



Review Article

## **Dietary Intake of Fruits and Vegetables and Risk of Non Communicable Diseases: A Review**

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### **ABSTRACT**

**Backgrounds:** High consumption of fruits and vegetables is generally considered to be beneficial to health. Over the past few decades, the number of studies suggesting an association between fruit and vegetable intake and reduced risk of major chronic diseases has continued to grow.

**Aim:** The main purpose of this review was to quantify the public health benefit of fruits and vegetables on the prevention of non-communicable diseases.

**Materials and Methods:** Data for this review were collected from database searches of PubMed, Medline, and Embase, Google scholar between January 2014 to June 2014. We also performed a manual search of references from retrieved articles.

**Results:** Results from different studies showed that Fruits and vegetables contain many beneficial nutrients that are thought to protect against cardiovascular disease and diabetes. Another findings from the 'nurses' health study' and 'health professional follow up' study showed a 31% lower risk (R.R, 0.69; 95% C.I, 0.52-0.92) of ischemic stroke for person in the highest quintile of fruits and vegetable intake. A recent analysis of the European Prospective Investigation into Cancer and Nutrition (EPIC, 2010) reported that consumption of 8 portions of fruits and vegetables per day (80 g/portion) was associated with a significant 22% reduction in CHD mortality compared to less than three portions per day.

**Conclusions:** Research related to Fruits and vegetables over the past 5 years has expanded and added to earlier evidence supporting a positive association between FV intake and human health.

**Key Words:** Fruits &Vegetables, cardiovascular disease, health.

### **INTRODUCTION**

According to botanists (those who study plants) a fruit is the part of the plant that develops from a flower. It's also the section of the plant that contains the seeds. The other parts of plants are considered vegetables. These include the stems, leaves and roots and even the flower bud. Nutritionally speaking, fruits and vegetables

are similar. Compared with animal products, they're generally lower in calories and fat, but higher in fibre. Fruits and vegetables also contain health-enhancing plant compounds such as antioxidants. And they're loaded with vitamins and minerals. "Eat more fruits and vegetables" is one of the tried and true recommendations for a healthy diet. Eating plenty of vegetables and

fruits can help you ward off heart disease and stroke, control blood pressure, prevent different types of cancer, avoid a painful intestinal ailment called diverticulitis, and guard against cataract and macular degeneration, two common causes of vision loss.

#### **Why should we eat vegetables/fruits?**

- Having a low intake of fruit and vegetables is estimated to cause about 19% of cancers of the digestive system, 31% of heart disease and 11% of stroke.
- They are rich in vitamins and minerals which keep the body healthy.
- They also contain chemicals called antioxidants, such as beta-carotene and vitamin C. These are thought to protect against damaging chemicals that get into the body. However, the exact way in which they prevent disease is not fully understood.
- Fruit and vegetables also contain fibre. This can help to control cholesterol levels and keep blood sugar levels steady.
- Eating fruit and vegetables can help to replace other foods that are high in fat, salt and sugar, which further helps to reduce our risk of these diet-related diseases.

#### **How much should we consume?**

What does “plenty” mean? The latest dietary guidelines call for five to thirteen servings of fruits and vegetables a day (2½ to 6½ cups per day), depending on one’s caloric intake. <sup>[1]</sup> For a person who needs 2,000 calories a day to maintain weight and health, this translates into nine servings or 4½ cups per day (2 cups of fruit and 2½ cups of vegetables). Healthy eating includes eating *at least* five portions, and ideally 7-9 portions, of a variety of fruit or vegetables each day. The Expert Committee of the

Indian Council of Medical Research, has recommended that every individual should consume at least 300 g of vegetables (GLV: 50 g; Other vegetables: 200 g; Roots & Tubers: 50 g) in a day. In addition, fresh fruits (100 g), should be consumed regularly. Since requirements of iron and folic acid are higher for pregnant women they should consume 100g of leafy vegetables daily. High calorie vegetables and fruits should be restricted for overweight/ obese subjects.

#### **Why Five a Day?**

Health promotion campaigns often refer to 'Five a Day'. So, why are we encouraged to eat at least five portions of fruit and vegetables each day? The World Health Organization collected evidence together. It was found that a minimum of 400 g (about five 80 g portions) were needed to: Allow us to meet our nutritional requirements. Protect us from diseases such as stroke, heart disease, some cancers, type 2 diabetes and obesity. In fact, five portions of fruit and vegetables each day is the minimum. This number is also based on how many portions the nation is likely to be able to achieve. So, if it is set too high, the target would be unrealistic. Nevertheless, it appears that the more fruit and vegetables we eat, the greater our protection from diet-related diseases.

