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Review

Diet and Prevention of Cardiovascular Disease

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Abstract

Promoting a healthy diet is an effective strategy for preventing cardiovascular disease (CVD). The characteristics of a healthy diet are known. However, an unhealthy diet has become a significant contributor to the global burden of diseases, mainly due to its effect on CVD, diabetes, and cancer. A healthy diet is not accessible and affordable to most people worldwide. Marketing influences food choices and promotes unhealthy diets that contribute to obesity, CVD, diabetes mellitus, and cancer. Governments are responsible for transforming food systems to deliver healthy, sustainable, and affordable diets using coherent policies, regulations, and legislation portfolios. This review highlights the role of a healthy diet in preventing CVD. It summarises the current scientific evidence underpinning dietary recommendations and the strategies for translating them into action.

Keywords

Cardiovascular disease; cardiovascular risk; coronary heart disease; stroke; healthy diet; dietary fats; dietary fibre; meat consumption; salt intake; sugar sweetened beverages; dietary recommendations; prevention; diabetes mellitus

1. Introduction

Cardiovascular Diseases (e.g., coronary heart disease (CHD), strokes, and heart failure) continue to account for the highest disease burden worldwide. In 2019, out of the 41 million deaths due to Non-Communicable Diseases (NCD), 17.9 million were due to Cardiovascular Diseases (CVD) [1]. Unhealthy diet, tobacco use, physical inactivity, and air pollution are the four major risk factors for NCD and CVD. They lead to cardiometabolic derangement, obesity, diabetes, hypertension, and hyperlipidemia), which drives up the CVD burden [2]. Reducing exposure to those described above behavioral, environmental, and metabolic risk factors is an effective strategy to prevent NCD and CVD [3] and significantly reduce high healthcare costs [2, 4]. Currently, many people are food insecure, malnourished, or overweight because they are unable to afford a healthy diet. In 2020, adult and childhood obesity increased alarmingly in all parts of the world, and an estimated 38.9 million children were overweight [5].

2. Role of Diet in Prevention of CVD

Macro and micronutrients affect the development of CVD through multiple mechanisms, including their impact on blood lipids, blood pressure, blood clotting, blood glucose, body weight, and the gut microbiome [2, 6-13]. Guidelines recommend that a healthy diet include various foods while ensuring energy balance to avoid unhealthy weight gain [6-12]. Being overweight and obese increases the risk of NCD, including CVD, type 2 diabetes, and certain types of cancer [14]. Obesity is associated with higher all-cause mortality [15]. In addition to physical inactivity and genetic factors, macronutrient imbalance in the diet (e.g., the proportion of protein, fat, and carbohydrates) contributes to the development of overweight and obesity [14-17]. Another critical driver of obesity in all countries is the aggressive marketing of more processed, high-energy, and affordable food [17].

3. Healthy Diet

A healthy diet should provide proteins, carbohydrates, fiber, fat, fluids, and micronutrients (minerals and vitamins) from a range of food groups [6-12] (Figure 1). Proteins from animal sources (milk, eggs, fish, and meat) fully complement the essential amino acids the body needs. Most plant-based foods do not contain all the essential amino acids. If the diet is entirely plant-based, it is necessary to consume a mixture of plant-based foods to obtain all the essential amino acids. Fruits and vegetables are rich sources of fiber and micronutrients. Most ultra-processed foods (e.g., ham, sausages, bacon, crisps, ice cream, biscuits) contain high saturated fat, salt, sugar, and food additives. Consumption of ultra-processed food has no health benefits and is associated with an increased risk of Non-Communicable Diseases and mental health disorders [13]. Herbs and spices (turmeric, saffron, black pepper, red pepper, ginger, garlic, onion, coriander, thyme, oregano, bay leaf, dill, sumac, cinnamon, cloves, cardamom, and many others) used in the preparation of food, are rich in phytonutrients and have been shown to have a range of beneficial health effects [18].

