

Impact of Nutrition and Lifestyle on the Development of Non-Communicable Diseases: A Review

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ABSTRACT

Non-communicable diseases include conditions such as obesity, diabetes, heart disease, and hypertension. Unlike infectious diseases, these are not caused by germs but develop gradually due to our daily habits. In recent years, non-communicable diseases have become a major health concern all over the world. These diseases are mainly caused by unhealthy eating habits, lack of physical activity, stress, and poor lifestyle choices. One of the most important factors behind these diseases is poor nutrition. Many people today consume excessive amounts of fast food, sugary drinks, and processed foods. These foods are high in fats, sugar, and salt, but low in essential nutrients. At the same time, modern lifestyle has become more sedentary. People spend long hours sitting, using mobile phones, computers, or watching television. This lack of physical activity leads to weight gain and increases the risk of chronic diseases. Stress is another major factor. Busy schedules, work pressure, and lack of proper rest negatively affect both mental and physical health. The aim of the study is to synthesize existing literature on the relationship between nutrition and non-communicable diseases. The study also discusses public health implications and future directions for nutritional strategies aimed at reducing the global burden of non-communicable diseases.

Keywords: Diet, Nutrition, Eating Habits, Lifestyle, Non-communicable diseases

INTRODUCTION

Non-communicable diseases (NCDs), include a group of chronic conditions like cardiovascular diseases (CVDs), type 2 diabetes mellitus, obesity, hypertension, metabolic syndrome, and certain types of cancer. These diseases are largely driven by unhealthy dietary habits, physical inactivity, tobacco use, and harmful use of alcohol (World Health Organization [WHO], 2023). Globally, NCDs account for nearly three-fourths of all deaths, with a disproportionately high burden in low- and middle-income countries undergoing rapid urbanization and economic transition (Afshin *et al.*, 2019).

Over the past few decades, significant changes in food systems and dietary patterns have occurred worldwide. Traditional diets rich in whole grains, fruits,

vegetables, and minimally processed foods have been replaced by diets high in refined carbohydrates, saturated fats, added sugars, salt, and ultra-processed foods (Popkin *et al.*, 2020; Monteiro *et al.*, 2018). This phenomenon, known as the nutrition transition, has been strongly adhered with rising prevalence of obesity, diabetes, and cardiovascular diseases (Malik *et al.*, 2013).

Nutrition plays an important role in the prevention and management of non-communicable diseases by managing body weight, lipid profiles, blood pressure, glucose metabolism, inflammation, and oxidative stress (Hu, 2011; Mozaffarian *et al.*, 2018). Evidence from epidemiological and clinical studies suggests that healthy dietary patterns like the Mediterranean diet, DASH diet, and plant-based diets significantly lower the risk of major NCDs (Satija and Hu, 2018; Willett *et al.*, 2019).

Rapid urbanization, sedentary lifestyles, and

increased consumption of energy-dense foods have contributed to a sharp rise in non-communicable diseases, particularly cardiovascular diseases and diabetes (Gupta *et al.*, 2017; Bhattacharya and Pal, 2021). Understanding the role of nutrition in the development and prevention of lifestyle diseases is therefore necessary for designing effective public health interventions.

The aim of the study is to critically examine the relationship between nutrition and non-communicable diseases and discusses public health implications and future directions for nutritional strategies aimed at reducing the global burden of non-communicable diseases.

METHODOLOGY

This review study adopts a systematic approach to identify, select, and analyze relevant literature related to the research topic. A comprehensive search of academic sources was conducted using various journal, books, and official reports.

The selected studies were carefully reviewed, and relevant data were extracted and organized. A thematic analysis approach was employed to categorize the findings into meaningful themes and patterns.

RESULTS AND DISCUSSION

Meaning of Non-communicable Diseases:

Non-communicable diseases are chronic disorders primarily associated with dietary habits and lifestyle choices. Important risk factors include unhealthy diets, physical inactivity, tobacco use, excessive alcohol consumption, and chronic stress. These diseases develop gradually and often remain asymptomatic in early stages, leading to delayed diagnosis and increased complications. Common non-communicable diseases include, Obesity and overweight, Type 2 diabetes mellitus, Cardiovascular diseases, Hypertension, Dyslipidemia, Certain cancers . Nutrition influences these diseases both directly and indirectly by affecting body weight, metabolic health, inflammation, oxidative stress, gut microbiota, and hormonal regulation.

