to premature mortality and the years of productive life lost due to disability) and 1.7million (2.8%) of deaths worldwide are attributable to low fruit and vegetable consumption. Moreover, insufficient intake of fruit and vegetables is estimated to cause around 14% of gastrointestinal cancer deaths, about 11% of ischemic heart disease deaths and about 9% of stroke deaths globally. A recently published WHO/FAO report recommends a minimum of 400g of fruit and vegetables per day (excluding potatoes and other starchy tubers) for the prevention of chronic diseases, as well as for the prevention and alleviation of several micronutrient deficiencies, especially in less developed countries.⁹

Types of fruit and vegetables

The term “fruit and vegetables” encompasses a huge array of food products. From a botanical perspective we can sort vegetables into eight categories:

- i. root vegetables (e.g. carrots),
- ii. tubers (e.g. potatoes),
- iii. leafy (e.g. spinach),
- iv. inflorescence or flower heads (e.g. broccoli),
- v. seed (e.g. green pea), bulbs (e.g. onions),
- vi. stem or stalk (e.g. celery), and
- vii. Fruit vegetables (e.g. tomato, peppers).
- viii. Fruits can be sorted into
 - ix. citrus fruits (e.g. orange),
 - x. stone fruits (e.g. apricot),
 - xi. pomme fruits (e.g. apples),
 - xii. tropical/subtropical fruits (e.g. banana), and
 Wild fruits (e.g. elderberry).

In addition to the essential nutrition that fruit and vegetables give us, they also lend a variety of sensory properties to the meals eaten.

Fruits and vegetables can decorate a meal. In addition to their unique nutritive properties, adding a variety of rich colors can make a meal look more attractive. Fruit and vegetables also add texture, such as the crispy lettuce leaves in a salad or crunchy carrots in a spaghetti Bolognese sauce. When vegetables are cooked, their texture changes as they soften. If we over-cook them, we lose the crisper texture and many of the good nutrients so it is better not to over-cook.⁴

Colors of fruits & vegetables

Fruit and vegetables are an important part of a good diet. To obtain the maximum health benefits from fruit and vegetables, variety is as important as quantity, because no single fruit or vegetable can provide all the nutrients needed. Fruit and vegetables of different colors contain different unique and specific combinations of nutrients and phytochemicals.

RED fruit and vegetables (contain lycopene or anthocyanin)

- i. Cherry, strawberry, red grape, watermelon, pink grapefruit
- ii. Tomato, beetroot, red pepper

ORANGE / YELLOW fruit and vegetables (contain carotenoids)

- i. Orange, mango, pineapple, papaya, melon, lemon
- ii. Carrot, yellow tomato, yellow maize, yellow pepper, pumpkin, sweet potato

GREEN fruit and vegetables (contain chlorophyll)

- i. Kiwifruit, green grape, avocado, lime
- ii. Kale, Chinese cabbage, spinach, broccoli, lettuce, cucumber, celery, green pepper, green pea

PURPLE / BLUE fruit and vegetables (contain anthocyanin)

- i. Blueberry, black current, plum, purple fig
- ii. Eggplant, purple onion, purple cabbage, black olive

WHITE fruit and vegetables (contain anthoxanthins)

- i. Banana, pear, white peach
- ii. Cauliflower, cabbage, potato, white turnip, bean sprout, mushroom, onion, garlic, leek.¹⁰

Nutritional quality of fruits & vegetables

Traditional components

Water: The most abundant single component of fruits and vegetables is water, which may account for up to 90% of the total mass. The maximum water content varies between fruits and vegetables, because of structural differences.

Organic acids: There are two types of acids, namely aliphatic (straight chain) and aromatic acids. The most abundant acids in fruits and vegetables are citric and malic (both aliphatic) acids. However, large amounts of tartaric acid occur in grapes. Malic acid is the major component in oranges and apples. Aromatic organic acids occur in several fruits and vegetables, but in very low concentrations. Benzoic

acid occurs in cranberries, quinic acid in bananas and chlorogenic acid in potatoes. Organic acids play an important role in the sugar to acid ratio, which affects the flavor of fruits and vegetables.

Proteins: Proteins represent less than 1% of the fresh mass of fruit and vegetable tissues. Leguminous seeds are rich in protein, containing 15% to 30%. The proteins of fruits and vegetables are built from amino acids, but other related simple nitrogenous compounds also occur.