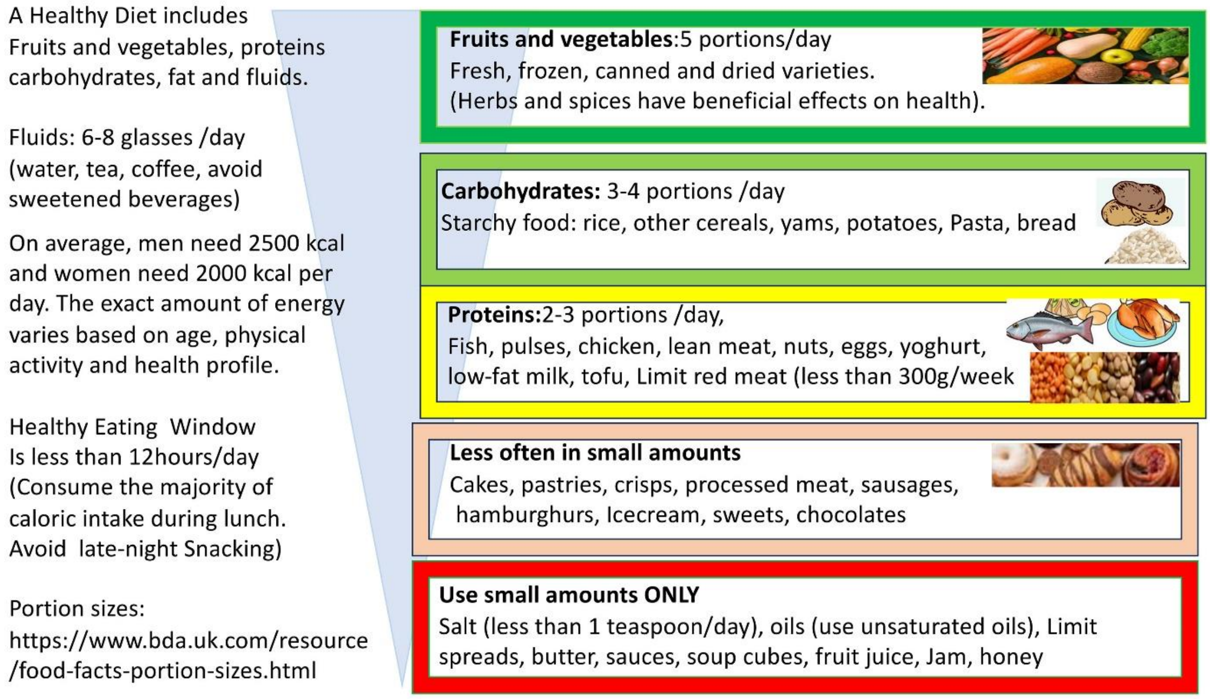

Figure 1 Health promoting diet.

Based on scientific evidence, current dietary Guidelines recommend: i) restricting high-fat foods (e.g., butter and cream), replacing saturated fats (SF) with polyunsaturated (PUSF) and monounsaturated fats (MUSF), and avoiding trans fatty acids (TFA); ii adequate intake of plant-based food from complex, high-fiber carbohydrates such as whole grains, legumes, fruits, vegetables, and nuts while restricting refined starches and free sugars; iii reducing salt intake; iv consumption of fish and lean meat in moderation but restricting red meat and processed meat; v consumption of low-fat and/or fermented dairy products (e.g., yogurt); vi reducing foods rich in cholesterol (e.g., eggs and shellfish) for those with diabetes or at higher risk of CVD and vii restricting sugar-sweetened beverages.

Scientific evidence underpinning each of these recommendations is summarised below.

3.1 Restrict High Fat Foods, Substitute SF with PUSF and MUSF and Avoid TFA

Dietary fat is the most energy-dense macronutrient. Foods and oils contain a mixture of fats and fatty acids: SF, PUSF, and MUSF. The primary sources of SF are fatty meat, dairy foods, lard, butter, ghee, palm oil, and coconut oil. There are two main families of PUSF: omega-3 and omega-6. PUSF and MUSF come mainly from plant sources: PUSF from nuts, soybean, safflower, sunflower, and sesame seeds, and fish; MUSF from avocados, olives, tree nuts (e.g., almonds, cashews, and pistachios) and seeds (flax and chia). Oils have a mixture of fats. Canola, corn, soybean, peanut, safflower, and sunflower oil are rich in PUSF. Olive oil is high in MUSF. Partial replacement of SF by PUSF and MUSF tends to lower total and low-density lipoprotein cholesterol (LDLC) levels [19].

