



Scientific Facts on **Diet and Nutrition** Prevention of Chronic Diseases

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WHO / FAO (2003)

Summary & Details:
GreenFacts (2006)

Context - As a result of changes in the way we eat and live, some chronic diseases are increasingly affecting both developed and developing countries. Indeed, diet-related chronic diseases - such as obesity, diabetes, cardiovascular disease, cancer, dental disease, and osteoporosis - are the most common cause of death in the world and present a great burden for society.

How can improvements in terms of diet and physical activity help us reduce the risk of these chronic diseases?

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This Digest is a faithful summary of the leading scientific consensus report produced in 2003 by the World Health Organization (WHO) and the Food & Agriculture Organization (FAO):
"Diet, Nutrition and the prevention of chronic diseases"

The full Digest is available at: <http://www.greenfacts.org/en/diet-nutrition/>

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- Each question is answered in Level 1 with a short summary.
- These answers are developed in more detail in Level 2.
- Level 3 consists of the Source document, the internationally recognised scientific consensus report which is faithfully summarised in Level 2 and further in Level 1.

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1. To what extent does diet play a role in chronic diseases?

1.1 Chronic diseases are long-term diseases that are not contagious and largely preventable. They are the most common cause of death in the world and present a great burden for society, particularly diseases such as obesity, diabetes, cardiovascular disease, cancer, dental disease, and osteoporosis. Making improvements in terms of diet and physical activity can help reduce the risk of these chronic diseases.



Chronic diseases occur across the world

1.2 Hunger and malnutrition are the most devastating problems facing the world's poorest nations, often leading to physical or mental disability, or even death. Simultaneously, because of rapid changes in the diets and lifestyles among certain population groups, many of these countries have seen an increase in chronic diseases, such as obesity and heart disease.

Therefore, safe and adequate food supplies are needed in order to combat both nutritional deficiencies and chronic diseases.

2. How are diets changing?

In what is known as the "**nutritional transition**", traditional plant-based diets including foods such as cereals and potatoes are increasingly being replaced by diets that are richer in added sugars and animal fats. This transition, combined with a general trend towards a more sedentary lifestyle, is an underlying factor in the risk of developing chronic diseases.



Demand for animal products like meat has increased

2.1 The average **food consumption** (in terms of calories) appears to have increased steadily in countries around the world, particularly in developing countries, though not in sub-Saharan Africa.

2.2 The average **fat** content of the diet is also increasing throughout the world, and it is especially high in parts of North America and Europe. An increasingly large portion of this fat comes from animal products and vegetable oils.

2.3 Factors such as rising incomes and population growth have raised the demand for **animal products** like meat, dairy products, and eggs. These products provide high-value protein and many essential nutrients, but excessive consumption can lead to excessive intakes of fat.

2.4 Fisheries are an important source of animal protein, employment and revenue in many countries. The average amount of fish and fishery products consumed per person has nearly doubled since 1957. The future availability of this food source will depend on the sustainable use of marine fish stocks, many of which are already being fully exploited.

2.5 A diet high in **fruits and vegetable** is recommended for good health, yet, although average consumption has increased, only a small minority of the world's population eats an adequate amount.

2.6 In the future, the average food consumption (in calories) in developing countries is expected to increase. Diets previously based on cereal, roots and tubers will increasingly be replaced by diets that are rich in meat, dairy-products and oil. The consumption of fishery products will be more and more limited by environmental factors.

2.7 In **conclusion**, changes in diets are needed to cope with the burgeoning epidemic of chronic diseases. The entire process, from food production to consumption, should be considered when determining the relationship between diet and the risk of developing chronic diseases.

3. How are chronic diseases linked to diet and nutrition?

Diet, as well as other factors such as physical activity and tobacco use, can affect health throughout life.