Lipids and fatty acids: Lipids are an energy source for plants during germination, forming components of cellular membranes and cuticular waxes, and they are mainly present as triglycerides (esters of glycerol and three fatty acids) or phospholipids (in which one fatty acid has been replaced by a phosphate group). The fat content of fruits and vegetables is usually below 1% and varies with the product.

Many of the physical and chemical properties of lipids are due to the fatty acids present in their structure. Olive oil and other fats high in monounsaturated fatty acids are becoming well-known for helping to lower LDL-cholesterol, while protecting HDL-cholesterol when consumed in moderation in place of saturated fats.

Dietary fiber

Dietary fiber is defined as of non-digestible carbohydrates and lignin that are intrinsic and intact in plants. Dietary fiber includes very diverse macromolecules exhibiting a large variety of physico-chemical properties. The main components included as fiber are cellulose, hemicelluloses, pectins, & lignin.

Cellulose is a cell wall polymer of β -1, 4-linked glucose. In fruits and vegetables, the cell wall constitutes 1% to 2% of the fresh weight, and cellulose could be as much as 33% of that amount.

Hemicelluloses: Several cell wall polymers soluble in alkalis are classified as hemicelluloses or cross-linking glycan. Within the primary cell wall, hemicellulose levels are usually around 30%

Pectins: Fruit tissues are particularly rich in pectins, which can account for up to 40% of the total cell wall polysaccharides. Pectins, which are used in the commercial manufacture of jams and jellies, are extracted from certain fruits and vegetables such as citrus, apples and beets.

Lignin: It is one of the most abundant biopolymers in nature. Lignin is a highly resistant polymer present in secondary cell walls, and is associated with fibers and xylem vessels. In the case of fruits and vegetables, lignin content is relatively low.

Vitamins

Vitamins are organic molecules required in trace amounts for normal development, which cannot be synthesized in sufficient quantity by the organism and must be obtained from the diet. The term “vitamin” derives from the words “vital amine” because the first vitamin discovered (thiamine) contained an amino group. The 14 vitamins known today are vitamin A (retinol), B complex [B1 (thiamine), B2 (riboflavin), B3 (niacin), B5 (pantothenic acid), B6 (pyridoxine), B9 (folate/folic acid), biotin, choline and B12 (cyanocobalamin)] and vitamins C, D, E and K. They are usually grouped into fat-soluble (A, D, E and K) and water-soluble (B group and C) molecules. The vitamins present in fruits and vegetables make an important contribution to human nutrition, as they have specific functions in normal body performance. The vitamin content of fruits and vegetables shows a wide variation among species.

Vitamin A: Carotenoids are lipid soluble pigments responsible for the yellow, orange and red color of several fruits and vegetables. Vitamin A plays an important role in vision, cell division and differentiation, bone development and reproduction. The average daily requirement for vitamin A for an adult is estimated at 5000 international units. Vegetables that can supply useful amounts of carotene include carrots, pumpkins and squashes. Compared to vegetables, fruits are generally not as good a source of carotenoids, although there are a few notable exceptions such as apricot, mango, citrus, papaya and watermelon. Tomatoes and peppers also contain high levels of carotenoids.

Vitamin B complex: Thiamine is required in the human body for the metabolism of carbohydrates. A daily intake of 1–2mg is generally considered as necessary for a normal adult. Legumes are especially rich in thiamine. Thiamine is relatively stable at cooking temperatures, especially in a slightly acidic solution. However, losses of 25% to 40% may occur during cooking. The average human requirement for riboflavin is estimated to be 1–2mg per day. Green vegetables such as beans, beets, peppers and spinach are particularly rich in riboflavin. Starchy vegetables and fruits are relatively poor sources of riboflavin. Niacin, also known as nicotinic acid, is a precursor to NADH, NAD, NAD and NADP, which play essential roles in living organisms. A daily intake of 10mg to 15mg niacin is recommended. There is evidence that niacin can be synthesized in the body from tryptophan. Almonds are a rich source, but no fruits or vegetables can be singled out as being rich in niacin except cape gooseberry and avocado. Niacin is relatively stable. Vitamin B 6 is present in appreciable amounts in beans, cabbage, cauliflower, spinach, sweet potatoes, grapes, prunes, avocados and bananas. It is fairly heat stable. Pantothenic acid can be obtained from fresh, canned or frozen fruits and vegetables. Pantothenic acid occurs widely in peas, beans, nuts, broccoli, mushrooms, potatoes and sweet potatoes. Biotin is stable during cooking, processing and storage of fresh, canned and frozen fruits and vegetables. Folic acid is essential for reproduction and normal growth. The vitamin is present in fruits, spinach, cabbage and other green vegetables. Choline is heat-stable and occurs in dried legumes and vegetables. Vitamin B12 does not occur in fruits and vegetables. Because vitamins of the B group are water-soluble, leaching losses occur during cooking.