Nutrition Transition and Non-communicable Diseases:

The nutrition transition means to shifts in dietary intake and energy expenditure patterns that occur

alongside economic growth, urbanization, and technological advancement. These shifts are characterized by increased consumption of animal-source foods, edible oils, sugar-sweetened beverages, and ultra-processed foods, along with reduced physical activity (Popkin *et al.*, 2020). Ultra-processed foods, as classified by the NOVA system, are typically high in calories, unhealthy fats, salt, and added sugars, and low in dietary fiber and micronutrients. High intake of such foods has been linked with obesity, metabolic syndrome, hypertension, and cardiovascular diseases (Monteiro *et al.*, 2018; Afshin *et al.*, 2019).

In developing countries, the nutrition transition has resulted in a double burden of malnutrition, where undernutrition and micronutrient deficiencies coexist with overweight, obesity, and lifestyle diseases. In India, changing food habits, increased over reliance on packaged foods, and declining physical activity have significantly contributed to increasing rates of diabetes and cardiovascular diseases (Gupta *et al.*, 2017; Bhattacharya and Pal, 2021).

Several studies have focused that diets rich in whole grains, fruits, vegetables, legumes, and healthy fats offer protection against non-communicable diseases, whereas western-style dietary patterns increase disease risk (Schwingshackl *et al.*, 2017; Willett *et al.*, 2019). These findings underscore the importance of promoting traditional and culturally appropriate diets as part of non-communicable disease prevention strategies.

Role of Nutrition in Major Non-communicable Diseases:

Obesity:

Obesity is a major public health concern and a main risk factor for several non-communicable diseases. It results primarily from an imbalance between energy intake and energy expenditure, often driven by diets rich in refined carbohydrates, saturated fats, sugar-sweetened beverages, and ultra-processed foods (Malik *et al.*, 2013; Monteiro *et al.*, 2018). Less intake of dietary fiber, fruits, and vegetables further contributes to more weight gain by reducing satiety and impairing metabolic regulation (Slavin, 2013).

Obesity is associated with chronic low-grade inflammation, insulin resistance, and dyslipidemia, which significantly increase the risk of type 2 diabetes, cardiovascular diseases, and certain cancers (Hu, 2011; Afshin *et al.*, 2019).

Type 2 Diabetes Mellitus:

Type 2 diabetes mellitus is strongly influenced by dietary habits and body composition. Diets rich in refined grains, added sugars, and sugar-sweetened beverages lead to repeated postprandial glucose spikes, increasing insulin demand and eventually resulting in insulin resistance (Hu, 2011). Evidence from systematic reviews suggests that high consumption of whole grains, legumes, fruits, and vegetables is associated with a reduced risk of type 2 diabetes (Schwingshackl *et al.*, 2017).

Micronutrients such as magnesium and dietary antioxidants also play a supportive role in glucose metabolism and insulin sensitivity (Mozaffarian *et al.*, 2018). Plant-based dietary patterns have shown consistent benefits in diabetes prevention and glycemic control (Satija and Hu, 2018).

Cardiovascular Diseases:

Cardiovascular diseases remain the leading cause of mortality worldwide. Dietary factors including high intake of saturated fats, trans fats, cholesterol, and sodium are strongly associated with dyslipidemia, hypertension, and atherosclerosis (Micha *et al.*, 2017; Afshin *et al.*, 2019). In contrast, diets rich in omega-3 fatty acids, dietary fiber, antioxidants, and plant sterols are cardioprotective (Calder, 2017; Slavin, 2013).

Dietary patterns such as the Mediterranean diet and DASH diet have been extensively studied and shown to significantly reduce cardiovascular risk factors, including blood pressure and serum cholesterol levels (Sacks *et al.*, 2001; Willett *et al.*, 2019).

Hypertension:

Hypertension is closely linked to excessive sodium intake, low potassium consumption, obesity, and inadequate intake of fruits and vegetables. Processed and packaged foods are major contributors to high dietary sodium intake (WHO, 2022). Epidemiological evidence indicates that reducing sodium intake and increasing consumption of potassium-rich foods can effectively lower blood pressure (Sacks *et al.*, 2001).

The DASH diet, which emphasizes fruits, vegetables, whole grains, low-fat dairy products, and reduced sodium intake, has been proven effective in both prevention and management of hypertension (Sacks *et al.*, 2001).

