

NON-COMMUNICABLE DISEASES (NCDs)



According to the World Health Organisation, **non-communicable diseases**, including heart disease, stroke, cancer, or diabetes are collectively responsible for **74% of all deaths worldwide**.

QUICK FACTS

The costs of NCDs on the health care systems:

- **Cardiovascular diseases:** €217 billion (2015, EU, direct cost).
- **Colorectal cancer:** €19,100 million (2015, EU, total cost).
- **Diabetes:** €150 billion (2019, European regions, total cost).
- **Dementia:** €177 billion (2008, Europe, total cost).

NCD in Europe

NCDs contribute to all-cause mortality in Western Europe according to Global Burden of Disease database (2019):

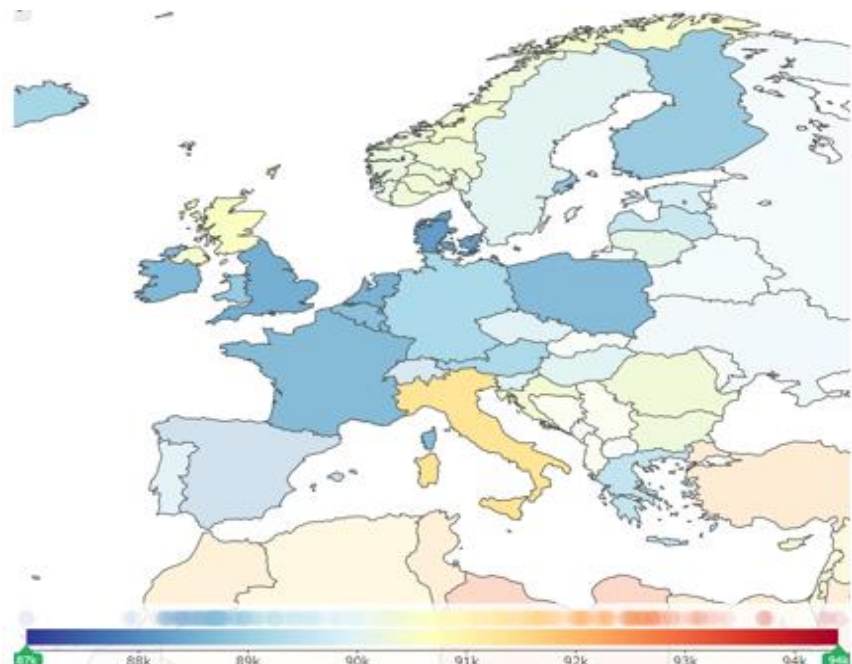
- **Cardiovascular diseases** (34.1%)
- **Cancers** (30.8%)
- **Neurological disorders** (6.7%)
- **Diabetes and kidney diseases** (4.1%)

SHORT DESCRIPTION

NCDs are those diseases that are not transmissible directly between individuals. NCDs tend to be of long duration and are the result of a combination of genetic, physiological, environmental and behavioural factors. They include most cardiovascular diseases (among those are heart disease and stroke) most cancers, diabetes, Alzheimer's disease. Their impact can be both chronic and/or acute.

Globally, every two seconds, a person dies prematurely from a NCD.

Prevalence in NCDs (per 100,000, 2019, both sexes, age-standardised)*



* The map shows the full range of NCDs and hence covers conditions beyond the diet-responsive NCDs discussed in these factsheets.

MOST COMMON IMPACT FACTORS

- Unhealthy diet
- Smoking
- Age
- Physical inactivity
- Excessive alcohol consumption
- Genetic predisposition

DIETARY RESPONSIVENESS of NCDs

NCDs are associated with an unhealthy diet, smoking, physical inactivity and excessive alcohol consumption. Globally, consumption of meat, sugars, oils and fats has been increasing during recent decades, whereas the intake of fibre-rich foods such as whole grains, pulses and roots has been declining. Simultaneously, the consumption of processed and convenience foods continues to rise rapidly. These changes affect dietary patterns and nutrient intake, which lead to key metabolic changes such as raised blood pressure, blood cholesterol, blood glucose and overweight/obesity. Consequently, the new consumption habits increase the risk of developing NCDs.

Studies have shown that many NCD risk-factors can be managed by improving nutritional intake through preventing these metabolic changes. Healthy diet is known to be the most important factor in the prevention of many NCDs. A short overview of the effects of diet on selected NCDs is presented below.

Colorectal cancer: Diets rich in fruit and vegetables, fibre, folate, calcium-rich dairy foods and fish have been associated with a decrease in the incidence of colorectal cancer. The World Cancer Research Fund/American Institute For Cancer Research also reports that processed meat causes colorectal cancer.

Stroke: Diets high in fibre, phenolics and unsaturated fatty acids and low in sodium and saturated and industrial trans fatty acids are beneficial for stroke prevention.

Heart disease: Following diets rich in fruit and vegetables and whole grains, plant proteins, fish and seafood and unprocessed and lean meat has been advised for heart disease prevention. It has been suggested that replacing dietary saturated fatty acids with mono/polyunsaturated fatty acids is beneficial for heart disease prevention.

Type 2 diabetes mellitus: Carbohydrate intake should emphasise nutrient-dense sources that are slowly digested (low glycaemic index). A diet high in fibre, vegetables, fruits, legumes, whole grains, as well as dairy products has been associated with a decrease in its risk. Diets which are lower in carbohydrates may also be helpful under professional guidance.

Alzheimer's disease and dementia: Consumption of fruit, vegetables and whole grains has been associated with a lower risk of developing Alzheimer's and dementia.

Common dietary recommendations for NCDs:

Diets high in:

- Fruits and vegetables
- Whole grains
- Pulses
- Nuts and seeds

Consumption of red and particularly processed meat should be minimised.

