
**International Journal of Innovative Technologies in Social Science**

e-ISSN: 2544-9435

**Scholarly Publisher**
**RS Global Sp. z O.O.**
ISNI: 0000 0004 8495 2390

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| **ARTICLE TITLE** | THE ROLE OF DIET IN THE PREVENTION OF LIFESTYLE DISEASES: A LITERATURE REVIEW |
| **DOI** | https://doi.org/10.31435/ijitss.3(47).2025.4203 |
| **RECEIVED** | 24 July 2025 |
| **ACCEPTED** | 08 September 2025 |
| **PUBLISHED** | 30 September 2025 |
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# THE ROLE OF DIET IN THE PREVENTION OF LIFESTYLE DISEASES: A LITERATURE REVIEW

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**ABSTRACT**

Lifestyle diseases such as obesity, type 2 diabetes, cardiovascular disease, and certain cancers are still on the rise globally due to poor diet and global adoption of the Western diet. The literature review is investigating how nutrition compounds with chronic disease, as well as both harmful dietary elements and safe diets. The article responds to the impacts of sugar-sweetened beverages, processed food, artificial food components, and red meat with attention to the preventative benefits of fiber, antioxidants, and healthy fat. Proof for diets such as the Mediterranean, DASH, plant-based, and ketogenic diets is addressed, along with their metabolic, cardiovascular, and neuroprotective benefits. This review points out the value of public health programs in encouraging healthy dietary behavior as part of chronic disease prevention.

**KEYWORDS**

Dietary Patterns, Chronic Disease Prevention, Mediterranean Diet, Western Diet, Lifestyle Medicine

**CITATION**

Szymon Janczura, Bartosz Dądela, Kacper Zielonka, Natalia Śliwa, Marcin Markowski, Joanna Jasińska, Eliza Kawalska, Dominika Jakubowska, Szymon Gnitecki, Maciej Borowski. (2025) The Role of Diet in the Prevention of Lifestyle Diseases: A Literature Review. *International Journal of Innovative Technologies in Social Science*, 3(47). doi: 10.31435/ijitss.3(47).2025.4203



## Introduction

Obesity, type 2 diabetes, cardiovascular disease, and some cancers are the global lifestyle diseases most prevalent in the world and responsible for a significant percentage of global morbidity and mortality (Swinburn et al., 2019). The disorders have direct associations with modifiable risk factors, and diet is the key component in causation and prevention (Mozaffarian et al., 2018). The modern diet, rich in processed foods, sugars, and saturated fats, has been identified as a main cause of these diseases (Swinburn et al., 2019). On the other hand, evidence proves that the adoption of healthier diets, such as the Mediterranean diet or plant-based diets, can significantly reduce the burden of chronic diseases (Estruch et al., 2018).

The interaction between diet and lifestyle diseases is complex and multidimensional. For instance, excess calorie consumption and inadequate fiber intake are key determinants for obesity, which consequently increases the risk of type 2 diabetes and cardiovascular diseases (Malik et al., 2013). Similarly, high intake of red and processed meat has been associated with an increased risk of colorectal cancer, while fruits, vegetables, and whole grains have protective associations (Schwingshackl et al., 2017). Despite the growing body of evidence, there remains a need for a full overview that combines the existing evidence regarding the possible role of diet to prevent lifestyle diseases (Willet et al., 2019).

This review will address dietary habits and specific nutrients' role in disease prevention of lifestyle disorders. With reference to recent evidence, we will present the optimum dietary interventions and make public health policy recommendations based on evidence. The comprehension of dietary role in disease prevention is significant to reduce the burden of lifestyle diseases and overall health impacts globally.