3.1

- Growth delays **in the womb and in early infancy** can increase the risk of diet-related chronic diseases in later life. Breastfeeding may lower the risk of later developing obesity. In contrast, breast-milk substitutes (formula) may increase the risk of developing several chronic diseases.
- **During childhood and adolescence**, adopting habits such as unhealthy diets and low-levels of exercise increases the risk of developing cardiovascular diseases and obesity.
- Most chronic diseases are expressed **in adulthood**. Therefore, it is a critical time for reducing risk factors such as tobacco use, excess weight gain and obesity, physical inactivity, cholesterol, high blood pressure and alcohol consumption.
- The main burden of chronic diseases is observed **in people older than 60**.



Adopting habits in childhood
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As the risk of developing chronic disease can be reduced at any age, people of all ages are encouraged to eat healthily, maintain their weight, and exercise.

3.2 Individual risk factors can combine over time to create a greater overall risk of developing chronic disease. Unhealthy diets, and habits such as excessive television viewing that results in low levels of exercise, increase the risk of disease in early adulthood.

3.3 Certain individuals are more susceptible to developing chronic disease because of genetic factors.

3.4 A lifestyle combining physical activity, food variety, and social interaction is the most conducive to good health. Many cases of coronary heart disease, diabetes, and cancers could likely be avoided if steps are taken throughout life to reduce risk factors.

4. Are certain dietary intakes recommended to prevent chronic diseases?

4.1 No specific dietary intakes are recommended for the prevention of chronic diseases. There is, however, a "safe range" of dietary intakes that is considered to be consistent with the maintenance of health of a population.

4.2 Scientific evidence can be classified as convincing [see Annex 2, p. 9] , probable [see Annex 2, p. 9] , possible [see Annex 2, p. 9] , or insufficient depending on the number and type of studies carried out and the consistency of the results.



At least 400g of fruits & vegetables per day
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4.3 A balanced diet can help prevent chronic diseases. The Joint WHO/FAO Expert Consultation proposes guidelines for the contribution of different food groups towards a typical balanced diet.

Table 6: Ranges of population nutrient intake goals [see Annex 3, p. 11]

- Total fat intake should represent 15 to 30% of total dietary energy intake.
- Intake of free sugars, such as those found in soft drinks and many processed foods, should amount to less than 10% of total energy intake (Comment [see Annex 1, p. 9]).
- An intake of at least 400g of fruits and vegetables per day is recommended. Combined with a consumption of wholegrain cereals this intake is likely to provide an adequate amount of fibre.

The WHO also makes recommendations about body weight – in terms of Body Mass Index (BMI) – and physical activity.

4.4 In order to maintain a good level of cardiovascular health, at least 30 minutes of moderate physical activity (such as brisk walking) every day is recommended for people of all ages.

Engaging in a higher level of physical activity for a longer period of time (60 minutes) can provide even greater health benefits, particularly in terms of preventing of obesity.

When determining an appropriate level of physical activity, potential benefits and risks should be considered on an individual basis.

5. Excess weight gain and obesity

5.1 Excess weight gain and obesity are increasingly affecting adults, adolescents and children throughout the world.



Weight gain can result from a change in diet or level of physical activity and can lead to obesity and other chronic diseases.

5.2 Certain types of foods and eating habits such as snacking, binge-eating, and eating out can contribute to excessive weight gain and obesity. A moderate to high level of regular physical activity is important in preventing unhealthy weight gain and moderate to high fitness entails health benefits (independently of body weight). A healthy weight may reduce the risk of disease and premature death.

5.3 Many factors have been shown to protect against obesity:

- Regular physical exercise
- High dietary fibre intake
- Home and school environments that promote healthy food and activity choices
- Having been breastfed

Some factors that may increase the risk have also been identified:

- Sedentary lifestyles, particularly sedentary occupations and inactive recreational activities such as watching television
- Large portion sizes
- High intake of drinks containing added sugars

5.4 Obesity may be prevented by encouraging healthy habits early in life. Individuals can reduce the overall risk of obesity by maintaining a healthy Body Mass Index (BMI) and

controlling waist measurements. Engaging in a moderate to high level of regular physical activity (for instance walking for one hour per day), and limiting consumption of foods and drinks that contain high amounts of fats and sugars can also decrease the risk of becoming overweight or obese.

