European Journal of Public Health Studies
ISSN: 2668 - 1056
ISSN-L:2668 - 1056
Available on-line at: www.oapub.org/hlt

DOI: 10.46827/ejphs.v9i1.252 Volume 9 | Issue 1 | 2026

PRIMARY PREVENTION OF ARDIOVASCULAR DISEASES WITH SPECIAL REGARD TO YOUNG PEOPLE: ONLINE EDUCATIONAL AND INFORMATIVE RESOURCES

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Abstract:
This paper presents online informative and educational documents downloadable for free on the prevention of cardiovascular diseases. The number of deaths from cardiovascular diseases per 100,000 people ranges between 512.9 in Uzbekistan and 60.4 in South Korea, which suggests the potential for improvement, thanks to public health efforts and education. The article pays special attention to young people; in fact, a healthy lifestyle with physical activity and a well-balanced diet is easier to acquire at a young age and then easier to maintain into adulthood. The documents presented hereafter discuss the mechanisms by which elevated blood pressure, high levels of lipids and sugar in the blood, obesity, tobacco and alcohol use increase our risk of cardiovascular diseases, and what we can do to mitigate the risk. Some countries, thanks to increased tobacco tax, have reduced their consumption among young people in particular, with the related earmarked money used to promote sport activities. A pack of cigarettes in Australia may cost nearly 26 US$. A lifestyle aimed at cardiovascular prevention often reduces the risk of other diseases, including cancer. The quality of life is largely the result of environmental and societal conditions; poor urban planning, for instance, may limit the safe and easy mobility of people and the availability of healthy, affordable food. Worldwide, insufficient physical activity is responsible for more than 5 million deaths per year across all age groups. Globally, 80% of adolescents do not meet the recommended level of physical activity; a long time spent glued to the screen is associated with sedentary behaviour, higher intake of ultra-processed unhealthy food, and reduced scholastic achievement. Clearly, school education and parental example are of the utmost importance.

Keywords: online educational resources, cardiovascular prevention, young people, healthy lifestyle

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Resumen:
Este artículo presenta documentos informativos y educativos en línea, que se pueden descargar de forma gratuita, sobre la prevención de enfermedades cardiovasculares. El número de muertes por enfermedades cardiovasculares por cada 100 000 personas oscila entre 512,9 en Uzbekistán y 60,4 en Corea del Sur. Esto sugiere que existe un potencial de mejora, gracias a los esfuerzos en materia de salud pública y educación. El artículo presta especial atención a los jóvenes; de hecho, un estilo de vida saludable con actividad física y una dieta bien equilibrada, es más fácil de adquirir a una edad temprana y, por lo tanto, más fácil de mantener en la edad adulta. Los documentos que se presentan analizan los mecanismos por los cuales la presión arterial elevada, los niveles elevados de lípidos y azúcar en la sangre, la obesidad, el consumo de tabaco y alcohol aumentan nuestro riesgo de enfermedades cardiovasculares y qué podemos hacer para mitigar dicho riesgo. Algunos países, gracias al aumento de los impuestos al tabaco, redujeron su consumo, sobre todo entre los jóvenes, y el dinero recaudado se ha destinado a promover actividades deportivas. Un paquete de cigarrillos en Australia cuesta casi 26 dólares estadounidenses. Un estilo de vida orientado a la prevención cardiovascular a menudo reduce el riesgo de otras enfermedades, incluido el cáncer. La calidad de vida depende en gran medida de las condiciones ambientales y sociales; por ejemplo, una mala planificación urbana puede limitar la movilidad segura y fácil de las personas, así como la disponibilidad de alimentos saludables y asequibles. A nivel mundial, la falta de actividad física es responsable de más de 5 millones de muertes al año en todos los grupos de edad. A nivel mundial, el 80 % de los adolescentes no alcanza el nivel recomendado de actividad física; pasar mucho tiempo pegado a la pantalla se asocia con un comportamiento sedentario, una mayor ingesta de alimentos ultraprocesados poco saludables y un menor rendimiento escolar. Es evidente que la educación escolar y el ejemplo de los padres son de suma importancia.

Palabras clave: recursos educativos en línea, prevención cardiovascular, jóvenes, estilo de vida saludable

Riassunto:
Questo documento presenta una serie di documenti informativi ed educativi, scaricabili gratuitamente online, sulla prevenzione delle malattie cardiovascolari. Il numero di decessi per malattie cardiovascolari ogni 100.000 persone varia da 512,9 in Uzbekistan a 60,4 in Corea del Sud. Ciò suggerisce il potenziale di miglioramento ottenibile grazie ad impegni nel campo della sanità pubblica e dell'educazione. L'articolo presta particolare attenzione ai giovani; infatti, uno stile di vita sano, con attività fisica e dieta equilibrata, è più facile da acquisire in giovane età e poi da mantenere in età adulta. I documenti presentati trattano i meccanismi attraverso i quali ipertensione, livelli elevati di lipidi e zuccheri nel sangue, obesità, consumo di tabacco e alcol aumentano il rischio di malattie cardiovascolari, nonchè ciò che possiamo fare per mitigarlo. Alcuni paesi, grazie all'aumento delle tasse sul tabacco, ne hanno ridotto il consumo, in particolare tra i