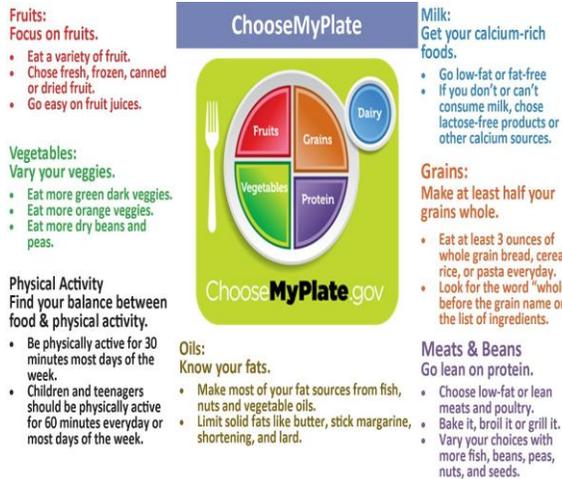
To help people make smart food choices, the U.S. Department of Agriculture (USDA) has designed an easy- to-follow symbol: My Plate. The plate graphic, with its different food groups, is reminder of what and how much –we should be putting on our plate to stay healthy.

#### **How My Plate works:**

My Plate graphic has sections for vegetables, fruits, grain, and food that are high in protein, as well as a “cup” on the side for dairy. Each section is a different size and colour coded (green for veggies, red for fruits, orange for grains, purple for

proteins, and blue for dairy so you can see at a glance how much of these food to eat.

## USDA My Plate (Food Guide)



Source: [ChooseMyPlate.gov](http://ChooseMyPlate.gov)

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Figure 1

The plate graphic reminds use of the following nutrition needs:

- Choose variety: The best meals have a balance of items from different food groups.
- Half of our plate should be vegetables and fruits.
- About one –quarter of your plate should be cereal-grains and quarter protein.
- Drink fat free or low fat milk and water instead of soda, sports drinks, and other sugary drinks.
- Avoid oversized portion.

**What is one serving of fruits and vegetables roughly equivalent to:**

- One large fruit such as an apple, pear, banana, orange, or a large slice of melon.
- Or two smaller fruits such as plums, kiwis etc.
- Or one cup of small fruits such as grapes, strawberries, raspberries, cherries, etc.

- Or two large tablespoons of fruit salad stewed or canned fruit.
- Or one tablespoon of dried fruit.
- Or one glass of fresh fruit juice (150 ml).
- Or a normal portion of any vegetable (about two tablespoons).
- Or one dessert bowl of salad.

**Note:** a 150 ml glass of fruit juice counts as only one of your five a day, even if you have more than one glass. This is because during processing most of the fibre has been removed and the product has higher sugar content. Some smoothies that are on the market might count as two portions, depending on how they are made and how much fruit is included. To count as two portions, smoothies must contain at least 150 ml of fruit juice and 80 g of pulped fruit or vegetables.

**Which vegetables and fruits should be consumed?**

We should consume fresh, locally available and preferably seasonal vegetables and fruits. They have more micronutrients and are tasty. However, no single fruit or vegetable provides all the nutrients you need. The key lies in eating a variety of them and with different colours. Include commonly consumed leafy greens, tomatoes and other vegetables, apart from those which are yellow, orange, red, deep red, purple colored citrus fruits, being vitamin C-rich enrich the diets significantly. Along with these, try selecting some new vegetables and fruits to your meals.

**What doesn't count?**

Sometimes, we might think something counts as a portion of fruit and vegetables, but we can be mistaken. Here are some common misunderstandings:

- Potatoes, yams, cassava and plantain: these contain more starch than anything else, so they don't count as a portion.

- Fruit cake/fruit yoghurts: these contain little fruit and also have added sugar, fat and other ingredients. So we should be trying to keep these to a minimum in the diet.
- Fruit-flavoured soft drinks: these usually contain minimal fruit and are high in sugar.
- Tomato ketchup, jam and chutneys: these have high salt/sugar content.