6. Diabetes

6.1 Diabetes is a disease that is linked to the hormone insulin which regulates levels of sugar in the blood.

- Type 1 diabetes occurs when the body fails to produce insulin.
- Type 2 diabetes, which is much more common, occurs when the body fails to respond to insulin in a normal way.



Insulin regulates blood sugar levels
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Diabetes can lead to serious complications including blindness, kidney failure, heart disease, and strokes. In the case of type 2 diabetes, lifestyle changes are important in preventing and managing the disease.

The number of cases of diabetes is currently estimated to be around 150 million worldwide, but that number is expected to double by 2025.

6.2 Inactive lifestyles and excessive weight gain increase the risk of type 2 diabetes, especially when excess fat is stored in the abdomen.

6.3 Excess fat in the abdomen can contribute to the development of insulin resistance, a condition that underlies most cases of type 2 diabetes. Children of mothers who are affected by diabetes during pregnancy are also at high risk of developing obesity and type 2 diabetes early in life. Consumption of saturated fats may increase the risk of developing type 2 diabetes.

6.4 Efforts to prevent excessive weight gain and cardiovascular disease can also reduce the risk of developing diabetes. Measures include maintaining a healthy weight, engaging in at least one hour of moderate physical activity (for instance walking) in the course of the day most days of the week, consuming sufficient fibre from fruits, vegetables and wholegrain cereals, and limiting consumption of saturated fats.

7. Cardiovascular diseases

7.1 Ongoing lifestyle changes are contributing to the increase in the global burden of cardiovascular diseases. Currently, one third of all the deaths in the world are estimated to be due to diseases which affect the heart and blood vessels.



Stethoscope
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7.2 Risk factors such as poor nutrition, insufficient physical activity, and tobacco use tend to accumulate over time, increasing the overall risk of developing cardiovascular disease.

7.3 Certain dietary **fats**, especially those that are commonly found in dairy products, meat and hardened oils (such as certain margarines) have been shown to increase the risk of cardiovascular disease. Other dietary fats, such as those found in soybean and sunflower oils, can lower the risk of cardiovascular disease. Fish oil (which is found in fatty fish) is also beneficial.

A high intake of **salt** can increase blood pressure and the risk of stroke and coronary heart disease, whereas eating a diet high in fiber and wholegrain cereals can reduce the risk of coronary heart disease.

7.4 A high intake of fruits, vegetables, and fish can contribute to good cardiovascular health and reduce the risk of developing certain cardiovascular diseases. Alcohol consumption should be limited in view of cardiovascular and other health risks.

7.5 To prevent cardiovascular disease, intake of fat from dairy products, meat and certain cooking fats should be limited. Eating 400 to 500g of fruits and vegetables everyday and fish once or twice per week is recommended. Restricting salt intake to less than 5 g per day and exercising for at least 30 minutes a day are also beneficial to cardiovascular health.

8. Cancer

8.1 As the population is aging, cancer is becoming a growing problem and a major cause of death. Apart from tobacco smoke, which is the most common proven cause of developing cancer, other identified and unidentified factors also play a role.

8.2 Dietary factors are estimated to account for nearly a third of cancers in industrialized countries, making diet second only to tobacco as a theoretically preventable cause of cancer. The risk of developing cancer can increase due to factors such as obesity, high consumption of alcohol or preserved meat, and lack of physical activity.

8.3 Stomach cancer and liver cancer occur more frequently in certain developing regions. Excessive alcohol consumption is the main dietary risk factor for liver cancer and high intake of salty, preserved foods can increase the risk of stomach cancer. However, certain infections are also known to play a role.