Systematic reviews of randomized controlled trials (RCTs) find that reducing total fat intake reduces body weight [20, 21]. To reduce the risk of unhealthy weight gain, the WHO recommends that adults limit their total fat intake to 30% of their total energy intake or less. Reduced fat intake also results in a slight improvement in total cholesterol, LDL-C, and blood pressure. Meta-analysis of four RCTs has shown that lowering SF and replacing it with PUSF lowers CHD by 29% [22-26]. This finding is supported by several other meta-analyses [27-31]. The reduction in CHD is similar to that achieved by statins [22]. Based on these and other findings [32-34], it is recommended that adults and children reduce SF intake to at least 10% of total energy intake, replacing SF in the diet with PUSF or MUSF from plant sources [8].

Strong evidence exists that lowering TFA intake reduces LDLC and is associated with a reduced risk of CVD [35]. Industrially produced TFA can be found in baked and fried foods (e.g., cookies, biscuits, pies) and pre-packaged snacks. Partially hydrogenated cooking oils and fats also contain TFA. WHO recommends consuming 1% or less of total energy intake as TFA [8]. Industrially produced TFA have no known health benefits and must be removed from the food supply through legislation or regulatory action.

Coconut oil, which contains 82% of SF, has been shown to significantly increase LDLC [36, 37]. The LDL cholesterol-raising property of cholesterol is confirmed by a recent systematic review of 7 controlled trials [38]. The review also found no difference in raising LDLC between coconut oil and other oils high in SF, such as butter, beef fat, or palm oil. Guidelines advise against using coconut oil because coconut oil increases LDL-C, which increases the risk of CVD [22].

3.2 Adequate Intake of Plant-Based Food: Wholegrains, Pulses, Fruits, Vegetables and Nuts

Carbohydrates (e.g., starches, sugar, and fiber) are found primarily in plant-based foods such as grains, cereals, pulses, fruits, and vegetables. Carbohydrates that are slowly digested, such as whole grains, pulses, fruits, and vegetables, are considered high quality and beneficial to health [39]. Rapidly digested carbohydrates (e.g., sugars, white bread, white rice) are regarded as low quality, and their restriction is recommended [10]. Many studies have found that a higher intake of whole grains, vegetables, fruits, and pulses was associated with a significantly reduced risk of disease and mortality [40-48]. This included a nearly 20% decrease in all-cause mortality, a 10–20% decrease in the risk of CVD, a greater than 20% decrease in the risk of type 2 diabetes, and a 16% reduction in cancer risk. A systematic review analyzed data from 95 studies and found a nonlinear dose-response relationship between fruit and vegetable intake of up to 800 g per day and CHD, stroke, and CVD [42]. Fruits and vegetables are rich in nutrients- fiber, vitamins (e.g., vitamin C and folate), minerals (e.g., potassium, iron, and magnesium), and dietary bioactive compounds (antioxidants, polyphenols, and carotenoids). These nutrients act synergistically through various biological mechanisms to improve vascular and immune function and to lower blood cholesterol, blood pressure, inflammation, and platelet aggregation [49-53].

Intake of fiber, fruit, and vegetables also influences the composition and diversity of the microbial population in the gut [54]. Certain dietary constituents are known to be metabolized by intestinal bacteria into metabolites that affect CVD or diabetes [55]. Some of the health-promoting effects associated with consumption of dietary fiber are mediated by butyrate-producing microbes [56]. There is also evidence that polyphenols (e.g., phenolic acids, flavonoids, and lignans) from fruits, vegetables, and cereals could alter gut microorganisms by inhibiting potential pathogenic organisms (e,g, *Helicobacter pylori*, *Staphylococcus* sp.) while promoting the growth of beneficial bacteria, including *Lactobacillus* and *Bifidobacteria* [57, 58].

It is recommended that carbohydrate intake should come mainly from whole grains, pulses, fruits, and vegetables. It is recommended that adults consume at least 400 gm of fruits and vegetables (2 servings of fruits and 3 servings of vegetables) per day, excluding starchy vegetables such as potatoes and yams [6]. Intake of whole grains, pulses, fruits, and vegetables is highly variable across and within populations and is generally inadequate globally [59-65]. Less than 20–30% of individuals in many low and middle-income countries meet WHO recommendations for vegetable and fruit consumption [66, 67].

