

Importance of considering environmental sustainability in dietary guidelines

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See [Articles](#) page e344

The composition of diets and the quality of foods we eat have direct effects on our health and wellbeing. The indirect health effects caused by environmental changes associated with the processes of producing the foods for the diets, are less recognised. Because the aim of national dietary guidelines is to provide advice for constructing healthy diets, the guidelines should arguably consider both direct and indirect health consequences of the nutritional recommendations.

Food systems are one of the main contributors to environmental changes such as climate change, land use, and water and air pollution, accounting for about 19–29% of all anthropogenic greenhouse gas emissions¹ and having a substantial impact on most planetary boundaries that determine the safe operating space for humanity.² At the same time, food systems are also heavily affected by environmental changes that can have major health implications because of reductions in yields and alterations of the nutritional composition of crops if adequate adaptation technologies are not developed.^{3,4}

Ensuring food and nutrition security in the future requires urgent actions for both mitigation and adaptation to environmental changes in all parts of food systems. The study in *The Lancet Planetary Health* by Nicole Blackstone and colleagues⁵ contributes to this important debate by highlighting the environmental footprint of three different diets recommended in the 2015–20 Dietary Guidelines for Americans:⁶ the healthy US-style, healthy Mediterranean-style, and healthy vegetarian dietary patterns. By assessing six categories of environmental impacts (climate change, land use, water depletion, freshwater eutrophication, marine water eutrophication, and particulate matter or respiratory inorganics), they established that the healthy vegetarian diet produced a 42–84% lower burden than the other two diets for all impacts except water depletion, which was similar between the three diets.

Blackstone and colleagues⁵ call for better incorporation of environmental sustainability aspects into future dietary guidelines, because the 2015–20 Dietary Guidelines for Americans considered sustainability aspects to be beyond the scope of the guidelines. By contrast, the Nordic

nutritional recommendations⁷ adopt a more holistic view by including guidance for reducing the environmental impact of diets, such as to choose meat and fish with low environmental impacts, replace livestock products with plant-based protein sources, consume seasonal fruits and vegetables, and reduce food waste.⁷ Additional guidelines for optimising the health and environmental outcomes of diets are indeed needed because diets recommended in healthy eating guidelines could have even greater environmental impacts than the current average diet. Birney and colleagues⁸ showed that switching from the current average American diet to the healthy US-style diet recommended in the Dietary Guidelines for Americans⁶ would increase energy use, blue water footprint, and fertiliser use. This would be mainly caused by the recommendation to substantially increase the intake of fruits, vegetables, and dairy products. However, the protein food group recommendations, including red meat, poultry, and seafood produced a similar impact to that of the current average US diet. Much evidence has shown that plant-based diets have both health and environmental benefits.⁹ Therefore, incorporation of sustainability in the dietary recommendations would require inclusion of advice to replace livestock products with plant-based alternatives.

One of the major challenges of switching to plant-based diets is changing the consumer preferences, because meat is an important part of American food culture. Developing better alternatives to livestock products can improve the attractiveness of reducing the intake of animal-based foods. Cellular agriculture, for example, uses cell-culture technologies for producing agricultural products, and therefore, provides possibilities to produce foods that closely imitate livestock products.¹⁰ Cultured meat (ie, in-vitro meat, clean meat, or laboratory-grown meat) is one of the applications of cellular agriculture and is produced by cultivating livestock cells in a bioreactor in nutrition medium. Cellular agriculture also involves processes in which microbes, such as yeast, fungus, or bacteria synthesise proteins (eg, milk or egg albumin) that are used as food ingredients. Some studies have indicated that cellular agriculture could have major environmental

benefits over livestock production if the processes could be efficiently scaled up.^{11,12}

Further research is needed to establish the consequential environmental impacts of dietary changes. A major reduction in livestock production would release large areas of land for other uses, as production of animal-based protein requires more land than plant-based protein. Therefore, the total consequential impacts of the dietary switch would depend on the way the released land would be used.

The integration of sustainability in all policies is essential to minimise environmental challenges. Recommendations for healthy diets are not complete if they ignore the indirect health impacts caused by environmental changes associated with food production and consumption. In addition to dietary change, improvements in the sustainability of food systems require further efforts for reducing the environmental burden of agriculture and food production, decreasing food waste, and improving the adaptation capacity of food systems to environmental changes.

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I declare no competing interests.

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