8.4 Aspects linked with the Western diet and obesity may be contributing to an increased risk of developing cancer, such as colorectal cancer, cancer of the pancreas, breast cancer, and prostate cancer. These types of cancers are more common in developed countries.

8.5 The risk of developing certain types of cancer may be reduced for instance by maintaining a healthy Body Mass Index (BMI), engaging in one hour of physical activity per day (for instance fast walking), limiting consumption of alcohol and salt, consuming sufficient fruits and vegetables and not eating foods when they are at a very high temperature.

9. Dental diseases

9.1 Dental diseases, such as tooth decay and gum disease, are a costly burden to health care services. Although caries have become less frequent over the past 30 years, as people are living longer the number of people developing dental diseases is likely to increase. This is a particular concern in countries where sugar consumption is increasing and where fluoride exposure may be inadequate.



Diet is a factor in dental health
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9.2 Diet is an important factor in the risk of developing dental diseases. The development of caries requires the presence of both sugars (from the diet) and bacteria. The tooth surface can also be attacked by acids from some foods and drinks.

9.3 Sugar consumption is the most significant factor for dental caries. Studies found a strong link between the amount and frequency of sugar consumption and the development of caries.

9.4 Adequate exposure to fluoride is the most effective preventive measure against dental caries, but sugar consumption needs to be limited as well in order to further reduce the risk. Eating certain foods, such as cheese, may stimulate salivary flow which can protect against the development of dental caries. Breastfed babies tend to have less dental caries in early childhood than babies fed on formula milk.

9.5 The main diet-related recommendations for reducing the risk of dental diseases are: limiting the amount and frequency of consumption of free sugars, assuring adequate exposure to fluoride, and avoiding certain nutrient deficiencies.

10. Osteoporosis

10.1 Osteoporosis is a disease affecting millions of people around the world that leads to bone fragility and a consequent increase in risk of bone fracture. The risk of osteoporosis increases with age and can lead to illness, disability, and even premature death.

The risk of fractures of the hip and vertebrae increases exponentially with age. In countries where fractures are frequent, women are affected more often than men. Overall, approximately 1.66 million hip fractures occur each year, and that number is expected to rise in the future.



10.2 **Calcium** and **vitamin D** deficiencies increase the risk of osteoporosis in older people. Other dietary factors and physical activity may reduce the risk, whereas low body weight and high alcohol consumption increase the risk.

10.3 The risk of osteoporosis in older people may be reduced through a diet providing more calcium and vitamin D. However, such preventive measures should focus on population groups that are at a high risk of suffering from osteoporotic fractures. Other prudent measures include increasing sunlight exposure (a source of Vitamin D), increasing physical activity, eating more fruit and vegetables, and consuming less alcohol and salt.

11. Conclusion

Chronic diseases are widespread diseases that present a great burden for society as they are the most common cause of death in the world. They include:

- obesity (see 5.)
- diabetes (see 6.)
- cardiovascular disease (see 7.)
- cancer (see 8.)
- dental diseases (see 9.)
- osteoporosis (see 10.)

Chronic diseases are largely preventable through a healthy lifestyle involving a balanced diet and regular physical activity.

The Joint WHO/FAO Expert Consultation provides guidelines for an average balanced diet (at the population level):

- total fat intake should represent 15 to 30% of total dietary energy intake.
- free sugars, such as those found in soft drinks and many processed foods, should account for less than 10% of total energy intake (Comment [[see Annex 1, p. 9](#)]).
- at least 400g of fruits and vegetables per day should be part of the diet. (see 4.)

In general, a lifestyle combining physical activity with food variety and social interaction is the best way to reduce the risk of developing chronic diseases.

12. Other views and links

This study is based on a report of a Joint WHO/FAO Expert consultation entitled "Diet, Nutrition and the prevention of chronic diseases", a leading scientific report produced in 2003 by a large international panel of scientists.