## Lifestyle Diseases and Diet

### Obesity

Obesity is a global epidemic of public health importance, primarily due to excessive calorie intake, notably sugars and saturated fats (Swinburn et al., 2019). High consumption of energy-dense, nutrient-poor foods, such as sweet beverages, has been strongly associated with weight gain and obesity onset (Malik et al., 2013; Te Morenga et al., 2012). Regular consumption of sugar-sweetened beverages is a leading cause of excessive body weight in children and adults, owing to their high caloric and low satiety content that has the propensity to cause excess calorie consumption (Malik et al., 2013; Ludwig et al., 2018). This relationship has been consistently demonstrated in a series of clinical trials and epidemiological studies (Hu, 2013; Bray et al., 2018).

Fiber in the diet is crucial to weight management through promotion of satiety and blood sugar regulation (Slavin, 2005; Weickert, Pfeiffer, 2018). High-fiber diets correlate with lower body weight and obesity risk because the fiber enlarges foods without providing too many calories, leaving the individual full and reducing overall caloric intake (Howarth et al., 2001). Additionally, fiber slows down the sugar absorption, preventing rapid rises in blood glucose and consequential insulin resistance (McRae, 2017).

The contribution of sugar beverages to the development of obesity has been extensively studied, and there has been confirmation through extensive reviews that they make a major contribution to the obesity pandemic (Malik et al., 2019). This lends support to public health policies to restrict the consumption of such beverages among children and adolescents.

### Type 2 Diabetes

Type 2 diabetes is a metabolic disorder characterized by insulin resistance and impaired glucose metabolism, in which diet plays a central role in both its development and management (Hu et al., 2018). Diets high in simple sugars and refined carbohydrates have been strongly associated with an elevated risk of type 2 diabetes (Malik et al., 2010; Imamura et al., 2016). They induce acute spikes in blood glucose levels, playing a role in chronic hyperglycemia and insulin resistance with regular consumption (Ley et al., 2014). Regular consumption of sugar-sweetened beverages is closely linked to an increased risk of type 2 diabetes, independent of body weight (Malik et al., 2010; Greenwood et al., 2014).

Red and processed meat intake has also been linked with a higher risk of type 2 diabetes (Schwingshackl et al., 2017; Micha et al., 2018). Processed meats contain additives like nitrates and high levels of saturated fat, which can exacerbate insulin sensitivity (Schwingshackl et al., 2017). The individuals with the highest processed meat consumption had a 30% greater risk of type 2 diabetes compared to those in the lowest group of processed meat intake (Schwingshackl et al., 2017).

Diets with low glycemic index (GI) have been shown to improve glycemic control and reduce the risk of type 2 diabetes (Livesey et al., 2019). Low-GI foods, such as whole grains, legumes, and non-starchy vegetables, release glucose slowly into the bloodstream, preventing abrupt spikes in blood glucose concentrations (Zeevi et al., 2015). Adherence to a low-GI diet was associated with a 20% reduction in risk of type 2 diabetes (Chiu et al., 2020).

Dietary recommendations that target the restriction of intake of simple sugars, refined carbohydrates, and processed meat, and promote low-GI foods, are essential in type 2 diabetes prevention and management (Evert et al., 2019). Public health campaigns must emphasize these dietary changes to curtail the global diabetes burden (Forouhi et al., 2018).

### Cardiovascular Diseases

Cardiovascular diseases (CVDs) including coronary heart disease, stroke, and hypertension are leading causes of death worldwide, and diet is a leading modifiable risk factor (GBD 2017 Diet Collaborators, 2019; Roth et al., 2020). Saturated and trans fat intake has been strongly associated with the development of atherosclerosis (Mozaffarian et al., 2016), as saturated and trans fat increases low-density lipoprotein (LDL) cholesterol, which is responsible for plaque buildup in arteries (Jakobsen et al., 2009). Replacement of saturated fatty acids with polyunsaturated fatty acids reduces coronary heart disease risk significantly (Jakobsen et al., 2009).

Omega-3 fatty acids exert protective effects on cardiovascular disease by various mechanisms (Del Gobbo et al., 2016). Omega-3 fatty acids reduce triglycerides, enhance endothelial function, and diminish inflammation (Calder, 2018). Every-day food consumption with omega-3 fatty acids is associated with 10-20% reduced cardiovascular events (Hu et al., 2018).

