



## Original Research

# Saving the Environment – One Food-Based Dietary Guideline at a Time

**Antonia Bahr<sup>1\*</sup>, Sara Coimbra Lopes<sup>1\*</sup>, Pauline Grohne<sup>1\*</sup>, Ariane Herberg<sup>1\*</sup>,  
Gabriela Samková<sup>1\*</sup>, Mohammed Ba Shoaib<sup>1</sup>, Suzanne Babich<sup>2</sup>**

<sup>1</sup>Department of Public Health, Governance and Leadership in European Public Health Programme, FHML, Maastricht University, Maastricht, The Netherlands.

<sup>2</sup>Richard M. Fairbanks School of Public Health, Indiana University, Indiana, United States of America.

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**Corresponding author:** Pauline Grohne

Faculty of Health, Medicine and Life Sciences, Maastricht University

Address: Universiteitssingel 40, 6229 ER Maastricht, The Netherlands

Email: [pauline.grohne@icloud.com](mailto:pauline.grohne@icloud.com)



## Abstract

**Background:** Food systems are major contributors to climate change, accounting for one-third of global greenhouse gas emissions. Transitioning to plant-based diets, reducing food waste, and emphasizing local, seasonal foods are key steps towards sustainability. How well are these concepts reflected in food-based dietary guidelines (FBDG) of European Union (EU) Member States?

**Results:** This policy brief uncovers significant disparities: While Estonia, Finland, Sweden, Denmark, and Germany incorporate sustainability extensively into their FBDG, others – Cyprus, Greece, Hungary, and the Czech Republic – fail to address it at all. Most Member States only partially include sustainability elements, limiting the potential for coherent action across the EU.

**Conclusion:** To bridge this gap, EU Member States must harmonize their approach to sustainability in FBDG. Key recommendations include prioritizing plant-based diets, tackling food waste, and emphasizing culturally relevant organic, local, and seasonal food options. Leveraging public interest groups and EU frameworks can ensure broader stakeholder engagement and drive meaningful change. Sustainability must become the core of dietary guidance across Europe – aligning public health with planetary health.

**Keywords:** Food-based Dietary Guidelines, Sustainability, European Union, Member States

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## Introduction

### Problem Statement

Climate change is an urgent problem worldwide, with catastrophic consequences including decreased biodiversity and drinkable water, increased droughts, wildfires and deaths, among others (1). Greenhouse gas (GHG) emissions are contributors and approximately one-third of human-made sources are linked to the food system (2). In Europe, agriculture contributes more than 10% of the total European Union (EU) GHG (3). Animal-based food production represents the largest share. Plant-based foods have a lower impact, as their production requires fewer resources, including less energy, water and land (2).

The United Nations (UN) recommends a shift to plant-based food systems with diets rich in beans, lentils and nuts, and fewer animal-based foods. Barriers to this change have been identified, including a preference for animal-based foods in the diet and their associations with livelihoods in many cultures worldwide. Research on the topic has neglected the social and cultural aspects of diets, which impact the willingness of populations to change their eating habits (4). Other barriers relate to accessibility of fresh fruits and vegetables, convenience of food preparation, lack of nutrition knowledge and related concerns about the effects of diet on health, and emotional factors (5). Additionally, food waste and transportation routes also require attention, since they contribute to approximately 8% of global GHG emissions (2).

Taking sustainability into account in food-based dietary guidelines (FBDG) can help raise consumers' awareness of the impact of their diets on climate change. Therefore, this policy brief aims to examine how sustainability is integrated in FBDG in European Union Member States (MS), identify best practices, and suggest recommendations for improvement.

### Definition of sustainable diets

We use the definition of sustainable diets of the Food and Agriculture Organization of the United Nations (6). It states that sustainable diets *“are those [...] with low environmental impacts which contribute to food and nutrition security and to healthy life for present and future generations. Sustainable diets are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources”* (7).