Food Choice also affects Food Intake

Eating behaviour is profoundly affected by social factors, which can impact food choice:

- **Interpersonal factors**
Family practices, rules and structure around mealtimes affect eating habits.
- **Role models**
People conform to others' eating because they consider the amount eaten by others as an indicator of how much food one can or should consume or because of affiliation motives.
- **Social facilitation of eating**
Food intake is increasing when people eat together as compared to when they eat alone. Social facilitation occurs as people who are to eat in groups select more food especially with friends.
- **Social media**
Engagements in social media and exposure to image related content has a negative impact of body mass index and food choices in young adults who are vulnerable to social media influence.

SELECTED REFERENCES

- Data - Health - Eurostat (europa.eu)
VizHub - GBD Results (healthdata.org)
Wimo A., Jönsson, J., and Gustavsson, A., 2009, Cost of illness and burden of dementia – the base option. Available at <http://www.alzheimer-europe.org/Our-Research/European-Collaboration-on-Dementia/Cost-of-dementia/Cost-of-illness-and-burden-of-dementia>
World Health Organization. (2018). Noncommunicable diseases country profiles 2018. World Health Organization. <https://apps.who.int/iris/handle/10665/274512>

Figures were created using *Global Burden of Disease data*.
<https://www.healthdata.org/gbd/2019>

COLORECTAL CANCER



Colorectal cancer is defined as cancer of the colon or rectum. It is the 3rd most frequently diagnosed cancer in men and the second in women.

QUICK FACTS

- Cancers are the 2nd largest cause of deaths (31%) with colorectal cancer being responsible for 13% of total cancers.
- Colorectal cancer prevalence is rising in most countries.
- Austria has the most consistent decline from 1996.
- Hungary has the highest death rate from this condition.

5-YEAR TARGETS

Top 5-year targets for action

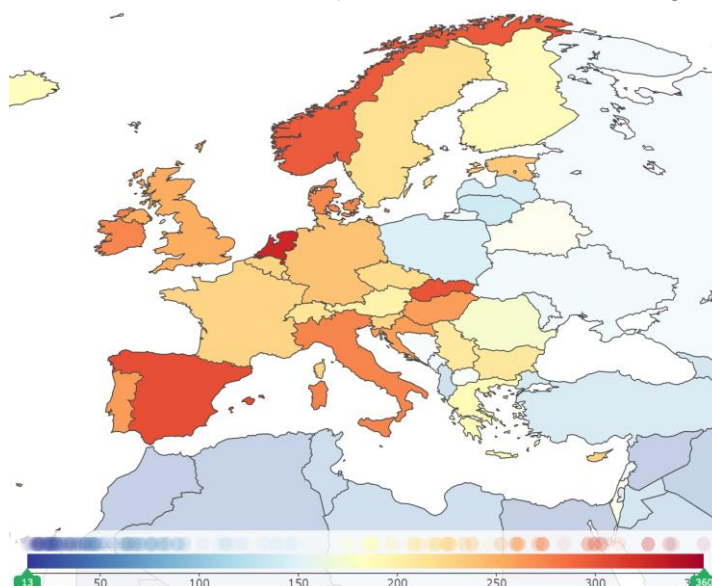
- Identify reasons for between country variation.
- Develop strategy for increasing intake of dietary fibre and whole grains.
- Reducing consumption of processed meat.
- Capitalising on benefits of calcium-rich dairy foods.

SHORT DESCRIPTION

The colon is the lower part of the intestinal tract and extends from the caecum to the rectum. It contains a very large population of different microorganism, which have important functions. These include the fermentation of unabsorbed carbohydrates (non-starch polysaccharides and resistant starch) resulting in the production of short chain fatty acids that influence the health of the colonic mucosa.

The World Cancer Research Fund (WCRF) in collaboration with the American Institute for Cancer Research (AICR) concluded that there is probable evidence that consumption of whole grains, dietary fibre, dairy products and calcium supplements protects against colorectal cancer. They also say that consumption of red meat is probably a cause of colorectal cancer and that there is convincing evidence that processed meat and being overweight/obese cause colorectal cancer.

Prevalence of colorectal cancer (per 100,000, 2019, both sexes, age-standardised)



- Prevalence of colorectal cancer varies considerably among European countries.
- Lowest prevalence:
 - Lithuania
 - Latvia
- Highest prevalence:
 - The Netherlands
 - Spain
- With few exceptions, the trends in prevalence of colorectal cancer rates are increasing.

IMPACT FACTORS

- Unhealthy diet
- Increasing age
- Ethnicity
- Family history of colorectal cancer
- Physical inactivity
- Being overweight or obese
- Excessive alcohol consumption
- Smoking

Dietary factors, those that are directly related to eating habits, are the leading cause of colorectal cancer death. 32% of global deaths from colorectal cancer were related to dietary factors.

INFLUENCE OF NUTRITION

Dairy products

A recent review of mainly WCRF/AICR data concluded that consumption of milk and cheese showed a decreased risk of colorectal cancer, although the evidence for cheese was less strong than other dairy food exposures. No evidence concerning consumption of butter, yoghurt, ice cream, and fermented milk was available. There is evidence that the calcium in dairy foods has a role in reducing colorectal cancer risk.

Processed meat

A recent review of data mainly from WCRF/AICR and Farvid *et al.* concluded that processed meat is a greater risk to colorectal cancer than red meat. However, it remains uncertain how different meat types and methods of processing differ in the impact on colorectal cancer development. There is evidence that cooking meat at high temperatures can result in the formation of chemicals which have been linked with colorectal cancer development. Also, haem iron in red meat and processed red meat may be involved in the cancer initiation.