giovani, ed utilizzano i fondi così raccolti per promuovere attività sportive. Un pacchetto di sigarette in Australia costa quasi 26 dollari USA. Uno stile di vita mirato alla prevenzione cardiovascolare spesso riduce anche il rischio di altre malattie, compreso il cancro. La qualità della vita è in gran parte il risultato delle condizioni ambientali e sociali; povertà e cattiva pianificazione urbana, ad esempio, possono limitare una mobilità sicura e facile delle persone, nonchè la disponibilità di alimenti sani ed a prezzi accessibili. In tutto il mondo, l'insufficiente attività fisica è responsabile di oltre 5 milioni di decessi all'anno in tutte le fasce d'età. A livello globale, l'80% degli adolescenti non pratica la quantità raccomandata di attività fisica. Il tempo trascorso davanti allo schermo è associato a comportamenti sedentari, maggiore consumo di alimenti ultra-trasformati poco salutari, nonché un rendimento scolastico ridotto. Chiaramente, l'educazione scolastica e l'esempio dei genitori sono di fondamentale importanza.

Parole chiave: risorse educative online, prevenzione cardiovascolare, giovani, stile di vita sano

1. Aims of the Teaching Unit

The article is aimed at increasing knowledge and awareness of the possibilities of preventing cardiovascular diseases, and of the importance of adopting healthy behaviours from childhood. The article is intended as an introduction to a deeper study.

2. Materials and Methods

The article presents educational and educative resources that consist of text, graphs, images, tables, videos and animations downloadable for free from the internet. These resources can be used by the teacher using the method felt as most appropriate. The article is exclusively based on documents quoted in the paper.

3. Introduction

A video provides basic information on the circulation of blood, so important in supplying our tissues with oxygen (1).

"Cardiovascular Disease" is a UK document that describes the main types of cardiovascular (CV) diseases. The blood supply can be reduced or blocked in, e.g. the coronaries, or the brain, the peripheral arteries, or the aorta. The consequences of blood flow alterations in these different locations are also different, as described in the document (2). More information on the subject is provided by a document of the American Heart Association (3).

In a document of Our World in Data, an animated diagram reports the number of deaths from CV diseases, increased from 14.12 to 19.21 million between 2000 and 2021 (4). The increasing prevalence of obesity and diabetes, with growing and aging

populations are contributing to the global rise of CV diseases. In 2019, they constituted the first cause of death, with 33% of victims (4> Cardiovascular diseases are the most common cause of death worldwide). *Death rates, however, have fallen in countries where prevention and treatment have improved*.

An interactive map shows the number of deaths from CV diseases per 100,000 people; we can observe a value of 60.4 for South Korea and 512.9 for Uzbekistan. The large disparities between countries suggest the potential in reducing the impact of CV diseases, thanks to education and public health efforts (4> Death rate from cardiovascular diseases).

According to a global report of the Institute for Health Metrics and Evaluation, CV diseases constitute the leading cause of disability (5). In 2023, they caused 437 million disability-adjusted life years, also called DALYs. The disparities in the rate between countries remain enormous, with the highest rates 16 times higher than the lowest. The document contains the link to the complete report (5> Global Burden of Disease Study special report).

4. Risk Factors of CV Diseases

4.1 Hypertension

According to "Effects of High Blood Pressure on Your Body", the stress that high blood pressure (BP) puts on the heart and arteries may cause tears in the inside walls of the arteries; here, fatty bits may get caught and accumulate. This results in a reduction or even a blockage of the blood flow, which may affect the functions of our body (6). The document outlines what happens when, e.g., the heart, or brain, or eyes, or kidney, or the genitals do not receive the required blood supply.

"Health Threats from High Blood Pressure" is a document of the American Heart Association that, besides providing text on the subject, contains an infographic on the consequences of high BP. The document also provides images and animations that may help to learn more (7), and tips aimed at self-protection from high BP.

"High blood pressure (hypertension)" provides more information on the many factors, sometimes unexpected, that may influence BP, e.g. medication and supplements or a sudden change in weather patterns (9).

Although high temperatures typically cause vasodilation and lower BP, in older adults and individuals with CV diseases, this response can even be reversed when high nocturnal temperatures occur (19).

A document of the National Heart, Lung and Blood Institute provides more information on BP, e.g. influence of ethnicity, pregnancy, certain medicines and medical conditions, and of stressors on the job (8).

"The Impact of Bladder Distension on Blood Pressure in Middle-Aged Women" deals with the influence of holding urine on BP (10).

Even short-term ascents beyond 2500 metres above sea level have been associated with a raise in BP (19).

Exercise is beneficial for BP, but during exercise, there is a temporary physiological rise in BP, which then lowers as we stop the activity. "Exercise and blood pressure", a document of the National Heart Foundation of New Zealand, helps find out which exercises are best for hypertensives, and those that should be avoided. People with high BP would do better to select low-intensity aerobic activities, such as brisk walking, jogging, swimming and cycling. Yoga is generally helpful, providing that the inverted positions, e.g. headstands, are avoided (18). "Extreme sports and activities that imply intense efforts lasting a short time should be avoided by the hypertensive; Valsalva manoeuvre, and even some Pilates poses might be unsafe and talking to the instructor can be useful.

The document provides ideas on how to add more activity into the daily routine (18> physical activity page).

"Environmental Hypertensionology and the Mosaic Theory of Hypertension" is a review article (19) that deals with the impact many environmental factors have on the global burden of hypertension.

"How to accurately measure blood pressure at home" is a document of the American Heart Association that provides text and a video on the subject (11).