A high consumption of nuts is associated with a 15% lower risk of CVD incidence and a 23% lower risk of CVD mortality [68]. Consumption of nuts positively impacts blood lipids, blood pressure, inflammation, and markers of glycemic control [69]. In addition to unsaturated fats, nuts are rich in protein, phytosterols, fiber, minerals, vitamins, and phenolic compounds. Dietary Guidelines recommend 30 grams of nuts for adults most days of the week [70].

3.3 Reduce Salt (Sodium) Intake

High intake of sodium, is a well-established cause of elevated blood pressure, increased risk of CVD, and chronic kidney disease [71, 72]. Results of RCTs report that salt reduction lowers blood pressure in both hypertensive and normotensive people [73]. A dose-response relation has been demonstrated between the magnitude of blood pressure lowering and sodium reduction in the diet [74]. A decrease of 4.4 g/day salt is associated with a mean reduction of 4.18 mmHg for systolic blood pressure and 2.06 mmHg for diastolic blood pressure [75]. Salt reduction is one of the recommendations for the nonpharmacological treatment of hypertension, in addition to weight reduction, dietary potassium supplementation, and physical activity [76].

Reducing dietary sodium intake can prevent a large number of fatal and non-fatal heart attacks at a meager cost. Hence, a 30% relative reduction in the mean population's intake of salt/sodium by 2030 is one of the nine global NCD targets [2]. This target is attainable if several cost-effective (Best Buy) policies are rapidly implemented to lower population sodium intake [2-4, 9, 77]. They include reducing the sodium content in food products, front-of-pack labeling to help consumers choose food products with lower sodium content, mass media campaigns to educate consumers, and implementing public food procurement policies to reduce sodium content in the food served or sold. Stepwise population salt reduction programmes are essential in low and middle-income countries where resource constraints and lack of health insurance limit access to antihypertensive medicines for many people with hypertension.

In high-income countries, most of the salt in the diet is from processed, restaurant, and fast foods [78], while in most low and middle-income countries, the primary salt source is added during cooking or in sauces [79]. WHO recommends a maximum intake of <2000 mg/day sodium (<5 g/day salt) in adults [9, 80].

WHO is monitoring the progress in implementing salt reduction policies in Member States [9]. As of October 2022, 5% of countries (n = 9) have implemented at least two mandatory sodium reduction policies and all sodium-related Best Buy policies for addressing NCD. 22% of countries (n = 43) have implemented at least one mandatory policy. One-third of the remaining Member States (n = 64) have implemented at least one voluntary policy to reduce sodium intake, while 29% (n = 56) have made a policy commitment towards sodium reduction.

Using low-sodium salt substitutes is increasingly considered a potential blood pressure-lowering strategy by national health authorities [81]. WHO is in the process of finalizing recommendations on the use of low-sodium salt substitutes.

3.4 Consumption of Fish and Lean Meat and Restriction of Red Meat and Processed Meat

Fish such as mackerel, salmon, and sardine are good sources of omega-3 fat. Antioxidant and anti-inflammatory properties of omega-3 fats lower the risk of CVD by reducing blood clotting, protecting arteries from hardening, and reducing the level of triglycerides in the blood [82-84]. The results of a systematic review of 25 prospective cohort studies indicate that fish consumption is inversely associated with CVD mortality. The CVD mortality risk was decreased by 4% with an increase of 20 g of fish intake [84].

Meats are broadly categorized into red (beef, pork, lamb), white (chicken, turkey, and rabbit), and processed meat (sausages, bacon, and salami). Unprocessed and processed red meat consumption are both associated with a higher risk of CVD and diabetes [85, 86]. Currently, evidence does not suggest a beneficial or detrimental role of white meat consumption in the development of CVD [87].

3.5 Consumption of Low-Fat and/or Fermented Dairy Products

Meta-analysis of cohort studies with CVD hard endpoints and RCTs investigating the effect on major cardiovascular risk factors provide evidence that moderate dairy consumption (up to 200 g/day) has no detrimental impact on cardiovascular health [88, 89]. Further studies are needed to determine whether fermented dairy products have cardiovascular benefits compared to non-fermented dairy products [90].