### Aims

We assessed sustainability aspects of the FBDG in the 27 EU MS that were applied in February 2025. The FBDGs were assessed between November 2024 and February 2025. To operationalise sustainability in the existing FBDG, four aspects were identified and evaluated: plant-based diets, food waste, organic foods, and seasonal and local food. Recommendations to improve and extend existing FBDG are proposed.

**Plant-based diets:** Based on a definition provided by PubMed, plant-based diets *“emphasize the consumption of plant foods, such as grains, fruits, vegetables, nuts, and legumes while*



*reducing the intake of animal-based foods*” (8). Any reference to reductions in the consumption of animal-sourced foods and/or increase of plant-sourced foods account for this category.

**Food waste** can be defined as “[...] *the discard of edible foods at the retail and consumer levels [...]*” (6). Any reference to measures to reduce food discarded accounts for this category (6).

**Organic food** refers to food produced in agriculture that adheres to nationally regulated standards that restrict the use of pesticides, non-organic fertilisers, genetic engineering, growth hormones, irradiation, antibiotics, and non-organic animal feed (9). Any reference related to the reduction of any of the aspects above and increased consumption of food derived from organic agriculture accounts for this category.

**Seasonal and local foods** are defined as food produced outdoors or during the natural growing period for the country where it is produced, without the use of high energy production techniques for climate modification, such as cold storage and heated glasshouses, and consumed within the political boundaries of a country (10). Any reference to reductions in transport, preference for food produced within short distances of the selling point, or within the natural growing period accounts for this category.

#### **Results: Status of FBDG in the EU**

The extent to which each area of sustainability is taken into account in the FBDG in the EU was reviewed and scored from 1 to 4. The results can be found in Table 1.



Table 1: Sustainability Analysis of the FBDG in the EU MS

27 EU Countries	Food Waste	Organic Foods	Plant-Based Diets	Seasonal and Local	Score
Denmark (11)	1	1	1	1	4
Estonia (12, 13)	1	1	1	1	4
Finland (14)	1	1	1	1	4
Germany (15)	1	1	1	1	4
Sweden (11)	1	1	1	1	4
Austria (16)	0	1	1	1	3
France (17)	0	1	1	1	3
Lithuania (18)	1	0	1	1	3
Netherlands (19)	1	0	1	1	3
Spain (20)	0	1	1	1	3
Belgium (21)	0	0	1	1	2
Bulgaria (22)	0	0	1	1	2
Ireland (23)	0	0	1	1	2
Latvia (24)	0	0	1	1	2
Malta (25)	0	0	1	1	2
Romania (26)	0	0	1	1	2
Slovakia (27)	0	1	0	1	2
Slovenia (28)	0	0	1	1	2
Croatia (29)	0	0	0	1	1
Italy (30)	1	0	0	0	1
Poland (31)	0	0	1	0	1
Portugal (32)	0	0	0	1	1
Cyprus (33)	0	0	0	0	0
Czech Rep. (34)	0	0	0	0	0
Greece (35)	0	0	0	0	0
Hungary (36)	0	0	0	0	0
Luxembourg (37)	-	-	-	-	-
<b>Total per category</b>	<b>8</b>	<b>9</b>	<b>18</b>	<b>20</b>	

Denmark, Estonia, Finland, Germany, and Sweden lead MS in fulfilling all of the predefined sustainability aspects. Their FBDG were mostly published between 2021 and 2025, Five MS scored three points for sustainability in their FBDG (France, Lithuania, Netherlands, Spain, Austria), while eight only fulfilled two aspects (Belgium, Bulgaria, Ireland, Latvia, Malta, Romania, Slovakia, Slovenia). Four MS only address one criterion (Croatia, Italy, Poland, Portugal), while four MS do not take sustainability into account at all (Cyprus, Czech Republic, Greece, Hungary). Luxembourg could not be assessed individually, because they rely on the FBDG in Europe in general (37). Most MS focus on seasonal and local food (n=18), and/or address plant-based foods (n=20) in their FBDG. Food waste and organic foods are only considered by nine MS each in their guidelines, respectively.