Vitamin C: Ascorbic acid (AsA) and its first oxidation product dehydroascorbic acid (which can be reduced in the human body) might be considered as vitamin C. AsA is a water-soluble carbohydrate-derived compound. Humans and a few other species are not able to synthesize AsA. The recommended dietary allowance of vitamin C for men is 75mg daily, while the recommended dietary allowance for young women is higher, at 90mg daily. Fruits, vegetables and juices are the main dietary sources of vitamin C. Fruits and vegetables account for 90% of the vitamin C in the US food supply. Vitamin C is present in fresh fruits and vegetables, as well as in fruit juices. Fruits, particularly tropical species, and leafy vegetables are rich in ascorbic acid. Rosehip, jujube and guava have very high levels of ascorbic acid. Other good sources of AsA include persimmon, strawberry, kiwifruit, peppers, and citrus fruit, and spinach, broccoli and cabbage among vegetables

Vitamin E: Vitamin E includes tocopherols and tocotrienols. They can be in eight different forms (four tocopherols and four tocotrienols). Vitamin E levels are more abundant in oily seeds, olives, nuts, peanuts, avocados and almonds. Even though the levels of tocopherol in broccoli and leafy vegetables are lower than in fat-rich products, they are good sources compared to other fruits and vegetables. Vitamin E is highly susceptible to oxidation during storage and processing.

Vitamins D and K: Vitamin D is a group of fat-soluble compounds. The main forms of vitamin D are ergocalciferol and cholecalciferol. It occurs only in trace amounts in fruits and vegetables. Vitamin K is essential for blood coagulation, but dietary deficiency is uncommon. The recommended daily intake is 120µg. It occurs abundantly in lettuce, spinach, cauliflower and cabbage. As well as direct intake, it can also be produced by bacteria in the intestines.

Minerals

Potassium (K): A potassium-rich diet contributes to lower blood pressure, blunting the effects of salt. Inadequate levels of potassium intake have long been associated with higher blood pressure. Potassium also regulates heartbeat, assists in muscle contraction and is needed to send nerve impulses and to release energy from fat, carbohydrates and protein. Different nutrients and phytochemicals in fruits and vegetables, including potassium, may be independently or jointly responsible for an apparent reduction in cardiovascular disease risk. Potassium is a systemic electrolyte and is essential in co-regulating ATP with sodium. Potassium favorably affects acid–base metabolism, which may reduce the risk of developing kidney stones, and possibly decrease bone loss with age. Potassium is the most abundant individual mineral element in fruits and vegetables. It normally varies between 60 and 600mg per 100g of fresh tissue. In fruits and vegetables, potassium occurs mainly in combination with various organic acids. Examples of potassium-rich fruits and vegetables include bananas and plantains, leafy green vegetables, many dried fruits, oranges and orange juice, cantaloupes and honeydew melons, tomatoes and root vegetables.

Calcium (Ca): Calcium is essential for bone and tooth formation. Calcium is also very important during later adulthood, and of great consequence from a public health perspective, because inadequate intake of calcium may increase the risk of osteoporosis. In plants, calcium is primarily associated with the pectic materials. It is believed to have a major influence on the rheological properties of the cell wall and, consequently, on the texture and storage life of fruits and vegetables.

Magnesium (Mg): Magnesium is important in protein synthesis, release of energy from muscle storage and body temperature regulation. It is critical for proper heart function and plays a role in bone formation. Magnesium activates over 100 enzymes. In plants, magnesium is a constituent of the chlorophyll molecule: the porphyrin-like ring structure of chlorophylls contains a central magnesium atom coordinated to the four pyrrole rings. In 2004, vegetable contribution to the total magnesium in the US food supply was an average of 14%. Generally, magnesium levels are significantly higher in vegetables than in fruits, but nuts are good sources of this nutrient. Dry fruits and legumes are the food groups that rank higher in magnesium content.

