

Nutritive Synergy and Dietary Biodiversity as Determinants of Long-Term Health Outcomes

Nika Lovrinčević Pavlović^{1*}, Ivan Miškulin¹, Ivana Kotromanović Šimić¹, Darko Kotromanović¹, Ivan Vukoja¹, Matea Matic Ličanin¹, Jelena Kovačević¹, Maja Miškulin¹

Josip Juraj Strossmayer University of Osijek, Faculty of Medicine Osijek, J. Huttlera 4, Osijek 31000, Croatia

INTRODUCTION: Nutritive Synergy and Diversity

A varied and balanced diet is essential for achieving optimal nutritional status and long-term health. The concept of nutritional synergy highlights the enhanced physiological effects that result from the interaction of nutrients and bioactive compounds from diverse food sources.

The Mediterranean Diet (MeD) is a nutritionally and ecologically balanced model that fits within the “One Health” concept—promoting human, planetary, and food system health.

Defined by UNESCO (2010) as an Intangible Cultural Heritage of Humanity, the MeD embodies not only food but lifestyle, social connection,

and cultural identity—all essential for wellbeing and healthy ageing. This review aims to explore the role of dietary diversity and nutrient synergy in disease prevention and health promotion.



METHODS: Literature and Policy Review

This findings are synthesis from recent epidemiological studies, systematic reviews, and key public health documents (e.g., WHO, FAO, EFSA). The focus was placed on dietary patterns considered nutritionally beneficial and on initiatives aimed at promoting greater diversity in food consumption. Particular attention was given to plant-based whole foods, which are strongly linked to reduced morbidity and mortality, increased longevity, and improved life quality.

RESULTS & DISCUSSION: Positive Effects on Diverse Diets

Dietary diversity supports a more resilient gut microbiota, increases levels of beneficial long-chain unsaturated fatty acids, and reduces bile acids linked to insulin resistance and inflammation. In children, diverse diets contribute to the development of a healthy gut microbiome, which may reduce the risk of allergies later in life. Evidence consistently links greater dietary variety with a reduced risk of obesity, cardiovascular disease, diabetes, certain cancers, and all-cause mortality.



The MeD exemplifies the health benefits of traditional, biodiversity-based food practices and shows the most beneficial overall effect on health. It is highly recommended as a dietary intervention for the prevention and management of cardiometabolic and endocrine disorders.

As a non-pharmacological and natural strategy, the MeD helps counter oxidative stress and supports longevity and healthy ageing. Primarily plant-based, it is partly omnivorous and adaptable, varying by country and local food biodiversity. Smaller and more frequent meals, characteristic of this pattern, further contribute to metabolic stability and improved satiety. Additional examples of biodiversity-driven nutrition and public health promotion include educational programs such as the „Colorful Plate” concept and „Color Your Plate” pilot studies, local food systems supported by *urban gardens* and farmers’ markets, as well as EU strategies like *Farm to Fork* Strategy and the EU Biodiversity Strategy for 2030.

In contrast, many populations in developing regions face severe malnutrition, weakened immune systems, and multiple micronutrient deficiencies due to poor dietary intake and lack of awareness about traditional, nutrient-rich diets and ecofriendly organic farming methods.



Promoting education on sustainable nutrition, traditional food systems, and local biodiversity is therefore essential to improve global health and resilience.



CONCLUSION: A Multidisciplinary Approach

A multidisciplinary approach that integrates nutrition, medicine, agriculture, and cultural practices is essential for building healthier and more sustainable food systems. Recognizing food not only as a fuel but as a form of preventive medicine highlights its critical role in public health. Ultimately, a wide variety of nutrient-rich foods remains one of the most powerful tools for promoting lifelong health and resilience.

REFERENCES:

- Chatzianagnostou K, Del Turco S, Pingitore A, Sabatino L, Vassalle C. The Mediterranean Lifestyle as a Non-Pharmacological and Natural Antioxidant for Healthy Aging. *Antioxidants*. 2015; 4(4):719–736.
- Dimopoulou M, Androutsos O, Kipourou M, Bargiota A, Gortzi O. Culinary Medicine in Type II Diabetes Mellitus Management: A Narrative Review of Randomized Clinical Trials on Dietary Interventions (Nutritional Profiles of Meals and Snacks, Timing, Preparation and Key Considerations). *Diabetology*. 2025; 6(8):72.
- Koliaki CC, Katsilambros NL, Dimosthenopoulos C. The Mediterranean Diet in the Era of Climate Change: A Reference Diet for Human and Planetary Health. *Climate*. 2024; 12(9):136.
- Bhardwaj RL, Parashar A, Parewa HP, Vyas L. An Alarming Decline in the Nutritional Quality of Foods: The Biggest Challenge for Future Generations’ Health. *Foods*. 2024; 13(6):877.
- Kostecka M. The Effect of the “Colorful Eating Is Healthy Eating” Long-Term Nutrition Education Program for 3- to 6-Year-Olds on Eating Habits in the Family and Parental Nutrition Knowledge. *Int J Environ Res Public Health*. 2022;19(4):1981.
- https://food.ec.europa.eu/horizontal-topics/farm-fork-strategy_en?
- https://environment.ec.europa.eu/strategy/biodiversity-strategy-2030_en?