Dietary fibre and whole grains

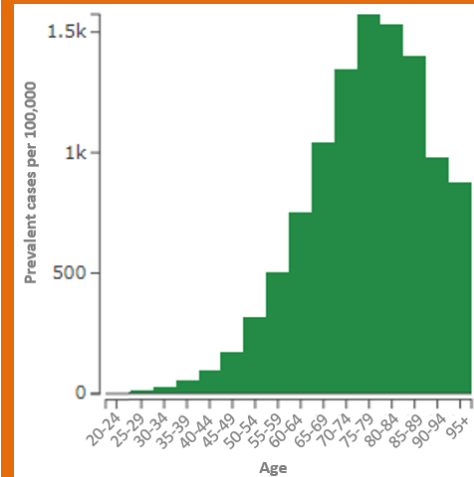
Increased fibre intake is associated with reduced risk of colorectal cancer, likely due to influences mediated by the gut microbiota as well as a mildly laxative effect of fibre (allowing less time for carcinogens or tumour promoters to accumulate). Gut microorganisms are adept at carbohydrate metabolism, with the production of benign metabolites such as organic acids. As such, fibres that stimulate butyrate and which are found in whole grains are likely to be preferred types in terms of colorectal cancer protection. Unfortunately, some of the bacteria traditionally regarded as health promoting may not have anti-cancer effects. Therefore, we need a better understanding of other positive groups of bacteria and how they work. Most incidences of colorectal cancer arise in the distal large, are the result of the exposure of the gut bacteria to excess protein.

Other dietary factors

WCRF/AICR also examined evidence suggesting some decreased colorectal cancer risk was associated with foods containing vitamin C, fish, vitamin D and multivitamin supplements. It was concluded that the evidence was limited but suggestive.

AGE GROUPS

Colorectal cancer risk increases with age. It is more common after age of 50.



Colorectal cancer prevalence at different ages (European region, both sexes, 2019)

SEX

Colorectal cancer, unlike some cancers, affects both females and males but overall, males seem to have higher death rates than females.

SELECTED REFERENCES

- Farvid, M.S et al. Consumption of red meat and processed meat and cancer incidence: A systematic review and meta-analysis of prospective studies. *Eur. J. Epidemiol.* 2021, 36, 937–951.
- Givens DJ (2020) Dairy foods and the risk of cancer. In *Milk and Dairy Foods: Their Functionality in Human Health and Disease* [Ed D I Givens] Elsevier/Academic Press Cambridge, MA.
- Giromini C and Givens D I (2022) Benefits and risks associated with meat consumption during key life processes and in relation to the risk of chronic diseases. *Foods* 11: 2063.
- Louis P, Hold GL & Flint H (2014) The gut microbiota, bacterial metabolites and colorectal cancer. *Nat. Rev. Microbiol.* 12: 661–672.
- World Cancer Research Fund/American Institute for Cancer Research (2018) Diet, Nutrition, Physical Activity and Colorectal Cancer, Continuous Update Project Expert Report. Summary available at: [Colorectal cancer | What causes colorectal cancer? | WCRF International](https://www.wcrf.org/colorectal-cancer/)

Figures were created using *Global Burden of Disease* data. <https://www.healthdata.org/gbd/2019>

STROKE



*In 2017
over 1.4 million Europeans
aged 20 years or over
suffered an ischaemic
or haemorrhagic stroke.*

QUICK FACTS

- Stroke prevalence and mortality is reducing in Europe.
- The European Commission has estimated that stroke cost EU health care systems €39 billion in 2015.
- According to Stroke Alliance for Europe, the costs of stroke will rise by 44% between 2017 and 2040, with some countries seeing a rise of nearly 100%.
- Trans fat intake in the Baltic and eastern European states remains high and is a major risk factor for stroke.

5-YEAR TARGETS

Top 5-year targets for action

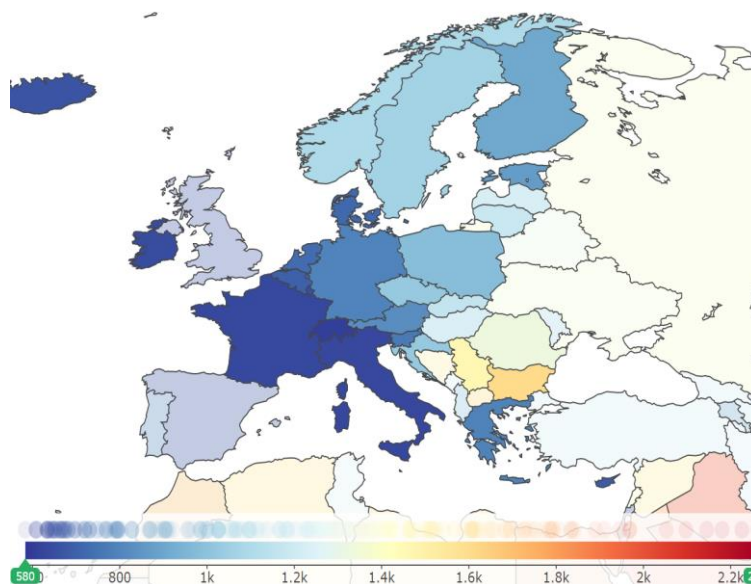
- Develop strategy for reducing of trans fat intake in Baltic and eastern European member states.
- Emphasise the continuing need for healthy diets, exercise and blood pressure control.

SHORT DESCRIPTION

Stroke occurs due to a decrease in blood supply to the brain resulting from a blockage of the carotid arteries (ischaemic) or when a blood vessel in the brain bursts (haemorrhagic). Blockages typically form in areas where the arteries have been narrowed over time by fatty deposits known as atherosclerotic plaques which can lead to thrombosis (blood clot). Stroke sits within the umbrella term of cardiovascular disease, of which there are many conditions.

One of the most significant risk factors for stroke is high blood pressure. The availability and consumption of a Westernised diet, adoption of a sedentary lifestyle that leads to obesity, and advancing age in the population are factors associated with the predicted increase in the prevalence of hypertension worldwide.

Prevalence of stroke (per 100,000, 2019, both sexes, age-standardized)



Top 5 European countries with highest stroke prevalence rates in 2019:

- Bulgaria
- Serbia
- Romania
- Hungary
- Latvia

A 34% increase in total number of stroke events in the EU between 2015 and 2035 is predicted.

IMPACT FACTORS

- Unhealthy diet
- Smoking
- Physical inactivity
- Excessive alcohol consumption
- Family history of cardiovascular disease
- High blood pressure
- Being overweight or obese
- High blood cholesterol levels
- Increasing age
- Sex
- Ethnicity

Treatment and prevention of stroke include lifestyle changes. Diet is known as one of the most important modifiable factors in the prevention and risk reduction of stroke. Diet quality impacts blood pressure, body weight and blood cholesterol levels. In line with this, a review by Rees *et al.* estimated that dietary interventions can reduce stroke risk by 19%.