Phosphorus (P): Inorganic phosphate is essential for skeletal mineralization and for multiple cellular functions, including glycolysis, gluconeogenesis, DNA synthesis, RNA synthesis, cellular protein phosphorylation, phospholipid synthesis and intracellular regulatory roles. Phosphorus is a primary bone-forming mineral. In 2004, the primary contributor of phosphorus to the food supply was the dairy group (31.3%), followed by the meat, poultry and fish group (24.9%) and grain products (19.4%). Fruit and vegetable contribution to the total phosphorus in the US food supply was an average of 9.5%. Among tree fruits, nuts are natural sources of phosphorus.

Nitrogen (N): The largest requirement for nitrogen in eukaryotic organisms is the biosynthesis of amino acids, building blocks of

proteins and precursors of many other compounds. Nitrogen is a major constituent of chlorophyll. The characteristic preharvest yellow color of nitrogen-starved vegetables - a physiological disorder called chlorosis - reflects their inability to synthesize adequate amounts of green chlorophyll under nitrogen-limited conditions.

Sulfur (S): Sulfur is an essential nutrient required for growth, primarily used to synthesize cysteine and methionine. The sulfur-containing amino acids play pivotal roles in the structural and catalytic functions of proteins. Sulfur nutrition is important in the species within the order Brassicales (e.g. white cabbage, broccoli, cauliflower, capers) for the synthesis of anti-carcinogenic glucosinolate compounds.

Manganese (Mn): Manganese is a key component of enzyme systems, including oxygen-handling enzymes. It supports brain function and reproduction and is required for blood sugar regulation. In addition, it is part of bone structure. Manganese is a cofactor in function of antioxidant enzymes; Spinach is a good source of manganese.

Copper (Cu): Copper plays an important role in the oxidative defense system. Copper is necessary for the formation of hemoglobin and is required for the function of over 30 proteins. In plants, copper is required for chlorophyll synthesis and in several copper-containing enzymes involved in the reduction of molecular oxygen. Between 1909 and 1919 in the US, the vegetable group was the leading source of copper (30%). In 2004, the grain group (21%) and the legumes, nuts and soy group (20%) replaced the vegetable group (17%) as the leading sources of copper.

Iron (Fe): Iron is required in numerous essential proteins, such as the heme-containing proteins, electron transport chain and microsomal electron transport proteins, and iron-sulfur proteins and enzymes such as ribonucleotidoreductase. In green vegetable leaves, there is a good correlation between iron supply and chlorophyll content. Almonds, pistachio nuts, walnuts, pecans, etc., are very good sources of iron. Different vegetables (e.g. parsley, broccoli, kale, turnip greens and collards) and legumes (e.g. green peas and beans) are also considered good sources of iron.

Zinc (Zn): Zinc is a pervasive microelement that plays a catalytic or a structural role in more than 200 enzymes such as carboxypeptidase. Zinc also plays a role in the maintenance of cell membrane integrity, and the synthesis of RNA and tryptophan. Fruits and vegetables account for only 1.2% and 6.4%, respectively, of the zinc in the American food supply. Fruits are poor in zinc, but pecans and walnuts are good sources of this essential mineral. Parsley is also a good source of zinc.

Sodium (Na): Sodium is a systemic ion. It is important in electrolyte balance and essential in co-regulating ATP with potassium. In addition, it has an important role in the regulation of blood pressure. Sodium contributed from vegetables increased during the last decades, due to the increased consumption of processed vegetables (largely tomatoes and white potatoes). Table salt (NaCl) is by far the main dietary source for sodium. Olives and spinach are sources of sodium. In general, fruits are poor in sodium, and are recommended for low-sodium dietary patterns.¹¹

Antioxidants in fruits and vegetables

Oxidative damage and antioxidants: Imbalance in the production of reactive oxygen species (ROS) leading to negative cellular alterations is known as oxidative damage, which is caused by several molecules. Reactive oxygen species are partially reduced forms of oxygen such

as singlet oxygen, hydrogen peroxide, superoxide or hydroxyl radical. Some, but not all of the components able to cause oxidative damage is free radicals (i.e. molecules with unpaired electrons, which determine their high reactivity). From a biological perspective, an antioxidant is considered as any compound able to oppose cellular oxidation. Diets rich in fruits and vegetables have been shown to reduce the incidence of cardiovascular disease and some chronic and degenerative diseases associated with oxidative damage. Antioxidants are present in all plant organs and include ascorbic acid, carotenoids, vitamin E and phenolic compounds, among others.