**Health Benefits of fruits and vegetables:**

***Role of Vegetables and Fruits in the prevention of Cardiovascular Disease:***

There is compelling evidence that a diet rich in fruits and vegetables can lower the risk of heart disease and stroke. The largest and longest study to date, done as part of the Harvard-based Nurses' Health Study and Health Professionals Follow-up Study, included almost 110,000 men and women whose health and dietary habits were followed for 14 years. The higher the average daily intake of fruits and vegetables, the lower the chances of developing cardiovascular disease. Compared with those in the lowest category of fruit and vegetable intake (less than 1.5 servings a day), those who averaged 8 or more servings a day were 30 percent less likely to have had a heart attack or stroke. [2] When researchers combined findings from the Harvard studies with several other long-term studies in the U.S. and Europe, and looked at coronary heart disease and stroke separately, they found a similar protective effect: Individuals who ate more than 5 servings of fruits and vegetables per had roughly a 20 percent lower risk of coronary heart disease and stroke, compared with individuals who ate less than 3 servings per day. [3,4]

***Role of Vegetables and Fruits, in the Prevention of Blood Pressure:***

High blood pressure is a primary risk factor for heart disease and stroke. One of

the most convincing associations between diet and blood pressure was found in the Dietary Approaches to Stop Hypertension (DASH) study. [5] This trial examined the effect on blood pressure of a diet that was rich in fruits, vegetables, and low-fat dairy products and that restricted the amount of saturated and total fat. The researchers found that people with high blood pressure who followed this diet reduced their systolic blood pressure (the upper number of a blood pressure reading) by about 11 mm Hg and their diastolic blood pressure (the lower number) by almost 6 mm Hg—as much as medications can achieve. More recently, a randomized trial known as the Optimal Macronutrient Intake Trial for Heart Health (Omni Heart) showed that this fruit and vegetable-rich diet lowered blood pressure even more when some of the carbohydrate was replaced with healthy unsaturated fat or protein. [6]

***Role of Vegetables and Fruits in the prevention of Cancer:***

A more likely possibility is that some types of fruits and vegetables may protect against certain cancers. A massive report by the World Cancer Research Fund and the American Institute for Cancer Research suggests that non-starchy vegetables—such as lettuce and other leafy greens, broccoli, cabbage, as well as garlic, onions, protect against several types of cancers, including those of the cancer. [7] The mouth, throat, voice box, oesophagus, and stomach; fruit probably also protects against lung Black Women's Health Study, a prospective cohort of 51,928 American women (ages 21-69 years) followed for 12 years, identified 1268 incident cases of breast cancer Based on FFQ assessment it was found that total vegetable intake was associated with a 43% reduction in risk of estrogen and progesterone-receptor negative breast cancer in women consuming more than 2 FV

servings/day, compared to those eating less than 4/week. [8]

For example, a line of research stemming from a finding from the Health Professionals Follow-up Study suggests that tomatoes may help protect men against prostate cancer, especially aggressive forms of it. [9]

Lycopene is one of several carotenoids (compounds that the body can turn into vitamin A) found in brightly colored fruits and vegetables, and research suggests that foods containing carotenoids may protect against lung, mouth, and throat cancer

### ***Role of Vegetables and Fruits in Gastrointestinal Diseases:***

One of the wonderful components of fruits and vegetables is their indigestible fiber. As fiber passes through the digestive system, it sops up water like a sponge and expands. This can calm the irritable bowel and, by triggering regular bowel movements, can relieve or prevent constipation. [10] The bulking and softening action of insoluble fiber also decreases pressure inside the intestinal tract and so may help prevent diverticulosis (the development of tiny, easily irritated pouches inside the colon) and diverticulitis (the often painful inflammation of these pouches). [11]

### ***Role of Vegetables and Fruits in Vision:***

Eating plenty of fruits and vegetables also keeps your eyes in good shape. You may have learned that the vitamin A in carrots aids night vision. Other fruits and vegetables help prevent two common aging-related eye diseases - cataract and macular degeneration- which afflict millions of people over age 65. Dark green leafy vegetables- such as spinach and kale- contain two pigments, lutein and zeaxanthin, that accumulate in the eye; these pigments are found in other brightly colored fruits and vegetables as well, including corn, squash, kiwi, and grapes. [12] These two pigments appear to be able to snuff out free radicals before they can harm the eye's sensitive

tissues. Glaucoma involves progressive deterioration of the optic nerve and is the second leading cause of blindness after cataracts. [13] A combined analysis of prospective data from the Nurses' Health Study and the Health Professionals Follow-up Study published in 2003 did not demonstrate an association between FV intake and risk of glaucoma, but a recent cross-sectional study suggested that consumption of some FV might be protective. [13]

### ***Role of fruits and vegetables in the prevention of diabetes:***

Fruits and vegetable contain different beneficial nutrients and phytochemicals that are helpful in the prevention of Type 2 diabetes mellitus. The role of fruits and vegetables in prevention of type 2 diabetes tends to be associated the fiber found in fruits and vegetables. Dietary fiber helps slow the release of sugar into the bloodstream, helping keep blood sugar levels normal. "Current recommendations from the American Diabetes Association and the World Health Organization for the prevention of type 2 diabetes encourage the consumption of carbohydrate-containing foods such as whole grains, fruits, vegetables, and low-fat milk."