3.6 Reduce Foods Rich in Cholesterol

Dietary cholesterol has been suggested to increase the risk of CVD. However, studies included in systematic reviews have lacked the methodologic rigor to enable firm conclusions regarding the effects of dietary cholesterol on CVD risk [91]. Meat, eggs, shellfish, and full-fat dairy products are rich in cholesterol. Meat and full-fat dairy products also have high levels of SF. Eggs are high in cholesterol but low in SF: a sizeable whole egg (50 g) contains 244 mg of cholesterol in the egg yolk but only 1.2 g of SF [92]. Evidence on the impact of consumption of eggs on CVD from observational studies is mixed [93]. Studies report no association [94, 95], increased risk of CVD [96], or decreased risk of stroke [97]. Using data from observational studies, It is challenging to determine the impact of any individual food independently of a dietary pattern. The increased risk of CVD with egg consumption reported in the above studies may be related to dietary patterns rather than eggs. There is evidence from some observational studies suggesting that higher egg consumption could be associated with a higher risk of CVD in people with diabetes [98-100]. However, results from RCTs suggest that including 6 to 12 eggs per week, in a balanced diet consistent with cardiovascular health, has no adverse effect on major CVD risk factors in individuals with type 2 diabetes [101]. These findings suggest that eggs could be consumed in low to moderate amounts (≤1 egg/d) as part of a healthy diet. Eggs contain all essential amino acids and offer a complete source of protein, minerals, and vitamins.

3.7 Restrict Sugar Sweetened Beverages (SSB)

Prospective cohort studies have investigated the impact of SSB intake on the risk of CVD. For example, a meta-analysis of 27 longitudinal studies of medium to high methodological quality showed that SSB intake increased the risk of obesity (RR = 1.17; 95% C.I. 1.10-1.25), CHD (RR = 1.15; 9% C.I. 1.06-1.25), stroke (RR = 1.10; 9% C.I. 1.01-1.19) and type 2 diabetes (RR = 1.20; 95% C.I. 1.13-1.28) in adults [102]. These findings are consistent with the results of several other meta-analyses [103-106]. A meta-analysis of six cohort studies found an 8% higher risk of CVD mortality and CVD incidence per one serving per day increment in SSB [107].

Probable biological mechanisms of the association between SSB and CVD risk include a rapid rise in blood glucose and insulin after SSB consumption, a high glycemic load that leads to weight gain, inflammation, insulin resistance, and metabolic syndrome [108-110], increased blood pressure [111] and increased synthesis hepatic triglycerides, all of which increase the risk of CVD [112].

Artificially sweetened beverages (ASB), such as low, no-calorie sweetened beverages, are potential SSB replacements. However, a meta-analysis of prospective cohort studies has shown that compared with those in the lowest group, the relative risk comparing extreme groups of ASB consumption was 1.10 (0.98-1.23) for CHD, 1.19 (1.09-1.29) for stroke, and 1.32 (1.15-1.52) for CVD events [104]. Another meta-analysis reported a J-shaped association between ASB intakes and all-cause or CVD mortality. Daily consumption of 1.5, 2, and 2.5 servings of ASB was associated with 4%, 8%, and 13% higher risks of all-cause mortality. These findings suggest that ASB is not necessarily a healthier alternative to SSB [113]. Future studies should further investigate the association between ASB intakes and cause-specific mortality.

Evidence shows that frequent 100% fruit juice intake may promote weight gain [114]. Based on the results of prospective cohort studies, 1 serving per day of 100% fruit juice was associated with a higher increase in body mass index among children.

4. Association between Healthy Dietary Patterns, Food Groups and CVD

Prospective cohort studies report that adherence to specific quantifiable eating patterns is consistently associated with a lower risk of CVD [115-117]. They are the healthy Mediterranean-style eating, healthy US-Style eating, healthy vegetarian eating [118], the alternative healthy eating index [119], the alternate Mediterranean diet score [120], and the Dietary Approaches to Stop Hypertension (DASH) diet [121, 122]. The Mediterranean diet is high in vegetables, fruits, grains, legumes, nuts, and virgin olive oil. It includes moderate fish and wine and is low in red, processed meat, and added sugars. The vegetarian diet is based on various fruits, vegetables, legumes, and whole grains. It does not include meat, poultry, or fish. The DASH diet focuses on vegetables, fruits, whole grains, legumes, fat-free or low-fat dairy, and nuts and limits the intake of salt, cholesterol, total and SF, red and processed meats, sweets, and added sugars, including SSB. All these dietary patterns, including food groups associated with lower risk of CVD, have reduced all-cause deaths by 8-22% [120, 123], 19-28% CVD death, and 11-23% cancer death [124-126].

