Analysing the affordability of the EAT–*Lancet* diet

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Healthy diets from sustainable food systems was the ostensible theme of the EAT–*Lancet* Commission.[1] The four principal domains of sustainable diets, as defined by the Food and Agriculture Organization of the United Nations in 2010,[2] were health, economics, society, and the environment. Sustainable diets were defined as those that were healthy, affordable, appealing, and environmentally friendly.[2] Sustainable food systems are now defined as those that produce nutrient-rich foods that are affordable, socially and culturally acceptable, and sparing of both natural and human resources.[3] Affordability was, and is, a key component of sustainable diets and of sustainable food systems.

The need to produce planet-friendly foods that are both affordable and nutrient-rich presents a challenge to agricultural food systems. In general, refined grains, sugars, and vegetable oils cost less per 1000 kcal and have a lower carbon footprint than do many animal-source foods.[4,5] However, nutrient density of processed sweets and fats can also be low.[4] Excessive consumption of low-cost empty calories is at the root of the global obesity epidemic. Conversely, many sources of high-quality protein—an essential nutrient for development and growth—cost more per calorie and can have a higher carbon footprint than do the staple grain crops. In some studies, the more nutrient rich foods were associated with higher environmental cost, most often measured in terms of greenhouse gas emissions.[6]

The nature of the carbon footprint of food itself has been a source of confusion. The EAT–*Lancet* global benchmark diet[1] has featured whole grains, fruits, vegetables, legumes, olive oil, and plenty of potatoes and nuts. The perception that plant-based foods are more planet-friendly is shaped by the practice of calculating greenhouse gas emissions per kilogram of food, any food, rather than per 1000 kcal or per nutrient.[5] Low energy density foods can contain 90% water which provides no calories and no nutrients. The effective monetary or environmental cost of vegetables and fruit can thus change depending on whether the cost is based on food weight, energy, or nutrient content.[7] Although undoubtedly nutrient-rich, some of the foods featured in the global benchmark diet cost more per calorie, if not necessarily per nutrient, compared with less healthy options. To complicate matters, the relative affordability of different foods also depends on the relation between local food prices and household food budgets.

Dietary guidelines for health promotion do not, as a rule, consider the likely cost of the proposed diets. In the USA, the Dietary Guidelines Advisory Committee was under pressure to offer advice that was soley nutritional and dietary in nature, setting aside any broader concerns with cost and sustainability of the food supply.[8] The EAT–*Lancet* Commissioners did not have to face any such pressures. Yet, little was mentioned in the Commission of the economic and sociocultural aspects of sustainable diets. The economic domain covers not only the cost of food to the consumer but also the economic viability of food production from agricultural production to food processing and food retail. The social domain covers not only food enjoyment and eating pleasure but also the contribution of food systems to social and cultural identity. Viewing sustainable food systems exclusively in terms of their environmental effect has effectively reduced the four domains of sustainability to just two: health and the environment.

Kalle Hirvonen and colleagues' global analysis[9] of the EAT–*Lancet* reference diet helps to fill that void by addressing pressing affordability concerns.Prices from the World Bank were used to select lowest cost foods to meet EAT–*Lancet* targets and to calculate total daily diet cost. Data from the World Bank International Comparison Program for 2011 provided prices for 744 food items in 159 countries for 21121 price observations. These items were then matched to food groups in the US Department of Agriculture Standard Reference-28 database to select the least expensive item from each food group. The finding that fruits and vegetables accounted for the largest share of total diet cost was not altogether surprising. In a further refinement, relative affordability of the EAT–*Lancet* diet was assessed by comparing the total cost per day to each country's national incomes. Finally, linear programming was used to create a least-cost diet with only essential nutrients. Other studies have deployed similar methods to optimise diet quality in low-income and middle-income countries without increasing cost.[10] Social considerations were key: making socially acceptable food choices could be more costly than meeting nutrient needs.

Calculating diet affordability by relating diet cost to national incomes produced results consistent with the long-standing Engel's Law. The striking observation was that the cost of diets ranged from 3% to as much as 73% of national income in some of the low-income and middle-income countries. The estimated median price of US$2·89 for the EAT–*Lancet* diet was consistent with a previous report,[11] which put the price of 2000 kcal per day across multiple countries at $1·56 (range $0·61–2·51). All previous studies have consistently showed a direct link between dietary nutrient density and diet cost. Given that the EAT–*Lancet* diet was meant to be a global benchmark for a nutrient dense diet, the present calculation of its cost represents an important addition to the published literature. The main finding that the EAT–*Lancet* diet was not actually affordable by many of the world's poor attests to the importance of economic feasibility analyses that ought to accompany, or better yet precede, the issuing of dietary advice whether at national, regional, or global levels.

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I received contracts, consulting fees, and honoraria from both public and private entities with an interest in dietary quality and nutrient profiling of foods, including the Food and Agriculture Organization, Danone, Nestle, PepsiCo, and Unilever.

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