It is considered by most scientists as a consensus document and other recent scientific assessments reach similar conclusions, though some people and organizations put forward different views.

GreenFacts other views & factual links page on Diet and Nutrition [[see http://www.greenfacts.org/en/diet-nutrition/links/index.htm](http://www.greenfacts.org/en/diet-nutrition/links/index.htm)]

Annex

Annex 1: Comment

"The [Joint WHO/FAO Expert] Consultation recognized that a population goal for free sugars of less than 10% of total energy is controversial [with respect of the prevention of obesity]. However, the Consultation considered that the studies showing no effect of free sugars on excess weight have limitations."

Source & © WHODiet, Nutrition and the prevention of chronic diseases (2003) [see http://www.who.int/nutrition/topics/5_population_nutrient/en/index1.html]

Chapter 5 Population nutrient intake goals for preventing diet-related chronic diseases, 5.1.3 A summary of population nutrient intake goals, Free sugars

See also:

Comments on the draft report of the joint WHO/FAO expert consultation on diet, nutrition and the prevention of chronic diseases www.who.int/dietphysicalactivity/publications/ [see <http://www.who.int/dietphysicalactivity/publications/trs916/cmo/en/>]

Annex 2: Degrees of evidence by the Joint WHO/FAO Expert Consultation

In the Joint WHO/FAO Expert Consultation, scientific evidence has been categorized into four different levels of strength depending on the number and type of studies carried out and the consistency of the results:

- *Convincing evidence.*
- *Probable evidence.*
- *Possible evidence.*
- *Insufficient evidence.*

"Convincing evidence

Evidence based on epidemiological studies showing consistent associations between exposure and disease, with little or no evidence to the contrary. The available evidence is based on a substantial number of studies including prospective observational studies and where relevant, randomized controlled trials of sufficient size, duration and quality showing consistent effects. The association should be biologically plausible.

Probable evidence.

Evidence based on epidemiological studies showing fairly consistent associations between exposure and disease, but where there are perceived shortcomings in the available evidence or some evidence to the contrary, which precludes a more definite judgement. Shortcomings in the evidence may be any of the following: insufficient duration of trials (or studies); insufficient trials (or studies) available; inadequate sample sizes; incomplete follow-up. Laboratory evidence is usually supportive. Again, the association should be biologically plausible.

Possible evidence.

Evidence based mainly on findings from case-control and cross-sectional studies. Insufficient randomized controlled trials, observational studies or non-randomized controlled trials are available. Evidence based on non-epidemiological studies, such as clinical and laboratory investigations, is supportive. More trials are required to support the tentative associations, which should also be biologically plausible.

Insufficient evidence.

Evidence based on findings of a few studies which are suggestive, but are insufficient to establish an association between exposure and disease. Limited or no evidence is available from randomized controlled trials. More well designed research is required to support the tentative associations.

The strength of evidence linking dietary and lifestyle factors to the risk of developing obesity, type 2 diabetes, CVD [cardiovascular diseases], cancer, dental diseases, osteoporosis, graded according to the above categories, is summarized in tabular form, and attached to this report as an Annex [see www.who.int/nutrition/topics/annex/en/index.html] [see <http://www.who.int/nutrition/topics/annex/en/index.html>]]."

Source & © WHODiet, Nutrition and the prevention of chronic diseases (2003), Chapter 5 Population nutrient intake goals for preventing diet-related chronic diseases, 5.1 Overall goals, 5.1.2 Strength of evidence [see http://www.who.int/nutrition/topics/5_population_nutrient/en/index.html#diet5.1.2]

Chapter 5 Population nutrient intake goals for preventing diet-related chronic diseases, 5.1.3 A summary of population nutrient intake goals, Free sugars

Annex 3:

Table 6. Ranges of population nutrient intake goals

Dietary factor		Goal (in % of total energy)
Total fat		15-30%
	Saturated fatty acids	<10%
	Polyunsaturated fatty acids (PUFAs)	6-10%
	n-6 Polyunsaturated fatty acids (PUFAs)	5-8%
	>n-3 Polyunsaturated fatty acids (PUFAs)	1-2%
	>Trans fatty acids	<1%
	>Monounsaturated fatty acids (MUFAs)	By difference ^a
Total carbohydrate		55-75%^b
	Free sugars ^c	<10%
Protein		10-15%^d
Dietary factor		Goal (in mg or g)
Cholesterol		<300mg per day
Sodium chloride (sodium) ^e		<5g per day (<2 g per day)
Fruits and vegetables		≥400g per day
Total dietary fibre		From foods ^f
Non-starch polysaccharides (NSP)		From foods ^f

^a This is calculated as: total fat - (saturated fatty acids + polyunsaturated fatty acids + trans fatty acids).

^b The percentage of total energy available after taking into account that consumed as protein and fat, hence the wide range. ^c The term "free sugars" refers to all monosaccharides and disaccharides added to foods by the manufacturer, cook or consumer, plus sugars naturally present in honey, syrups and fruit juices.

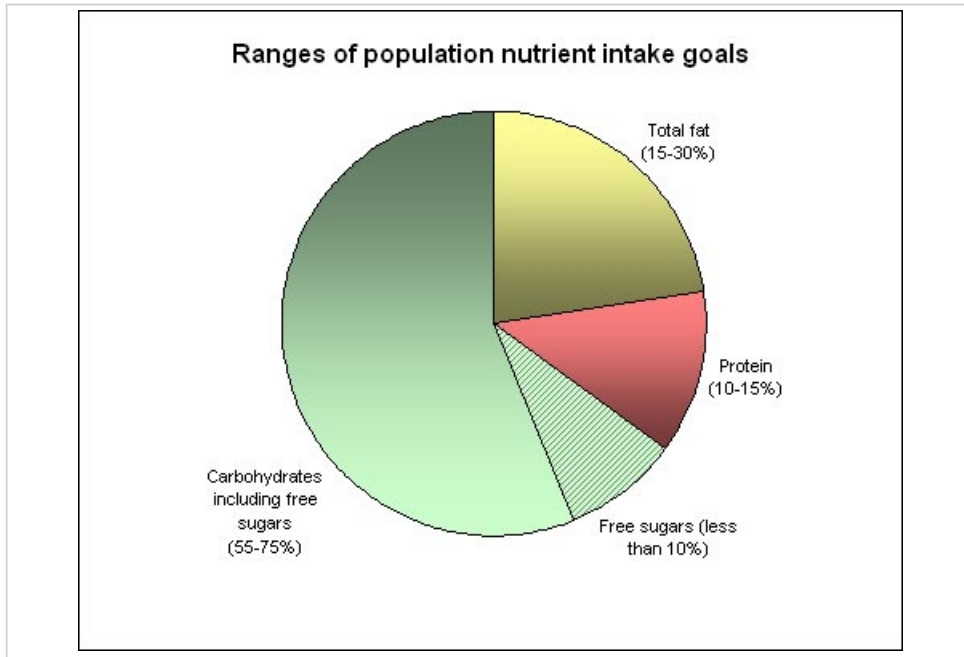
^d The suggested range should be seen in the light of the Joint WHO/FAO/UNU Expert Consultation on Protein and Amino Acid Requirements in Human Nutrition, held in Geneva from 9 to 16 April 2002(2).

^e Salt should be iodized appropriately (6). The need to adjust salt iodization, depending on observed sodium intake and surveillance of iodine status of the population, should be recognized.

^f See page 58, under "Non-starch polysaccharides".

Source: WHO/FAO "Diet, Nutrition and the prevention of chronic diseases"

Section 5.1.3 A summary of population nutrient intake goals [see http://www.who.int/nutrition/topics/5_population_nutrient/en/index.html#diet5.1.3]



Source: Greenfacts based on the above table