### **Discussion: Best Practice-MS in FBDG**

Estonia, Finland, Sweden, Denmark, and Germany address all four aspects of sustainability in their FBDG and thus will be used as examples of best practices. The most recent guidelines are, as expected, more comprehensive and intervene on a broader scope. Denmark, Finland, and Sweden use the Nordic Nutrition Recommendations 2023, which explicitly address sustainability based on the predefined aspects and therefore, the countries reach the maximum score (11). Estonia has the most recently published FBDG (2025) among all MS and is similarly based on the Nordic Nutrition Recommendations, adapted to its own needs (12). In the latest guidelines, all aspects are covered except organic foods; however, this aspect is explicitly addressed on the official Ministry of Health website (13). Germany has focused on the concept of One Health, with tailored recommendations for both human and animal welfare throughout the food chain (15). Older guidelines, on the contrary, show a need for an update, especially on sustainability recommendations.

To note, Slovenia has promising prospects of implementing a new FBDG by next year, emphasizing sustainability and the environment (27).

During the assessment, the different use of language was challenging, especially for the areas of *plant-based diets* and *organic food*. The absence of clear guidelines regarding the terminology raises concerns about communication of FBDG across cultures due to the lack of harmonised concepts and definitions. Furthermore, while organic diets are perceived as healthier and more environmentally friendly, they are also associated with higher monetary costs (38), which could be one of the reasons why some MS do not include organic foods in their FBDG. As the FBDG are applied to the whole population, it must be sensible of the different existent socioeconomic status. Therefore, improving the conditions to provide better accessibility is crucial to further implement sustainability into the FBDG.

The different approaches to creating and presenting the FBDG to the public was also striking, as some countries have created websites providing recommendations for healthy living (for example, Estonia, and Slovenia). The Nordic Nutrition Recommendations are comprehensive documents, approximately 300 pages in length. These countries were highly transparent and engaged with stakeholders throughout the process of creating the guidelines (11).

Using the FBDG from Estonia, Finland, Sweden, Denmark, and Germany as guidance for the other EU MS, it must be kept in mind that the adaptation of best practices must be culturally and politically feasible. Therefore, a short contextual analysis shows how *political*, *social*, *economic*, and *organizational* aspects might influence the consideration of sustainability.

In terms of *politics*, Estonia, Finland, and Germany are operating in a parliamentary democracy, while Denmark and Sweden are characterized by a constitutional monarchy with a parliamentary democracy (39-43).



*Social opinion* about plant-based diets has gradually aroused more interest reflecting broader European trends toward sustainability and health consciousness in Estonia, even though rural areas remain more conservative in their food preferences (44). Known for its strong welfare system, Finland is a leader in integrating sustainability into public policy, including health and dietary guidelines (40). Sweden is known for a high level of social equality, a comprehensive welfare system, ranking high in press freedom, gender equality and public health (43). In Denmark, the standards of living are high with universal healthcare, free education, social safety nets, and low-income inequality. Also, social cohesion is supported by a focus on gender equality, progressive family policies, and robust support for vulnerable populations in Denmark (42). In Germany, social equality and public welfare are key pillars, though regional disparities and demographic challenges persist (41). The German government has expressed its commitment to promoting sustainable and healthy nutrition for the German population. To this end, a nutrition strategy for the future of Germany has been developed, involving stakeholder participation from citizens (45). Reflecting growing dietary shifts, 8.12 million German citizens, roughly 10% of the whole population, identified as vegetarian in 2023 (46, 47). Equity is a central value that all five best practice MS share, and sustainability is considered in other areas beyond nutritional guidelines.