INFLUENCE OF NUTRITION

Fruits and vegetables

Consumption of more than five servings of fruits and vegetables per day has been associated with lower stroke risk compared to consumption of less than three servings.

Red and processed meat

High consumption of red and processed meat was associated with increased stroke risk.

Nutrients

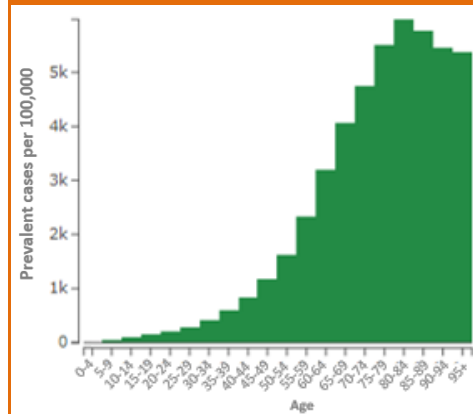
Supplementation of some antioxidant vitamins can prevent stroke. Similarly, higher potassium consumption was associated with reduced risk of stroke and reduced blood pressure. Although the appropriate potassium intake is unknown, 4.7 grams (or 120 mmol) of potassium per day has been suggested. Another key nutrient related to risk from stroke is dietary fibre with an estimated increase of 7 g/day associated with decreased stroke risk. Evidence also exists for the association between excess salt (sodium) intake and a greater incidence of stroke with intervention studies, such as the DASH diet (a dietary approach to help treat or prevent high blood pressure), showing significant reduction in blood pressure the greatest risk factor for stroke. Evidence suggests that there is a positive association between fish consumption and stroke prevention.

Other dietary factors

According to a systematic review by Sherzai *et al.* adherence to both a DASH or Mediterranean diet is associated with a reduced risk, whereas a Western diet is associated with increased stroke risk.

There is also increasing evidence that consumption of three or more cups of black/green tea a day compared with less than a cup/day is associated with lower stroke risk. Furthermore, in The Nurses' Health Study, higher consumption of sugar-sweetened and low-calorie drinks were associated with higher stroke risk. It is also known that some milk proteins, whey protein in particular, can lead to a reduction in blood pressure, a benefit since high blood pressure is a major risk factor for stroke.

AGE GROUPS



Stroke prevalence at different ages (European region, both sexes, 2019)

SEX

Men are more likely to develop stroke at an earlier age than women.

SELECTED REFERENCES

- Bjelakovic G, Nikolova D, Gluud LL, Simonetti RG, Gluud C. Mortality in randomized trials of antioxidant supplements for primary and secondary prevention: systematic review and meta-analysis. *Jama*. 2007;297(8):842-57.
- Chowdhury R, Stevens S, Gorman D, Pan A, Warnakula S, Chowdhury S, Ward H, Johnson L, Crowe F, Hu FB, et al. Association between fish consumption, long chain omega 3 fatty acids, and risk of cerebrovascular disease: systematic review and meta-analysis. *BMJ : British Medical Journal*. 2012;345:e6698.
- Frohlich ED. The salt conundrum: a hypothesis. *Hypertension*. 2007;50(1):161-6.
- Hooper L, Kroon PA, Rimm EB, Cohn JS, Harvey I, Le Cornu KA, Ryder JJ, Hall WL, Cassidy A. Flavonoids, flavonoid-rich foods, and cardiovascular risk: a meta-analysis of randomized controlled trials. *Am J Clin Nutr*. 2008;88(1):38-50.
- Rees K, Dyakova M, Ward K, Thorogood M, Brunner E. Dietary advice for reducing cardiovascular risk. *Cochrane Database Syst Rev* 2013, Issue 3. Art. No.: CD002128.
- Sauvaget C, Nagano J, Allen N, Kodama K. Vegetable and fruit intake and stroke mortality in the Hiroshima/Nagasaki Life Span Study. *Stroke*. 2003;34(10):2355-60.
- Sherzai A, Heim LT, Boothby C, Sherzai AD. Stroke, food groups, and dietary patterns: a systematic review. *Nutr Rev*. 2012;70(8):423-35.
- Threapleton DE, Greenwood DC, Evans CEL, Cleghorn CL, Nykjaer C, Woodhead C, Cade JE, Gale CP, Burley VJ. Dietary Fiber Intake and Risk of First Stroke. *Stroke*. 2013;44(5):1360-8.
- The Burden of Stroke in Europe Report, <https://www.safestroke.eu/burden-of-stroke/>

Figures were created using *Global Burden of Disease data*. <https://www.healthdata.org/gbd/2019>

HEART DISEASE



Heart disease is the narrowing of coronary arteries (that supply heart muscle with oxygen) by a build-up of fatty material within their walls. It accounts for 20% of all mortality in Europe.

QUICK FACTS

- The European Commission estimated that heart disease cost health care systems €37bn in 2015.
- Indirect costs (e.g. productivity losses and costs of home care) were estimated to be €80m for heart disease in 2015.
- Trans fat intake in the Baltic and eastern European states remains high and is a major risk factor for heart and vascular diseases.

5-YEAR TARGETS

Top 5-year targets for action

- Develop strategy for reducing of trans fat intake in Baltic and eastern European member states.
- Emphasise the continuing need for healthy diets and exercise.
- Ensure that sound dietary advice is readily available to all across Europe.