4.2 Blood Sugar and Type 2 Diabetes

Hyperglycaemia is common in diabetic people. Over time, untreated chronic hyperglycaemia may cause, inter alia, heart disease, stroke, retinopathy and nephropathy (24).

The sugar coming from the carbohydrates we eat is transported by the blood to all the cells of the body (24). The entry of glucose into the cells is made possible thanks to insulin, a hormone produced by the pancreas. This process, while providing energy to the cells, removes sugar from the blood. But, in type 2 diabetes, the cells cannot absorb glucose because resistant to the amount of insulin that the pancreas can produce, which implies the accumulation of sugar in the blood (25 video).

We also may suffer hyperglycaemia and diabetes when the insulin produced by our pancreas is not enough (24).

Common causes of insulin resistance are, e.g. obesity, excess of visceral fat, physical inactivity, consumption of highly processed, high-carbohydrate foods and saturated fats, and certain medications. However, regular exercise and dietary changes may contribute to a healthy life even with diabetes (24).

Family history and ethnic origin may influence our diabetes risk. *Early diagnoses of diabetes is important to prevent irreversible health complications* (25).

As shown in the graph, eating a certain amount of digestible carbohydrates may cause a rise in blood sugar, whose intensity depends on the Glycaemic Index of what we have eaten. This index is used for ranking foods according to their impact on blood sugar, and may help diabetic people in selecting the most suitable food for glycaemic control (26 video). The consumption of whole-grain bread results in a more limited rise in blood

sugar than in the case of sucrose. In fact, the fibre in this bread slows down the absorption of glucose, which does not happen with sucrose.

The presence of protein, fat and fibre along with carbohydrates lowers the Glycaemic Index of a meal, because their presence slows both digestion and absorption of carbohydrates (27 video / 28 video). According to "The Glycemic Index and Health Outcomes", some studies associate high glycaemic diets with a higher risk for type 2 diabetes, coronary heart disease, and certain cancers.

"How to Avoid Blood Sugar Spikes (Without Reducing Carb Intake)" provides text and graphs on the possibility of mixing foods so as to reduce as much as possible the postprandial glycaemic peaks. A strategy aimed at keeping the blood sugar low implies a minimal use of foods with a high glycaemic index (28 video). *Physical activity also plays an important role in the management of blood sugar*.

Of course, attention should be paid to the amount of carbohydrate contained in our portion sizes, avoiding large portions to keep our sugar level stable (67). In addition, it should be considered that for instance, pasta has more carbohydrates than watermelon; so if we eat the same amount of either of them, pasta has a stronger impact on blood sugar levels.

Ageing implies stiffening of arteries but, in patients with diabetes, this process is accelerated. A less distensible aorta cannot efficiently accommodate the blood volume ejected by the heart, which implies higher systolic BP and risk for CV disease (23).

The stiffening consequent to diabetes is associated to reactions involving glucose, with the formation of advanced glycation end-products involved in the creation of crosslinks on collagen fibrils (21 right part of figure 1). The collagen fibrils constitute highly elastic structures, but their crosslinking disables this function.

A Chinese study has found that diabetes status is strongly linked to an increased risk of arterial stiffness; the adverse effects of this disease, however, are attenuated by a rigorous glycaemic control (22). In fact, when this latter is implemented, the observed hazard ratio of arterial stiffness is 1.264; whereas, when diabetes is uncontrolled, the observed hazard ratio is 1.629.

Sugar may have an additive effect. The first part of a US video (29) shows the increase in portion sizes and caloric content of foods and drinks, with, e.g. French fries grown from 210 to 610 calories and a bagel from 140 to 350. In the meantime, *many highly-processed foods have been created, that can have an addictive effect*. The video also presents the latest research on the addictive effect of sugar and its implications for obesity.

According to papers reviewed in "Children's Sugar-Sweetened Beverage Consumption: Striking Parallels with Substance Use Disorder Symptoms", similar to drug abuse, sugar stimulates dopamine release and meets several criteria for addiction (30). *Children may start consuming caffeinated sugar-sweetened beverages much earlier in life than other addictive substances. This implies the need for an early active participation from parents to address this early occurring consumption*.

According to "How to Break Your Sugar Addiction", we need sugar to live, but *we do not need added sugar*, such as that found in highly processed foods. The document summarises the health benefits of reducing sugar intake, such as improving anxiety and

easing joint pain (31). The long-term consequences of sugar addiction may include a higher risk of Type 2 Diabetes, Obesity, Chronic Inflammation, Heart Disease, and Stroke.

A balanced and nourishing diet, with fruit, vegetables, proteins and high-fibre foods, helps in stabilising our blood sugar and feeling quite full (31). *Exercise reduces the stress hormones, which results in calming sweet cravings. Hydration provides beneficial effects; skipping meals may predispose us to sugar cravings*.

"The Surprising Health Benefits of Dark Chocolate for Diabetes", is a video based on a review study. Besides talking about the subject summarised by the title, the video discusses the design of the quoted studies, their results, strengths and limits (37 video). Professor Kratz, author of the video, provides some tips for a healthy use of dark chocolate in substitution of other cakes to reduce the risk of type 2 diabetes. Again, according to the professor, while dark chocolate improves the sensitivity to insulin in people that are resistant to it, an intake of large amounts of dark chocolate does not necessarily generate more benefits than small quantities.

