



Defining “sustainable” and “healthy” diets in an era of great environmental concern and increased prevalence of chronic diseases

Dear Sir:

We appreciate that Macdiarmid et al (1) in their article in a recent issue of the Journal seek diet-related solutions to mitigate climate change. Their study showed that reducing meat and dairy product consumption in the United Kingdom could lower greenhouse gas emissions (GHGEs) by 36%. Because of their concern for nutrient deficiencies and palatability, animal products were predominantly featured in their menus, whereas certain plant-based foods were excluded or used in limited quantities. Recognizing that they did not address other key factors that affect the natural environment such as resource utilization and biodiversity, they found their menus to be “sustainable” and “healthy.”

Although it is imperative to consider the nutritional value of foods so as to avoid nutrient deficiencies and to minimize the consumption of unhealthful foods, the authors missed an important opportunity to identify recommendations that optimize human health while further reducing GHGEs and protecting natural resources at a time of extreme environmental concern.

Climate change is thought to be irreversible and is projected to further distress human health and the living systems of the natural environment (2). Therefore, climate change mitigation efforts should maximize climate change mitigation potential while preserving natural resources. There is a small, but growing collection of literature substantiating that plant-based diets are effective in achieving climate stabilization goals, reducing GHGEs, and reducing resource utilization (3–6). In contrast, 80% of GHGEs of all agricultural food production arises from livestock. It is also important to note that GHGEs associated with livestock such as methane, nitrous oxide, and volatile organic compounds pose risks to the environment and to human health (7). In addition, the bioaccumulation of unhealthful compounds in fish such as mercury along with overfishing and the problems of aquaculture should also be considered. These findings are extremely important in light of climate change and environmental degradation, especially because it has been estimated that humans have exceeded the earth’s biocapacity by 50% (8).

The authors imply that animal products are necessary to achieve nutrient requirements. Studies have found that well-planned plant-based diets (whether vegetarian or vegan) are safe throughout the entire life cycle (9). In addition, numerous studies show that plant-based diets can reduce chronic disease morbidity and ameliorate chronic disease (9), whereas the literature documents the burden of chronic disease associated with animal products, particularly red meat consumption (10).

With a growing interest in vegetarian foods in the United Kingdom, the authors could have offered or contrasted a variety of plant-based and semivegetarian menus. In doing this, their recommendations could have increased the plant foods associated with reduced chronic disease risk such as whole grains, legumes, pulses, and nuts.

Letters to the Editor

In conclusion, dietary recommendations can and should optimize human health while simultaneously minimizing GHGEs and protecting the living systems of the natural environment. This means that all factors affecting food systems and ecosystems, which include but are not limited to pesticides, fertilizers, hormones, and antibiotics, must be considered when striving for a “sustainable” diet. Although the recommendations of Macdiarmid et al (1) appear to be healthier and produce less GHGEs than the current UK consumption standards, this should not translate to broad-based recommendations that are considered “healthy” or “sustainable.” Certainly, further research is warranted that comprehensively considers all factors that intersect the food system and the natural environment.

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Reply to I Hawkins and J Sabaté

Dear Sir:

Hawkins and Sabaté raise an important issue about the use of the terms *sustainable* and *healthy* diets. We agree that given the complex, multidimensional nature of these terms, especially sustainable, it is important in any discussion to be explicit about to what exactly it refers. The concept of a sustainable diet can have many different definitions relating to health, environment, economic and social factors, etc, and within each of these domains the meaning can differ depending on the context in which it is being used. As stated in our article (1), we included only one element of environmental sustainability, greenhouse gas emissions (GHGEs), but we acknowledged that there are a multitude of other elements that need to be considered in future research for a truly sustainable diet. Ideally, a comprehensive definition such as the UN Food and Agriculture Organization's definition of a sustainable diet (2) would be used. However, we also recognize that this would require data on the many different aspects of sustainability for a wide range of food items, and for many of these variables currently there are few or no data at this level of detail. We would support the need for future research to address this issue. In the context of the diet, we would argue that sustainability can be used only in a relative manner. Our analysis was designed not to define a sustainable diet but to assess whether reductions in GHGEs could be achieved by realistic dietary change at the population level while still achieving dietary requirements for health. In terms of a "healthy" diet, we defined healthy as meeting UK government dietary requirements for health.

Hawkins and Sabaté question the role of meat and animal products in a sustainable diet. In our study, meat was included in the diet (1), but we were not suggesting that this was necessary to achieve nutrient requirements; rather, we discussed some of the complexities of ensuring that the right combination of food was in a vegetarian diet to meet micronutrient requirements. Vegetarian diets can meet dietary requirements for health and generally will have lower GHGEs. Our approach, however, was to take into account current dietary patterns of the UK population so that proposed changes to the diet could be seen as realistic. In the UK National Diet and Nutrition Survey, only 5% of participants reported being vegetarian in 2001 and 2% in 2008–2011 (3), and for this reason meat was included in the sample diet but in smaller quantities than currently eaten. The diet contained only 372 g meat/wk (equivalent to ~4 servings/wk), which is ~60% of the current average dietary intake in the United Kingdom (3). A reduction of even this magnitude would still require a major shift in dietary habits for the majority of the population. From a public health perspective, a moderate change in diet (ie, reduction in meat) made by the majority of the population could have a greater impact than a large change (ie, eliminating all meat) made by a small number of people. We therefore tried to maintain menus and dishes that are

widely eaten in the United Kingdom but show how altering the proportions of animal-based to plant-based foods within these dishes can achieve a significant reduction in GHGEs. The sample menu may appear to contain a lot of meat, but the menu needs to be viewed alongside the actual quantity of animal products listed in our Table 3, which shows that these dishes contain only small amounts of meat and more plant-based foods (1). Furthermore, it is important to consider the impact of dietary changes on the whole diet rather than focus on specific food groups so as to avoid possible unintended consequences, as shown by other recent work. Vieux et al (4) showed that the magnitude of reduction in GHGEs by limiting the amount of meat in the diet was dependent on the caloric density of the replacement food; an isocaloric replacement of meat with fruit and vegetables, for example, could increase GHGEs of the total diet.

It is important to remember that the diet described in our article was only one example of how dietary requirements for health and a reduction in GHGEs could be achieved, and they could be achieved with many different combinations of food, including with vegetarian diets. No food items were deliberately excluded from the diet; rather, a combination of food items was optimized to meet dietary requirements and to minimize GHGEs. The article served to show, first, a methodology for optimizing different aspects of the diet, with a scope to include additional factors where data are available, and second, that it is possible to draw synergies between dietary requirements for health and minimizing GHGEs. We would support the need for more research in this area to understand all of the issues and interactions associated with sustainable diets.

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