Higher salt intake has a key position in the pathogenesis of hypertension (He et al., 2020, O'Donnell et al., 2019). High sodium consumption leads to fluid retention and increased blood pressure (He et al., 2020), and evidence suggests that reducing salt intake to less than 5g/day could prevent millions of CVD deaths yearly (He et al., 2020).

### Cancer

Cancer is a leading cause of death worldwide, and diet plays an essential role in its causation and prevention (Key et al., 2020). Antioxidants such as vitamins C and E, extinguish oxidative stress and eliminate free radicals, the primary mechanisms of cancer prevention (Aune et al., 2018; Pham-Huy et al., 2008). Fruit and vegetable intakes—high in antioxidants—are associated with reduced risks of lung, breast, and colorectal cancers (Aune et al., 2018).

Red and processed meat intake shares a strong relationship with colorectal cancer risk (Bouvard et al., 2019). Processed meat contains carcinogenic compounds like nitrates and heterocyclic amines formed by cooking or preservation (Bouvard et al., 2019). Individuals with the maximum amount of processed meat intake have a 20–30% high risk of colorectal cancer compared to individuals with minimum consumption (Bouvard et al., 2019; Chan et al., 2011).

Processed food contains chemical additives such as artificial color and preservatives, which are carcinogenic in nature (Song et al., 2020). Food dyes have also been found to increase the risk of cancer in animal studies (Song et al., 2020), although further studies are needed to confirm such effects in humans (Sasaki et al., 2002).

In short, intake of an antioxidant-rich diet, avoidance of red and processed meat, and exclusion of unhealthy additives can significantly reduce the risk of cancer. These dietary modifications should be targeted by public health policy for cancer prevention (Colditz et al., 2012; Grosso et al., 2017).

## Nutrients and diets that negatively affect health

### Artificial Food Additives

Artificial food additives, including colorings, preservatives, and flavor enhancers, are prevalent in processed food but have dire health consequences (Schnabel et al., 2018; ). Artificial food colorings like tartrazine (Yellow 5) and Allura Red (Red 40) are linked to behavioral issues in children, including hyperactivity ( Nigg et al., 2012). Elimination of these additives from diets leads to noticeable behavioral changes in vulnerable children (Stevens et al., 2019).

Certain preservatives have demonstrated possible carcinogenic effects (Song et al., 2020). Sodium nitrite in processed meat forms carcinogenic nitrosamines when cooked (Song et al., 2020; Jakszyn et al., 2013), while sodium benzoate can form toxic benzene compounds (Pipoyan et al., 2022).

### Gluten and Organic Food

Gluten, a protein found in wheat, barley, and rye, has been an increasing controversy in the field of nutrition science (Leonard et al., 2020). In individuals with celiac disease or non-celiac gluten sensitivity, gluten triggers immune responses causing intestinal damage and systemic inflammation (Lebwohl et al., 2018). Strict gluten avoidance remains the sole treatment with effectiveness for these conditions (Lebwohl et al., 2018).

In the general population, gluten-free diets have no proven health benefits (De Palma et al., 2019). Gluten-free diets can possibly increase risks of nutritional deficiencies since gluten-free products are lower in fiber, iron, and B vitamin content (Vici et al., 2016). Current evidence suggests that unjustified restriction of gluten can have unfavorable effects on gut microbiota (Wacklin et al., 2021).

Organic food production, i.e., without synthetic pesticides and GMOs, has been found to have quantifiable compositional differences (Barański et al., 2017; Mie et al., 2017). Organic crops contain higher concentrations of antioxidants (18-69% more phenolic compounds) and lower pesticide residues (Barański et al., 2017), while the clinical significance for human health requires further study (Vigar et al., 2020).

### Energy Drinks and Alcohol

Alcohol use and energy drinks pose considerable health dangers, especially to cardiovascular and metabolic functions. Energy drinks with very high doses of caffeine, sugar, and stimulants have negative cardiovascular outcomes such as increased heart rate, elevated blood pressure, and arrhythmias (Shah et al., 2019). Overuse, particularly when coupled with alcohol, can initiate severe cardiovascular occurrences (Shah et al., 2019).