Although studies on cognitive decline are outside the scope of this article, two studies on the association between hyperglycemia and Alzheimer's dementia risk seem noteworthy. According to "Increased Risk of Alzheimer's Disease with Glycemic Variability: A Systematic Review and Meta-Analysis", fluctuation in glucose levels, in individuals with or without type 2 diabetes, may lead to cognitive decline and risk of Alzheimer disease. The study suggests that managing blood sugar might help reduce the risk of dementia (69).

According to "Disentangling the relationship between glucose, insulin and brain health: A UK Biobank study", a 69% higher Alzheimer's dementia risk has been associated with postprandial hyperglycaemia (70).

4.3 Blood Lipids: Cholesterol and Triglycerides

According to "Cholesterol Good and Bad", cholesterol is an important substance, e.g. for the membrane of our cells and for producing vitamin D and bile. But different types of cholesterol exist, with LDL cholesterol that can stick to the arteries, thus forming a plaque having the potential to block the blood flow. On the contrary, HDL cholesterol removes the cholesterol from the blood and returns it to the liver (33 video). It is important to have cholesterol periodically checked.

According to "Stroke, clogged arteries and atherosclerosis", the fatty material that circulates in the blood may build up somewhere in our arteries, thus restricting the blood flow and increasing the risk of heart attack or stroke (32 video). High BP and smoking can damage some areas of the artery walls, thus predisposing them to the previously mentioned build-up of fatty material. Several factors increase this risk, including high cholesterol levels in the blood. If a fatty deposit ruptures, the blood clot that may form there can block the artery and, if this latter is intended to supply blood to the brain, a stroke may occur (32). Conversely, if the arteries that feed the heart are blocked, the result could be a heart attack (33 video).

A video explains *how to get a favourable situation, with low LDL and high HDL. This includes: a diet low in saturated and trans fats, regular exercise, maintaining a healthy weight, and quitting smoking* (33 video).

Most trans fats are industrially created by adding hydrogen to liquid vegetable oils to make them more solid (34). Trans fats increase the so-called bad cholesterol (LDL), and decrease the good cholesterol (HDL), which results in an increased risk of heart disease, stroke, and type 2 diabetes. Commercially fried foods, processed foods and cakes may contain trans fats. The document of the American Heart Association provides tips to avoid their consumption.

A document of the World Heart Federation deals with the global burden of cholesterol that affects about 39% of adults, and caused 4.4 million deaths in 2019 (35). The situation has improved in high-income Western countries, but the death toll has more than doubled in South Asia and tripled in East Asia.

A high triglyceride level, combined with low HDL cholesterol and high LDL cholesterol, increases our risk of CV disease (35).

Triglycerides, besides coming from the fats we consume, also come from extra calories ingested and not utilised right away by our body, with sugar in particular. Such calories are turned into triglycerides and stored in fat cells, which are then used when the body requires energy. Being overweight, smoking, alcohol abuse, excess of fatty food, and poorly controlled type 2 diabetes are among the factors that can raise our triglyceride level (35 / 36).

Some lifestyle changes may help decrease the triglyceride level: maintaining a healthy weight, practicing physical activity, not smoking, consuming healthy fats in place of saturated fats, and limiting sugar, refined foods and alcohol (36).

4.4 Obesity

Overweight and obesity result from an imbalance of energy intake and energy expenditure. In 2021, *Body Mass Index beyond the recommended limits caused an estimated 3.7 million victims from noncommunicable diseases, such as, diabetes, cancers, CV and chronic respiratory diseases, neurological and digestive disorders.* In children and adolescents, obesity may have adverse consequences on scholastic achievement and quality of life, with stigma, discrimination and bullying compounding the situation. Obesity in childhood often leads to adult obesity and a consequent higher risk of developing non-communicable diseases later in life. According to a World Health Organisation document, worldwide, the lack of appropriate action may cause sanitary costs higher than US$ 18 trillion by 2060. On a global scale, between 1990 and 2022, adult obesity has more than doubled, *while adolescent obesity has quadrupled* (41).

Once considered a typical problem of wealthy countries, overweight is now rising in low- and middle-income countries. Children are exposed to high-fat, high-sugar, high-salt, energy-dense, and micronutrient-poor foods, which often have low cost and low nutrient quality. This food, combined with low levels of physical activity, is resulting in a sharply increased childhood obesity (41). The document deals with preventive

interventions aimed at reducing the risk of developing obesity. They include: *breastfeeding, limiting energy-dense foods and sugar-sweetened beverages, increasing consumption of fruit, vegetables, legumes, whole grains and nuts, quality sleep, limiting screen time, avoiding tobacco and alcohol*. The dietary and physical activity patterns for individual people are largely the result of environmental and societal conditions that greatly constrain personal choices.

The environment may contribute to the development of obesity by restricting the safe and easy mobility of people and limiting the availability of healthy, affordable food. Multifactorial actions are required, such as poverty reduction and quality urban planning; food industry commitment is of the utmost importance (41).

"Obesity and cardiovascular disease: An executive document on pathophysiological and clinical links promoted by the Italian Society of Cardiovascular Prevention (SIPREC)" provides information on the relation between obesity and CV disease (42). According to a study reviewed in this perspective article, a 7% reduction in body weight is linked to a 58% lower diabetes risk. Studies demonstrated a 20-30% increased risk of hypertension for each 5% rise in body weight.

Visceral obesity is linked to increased incidence of myocardial infarction in elderly women, quick progression of coronary calcifications, and increased vulnerability of atherosclerotic plaques. In obese subjects with documented coronary artery disease, increased mortality risk was associated with excess visceral obesity (42).