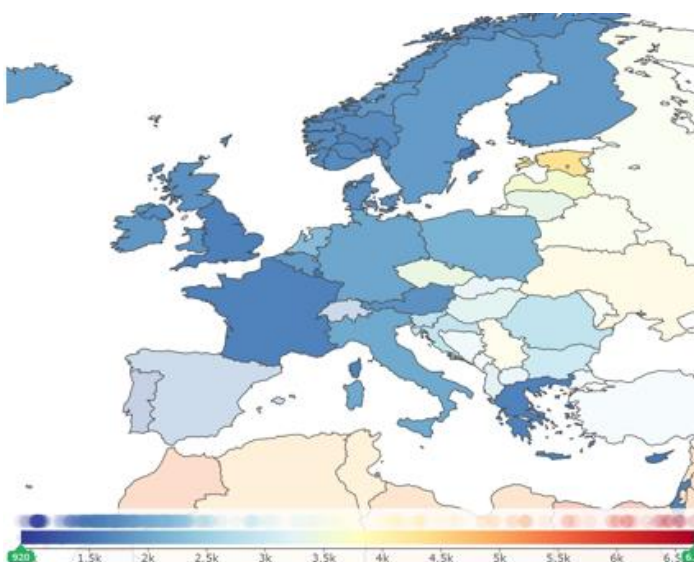
SHORT DESCRIPTION

Heart disease describes the narrowing or complete blockage of the coronary arteries due to atherosclerotic plaques, caused by a build-up of cholesterol and other fats within and on the surface of arteries. This can lead to heart attack. Heart disease sits within the umbrella term of cardiovascular disease, of which there are many conditions. Cardiovascular disease is a general term given to the group of conditions affecting the heart or blood vessels.

Living a healthy lifestyle can help lower the risk of developing heart disease. The promotion of healthy foods, physical activity and the control of ambient and indoor pollution can help to prevent heart disease.

At the individual level, identification of people at high risk and guideline-driven management of hypertension, cholesterol, and diabetes is required.

Prevalence in heart disease (per 100,000, 2019, both sexes, age-standardised)



The prevalence trends for heart disease are broadly downward but with a large variation between countries with Estonia being consistently higher than other European countries.

Top 5 European countries with highest heart disease prevalence rates in 2019 are:

- Estonia
- Serbia
- Latvia
- Czechia
- Lithuania

IMPACT FACTORS

- Increasing age
- Unhealthy diet
- Physical inactivity
- Excessive alcohol consumption
- Family history of cardiovascular disease
- Smoking
- High blood pressure
- Sex
- Ethnicity
- Being overweight or obese
- High blood cholesterol levels

Treatment and prevention of heart disease include lifestyle changes. Diet is known as one of the most important modifiable factors in the prevention and risk reduction of heart diseases.

INFLUENCE OF NUTRITION

Analysis of 27 years of data from global burden of disease database covering 137 countries showed that the Mediterranean diet (high in vegetables, fruits, pulses, fish and unsaturated fats) may have a preventative effect on heart disease. Similarly following the DASH diet (Dietary Approaches to Stop Hypertension) was found to reduce heart disease incidence.

Fruit and vegetables

In relation to food groups, the most consistent evidence is available for fruit and vegetable intakes and heart disease risk. In the EPIC study, higher intakes of fruit and vegetables were associated with lower risk of heart disease.

Whole grains

Hu *et al.* reported that higher consumption of whole grains were significantly associated with lower heart disease risk.

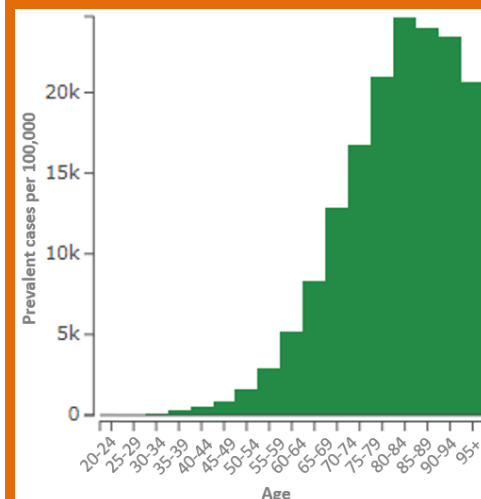
Dietary fats

The Seven Countries Study, performed in the 1950's, was the first to illustrate the associations between dietary fats and heart disease incidence. The study reported a strong positive relationships between heart disease mortality and intake of saturated fatty acids, dietary cholesterol and latterly industrial trans fatty acids.

Other dietary factors

Some antioxidant vitamins were also shown to be associated with lower heart disease risk. In terms of alcohol consumption, most meta-analyses show a J-shaped relationship between average alcohol consumption and ischaemic heart disease with lifetime abstainers showing a higher risk compared to current 'moderate' drinkers and then an increase of the risk curve to similar or higher risks compared to those seen for heavier drinkers.

AGE GROUPS



AD and other dementias prevalence at different ages (European region, both sexes, 2019)

SEX

Men are more likely to develop heart disease at an earlier age than women.

At EU level, death rates was higher in men compared with women, with 1 625 deaths per million men compared to 881 deaths per million women in 2016.

SELECTED REFERENCES

- Chiavaroli L, Vigiuliuok E, Nishi SK, Blanco Mejia S, Rahelić D, Kahleová H, Salas-Salvadó J, Kendall CW, Sievenpiper JL. DASH Dietary Pattern and Cardiometabolic Outcomes: An Umbrella Review of Systematic Reviews and Meta-Analyses. *Nutrients*. 2019;11(2).
Data-Health-Eurostat (europa.eu)
Hu Y, Willett WC, Manson JAE, Rosner B, Hu FB, Sun Q. Intake of whole grain foods and risk of coronary heart disease in US men and women. *BMC Med*. 2022;20(1):192.
Kromhout D, Menotti A, Bloemberg B, Aravanis C, Blackburn H, Buzina R, Dontas AS, Fidanza F, Giampaoli S, Jansen A, et al. Dietary saturated and trans fatty acids and cholesterol and 25-year mortality from coronary heart disease: the Seven Countries Study. *Prev Med*. 1995;24(3):308-15.
Perez-Cornago A, Crowe FL, Appleby PN, Bradbury KE, Wood AM, Jakobsen MU, Johnson L, Sacerdote C, Steur M, Weiderpass E, et al. Plant foods, dietary fibre and risk of ischaemic heart disease in the European Prospective Investigation into Cancer and Nutrition (EPIC) cohort. *International journal of epidemiology*. 2020;50(1):212-22.
Sezaki A, Imai T, Miyamoto K, Kawase F, Shirai Y, Abe C, Sanada M, Inden A, Kato T, Suzuki N, et al. Global relationship between Mediterranean diet and the incidence and mortality of ischaemic heart disease. *European Journal of Public Health*. 2021;31(3):608-12.