Alcohol consumption demonstrates a dose-response relationship with chronic disease risk (Rehm et al., 2019). Low-to-moderate alcohol consumption may have some cardiovascular benefit, but excessive drinking increases risks for liver disease, cancer, and cardiovascular illness (Rehm et al., 2019; Biddinger et al., 2023). Heavy drinking particularly increases risks of hypertension (≥140/90 mmHg), cardiomyopathy, and stroke (Roerecke et al., 2020).

The alcohol-energy drink combination has unique dangers (Marczinski et al., 2018; Verster et al., 2020). The stimulant effect of caffeine masks the depressant effect of alcohol, leading to increased intake (Marczinski et al., 2018). Consumers of the combined beverages show increased risk-taking behaviors (drunk driving odds ratio: 2.5-3.0) and increased severity of hangovers (Marczinski et al., 2018).

### The Western Diet

The high prevalence of Western diets, which are characterized by high consumption of processed foods, red meat, sugary beverages, and refined carbohydrates, is a major contributor to global chronic disease pandemics (Cordain et al., 2005; Mozaffarian, 2022). The diet is a primary risk factor for obesity (RR 1.45), type 2 diabetes (HR 1.62), cardiovascular diseases (OR 1.58), and certain cancers (AICR, 2021), but is fiber (≤15g/day) deficient, as well as antioxidants and health-promoting nutrients (Cordain et al., 2005; Juul et al., 2022).

Ultra-processed foods are a defining feature of Western diets and provide >50% of daily caloric intake in high-income countries (Monteiro et al., 2019). They cause overconsumption because they are hyperpalatable (Monteiro et al., 2019), while simultaneously raising systemic inflammation (CRP +30%) and oxidative stress biomarkers (F2-isoprostanes +25%) (Lane et al., 2022).

## Dietary Models in Disease Prevention

### Mediterranean Diet

The Mediterranean diet, derived from the traditional dietary patterns of the Mediterranean area, encourages high consumption of fruits, vegetables, whole grains, legumes, and nuts, olive oil as the principal source of fat, moderate intake of fish and poultry, and low consumption of red meat and processed meat. The dietary pattern is characteristically linked to cultural elements such as social eating and seasonal consumption, which explain its general health benefits (Bach-Faig et al., 2011).

The Mediterranean diet's cardiovascular protective effects have been extensively documented in many studies, including the seminal PREDIMED trial, which demonstrated a reduction of 30% in major cardiovascular events in individuals consuming a Mediterranean diet enriched with extra-virgin olive oil or nuts compared to a low-fat diet (Estruch et al., 2018). They are attributed to multiple mechanisms, including the cardioprotection provided by monounsaturated fatty acids of olive oil that improve the lipid profile by lowering LDL cholesterol by approximately 12%, and the anti-inflammatory effect of polyphenols that reduce concentrations of C-reactive protein (CRP) by up to 35% (Fito et al., 2007).

Beyond cardiovascular health, the Mediterranean diet has been associated with significant metabolic benefits, including a 23-30% lower incidence of type 2 diabetes and improved glycemic control, as evidenced by reductions in HbA1c levels by about 0.5% in prediabetic individuals (Schwingshackl et al., 2017; Papamichou et al., 2019). The diet's high content of fiber, antioxidants, and healthy fats is also likely to be responsible for its protective effect on some cancers, with 15-20% reduced risk of breast and colorectal cancers having been reported in adherents (Morze et al., 2021; Deleu et al., 2024).

Despite its universal benefits, it might not be simple to adhere to the Mediterranean diet, particularly for individuals accustomed to Western-style diets. Limitations encompass the high cost of some of the principal foods such as extra-virgin olive oil, which can be 40% higher than conventional vegetable oils, and food preparation time, which is typically more than 90 minutes a day (Martínez-González et al., 2019). Additionally, limited availability of fresh seafood in inland regions may demotivate adherence to the diet's recommendations (Dinu et al., 2018).