Cancer is not the focus of this article; however, it seems interesting to quote a document of the National Cancer Institute on the relationship between obesity and cancer. According to the document, the *visceral fat seems more dangerous than subcutaneous fat in determining cancer risk*. An infographic deals with cancers associated with overweight and obesity, e.g. the risks for endometrial and esophageal cancers are respectively 7-5 times higher compared with people whose weight is healthy. *A recent Spanish study reviewed in the document* (43) *has found that overweight and obesity are associated with 18 different types of cancer*. It has been suggested that fat tissue produces excess amounts of estrogen, which is known to cause cancer, e.g., in the breast, endometrium and ovaries.

In addition, many studies have shown obesity as an important determinant in the severity of Covid with a linear relationship between higher Body Mass Index and risk of hospitalisation, mortality and intensive care unit admission (42).

Excessive fat accumulation in children may imply a lot of physical and socio-psychological health conditions early in life, and increased morbidity and mortality in adulthood. The Body Mass Index, mostly used to evaluate adiposity, has some limitations as it does not take into account fat and fat-free body mass. In fact, frequent participation in sports activities besides contributing to fat oxidation stimulates muscle development, which increases the fat-free mass and does not always result in a reduced Body Mass Index. The quoted study (71) considers the fat-free body mass estimated from bio-electrical impedance analysis.

4.5 Tobacco Use

"Effects of tobacco on health" is a World Health Organisation document that describes the many adverse effects of smoking. Both cigarettes and e-cigarettes have adverse effects on CV health for both smokers and bystanders (55). The document also discusses the health benefits of quitting; in some cases, the risk can be reduced to that of a person who has never smoked.

As a consequence of nicotine consumption, children and adolescents may suffer adverse long-term impact on brain development, with potential learning and anxiety disorders (55). Even the brain development of a fetus may suffer similar consequences when pregnant women use e-cigarettes.

The content of "Cardiopulmonary Impact of Electronic Cigarettes and Vaping Products: A Scientific Statement From the American Heart Association" is summarised by the title (56).

The graph in figure S4 (61) shows the trends in tobacco consumption and lung cancer mortality rates by sex in the US, from 1900 to 2020. We can observe that the trend of lung cancer incidence closely reflects the prevalence of tobacco consumption, with a lag of a few decades.

According to a document of the National Cancer Institute, tobacco use causes cancer in many sites of the body, e.g. lungs, throat, stomach, kidney, liver, colon, cervix and acute myeloid leukemia (66).

According to a World Health Organisation document, tobacco use causes 8 million deaths annually (57). According to "Raising taxes on tobacco", this *is the single most successful and cost-effective measure aimed at reducing tobacco use and youth initiation*. The young and the low-income people are the most responsive to price increases.

"Countries share examples of how tobacco tax policies create win-wins for development, health and revenues" reports *success stories from countries where increased taxes on tobacco reduced affordability and consumption of cigarettes*. The revenues were earmarked for funding the universal health coverage (59).

According to Annex 1 (58) of "Earmarked tobacco taxes - lessons learnt from nine countries", in the Congo, for instance, half of the specific excise tax is used for health insurance and half for *sports*. Whereas, Madagascar is funding *Promotion and Development of Youth, Sports and Recreation*. In Romania, *part of the exercises is dedicated to health and part to sport*. Other countries dedicate part of the *revenues from taxes on tobacco to young people and sports*. In El Salvador, part of the revenues from *taxes on tobacco, and even from alcohol, firearms, ammunition and explosives, finance a solidarity fund for health*.

A graph shows the 2023 selling price for a pack of cigarettes in selected countries; we can observe that in Australia, the cost is nearly 26 US$ (60).

4.6 Alcohol Abuse

Heavy drinking is a well-established cause of chronic medical conditions. While in the past a consumption not exceeding 1 to 2 drinks a day was hypothesised as conferring a

cardioprotective effect, now, according to recent studies, additional research is needed to reconcile conflicting conclusions (62 /63).

"Alcohol Use and Cardiovascular Disease: A Scientific Statement from the American Heart Association" discusses the relations between alcohol use and: BP, Coronary Artery Disease, Stroke, Arrhythmias, Cardiomyopathy (62). Figure 2 of this 2025 study summarises the relations between CV disease and alcohol intake. *This latter may alter absorption, metabolism and physiological reactions of CV drugs; the effect of alcohol on CV conditions can be intensified when multiple medications are taken*.

According to multiple studies, young adults engaged in binge drinking exhibit early signs of endothelial dysfunction, coronary calcification and arterial stiffness. Binge drinking in adolescence is associated with an increased risk of higher systolic BP in young adulthood. *According to a study involving 32 countries, binge drinking was associated with an odds ratio of 5.44 of ischemic stroke in patients aged ≤45* (62).

"Alcohol And Teens: What Every Parent Needs to Know" (64) is an educational video aimed at increasing parents' preparedness for the dialogue with their children. The video also reminds the legal liability for the consequences of underage drinking.

5. CV Benefits of a Healthy Diet

The DASH diet is an example of a flexible and balanced eating plan, suitable for hypertensive individuals, aimed at creating a heart-healthy eating style (14). Inter alia, fruits, vegetables, legumes and whole grains are recommended in this diet. Low-fat or fat-free dairy products, fish, poultry, beans, nuts, and vegetable oils are included. Sweetened beverages, sweets, and foods rich in saturated fats, with trans fats in particular should be limited.