Figures were created using *Global Burden of Disease* data. <https://www.healthdata.org/gbd/2019>

TYPE 2 DIABETES MELLITUS



Type 2 diabetes mellitus contributes to ~90-95% of all diabetes in high-income countries. It is mainly characterised by the body's ineffective use of insulin (insulin resistance).

QUICK FACTS

- Type 2 diabetes is largely preventable and can often be managed through exercise and diet. However, oral drugs are often needed as well as insulin in some cases.
- Type 2 diabetes has relatively low direct mortality rate but it substantially increases the risk of cardiovascular diseases and related morbidity and mortality.

5-YEAR TARGETS

Top 5-year targets for action

- Assess the reasons for the wide variation in prevalence between countries.
- Emphasise the continuing need for exercise, and diets containing whole grains and other low GI carbohydrates and yoghurt.
- Reduction of total energy intake with minimum sugar consumption.
- Ensure that sound dietary advice is readily available to all across Europe.

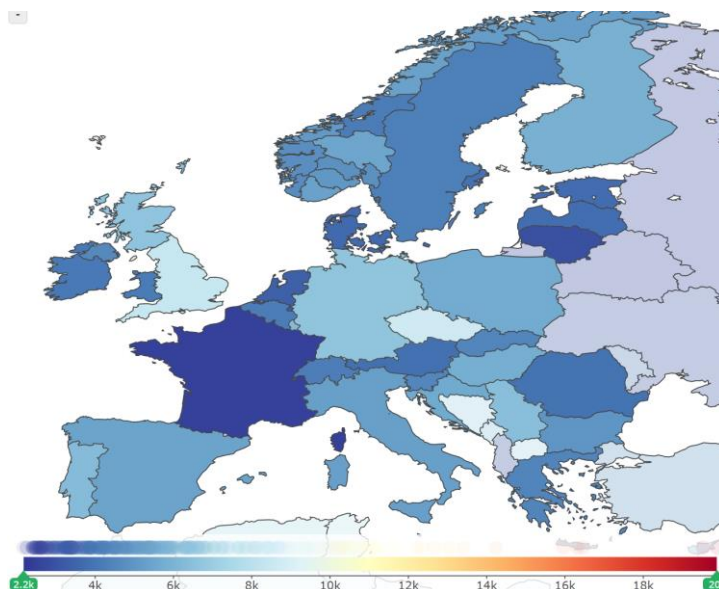
SHORT DESCRIPTION

Type 2 diabetes mellitus (T2DM) is the most prevalent form of diabetes. It is a complex and chronic illness, characterised by high levels of blood glucose, insulin resistance and relative insulin deficiency that can cause cardiovascular complications and mortality.

Most, but not all patients with type 2 diabetes are overweight or obese. It was demonstrated that providing individuals with education to be critical and effective to prevent acute complications and reduce the risk of long-term complications.

Diet plays an integral role in overall diabetes management. People with diabetes should be actively engaged in education, self-management, and treatment planning with a health care team, including the collaborative development of a personalised dietary plan.

Prevalence in Type 2 diabetes mellitus (per 100,000, 2019, both sexes, age-standardised)



The prevalence of type 2 diabetes has increased substantially in most European countries over the last 30 years.

Two European countries with highest type 2 diabetes prevalence in 2019 are:

- England
- Czechia

Two European countries with lowest type 2 diabetes prevalence in 2019 are:

- France
- Lithuania

IMPACT FACTORS

- Metabolic syndrome
- Family history of diabetes
- Overweight/obesity
- High blood pressure
- Unhealthy diet
- Physical inactivity
- History of gestational diabetes
- Smoking
- Poor nutrition during pregnancy
- Pollution
- Ethnicity
- Increasing age

Studies from different parts of the world agree that lifestyle modification with physical activity and/or healthy diet can delay or prevent the onset of type 2 diabetes. International Diabetes Federation recommends physical activity between three to five days a week, for a minimum of 30-45 minutes.

INFLUENCE OF NUTRITION

There is no ideal dietary pattern for people with diabetes. However, low carbohydrate diets have been identified as particularly appropriate for people with this disease. Mediterranean-style eating pattern which is rich in monounsaturated and polyunsaturated fats, such as oily fish, as well as pulses, nuts and seeds are recommended to prevent type 2 diabetes.

Fruits, vegetables and whole grains

An increased intake of whole grains, yellow and green leafy vegetables, whole fruits such as berries, apples and pears can reduce type 2 diabetes incidence. Processed grains such as white rice have been associated with an increased type 2 diabetes incidence.

Dairy products

Consumption of yogurt and other dairy products has been shown to be beneficial to reduce type 2 diabetes incidence.

Red and processed meat

A high intake of red or processed meat is associated with an increased incidence of type 2 diabetes.

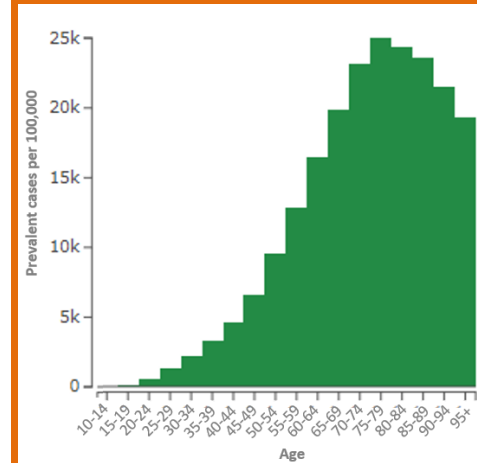
Other dietary factors

Inverse associations between total fibre, total polyphenols, calcium, catechin, phenolic acids, caffeine, anthocyanins, haem iron, vitamins C and E with the incidence of type 2 diabetes is evident in the literature. High intake of alcohol and high levels of sugar or artificially sweetened beverages were also associated with type 2 diabetes incidence. An inverse association between caffeinated coffee, decaffeinated coffee and the incidence of type 2 diabetes mellitus was reported.