Public health initiatives have shown promise in breaking down these barriers. Educational interventions promoting compliance with the Mediterranean diet have been shown to improve compliance rates by up to 58%, and subsidies for key ingredients like olive oil and nuts have made the diet more accessible to lower socioeconomic groups (Itsiopoulos et al., 2022). Culturally modified Mediterranean diets that maintain its basic principles but incorporate locally available foods have also been proven effective across a range of populations globally (Dinu et al., 2018).

### DASH Diet (Dietary Approaches to Stop Hypertension)

The DASH diet, originally developed for hypertension treatment, eventually gained acceptance as one of the finest dietary models for improving overall cardiovascular health (Appel et al., 1997). The diet is centered around fruits, vegetables, whole grains, lean protein, and low-fat dairy while limiting sodium, saturated fat, and added sugars (Sacks et al., 2017). Its well-balanced character makes it a perfect match for individuals suffering from blood pressure problems as well as those who desire overall better health (Siervo et al., 2015).

The DASH diet decreases blood pressure, reductions of 11.4 mmHg systolic and 5.5 mmHg diastolic compared with Western diets, as shown by clinical trials (Appel et al., 1997). These effects are because of its high content of potassium, magnesium, and calcium, which have an effect of blood pressure regulation and improvement in vascular function. Besides hypertension, the diet reduces coronary heart disease risk by 20% and stroke risk by 29% (Siervo et al., 2015; Filippou et al., 2020). Its low-calorie, nutrient-dense constitution is also beneficial in the control of weight as well as diabetes prevention (Juraschek et al., 2021).

Adoption challenges include reduced sodium intake, namely from restaurant and processed food (Sacks et al., 2017). Public health interventions promoting home food preparation and salt replacement (e.g., spices/herbs) can promote adherence (Greer et al., 2022). The DASH eating plan remains a science-supported framework for cardiovascular and overall well-being.

**Plant-Based Diets**

Vegetarian eating patterns are now science-based approaches to chronic disease prevention, which manifest benefits through their cumulative nutrient composition and the ensuing metabolic effects (Satija, Hu., 2018). From hardline veganism to flexitarian approaches, such eating patterns have typical attributes of high fiber consumption (≥30g/day), phytonutrient variability, and quality fatty acid patterns (Satija, Hu., 2018; Kahleova et al., 2023). New data show they modify gut microbiota composition (raising Bacteroidetes by 15-20%) and reduce systemic inflammation (CRP by -25%), explaining their health benefits beyond minimum nutrition.

Cardiovascular benefits are most strongly determined, where healthy plant diets (emphasizing whole foods) have 25% reduced coronary heart disease risk compared to animal-based diets (Kim et al., 2019). Protection is also extended to stroke risk decrease (18-22%) and improved endothelial function (FMD +2.1%) in excluding refined carbs (Kim et al., 2019).

Neuroprotective effects are increasingly valued, with high flavonoid/carotenoid plant consumption associated with 30% reduced cognitive decline. These impacts are found to be mediated by a number of mechanisms: reduced oxidative stress (MDA levels -35%), enhanced cerebral blood flow (CBF +15%), and augmented neurogenesis (Devranis et al., 2023).

**Low-Carbohydrate and Ketogenic Diets**

Low-carbohydrate and ketogenic diets constitute a great revolution of nutritional science, opposing conventional dietary recommendations with their unique metabolic effects. By carbohydrate restriction to below 50g or 20g daily respectively, these diets put people in a state of nutritional ketosis characterized by elevated blood ketone bodies (0.5-3.0 mM β-hydroxybutyrate) and a necessary change in fuel metabolism (Volek et al., 2021). This physiological transition between glucose and ketone body metabolism involves a number of cellular signaling pathways of widespread therapeutic significance, particularly for metabolic and neurological disorders (Newman, Verdin, 2017).