Ascorbic acid: Ascorbic acid is one of the most important compounds for human nutrition present in fruits and vegetables. The role of AsA in disease prevention has been associated with its capacity to neutralize ROS.

Carotenoids: Fruits and vegetables are the main sources of carotenoids in the diet. The presence of conjugated double bonds in carotenoids has a main role in determining their antioxidant properties. In the last few years, carotenoids have received great attention due to their antioxidant properties and potential to prevent some diseases.

Tocopherols and tocotrienols: These include the fat-soluble compounds grouped as vitamin E, characterized by a high antioxidant capacity.

Phenolic compounds: This group encompasses a great diversity of compounds derived from the aromatic amino acids phenylalanine and tyrosine. Their main functions are acting as deterrents of potential predators or antimicrobials, protecting against UV-radiation and contributing to the pigmentation of fruits and flowers. Phenolic compounds can contribute to the astringency and bitter taste of some products. They are generally present in low concentrations, but in certain cases, such as in blueberry, they can reach levels of more than 0.1%. In general, they also accumulate in the peel more than in the pulp of fruits. A large number of phenolic compounds have been identified in plants. They have been subdivided into different subclasses, such as phenolic acids, flavonoids and other compounds (e.g. lignans, stilbenes, tannins, coumarins and lignin).

Phenolic acids: Phenolic acids include derivatives of benzoic and cinnamic acid. Caffeic acid is the most abundant phenolic acid in several fruits such as berries, while coumaric acid is usually present in lower proportions. Ferulic acid represents 90% of total phenolic acids in cereals.

Flavonoids: Flavonoids represent a large group of phenolic compounds with two aromatic rings in their structure that are associated together by a 3C-oxygenated heterocycle. There are different classes of flavonoids such as flavones and flavanols; flavanones, flavanols; isoflavones; proanthocyanidins; anthocyanidins.¹¹

Role of fruits & vegetables in disease prevention

Fruit and vegetables, which come in a wide variety of colors, flavors and textures, offer a wide range of health benefits. Research suggests that eating adequate amounts of fruit and vegetables can reduce the risk of developing various chronic diseases.

Fruit, vegetables, and disease prevention

Epidemiological studies have shown that when consumed in adequate amounts on a regular basis, the various micronutrients and phytochemicals contained in fruit and vegetables can probably lower the risk of obesity and ward off many oxidative stress-related chronic diseases, including cardiovascular diseases, certain cancers, type 2

diabetes, chronic respiratory diseases, age-related cognitive decline or dementia, age-related eye diseases as well as rheumatoid arthritis.¹²

Obesity

Fruit and non-starchy vegetables can play an important role in weight management. With a high content of water and fiber and a relatively low amount of fat and calories, fruit and non-starchy vegetables can increase satiety and reduce the feeling of hunger. Furthermore, the flavonoids found in fruit and vegetables may fend off obesity through stimulating release of certain hormones that regulate lipid metabolism (such as adiponectin and adipokine), reverse insulin resistance or modulate appetite and energy expenditure. A review of various prospective and intervention studies asserted that in adults, consuming more fruit and vegetables could possibly contribute to a stable weight, and probably lead to weight loss if the fruit and vegetables consumed were to replace foods rich in fat or high in energy density. A prospective cohort study of over 74 000 women aged 38-63 at baseline in the United States (U.S.) found that during a 12-year follow-up, those who were in the quintile with the largest increase in fruit and vegetable consumption had a 24% lower risk of becoming obese compared with those who were in the quintile with the largest decrease in consumption.¹³