The document contains an infographic that summarises the main points of this eating plan (14).

"Mediterranean diet for heart health" (72) provides information on this traditional diet, also recognised by the World Health Organisation as a healthy eating pattern. It is mostly based on plant food, but not limited to it.

The Mediterranean diet recommends a daily intake of vegetables, fruits, whole grains and plant-based fats; each week, fish, poultry, beans, legumes and eggs can be consumed. Moderate amounts of dairy products are included in the diet; conversely, foods with added sugar, red and processed meat are limited. Wine is also limited; this is particularly true for women. Notoriously, some fish species may contain unhealthy chemical substances; the document recommends avoiding fish that are high in mercury, which is particularly true for children, pregnant or breastfeeding women. The spices used in the Mediterranean diet boost flavour and reduce the need for salt (72).

According to "Sodium reduction", a document of the World Health Organisation, the global mean intake of sodium is more than double the recommended level (15). This implies several health adverse effects, with an estimated 1.89 million deaths associated with consuming too much sodium. A reduction in sodium intake is not a costly measure

and results in large risk reduction for, e.g. high BP, CV diseases, gastric cancer and kidney disease. *Sodium is naturally found in many food items, but its content is particularly high in processed foods, snacks and condiments*. Sodium is a main component of the table salt that people add to food; in some parts of the world, sodium is added as glutamate or as soy sauce. The document contains recommendations and public health interventions aimed at reducing sodium consumption.

Low-sodium salt substitutes that contain potassium can be used to replace the conventional table salt, but cannot be used by individuals with kidney impairments (15> lower-sodium salt substitutes).

When people do not have easy access to healthy and affordable food, they may have to rely on unhealthy diets, with calorie-dense and high-sodium processed foods, which also increases hypertension risk. Urban vegetable gardens enable people to improve diet quality while increasing physical activity (19).

According to "Meat consumption and risk of ischemic heart disease: A systematic review and meta-analysis", ischemic heart disease caused globally over 9 million deaths in 2016. The high content of saturated fat in the meat, and the sodium in the processed meat, are thought to increase the risk because they raise blood LDL cholesterol, and BP (54). The relative risk of ischemic heart disease by each 50 g/day of unprocessed red meat and processed meat intake is heightened, respectively, by 9% and 18%. This supports the recommendation to reduce their consumption.

According to "Factors associated with dietary patterns of schoolchildren: A systematic review", childhood is a fundamental stage in the formation and establishment of eating habits. Therefore, nutrition education and regularisation of the marketing of ultra-processed foods are necessary in public policies to promote and protect children's health (53).

"Setting up and running a school garden: A manual for teachers, parents and communities" is a FAO handbook that can be used for schools (74). Running a school garden may offer children a pleasant and relaxing time, learning about agriculture and nutrition while developing environmental awareness.

5.1 Vegetable Oils and Fibre May Help in CV Prevention

"Fats and oils – a scoping review for Nordic Nutrition Recommendations 2023" studies the effects of different dietary oils and fats, considering their effect on CV diseases, LDL and HDL cholesterol, type 2 diabetes, cancer, inflammation, and body weight (51).

The consumption of olive oil is linked with reduced risk of CV disease, type 2 diabetes and some types of cancer, while canola oil exhibits interesting properties in decreasing LDL-cholesterol. According to the review study, vegetable oils rich in unsaturated fatty acids provide more benefits for health than tropical plant oils and animal fats high in saturated fatty acids. Figure 1 shows the composition of oils and fats considering their degree of saturation, which is known to have a significant impact on important risk markers. However, from the perspective of weight management, even

vegetable oils rich in unsaturated fatty acids should be used in moderate amounts because of their high energy content (51).

The saturation level of oils and fats is an important but not the only factor influencing their health effects. In fact, vegetable oils may also contain other bioactive compounds, e.g. polyphenols, antioxidants, vitamins and phytosterols, potentially important for health. In olive oil for instance, the content of these bioactive components depends on agronomic factors and extraction technology. Extra-virgin olive oils generally have a higher content of polyphenols than refined olive oils (51). Length, light and temperature condition during the storage time, and cooking temperature also influence the nutritional value of oils.

According to "How Different Dietary Fibers Impact LDL-Cholesterol, Insulin Resistance, and Cardiovascular Risk", the soluble fibre, once dissolved in water, forms a gel-like substance. According to studies, the intake of soluble fibre reduces LDL-cholesterol in a dose-dependent manner, as shown in the graph. According to studies reviewed in the video, soluble fibre is found in beans, lentils, fruits and vegetables, while oats are the only whole grain that exhibits an LDL-cholesterol-lowering effect (49 / 50).

The vegetables that contain insoluble fibre have no effect in this regard, but they play an important role in making the diet more satiating. This helps people to eat less and have a better weight control, which, in turn, lowers the risk of type 2 diabetes. In addition, insoluble fibre adds bulk to the stool, thus promoting regular bowel movements (49).

In the US, 38 g is the daily recommended intake of fibre for a man, but the average is around 15 g per day. People interested in increasing their fibre intake are recommended to do it slowly, to give their gut time to adjust, thus preventing digestive discomfort. Again, according to Kratz M., clinical nutrition researcher, whole plant food, besides providing a beneficial variety of soluble and insoluble fibres, also provides a lot of micronutrients, e.g. essential vitamins, minerals, polyphenols and trace elements (49).