Results of a dose-response meta-analysis quantify the relation between the intake of 12 major food groups and the risk of CHD, stroke, and heart failure [127]. An inverse association was present for whole grains (RR_{CHD}: 0.95 (95% CI: 0.92-0.98), vegetables and fruits (RR_{CHD}: 0.97 (0.96-0.99), nuts (RR_{CHD}: 0.67 (0.43-1.05), and fish consumption (RR_{CHD}: 0.88 (0.79-0.99). A positive association was present for red meat (RR_{CHD}: 1.15 (1.08-1.23), processed meat (RR_{CHD}: 1.27 (1.09-1.49), and SSB consumption (RR_{CHD}: 1.17 (1.11-1.23).

There is considerable evidence that specific dietary patterns can reduce cardiovascular events and mortality (Table 1). They include a Mediterranean diet pattern, plant-based diets, and low-fat diets.

Table 1 Impact of diet on cardiovascular morbidity and mortality.

Type of diet	Impact	Evidence
Mediterranean diet	Effective primary and secondary prevention significantly reduces vascular events (myocardial infarction and stroke) and cardiovascular deaths.	[128] [129] [130]
Plant-based diet	Greater adherence to an overall plant-based dietary pattern is significantly associated with a lower risk of cardiovascular mortality and a lower risk of CVD incidence.	[131]
Low-fat diet	Reducing saturated fat intake for at least two years causes a potentially significant reduction in combined cardiovascular events. Greater reduction in saturated fat causes more substantial reductions in cardiovascular events.	[20]
	Low-fat diets reduce all-cause mortality and non-fatal myocardial infarction in patients with increased cardiovascular risk.	[132]

5. Nutrition of Infants and Children

Breastfeeding of infants and young children (aged 12–36 months) significantly impacts their survival, health, and development. The positive effects of breastfeeding are sustained over the life course [133]. The findings of a multi-country study demonstrate how inappropriate marketing undermines confidence in breastfeeding, posing a significant threat to the health of infants and children [134]. Across all countries studied, formula milk companies market their products using diverse tactics, including engaging women through online and offline channels, exploiting the anxieties and concerns of parents, distorting science to legitimize their products, and encouraging health professionals to promote formula milk products. Governments need to recognize this threat and strengthen national measures to prevent formula milk marketing, including through domestic legislation and accountability mechanisms.

Healthy eating behaviors are formed during childhood. Adopting healthy behaviors in childhood can be beneficial for preventing CVD in later life. Children are exposed to aggressive marketing of foods and non-alcoholic beverages that are high in SF, TFA, free sugars and/or salt (HFSS), which is harmful to health. WHO has released a new policy guideline to protect children from the detrimental impact of food marketing. The guideline recommends that countries implement mandatory policies to protect children from marketing HFSS foods and non-alcoholic beverages. The new recommendations are based on recent evidence on how exposure to food marketing affects children's health, eating behaviors, and food choices [135]. The rise in the consumption of unhealthy food commodities in children is mainly driven by the aggressive marketing of transnational corporations [136, 137]. Regrettably, only a handful of governments have approved a policy framework to restrict all marketing to children up to 18 years of age of unhealthy foods and non-alcoholic beverages.

6. Implementation of Nutrition Action in Countries

In 2017, the global burden of disease study attributed 11 million deaths and 255 million DALYs to dietary risk factors [138]. The study found that high intake of sodium, low intake of whole grains, and low intake of fruits were the leading dietary risk factors for deaths and DALYs globally. WHO's Member States have endorsed global targets for improving nutrition and have committed to monitoring progress. These targets are vital for identifying priority areas for action and catalyzing global and local change. There are targets for maternal, infant, and child nutrition and breastfeeding. In addition to the target on reducing salt, three global NCD targets to be attained by 2030 are partly related to diet: A 25% relative reduction in the prevalence of raised blood pressure or to contain the prevalence of raised blood pressure and halt the rise in diabetes and obesity [2, 4].