Cardiovascular diseases (hypertension, coronary heart disease and stroke) Epidemiological studies consistently showed that a diet rich in fruit and vegetables could lower the risk of hypertension, coronary heart disease (CHD) and stroke. A prospective study examined the relation of food intake to blood pressure in a cohort of over 1700 middle-aged working men in Chicago. Results showed that while the blood pressure of men who ate more fruit and vegetables and that of men who ate less both rose over the 7 years of follow-up, those with a higher intake had less of an increase in blood pressure over time. Another cohort study of over 28 000 middle-aged and older women in the U.S. with a mean of 12.9 years of follow-up also found an inverse dose-response relationship between total fruit and vegetable consumption and the risk of hypertension compared with the women who consumed less than 2 servings of fruit and vegetables a day, women who consumed 2 to less than 4 servings, 4 to less than 6 servings, 6 to less than 8 servings, and 8 or more servings of total fruit and vegetables a day had a 3%, 7%, 11%, and 14% lower risk of hypertension respectively. For CHD, a meta-analysis of 13 independent cohort studies indicated that individuals who had 3 to 5 servings and more than 5 servings of fruit and vegetables a day had a respective 7% and 17% lower risk of CHD when compared with those who had less than 3 servings of fruit and vegetables a day. Similarly, pooled analyses of cohort studies reported that people who consumed fruit and vegetables 3 to 5 servings and more than 5 servings a day had a respective 11% and 26% reduced risk of stroke when compared with those who consumed less than 3 servings a day.¹⁴

Cancer

The World Cancer Research Fund (WCRF) and the American Institute for Cancer Research (AICR) estimated that diets high in fruit and vegetables (more than 400g per day) could prevent at least 20% of all cancer incidences. A higher consumption of fruit and non-starchy vegetables probably protects against cancers of the mouth, pharynx, larynx, oesophagus, and stomach. For example, a meta-analysis of 16 studies that examined the effects of fruit and vegetable consumption on the occurrence of oral cancer reported that each serving of fruit and each serving of vegetables consumed per day significantly reduced the risk of oral cancer by 49% and 50% respectively. Pooled analyses of

case-control studies showed that for each 100g of fruit consumed per day, there were respectively 27% reduced risk of laryngeal cancer and 28% reduced risk of esophageal cancer; for each 100g of vegetables consumed per day, there was 11% lower risk of esophageal cancer. A special type of vegetables, Allium vegetables (such as garlic, leeks, onions, shallots or chives), may protect against cancer of the stomach and colorectal in particular. A pooled analysis of 21 studies reported that people with the highest consumption of allium vegetables had a 46% reduction in gastric cancer risk as compared to those with the lowest consumption.¹⁵ While a meta-analysis of 14 cohort studies found that per 80 g serving of fruit per day was associated with a 6% decreased risk of lung cancer. Fruit and vegetables containing lycopene, such as tomatoes, are thought to be effective in fighting and preventing cancer, particularly prostate cancer in men. Increased consumption of cruciferous vegetables, such as cauliflower, broccoli and cabbage, might also modify bladder cancer risk. A meta-analysis of 10 cohort and case-control studies observed a significant 20% reduced risk of bladder cancer in the group with the highest cruciferous vegetables consumption compared with the group with the lowest consumption.¹⁶

Type 2 diabetes

Most of the epidemiological studies showed no significant risk relation between diabetes and consumption of fruit and vegetables as a whole, as well as consumption of either fruit or vegetables alone. However, one meta-analysis released in 2010 of six prospective cohort studies with over 220 000 participants aged 30-74years showed that the risk of type 2 diabetes was significantly lower in persons who consumed relatively large amount of green leafy vegetables.¹⁷

Chronic respiratory diseases (asthma and chronic obstructive pulmonary disease): Considerable epidemiological and clinical evidence supported an association between higher consumption of fruit and vegetables and a lower risk of asthma or asthma-related symptoms as well as chronic obstructive pulmonary disease (COPD). A prospective birth cohort study that investigated associations between childhood diet and asthma outcomes at 8years of age reported that one day per week of fresh fruit consumption at early age was associated with a 7% reduced risk of asthma symptoms; long-term consumption of fresh fruit from 2 to 8years of age was also associated with a 10% reduction in risk. Similarly, pooled analyses of 4 cross-sectional studies showed that high consumption of fruit (but not vegetables) by children aged 10-14years was associated with a 25% reduced risk of wheezing. In addition, one prospective study of over 68000 adult women observed that those in the highest quartile of carrot, leafy vegetable and tomato consumption had a 19%, 18% and 15% reduced risk of asthma respectively as compared to their peers in the lowest quartile.¹⁸

Cognitive decline or dementia: Research showed that higher fruit and vegetable consumption might protect against age-related cognitive decline or dementia. A systematic review of 9 cohort studies with a total of about 44,000 participants found that frequent consumption of vegetables, but not fruit, was associated with slower rates of cognitive decline and a lower risk of dementia in older age. Studies also found that better cognitive function was associated with high intakes of certain subgroups of fruit and vegetables, including citrus fruit, berry fruit, green leafy vegetables, cruciferous vegetables, legumes, carrots, or vitamin C-rich fruit and vegetables.¹⁹