Clinical evidence also demonstrates particular efficacy in metabolic disease, with a 2022 randomized controlled trial demonstrating enhanced glycemic control in type 2 diabetics treated with an optimally formulated ketogenic diet compared with conventional treatment, with decrease in HbA1c by 1.5% versus 0.5%. These benefits over and above weight loss include increased cellular insulin sensitivity and reduced hepatic glucose production (Volek et al., 2021). These diets may also influence appetite regulation by altering ghrelin and leptin signaling, potentially providing long-term weight-control benefits.

The neurologic applications of ketogenic diets are another area of great potential, with research demonstrating improvement in cognitive performance in patients with mild cognitive impairment during ketosis (Phillips et al., 2021). These are considered to be mediated by improved mitochondrial function and reduced neuroinflammation (Newman, Verdin, 2017). Perhaps most dramatically, ketogenic diets are extremely beneficial for drug-resistant epilepsy, with meta-analyses of more than 50% reduction in seizures in 40-50% of children (Martin-McGill et al., 2020).

**Conclusions**

The systematic review of food role in the prevention of lifestyle disease makes evident the enormous impact food consumption and some nutrients have on outcomes. The modern diet, characterized by high consumption of processed foods, sugars, and saturated fat, is the leading cause of obesity, type 2 diabetes, cardiovascular disease, and certain cancers. On the other hand, healthier dietary patterns such as the Mediterranean diet, DASH diet, and plant-based diets confer significant protective effects against such chronic diseases.

The Mediterranean diet, rich in fruits, vegetables, whole grains, legumes, and olive oil, has been shown to reduce cardiovascular disease, improve glycemic control, and reduce the incidence of some cancers. The DASH diet, intended to manage hypertension, significantly lowers blood pressure and coronary heart disease and stroke risk. Plant-based diets, rich in fiber, antioxidants, and healthy fats, provide cardiovascular benefits, neuroprotection, and reduced cancer risk.

Low-carbohydrate and ketogenic diets that induce a state of nutritional ketosis possess therapeutic potential for metabolic and neurologic disease. Low-carbohydrate and ketogenic diets are shown to be useful in the treatment of glycemic control, cognition, and seizure frequency in drug-resistant epilepsy.

The review also identifies the destructive health effects of artificial food additives, excessive alcohol consumption, and energy drinks. Artificial food additives are involved in children's behavioral issues as well as carcinogenicity. Excessive alcohol consumption results in elevated risk levels of liver disease, cancer, as well as cardiovascular disorders, whereas energy drinks have been associated with adverse cardiovascular outcomes.

Western diet, characterized by high processed food intake, red meat, sweet drinks, and refined carbohydrates, is at high risk of developing chronic diseases. Overconsumption and markers of systemic inflammation and oxidative stress are induced by ultra-processed foods and contribute to the global burden of lifestyle diseases.

Population-level interventions to enhance healthier eating habits and reduced consumption of unhealthy foods and beverages are central to maximizing overall health effects. Educational interventions, subsidy on preferred foods, and cultural adaptation of healthy diets can potentially improve compliance and access.

In conclusion, understanding the importance of diet in preventing disease is instrumental to reducing the global burden of chronic diseases. Public health intervention and evidence-based dietary interventions can significantly impact the prevention of lifestyle disease and, ultimately, improve the quality of life and health outcomes of individuals worldwide.

**Disclosure**

**Author’s Contributions Statement:**

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All authors have read and agreed with the published version of the manuscript.

**Funding Statement:** This study did not receive any financial support from outside sources. All research activities were conducted independently of any external funding. No grants, sponsorships, or financial contributions were received that could influence the design, conduct, or outcomes of the review.

**Conflict of Interest Statement:** The authors declare that there are no conflicts of interest regarding the publication of this review. No financial or personal relationships have influenced the work reported in this manuscript

**Informed Consent Statement:** Not applicable.

**Data Availability Statement:** The authors confirm that the data supporting the findings of this study are available within the article's bibliography.

**Acknowledgments:** Not applicable.

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