"The Effects of Too Much Fiber on Your Body" provides information on the consequences of an excess fibre intake, which may include interference with nutrient absorption, reduction in the absorption and effectiveness of certain medications. The document also discusses the beneficial effects of fibre (50).

6. Benefits of Physical Activity

For a long time during human history, moving was dictated by the need for hunting, gathering, farming and walking to survive. Nowadays, modernisation implies a more and more sedentary lifestyle, which has consequences for our heart (48). This became evident in the early 1950s, during studies on the coronary artery diseases among the London transit employees. A *50% lower risk of coronary artery disease was observed among the conductors spending most of the time walking on the bus to collect tickets, than among the drivers who worked sitting* (78).

According to "Cardiac and pulmonary benefits of forest walking versus city walking in elderly women: A randomised, controlled, open-label trial", forest walking,

differently from walking in a city, reduces arterial stiffness, increases pulmonary function in elderly women, and results in a 10 mmHg lower BP (16). Table 2 of this Korean study shows the changes in clinical variables at baseline and after intervention for city-walking and forest-walking groups. According to studies reviewed in the article, forest walking may reduce, inter alia, levels of stress hormones, anxiety and sympathetic nerve activity. While brisk walking is undisputedly considered as a safe and effective measure in counteracting the health risks of a sedentary lifestyle, *Nordic Walking may provide even more benefits than brisk walking and jogging* (13).

According to previous studies, Nordic Walking can reduce CV risk factors, such as BP, Body Mass Index, low-density lipoproteins, triglycerides and waist circumference. At the same time, this activity increases the concentration of the notoriously beneficial high-density lipoproteins. According to the review, Nordic Walking may contribute to reducing chronic neck pain and lower back pain, improving shoulder mobility, self-esteem and quality of life (13).

"Effect of Nordic Walking on Functional Ability and Blood Pressure in Elderly Women" has studied the changes that occurred after practicing Nordic Walking 3 times a week for 3 months. Inter alia, on average, the pulse rate at rest fell from 84.93 to 73.42, systolic BP from 129.83 to 118.52, and diastolic BP from 84.66 to 79.04 (65).

Nordic walking is considered suitable for people suffering from orthopaedic problems since the use of poles has a protective effect on the joints, including the back, with knees in particular, and a very low risk of injury (65).

"Association between active commuting and incident cardiovascular disease, cancer, and mortality: prospective cohort study" is a UK study that deals with some of the health benefits active commuting may provide. Inter alia, we can observe that the hazard ratio for CV mortality is 0.48 for cyclists and 0.64 for walkers. The focus of this article is not cancer; interestingly, however, the observed hazard ratio for its incidence in cyclists is 0.55 (20).

According to "How Copenhagen Became a Cycling City", the bike is the most common means of transportation, with people who select biking because it is a safe, fast and easy commuting system (73). Cycling in Copenhagen became safer as shown in the graph, thanks to, e.g. protected bike lanes and with cyclists waiting directly in front of the cars at red lights. In certain roads, with synchronised traffic lights, cyclists moving at 20 km/h do not have to stop for a red light. The many bridges intended solely for pedestrians and cyclists provide shortcuts, which further contribute to reducing the time spent travelling. A study showed that the conversion of a car park into a bike park resulted in more visitors to the shopping streets. The abolition of the additional cost for carrying bicycles on the urban rail system resulted in an increased number of passengers, which largely compensated for the lost bike fares. Homes, schools, public transports and commercial areas are connected by a network of well-maintained cycle superhighways with, e.g. prioritised snow removal.

A table provides more information on what Copenhagen is doing for cyclists. It is interesting to note that Denmark does not have an industry producing cars (73).

Poor urban planning, with limited sidewalks or parks, is associated with a sedentary lifestyle, which contributes to obesity; at the same time, air pollution linked to traffic promotes systemic inflammation and oxidative stress. The noise of the traffic increases stress and neuro-hormonal activation. Lack of communal spaces is a social determinant that also amplifies stress (19). All these conditions, and the very many other pollutants found in the environment, contribute to high BP.

It is good to talk with the doctor before starting an exercise plan; this is particularly true if the plan implies vigorous workouts, or if we have recently been inactive, or if we suffer a medical condition. A document of the Harvard Medical School provides tips for safe exercising (17). Training too hard or too often may cause overuse injuries, which may apply to, e.g. the shoulder of the swimmer, or the knee of the jogger. *The practice of a mix of different kinds of physical activities, and rest when necessary, may prevent such kind of troubles*.

The results of "Assessing the effect of regular swimming exercise on the micro- and macrovascular physiology of older adults (ACELA II study)" suggest that swimming can significantly reduce CV disease risk in the elderlies (12). Table 2 shows the changes observed in the participants.

In adults, *physical activity contributes to preventing CV diseases, cancer and diabetes, while improving brain health and overall well-being*. Whereas in young people, physical activity improves physical fitness, cardiometabolic health, bone health, cognitive outcomes, mental health, and reduces body fat. *But, 80% of adolescents do not meet the recommended level of physical activity*.

The modern lifestyle is getting more and more sedentary as a consequence of modern technology use, which, according to a World Health Organisation document, implies poor health outcomes and costs to the public health care systems of approximately US$ 27 billion per year. Text and an infographic provide guidelines on physical activity and the benefits which this latter may deliver in weight control. *Policies that ensure access to walking and cycling are of the utmost importance* (44).