In terms of *economy*, Estonia is below the EU average, facing challenges due to the War in Ukraine, although it has gradually been growing (39). Finland has a highly developed and open market economy, consistently ranking among the most innovative and sustainable economies in the world (40). The economy in Sweden is export-oriented and the population's income is comparably high. Public finances are strong, with a relatively low debt-to-GDP ratio (43, 48). The Danish economy benefits from extensive government welfare programs and a high GDP per capita (49). The public debt ratio is low as well (42). Known for its strong social market economy, Germany combines robust export-oriented industries with comprehensive social welfare programs. The economy is one of the largest globally (41). These examples showcase that the consideration of sustainability can work in MS with strong industries and public finances, as well as in MS that are currently challenged by crises.

In regard to *organisational conditions*, Sweden's focus on sustainability and innovation is evident in its emphasis on renewable energy and environmental initiatives (43). Finland is committed to addressing environmental challenges while improving public health (50). Public opinion generally supports sustainable food choices, and non-governmental organizations (NGO) play an active role in promoting awareness and policy advocacy (51). Finland's approach reflects a broader shift within the EU toward creating sustainable and health-conscious societies. The German government has expressed its commitment to promoting sustainable and healthy nutrition for the German population. To this end, a nutrition strategy for the future of Germany has been developed, involving stakeholder participation from citizens (45). Stakeholders that emphasise a sustainable diet in Estonia include the Health Development Institute ("*Tervise Arengu Instituut*"), Organic Estonia, The Estonian Chamber of Agriculture and Commerce, and The Estonian Food Industry Association (39, 44). Most of



the best practice examples indicate high public and NGO interest in integrating sustainability in nutrition, which might support the acceptance and implementation of the FBDG by consumers. As for availability and access, from 2017-2022, according to FAO's food balance, except for Estonia and Germany, the other three countries have decreased their overall availability of animal products (meat, eggs and fish), with a particular reduction of meat. The most significant decrease happened in Denmark, followed by Finland and Sweden. Germany maintained the overall availability, and Estonia increased it. On the contrary, the availability of pulses, nuts, cereals and fruits has increased in four of the MS, with the exception of Germany, which has shown a decrease (52).

In all, best practice examples of the MS for addressing sustainability in FBDG are structured by a parliamentary democracy and share values such as equity. They also consider sustainability in other areas, such as renewable energies. Beyond that, consumer interest groups and NGO, which are strengthening public opinion on sustainability with regards to nutrition, might support a successful integration. It can be assumed that MS with similar characteristics could be more likely to implement the predefined criteria of sustainability in their FBDG compared to countries with diverging characteristics.

At the European level, efforts have been made to harmonise the concept of sustainability in all food-related policies with the legislative framework for sustainable food systems (FSFS). This framework was expected in 2024; however, it has been delayed. A sustainability labelling framework is also expected, which will clarify the direction in which the concept should be applied to the different FBDG (53). Without it, it is likely that the divergences observed will continue and that efforts to reduce emissions through the food system will fall short of expectations.

## **Conclusion**

To conclude, MS that have not addressed all or most of the four aspects of sustainability could consider the MS best practices as guidance. The following recommendations are given:

- Include measures for all four sectors of sustainability in the FBDG: organic food, food waste, plant-based diets, and seasonal and local food;
- Adapt recommendations for cultural feasibility;
- Promote measures that increase accessibility;
- Integrate stakeholder input to strengthen public opinion on sustainability;
- Harmonization of vocabulary of sustainability in FBDG, which allows easier comparisons and transferability between countries.

Due to cultural, political, economic, structural and social differences, it can be expected that for some MS it will be more difficult to implement all the recommendations. However, our reflection has shown that MS with different economies, cultural habits, social opinions and organisational conditions can achieve best practices if the political ambition is there. The adaptation of sustainability into FBDGs is critical due to the increased threat of global





warming. Releasing the FSFS as a legislative framework could encourage MS to implement and adhere to sustainability aspects in their FBDG, while sustainability labelling could lead customers towards more sustainable nutritional choices.

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