In general, meal plans should be personalised while keeping the reduction of total energy and the pre-defined metabolic goals in mind. General recommendations are the consumption of nutrient-dense carbohydrate foods that are high in fibre and whole grains, non-starchy vegetables, fruits as well as dairy products with minimal or no added sugars. Protein intake be tailored to the people's needs.

AGE GROUPS

Type 2 diabetes mellitus becomes very common in patients over 50 years old, due to rising levels of obesity, physical inactivity and poor diet.



Type 2 diabetes mellitus prevalence at different ages (European region, both sexes, 2019)

GENDER

Although women have higher type 2 diabetes mellitus, prevalence rates in young age, men aged 35-54 are nearly twice as likely to have diabetes.

SELECTED REFERENCES

- Bloomfield HE, Koeller E, Greer N, MacDonald R, Kane R, Wilt TJ. Effects on health outcomes of a Mediterranean Diet with no restriction on fat intake: a systematic review and meta-analysis. *Ann Intern Med* 2016;165:491-500
- Briggs Early K, Stanley K. Position of the Academy of Nutrition and Dietetics: the role of medical nutrition therapy and registered dietitian nutritionists in the prevention and treatment of prediabetes and type 2 diabetes. *J Acad Nutr Diet* 2018;118:343-353.
- Estruch R, Ros E, Salas-Salvad o J, et al.; PREDIMED Study Investigators. Primary prevention of cardiovascular disease with a Mediterranean diet supplemented with extravirgin olive oil or nuts. *N Engl JMed* 2018;378:e34.
- Standard of Medical care in diabetes – 2022, *Diabetes Care*, January 2022 Volume 45, Supplement 1130-158-159-160-161-----166, 167, 168, 118-119-120-121-153.
- Wang DD, Li Y, Chiuve SE, et al. Association of specific dietary fats with total and causespecific mortality. *JAMA Intern Med* 2016;176:1134-1145.

Figures were created using *Global Burden of Disease* data. <https://www.healthdata.org/gbd/2019>

ALZHEIMER'S DISEASE



Alzheimer's disease is a type of neurological disorder. Alzheimer's disease is the 3rd most common cause of death in Europe.

QUICK FACTS

- Neurological disorders are the 3rd largest cause of death (6.7%) of which ~90% is Alzheimer's disease.
- Alzheimer's disease prevalence is fairly stable overall across Europe, however the numbers of healthy years lost due to ill-health, disability or premature death is increasing.

5-YEAR TARGETS

Top 5-year targets for action

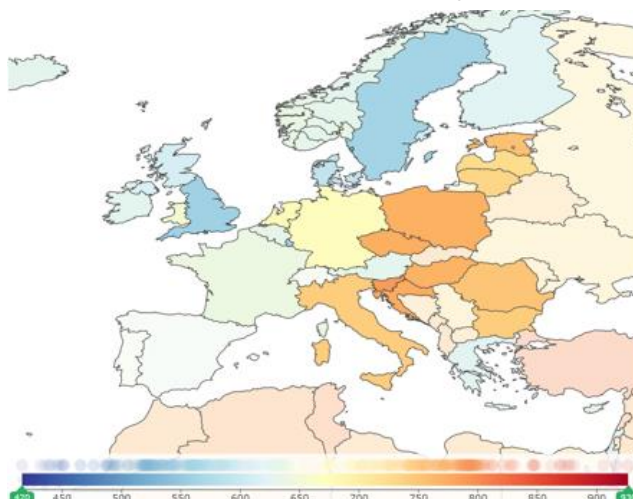
- Investigate the reasons for the higher prevalence in the five countries identified.
- Obtain a better understanding of the role of diet in dementia development and prevention.
- Assess interactions between diet and other lifestyle choices (e.g. smoking, alcohol consumption).
- Depending on the above, introduce measures to reduce prevalence across Europe.

SHORT DESCRIPTION

Alzheimer's disease is a progressive neurologic disease that is caused by damage to nerve cells (neurons) in the brain and affects behaviour and memory. While the terms Alzheimer's disease and dementia are used interchangeably, Alzheimer's disease is the most common type of dementia, which is a general term for symptoms that impact memory and performance of daily activities. Cognitive impairment is a typical feature of Alzheimer's disease and that is associated with reduced quality of life, increased risk of hospitalisation, inability to live independently, and increased health care costs. Therefore, identification of modifiable risk factors for prevention and delay of cognitive decline is of increasing importance.

There is a growing body of research and interest in the relationship between diet and cognitive function. Several studies have identified diets and/or nutrients associated with reduced risk of cognitive impairment and decline. Preventing or delaying the onset or progression of dementia through dietary interventions could have a significant impact on public health.

Prevalence in Alzheimer's disease and dementia (per 100,000, 2019, both sexes, age-standardized)



Top 5 European countries with highest Alzheimer's disease prevalence rates in 2019

- Slovenia
- Croatia
- Czechia
- Poland
- Hungary

In Switzerland, UK, Malta, Iceland, Ireland, Poland, and Austria, the prevalence rate has not changed substantially between 1990 and 2019.

IMPACT FACTORS

- High blood pressure
- Unhealthy diet
- Physical inactivity
- Genetic predisposition
- Family history of Alzheimer's disease
- Excess alcohol consumption
- Smoking

Alzheimer's disease is one of the most common neurological disease in the elderly population. Since there is still no cure for this disease, there is a demand for other effective strategies such as dietary interventions.

INFLUENCE OF NUTRITION

Dietary factors may mitigate the risk of developing Alzheimer's disease, specifically the consumption of healthy foods.