Cancer:

Dietary factors are estimated to contribute to approximately 30–35% of all cancer cases globally. High consumption of processed meats, red meats, alcohol, and energy-dense foods is associated with increased risk of colorectal, breast, and prostate cancers (World Cancer Research Fund/AICR, 2018). Conversely, diets rich in fruits, vegetables, whole grains, and dietary fiber provide protective effects through antioxidant activity, modulation of hormone metabolism, and reduction of inflammation (Fung and Brown, 2013; Willett *et al.*, 2019).

Mechanisms Linking Nutrition to Non-communicable Diseases:

Nutrition influences the development of non-communicable diseases through several interrelated biological mechanisms. Diets high in refined carbohydrates and saturated fats promote chronic systemic inflammation, a key underlying factor in obesity, diabetes, cardiovascular diseases, and cancer (Calder, 2017; Hu, 2011). In contrast, anti-inflammatory dietary patterns rich in fruits, vegetables, whole grains, and omega-3 fatty acids help reduce inflammatory biomarkers (Satija and Hu, 2018).

Oxidative stress is another important mechanism linking poor nutrition to chronic diseases. Diets low in antioxidants increase free radical production, leading to cellular and DNA damage (Mozaffarian *et al.*, 2018). Antioxidants and phytochemicals from plant-based foods play a protective role by neutralizing free radicals.

Emerging evidence also highlights the role of gut microbiota in metabolic health. Dietary fiber and prebiotics promote beneficial gut bacteria, which influence energy metabolism, immune function, and inflammation (Slavin, 2013). Disruption of gut microbiota due to poor dietary habits has been associated with insulin resistance and obesity.

Role of Nutrition in Prevention and Management of Non-communicable Diseases:

Nutrition-based interventions are among the most cost-effective and sustainable strategies for preventing and managing non-communicable diseases. International guidelines consistently recommend diets rich in whole grains, fruits, vegetables, legumes, lean proteins, and healthy fats, along with reduced intake of sugar, salt, and saturated fats (WHO, 2023; ICMR–NIN, 2020).

Clinical and population-based studies demonstrate that dietary modification improves glycemic control, lipid profiles, and blood pressure, thereby reducing the risk of complications associated with non-communicable diseases (Afshin *et al.*, 2019; Micha *et al.*, 2017). Nutrition education, behavior change communication, and culturally appropriate dietary guidelines are critical components of effective interventions, particularly in low- and middle-income countries.

Personalized nutrition approaches that consider genetic, cultural, and socioeconomic factors are increasingly recognized as effective tools in non-communicable disease management (Mozaffarian *et al.*, 2018).

Public Health Implications:

The rising burden of non-communicable diseases poses significant challenges to healthcare systems worldwide. Nutrition-focused public health strategies, including food labeling, regulation of trans fats, taxation of sugar-sweetened beverages, and promotion of traditional diets, have shown promise in reducing dietary risk factors (Afshin *et al.*, 2019; WHO, 2023).

In India, national initiatives such as dietary guidelines issued by the ICMR and community-based nutrition programs play a vital role in addressing the growing burden of non-communicable diseases (ICMR–NIN, 2020; Gupta *et al.*, 2017). Multi-sectoral collaboration involving health, agriculture, education, and food industries is essential for creating supportive food environments.

Conclusion:

Nutrition plays a fundamental role in the development, prevention, and management of non-communicable diseases. The global rise in non-communicable diseases is closely linked to unhealthy dietary patterns and sedentary lifestyles. Evidence from epidemiological, clinical, and policy research consistently supports the protective role of balanced diets rich in plant-based foods, whole grains, and healthy fats in reducing disease risk.

Strengthening nutrition education, promoting healthy food environments, and integrating nutrition into public health policies are critical for reducing the burden of non-communicable diseases, particularly in developing countries experiencing rapid nutrition transition.

Future Directions:

Future research should adopt a long-term perspective to better understand the sustained effects of different dietary patterns on the onset, progression, and management of non-communicable diseases. There is a growing need to explore the role of functional foods and nutraceuticals in disease prevention and health promotion, particularly their efficacy, safety, and mechanisms of action. Additionally, emerging evidence highlights the importance of gut microbiome–diet interactions in metabolic health, immunity, and chronic disease risk, warranting deeper investigation in diverse populations. Research should also prioritize the development of culturally appropriate, affordable, and sustainable dietary interventions that can be effectively implemented in low- and middle-income settings. Overall, advances in nutritional science, supported by strong public policies and active community engagement, have the potential to substantially reduce the global burden of non-communicable diseases and improve population health outcomes.

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