### ***Some tips on how to increase fruit and vegetables in your diet:***

Fruit and vegetables add colour, flavour, and texture to any dish. No one fruit or vegetable contains all the nutrients you need, so it is good to have a variety and include fruit and vegetables of all different colours. Different colours of fruits mean different combinations of vitamins, minerals and antioxidants.

- Try adding chopped bananas, apples, or dried fruits to breakfast cereals.
- Try to include at least two different vegetables with most main meals.

- Sometimes nutrients are lost or destroyed during cooking. Eat fruit and vegetables raw when possible, and try to avoid over-cooking them.
- Try poaching, steaming or microwaving rather than boiling. These methods help to reduce the amounts of nutrients lost or destroyed. If you do boil vegetables, the water can be used in stocks, sauces or soups.
- Always offer fruit to accompany meals.
- A banana sandwich is another idea for lunch. When making sandwiches, try to add in cucumber, tomato, lettuce, avocado or other suitable choices to accompany sandwich fillings
- Fruit is great for snacks. Encourage children to snack with fruit rather than with sweets.
- Most healthy eating plans allow for one or two small snacks a day. Choosing most fruits and vegetables will allow you to eat a snack with only 100 calories.

#### **About 100 Calories or Less**

- a medium-size apple (72 calories)
- a medium-size banana (105 calories)
- 1 cup steamed green beans (44 calories)
- 1 cup blueberries (83 calories)
- 1 cup grapes (100 calories)
- 1 cup carrots (45 calories), broccoli (30 calories), or bell peppers (30 calories) with 2 tbsp. hummus (46 calories)

Instead of a high-calorie snack from a vending machine, bring some cut-up vegetables or fruit from home. One snack-sized bag of corn chips (1 ounce) has the same number of calories as a small apple, 1 cup of whole strawberries, and 1 cup of carrots with 1/4 cup of low-calorie dip.

Substitute one or two of these options for the chips, and you will have a satisfying snack with fewer calories.

#### **Remember:**

It's true that fruits and vegetables are lower in calories than many other foods, but they do contain some calories. If you start eating fruits and vegetables in addition to what you usually eat, you are adding calories and may gain weight. The key is substitution. Eat fruits and vegetables instead of some other higher-calorie food.

#### **How to get at least 'five a day' on a budget**

The national institute of health has published studies on why fruits and vegetable consumption is low, with cost ranking highest among reasons. Additionally, many people are unsure of how to incorporate fruits and vegetables in to their busy lifestyle. There are ways to eat more fruits and vegetables daily starting with knowing how to shop to finding to creative ways to incorporate in to each meal. Getting at least five portions of fruit and vegetables each day doesn't have to be expensive. Some ways to cut the cost are:

- Make use of local convenience shops or markets. You can often get cheap deals and bargains.
- Look out for offers in supermarkets such as 'buy one, get one free'.
- Choose loose fruit and vegetables - check the price labels and compare how much they are per kilogram (kg).
- Look out for the reduced section in supermarkets. Sometimes you'll find price cuts on fruit and vegetables that are on the shelves for their last day.
- Go later in the evening to local stalls and get a bargain on fruit and vegetables that may otherwise go to waste.

- Buy in season, as this is when fruit and vegetables tend to be cheaper.
- Frozen or dried fruit and vegetables can be cheaper, and you don't need to worry about them going off too quickly.
- Tinned fruit and vegetables such as tinned tomatoes, beans, pulses, carrots, sweet corn and peas are cheap. They can be added to casseroles, stews, soups, curries, stir-fries or pasta dishes.
- Try to avoid those with added salt or sugar.
- Fruit and vegetables that are soon to go out of date can be used to make soups. These can then be frozen and eaten later.
- Green leafy vegetables (GLVs), other vegetables and fruits are easily available. Most vegetables, particularly GLVs are inexpensive. In fact, these foods can be grown in the backyard with very little effort and cost. Even in lean seasons like summer, they can be grown using water and waste from kitchen.

#### ***How to prevent cooking losses?***

Vitamins are lost during washing of cut vegetables and cooking of foodstuffs. However, proper methods of cooking can substantially reduce these losses. Nutrient loss is high when the vegetables are washed after cutting or when they are cut into small pieces for cooking. Consumption of properly washed raw and fresh vegetables is always beneficial.

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