Fruits and vegetables

Reducing the risk of developing Alzheimer's disease is associated with consuming a diet high in fruits and vegetables. Similarly, adherence to a Mediterranean diet, also high in fruits and vegetables, was reported to reduce the risk of Alzheimer's disease. This is supported by the findings from several other systematic reviews all of which indicate an association between either the Mediterranean diet or a fruit and vegetable-rich diet and lower risk of Alzheimer's disease.

More generally, recent evidence indicates that higher fruit and vegetable consumption is associated with a lower risk of developing dementia, similar to Alzheimer's disease. This is also supported by systematic reviews indicating that fruit and vegetables and the Mediterranean diet can reduce the likelihood of developing dementia.

Dairy products

Recent studies have suggested that consumption of dairy products may reduce the cognitive decline risk in older adults.

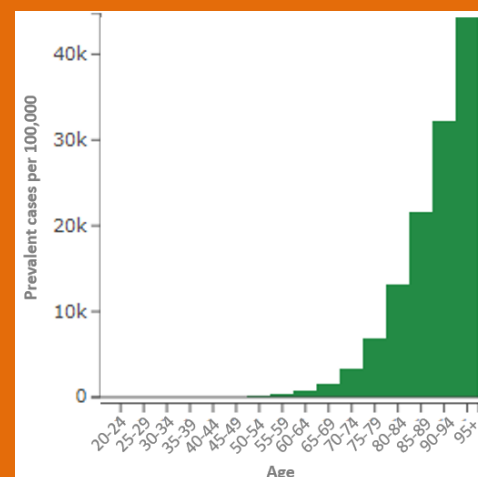
Processed meat

Processed meat intake has been reported to be a potential risk factor for incident dementia. Each additional 25 g/day intake was estimated to increase risks of all-cause dementia in a study by Zhang et al. (2021).

Interestingly, there is also recent evidence that other dietary interventions (e.g., a high fat, low carbohydrate diet) may help the ongoing management of the disease and the associated symptoms for those already diagnosed with Alzheimer's disease.

In summary, the scientific evidence points to the suggestion that diet is a modifiable risk factor for the development of neurological conditions such as Alzheimer's disease and other dementias.

AGE GROUPS



Alzheimer's disease and other dementias prevalence at different ages (European region, both sexes, 2019)

SEX

Nearly two-thirds of diagnosed cases of dementia and Alzheimer's are women. 65% of total deaths due to dementia are women.

SELECTED REFERENCES

- Chu, C. Q., Yu, L. L., Qi, G. Y., Mi, Y. S., Wu, W. Q., Lee, Y. K., & Chen, W. (2022). Can dietary patterns prevent cognitive impairment and reduce Alzheimer's disease risk: exploring the underlying mechanisms of effects. *Neuroscience & Biobehavioral Reviews*, 104556.
- García-Casares, N., Gallego Fuentes, P., Barbancho, M. Á., López-Gigoso, R., García-Rodríguez, A., & Gutiérrez-Bedmar, M. (2021). Alzheimer's Disease, Mild Cognitive Impairment and Mediterranean Diet. A Systematic Review and Dose-Response Meta-Analysis. *Journal of Clinical Medicine*, 10(20), 4642.
- Hartman, R. E., & Ross, D. M. (2018). Effects and mechanisms of actions of phytochemicals on Alzheimer's disease neuropathology. *Frontiers in Bioscience-Elite*, 10(2), 300-333.
- Hersant, H., & Grossberg, G. (2022). The Ketogenic Diet and Alzheimer's Disease. *The Journal of Nutrition, Health & Aging*, 1-9.
- Kępka, A., Ochocińska, A., Borzym-Kluczyk, M., Chojnowska, S., Skorupa, E., Przychodzeń, M., & Waszkiewicz, N. (2022). Healthy Food Pyramid as Well as Physical and Mental Activity in the Prevention of Alzheimer's Disease. *Nutrients*, 14(8), 1534.
- Khan, H., Ullah, H., Aschner, M., Cheang, W. S., & Akkol, E. K. (2019). Neuroprotective Effects of Quercetin in Alzheimer's Disease. *Biomolecules*, 10(1), 59.
- Román, G. C., Jackson, R. E., Gadhia, R., Román, A. N., & Reis, J. (2019). Mediterranean diet: The role of long-chain ω -3 fatty acids in fish; polyphenols in fruits, vegetables, cereals, coffee, tea, cacao and wine; probiotics and vitamins in prevention of stroke, age-related cognitive decline, and Alzheimer disease. *Revue Neurologique*, 175(10), 724-741.
- Rusek, M., Pluta, R., Ułamek-Kozioł, M., & Czuczwar, S. J. (2019). Ketogenic diet in Alzheimer's disease. *International Journal of Molecular Sciences*, 20(16), 3892.
- Samadi, M., Moradi, S., Moradinazar, M., Mostafai, R., & Pasdar, Y. (2019). Dietary pattern in relation to the risk of Alzheimer's disease: a systematic review. *Neurological Sciences*, 40(10), 2031-2043.
- Silva, M. V. F., Loures, C. D. M. G., Alves, L. C. V., de Souza, L. C., Borges, K. B. G., & Carvalho, M. D. G. (2019). Alzheimer's disease: risk factors and potentially protective measures. *Journal of Biomedical Science*, 26(1), 1-11.
- WHO dementia factsheet. <https://www.who.int/news-room/fact-sheets/detail/dementia>.
- Wu, L., Sun, D., & Tan, Y. (2017). Intake of fruit and vegetables and the incident risk of cognitive disorders: a systematic review and meta-analysis of cohort studies. *The Journal of Nutrition, Health & Aging*, 21(10), 1284-1290.
- Zang, H., Greenwood, D.C., Risch, H.A., Bunce, D., Hardie, L.J., & Cade, J.E. (2021). Meat consumption and risk of dementia: cohort study of 493,888 UK Biobank participants. *American Journal of Clinical Nutrition*, 114, 175-184.

Figures were created using Global Burden of Disease data. <https://www.healthdata.org/gbd/2019>