Based on the information in WHO's Global Database on the Implementation of Nutrition Action (GINA) [139], 189 countries have national policies that include goals to promote healthy diets. A total of 182 countries include in their policies goals aligned to the global nutrition targets for 2025: 129 exclusive breastfeeding and 141 children overweight. Further, 165 of the 189 countries have also integrated goals for diet-related NCD targets: 92 for sodium/salt intake, 82 for high blood pressure, 132 for diabetes, and 152 for overweight and obesity in adults and adolescents. There is moderate progress in policies to promote healthy diets. Nutrition labeling is implemented in 122 countries. Countries are also taking action in the following areas: food reformulation 60 (in 40 countries, the focus is on sodium/salt reduction); trans-fat bans 26; and fiscal policies to promote healthy diets 38 out of which 30 are on SSB.

7. Transformation of Food Systems to Deliver Environmentally Sustainable Health Promoting Diets

In addition to a health focus, diets must consider factors that determine the environmental sustainability of food production. They include greenhouse gas emissions, freshwater usage, land use, non-renewable energy consumption, eutrophication, particulate matter, food loss, and waste. A Lancet Commission presented a healthy diet for both people and the planet [140]. It emphasizes a plant-based diet with a more significant proportion of whole grains, fruits, vegetables, nuts, and legumes and a smaller proportion of meat and dairy products. A few countries have already incorporated sustainability into their national dietary guidelines by including recommendations such as a predominantly plant-based diet, reducing food waste, and reducing consumption of red and processed meat [141-144].

Cost is a critical factor that determines the adoption of a healthy diet. There is concern that a healthy diet may not be affordable to low-income households in most settings due to the higher costs associated with healthy cuts of meat and the enormous amount of fruits, vegetables, legumes, and nuts in such a diet [145, 146]. About three billion people cannot afford a healthy diet and consume foods high in unhealthy fats, sugars and/or salt, which have become cheaper and more widely available in recent years.

WHO recommends implementing cost-effective and scalable food systems that focus on improving the nutritional quality of food and creating healthier food environments [147]. They include:

- Levying taxes on unhealthy food and subsidizing healthy options;
- regulating the marketing of food and non-alcoholic beverages to children;

- ensuring clear, informative, and accurate front-of-pack nutrition labels;
- reducing salt, sugars, and harmful fats in processed food;
- fortifying staple foods by adding extra vitamins and minerals;
- ensuring healthier diets are served or sold in public places;
- achieving coherence between trade and nutrition policies;
- and improving and supervising national food control systems.

Taxes need to be levied on unhealthy food options (such as foods high in fats, sugars and/or salt) to increase prices and discourage purchase and consumption. At the same time, subsidies can reduce the cost of healthy options (e.g., nuts, fruits, and vegetables) and encourage consumption.

Dietary variability- the availability of a wide variety of highly palatable energy-dense food- can compromise satiety learning, one of the critical cognitive determinants of food intake. Research shows that animals learn about their foods' energy content or satiating quality and adjust their intake to balance energy needs. Further research is needed to better define aspects in the modern food environment that undermine human satiety-learning, such as dietary variability [147].

In conclusion, compelling evidence defines a dietary pattern that is effective for preventing CVD and promoting health. People can benefit from it only if governments address physical, economic, and commercial determinants of the nexus between food and health. Further, government regulations must transform food systems to make them sustainable and allow the population access to affordable, healthy diets.

Abbreviations

CHD	Coronary Heart Disease
CVD	Cardio Vascular Disease
DALYS	Disability Adjusted Life Years
DASH	Dietary Approaches to Stop Hypertension
LDLC	Low Density Lipoprotein Cholesterol
MUSF	Monounsaturated Fats
NCD	Non-Communicable Disease
PUSF	Polyunsaturated Fat
RCT	Randomized Controlled Trial
SF	Saturated Fat
SSB	Sugar Sweetened Beverages
TFA	Trans Fatty Acids
WHO	World Health Organization

Author Contributions

SM was responsible for conceptualization, writing, review and editing of the paper.

Competing Interests

Author was former Senior Adviser, Noncommunicable Diseases, World Health Organization, Geneva Switzerland.

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