Eye diseases (macular degeneration and cataract): While there was insufficient evidence to support a protective role for fruit or vegetables in preventing diabetic retinopathy and glaucoma, some studies observed that generous consumption of fruit and green leafy

or cruciferous vegetables rich in carotenoids, lutein and zeaxanthin might reduce the risk of age-related macular degeneration (AMD) or age-related nuclear cataract. One prospective study that followed over 110 000 men and women aged 50 and above for about 18 years showed that people who consumed 3 or more servings of fruit per day had a 36% reduced risk of AMD compared to those who consumed less than 1.5 servings per day. No significant protective effect was observed for vegetables.²⁰

Rheumatoid arthritis: Systematic reviews of literature on the role of fruit and vegetables in susceptibility to rheumatoid arthritis found that high intake of fruit and vegetables possibly cut rheumatoid arthritis risk or relieve inflammatory rheumatoid symptoms. To examine any association between consumption of fruit and vegetables and the risk of inflammatory polyarthritis like rheumatoid arthritis, a study followed over 25,000 men and women aged 45-74years for 9years and analyzed their dietary patterns. Results showed that people who consumed the lowest amounts of fruit and vegetables combined (less than 167g a day), fruit (78g or less a day), and vegetables (less than 64.6g a day) had a respective 90%, 60%, and 30% higher risk of developing inflammatory polyarthritis than those who consumed the highest amounts of fruit and vegetables combined (more than 275g a day), fruit (more than 176g a day), and vegetables (more than 113g a day). In addition, a case control study also revealed that increased consumption of cooked vegetables might reduce the risk of rheumatoid arthritis.^{21,22}

Fruits & vegetables - the actual fast foods

Globally, the burden of non-communicable diseases has rapidly increased. In year 2001 non-communicable disease accounted for 60 percent of the 56 million deaths worldwide and 47 percent of the global burden of disease. Apart from tobacco consumption, high levels of cholesterol in the blood, low intake of fruit and vegetables, being overweight and physical inactivity are among the leading factors in the increase in non-communicable diseases. For all countries, current evidence suggests that the underlying determinants of non-communicable diseases are largely the same. These include increased consumption of energy-dense, nutrient-poor foods that are high in fat, sugar and salt; reduced levels of physical activity; and of particular concern are the increasingly unhealthy diets and reduced physical activity of children and adolescents. Often overall nutrient intake adequacy improves with an increasing variety of foods, but the movement toward more fats, salt, sugars and refined foods quickly moves beyond the optimal state to one in which diets contribute to rapidly escalating rates of obesity and chronic diseases.²³

Now-a-days what people consider as fast food includes energy dense foods instead of nutrient rich foods. Energy dense foods include burgers, pizzas, carbonated beverages & lots more, whereas nutrient dense foods include fruits & vegetables. What actually needs to be done is to make shift of people's perception about fast foods from energy dense foods to nutrient rich foods. Fruits & vegetables should be called the original fast foods. Fruits and vegetables are truly lifesaving. The World Health Organization states that up to 2.7 million lives could be saved annually with sufficient fruit and vegetable consumption. Low fruit and vegetable intake is among the top ten risk factors attributable to early mortality, according to evidence presented in the World Health Report 2002.²⁴

The color in fruits and vegetables is created by flavonoids, which are promoters of health. Different colors represent different nutrients and benefits. Colorful fruits and vegetables are wonderful. For example, purple, red, and blue fruits or vegetables are rich in

phytochemicals called “anthocyanin,” which help get rid of free-radical damage in the body and the brain. Orange, yellow, and green vegetables are rich in stress-lowering carotenoids. One study found that some of these carotenoids, such as beta-carotene, when consumed on a regular basis, actually have a stress hormone-lowering effect, so enjoy eating colorful rainbow of fruits and vegetables in everyday life.²⁵

Global review on fruit & vegetable campaigns

On a global level, the number of campaigns specific to fruit and vegetables has grown considerably over the past 20 years. The WHO and FAO are supportive of national fruit and vegetable campaigns. In 2004, the two organizations hosted a conference in Kobe, Japan, the “Joint FAO/WHO Workshop on Fruit and Vegetables for Health” to bring together the evidence and develop a draft framework to guide the development of cost-efficient and effective interventions to promote adequate consumption of fruit and vegetables in Member States.⁹

A key global advocate for the development of these campaigns is the International Fruit and Vegetable Alliance (IFAVA), an organization with a membership of national campaigns groups and an internal board of directors. IFAVA aims to encourage and foster efforts to increase the consumption of fruit and vegetables globally for better health by supporting national initiatives, promoting efficiencies, facilitating collaboration on shared aims and providing global leadership.