6.1 Children and Physical Activity

"To grow up healthy, children need to sit less and play more" is a document of the World Health Organisation that provides guidelines for children on physical activity. This latter, while contributing to preventing obesity, helps to improve physical, mental health and wellbeing. Nowadays, more than 80% of adolescents do not practice enough physical activity. *Both physical activity and sedentary behaviour established early in life shape habits that persist into adulthood* (38). Worldwide, insufficient physical activity is responsible for more than 5 million deaths per year across all age groups.

Worldwide, bullying is recognised as an important problem among children; most studies on the relationship between physical activity and bullying have been carried out in high-income countries. "Can a before-school physical activity program decrease bullying victimization in disadvantaged children? The Active-Start Study" has investigated the relationship between physical activity and bullying in a Chilean disadvantaged area (46). Among the students who participated in this physical activity

programme, a statistically significant reduction in the probability of suffering physical bullying was observed, with odds ratio = 0.18.

The practice of non-competitive physical activity supports the promotion of pacific coexistence, socialisation, and reduction of cases of violence. Conversely, according to studies, this may not apply to competitive sports (45).

"Benefits of walking to school" is an Australian video. Here, studies have shown that children were walking and riding to school less frequently than previous generations, with more traffic congestion in the school area. Walking to school, besides reducing congestion and related environmental impacts, may have a positive impact on the children, who seem more alive and ready to start the day (47).

7. Children, Adolescents and Screen Time

The amount of physical activity undertaken by children depends on, e.g. availability of safe green spaces, road traffic and *activities that may compete for their attention, including the use of electronic devices* (39). A graph shows the share of 11- and 15-year-olds who met the WHO-recommended daily physical activity in 2018; we can observe the low shares observed in certain countries.

In addition, according to an OECD document, the use of electronic devices for leisure may result in a learning distraction. The first graph of the document shows the time spent for leisure on digital devices at school and mathematics performance (39).

"How Screen Time Affects Greek Schoolchildren's Eating Habits and Functional Food Consumption?—A Cross-Sectional Study" has found that *increased screen time was associated with higher consumption of fast food, sugary drinks and less adherence to the Mediterranean diet* (40).

"Screen Time Use and Ultra-Processed Food Consumption in Adolescents: A Focus Group Qualitative Study" explores perceptions, attitudes and motivations of the adolescents on the association between consumption of ultra-processed food and screen use. Ultra-processed foods may seem quick, easy to prepare and socially accepted products for teenagers. Their easy availability, combined with advertising, may shape food preferences among adolescents. But they are high in calories, unhealthy fats and sugar, which, combined with the sedentary lifestyle associated with screen use, contribute to overweight and obesity (52).

Other studies suggest that the time spent on screens may contribute to higher intake of ultra-processed food and lower intake of fruits and vegetables (52 / 53).

According to a study reviewed in the article (52), nutrition education in the school may have an important role. The adolescents who participated in the study, while being aware of the unhealthy and addictive nature of ultra-processed foods, were unaware of the specific negative consequences they may imply.

"Associations Between Screen Time Use and Health Outcomes Among US Teenagers" is a CDC document (75). Teens with more than 4 hours of daily screen time, in comparison to their peers who spend less time, are more likely to practice infrequently

physical activity, experience worse sleep quality, have more weight concerns, *more depression and anxiety symptoms*. In most cases, longer screen time is associated with poorer health outcomes; in addition, their social and emotional lives are also affected.
However, according to "Electronic Screen Use and Children's Socioemotional Problems: A Systematic Review and Meta-Analysis of Longitudinal Studies", when some types of screen use offer educational benefits, the links to socio-emotional problems is less pronounced than that observed with video games (77). The guidelines should aim to improve the quality of screen content and discourage the most risky behaviours, such as gaming. The parents should do their best to prioritise educational screen contents and ensuring recreational games are age-appropriate.

The content of "From Australia to Europe, countries move to curb children's social media access" is summarised by the title (76).

8. Parental Example Is of the Utmost Importance

CV diseases are typically considered adult problems. But, according to "5 things parents should know – and do – to keep kids' hearts healthy", the CV diseases occurring in adults are linked to obesity, high BP, high cholesterol and smoking, which start developing in childhood (68). According to experts, while parents and health care professionals often do their best to keep kids healthy, they may overlook the heart.

For this reason, health experts recommend greater attention and earlier interventions when necessary. This is true even from the maternal stage; in fact, obesity, high BP and diabetes in the mother may result in increased risk for the offspring (68). To keep the future CV risk of their children low, pregnant women are recommended, inter alia, to eat healthy food and practice physical activity as long as the doctor says it is safe to do it.

Children watch what parents do. For instance, if these latter regularly eat healthy foods and practice physical activity, then it is easier for the children to build similar habits (68). The values of BP and cholesterol may rise asymptotically; the longer their values remain high, the greater the artery damage. For this reason, checking their values should start from childhood. The document also discusses the social, economic and environmental determinants which may influence the availability of healthy food and the possibilities to practice a safe physical activity.

Acknowledgements
The author would like to thank Mrs. Tirhas Mehari for the information kindly provided.

Conflict of Interest Statement
The author declares no conflicts of interest.

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The author is a former middle school teacher, and has written more than 80 educational papers starting nearly 39 years ago. Areas of interest: Health, Peace Education, Environment and Prevention of Natural Disasters. The author has a University Degree in Biology.

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