At the national level, campaigns typically promote the consumption of a certain number of fruits and vegetables a day – such as “5 a day” or “6 a day”. The campaigns aim to encourage general populations to increase their consumption of fruits and vegetables.

It appears that over the past 20 years, not only have more campaigns been developed to promote fruits and vegetables, but, in some countries at least, they have become more sophisticated. In the US, for example, the original “5 a day” program was rebranded in 2007 into the “More Matters” campaign in order to make the message more compelling. Consumer research was conducted to facilitate the rebranding; finding that the most effective messages appealed to mothers’ emotional needs to be responsible.

In Western Australia, the approach to promoting fruits and vegetables has evolved on the basis of ongoing evaluations. The first campaign in the early 1990s provided information about the importance of consuming more fruits and vegetables. It led to increased awareness but no changes in consumer behaviour. The second campaign which started in 2005 (“Go for 2&5”) provided more specific information on the quantity people should be eating, but again, did not appear to have any behavioural impact beyond raising awareness. The campaign was then refined to include more “provocative” messages, which was attributed with boosting vegetable consumption.²⁶

Conclusion

Globally, the burden of non-communicable diseases has rapidly increased. In year 2001 non-communicable disease accounted for 60 percent of the 56 million deaths worldwide and 47 percent of the global burden of disease. Underlying determinants for non-communicable diseases includes increased consumption of energy-dense, nutrient-poor foods that are high in fat, sugar and salt; reduced levels of physical activity: and of particular concern are the increasingly unhealthy diets and reduced physical activity of children and adolescents. Cardiovascular diseases and cancers are main causes of morbidity and mortality in the UK, with cancer responsible for 127,000 deaths every year and coronary heart disease killing a further

110,000 a year. Although death rates have decreased slowly every year since 1985, these diseases continue to be main causes of mortality in the UK. Decreasing the prevalence of both diseases is therefore still an important goal in the public health strategy.

A high consumption of fruit and vegetables is generally considered to be beneficial to health, and there is now a comprehensive body of evidence recognizing the protective effects of high fruit and vegetable consumption on cardiovascular disease and certain cancers, particularly epithelial cancers.

Dietary advice to the public encouraging increased consumption of fruit and vegetables has been promoted since the 1970s, owing to the great nutritional quality & health benefits provided by them in reducing non-communicable diseases. The nutrients obtained from fruits and vegetables include water, carbohydrates, fats, proteins, fiber, minerals, organic acids, pigments, vitamins and antioxidants, among others. Most fruits and vegetables are available almost year-round in a wide variety and they not only taste good, but they also have favorable attributes of texture, color, flavor and ease of use.

Fruits & vegetables should be called as fast food. They can be consumed fresh, cooked, hot or cold, canned, pickled, frozen or dried. Fruits and vegetables are consumed at all times, and due to their convenient size; they are an excellent between-meal snack.

They are relatively low in calories and fat (avocado and olives being the exceptions), they have no cholesterol, they are rich in carbohydrates and fiber, they contain vitamin C and carotene, and some are a good source of vitamin B complex. Fruits and vegetables are relatively low in sodium and high in potassium. Ascorbic acid in fruits and vegetables enhances the bioavailability of iron in the diet. Because of all these characteristics, fruits and vegetables have a unique role in a healthy diet.

With the increasing recognition that fruit and vegetables are beneficial to health, official recommendations have been made as to the desirable quantities of fruit and vegetables that people should consume. The World Health Organization (WHO) recommended an intake of at least 400g of fruit and vegetables, per person per day, to provide protection against chronic diseases.

Recommendations simply state that five portions of fruit and vegetables per day should be taken including a diverse range of fruit and vegetables should be included in the daily diet. This diversity is important because different fruit and vegetables contain different types and amounts of nutrients and phytochemicals, and therefore a greater diversity of foods will lead to a greater diversity of nutrient and phytochemical intakes.

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Conflict of interest

The author declares no conflict of interest.

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