Global diet and health: old questions, fresh evidence, and new horizons

Few, if any, would contest that diet and nutrition have a crucial and substantial impact on human health. But the devil is in the details. Common questions include: is there such a thing as an optimal diet? What is suboptimal? Which dietary components matter most? And given the necessity to take action on climate change and planetary health, what should the world eat?[1] The Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) contributes towards answering these questions by estimating the burden of mortality and disability attributable to specific dietary risks, within a comparative risk assessment framework that currently considers 84 behavioural, environmental, occupational, and metabolic risks across 195 countries and territories.[2] The latest in the series is the current report in *The Lancet* by the GBD 2017 Diet Collaborators,[3] using data from GBD 2017.[2] 15 dietary risks were evaluated for their effects on mortality and disability from cancers, cardiovascular diseases, and diabetes.

The current GBD findings reveal layers of information. First, globally, in 2017, consumption of nearly all healthy foods and nutrients was suboptimal (topped by low intakes of nuts and seeds, milk, and whole grains), whereas that of all unhealthy items exceeded the recommended level (eg, sugary beverages, sodium, and processed and red meat). Second, the burden of disease attributable to dietary factors was huge: 11 million (95% uncertainty interval 10–12) deaths and 255 million (234–274) disability-adjusted life-years (DALYs; 22% of all deaths and 15% of all DALYs in adults aged 25 years or older). Third, more than half of all diet-related deaths and two-thirds of diet-related DALYs were attributable to just three factors: high intake of sodium, low intake of whole grains, and low intake of fruit. Last, there was a disproportionate burden in low-income settings. The regional-level findings were broadly similar, with some notable intercountry differences.

This information is not entirely new. The current headline results were included within the GBD 2017 publication, which reported that of 19 risk categories, dietary risks were the leading category for deaths and second leading category for DALYs.[2] In GBD 2016,[4] the top three dietary risks for deaths were the same as in

the current report, albeit in a different ranking order but with overlapping 95% uncertainty limits. In other words, these new findings—based on updated data and the application of consistent definitions—are consistent with previous findings. The national-level outputs provide opportunities for countries to compare themselves with other settings, to identify data gaps, and to set priorities; the global-level data act as an accountability tool.[5]

While acknowledging the huge achievements and value of GBD risk estimates, it is vital to be critical to further improve credibility of outputs. Model inputs determine model outputs, and a closer inspection reveals important challenges. Despite the authors' attempts to provide detailed information, there remains a degree of black-box methodology. Dietary data were from several mixed sources and were not available for all countries, and the extent and type of extrapolation are unclear despite their data representativeness index. The relationships between the 15 dietary risks and selected endpoints were based on meta-analyses from populations largely of European descent, with few and sometimes no data from some world regions, reflecting gaps in the evidence base. Therefore, generalisability of dietary risks and outcome relationships is questionable, and potential heterogeneity across populations is ignored. For example, there is considerable statistical heterogeneity in the overall summary estimates for the association between both

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fish intake and dietary omega-3 fatty acids and incident type 2 diabetes. This heterogeneity is partly explained by geography: positive associations in North American studies, null associations in European studies, and inverse associations in Asian or Australasian studies.[6] The use of summary risk estimates by the GBD Collaborators fails to account for such differences, which could reflect differences in food preparation, environmental factors, or confounding structure. The authors acknowledge the need for future collaborative efforts to harmonise data across studies and conduct analyses adjusting for the same set of confounders. It is encouraging that initiatives such as InterConnect have emerged in the past 5 years, and might provide approaches that GBD investigators can use. For some diet–disease associations, GBD conclusions seemed to be based on a single endpoint or food from a food group. Low milk consumption, for example, was considered as a risk for colorectal cancer, but evidence of the inverse associations of fermented dairy products, such as cheese or yoghurt, with colorectal cancer or other disease outcomes was not considered.[7–9] Causal inference from nutritional epidemiology evidence is challenging, but as new evidence emerges it is important that GBD investigators continue to critically appraise their choice of dietary factors and related outcomes, and their generalisability. Implications arising from the findings are also challenging. For example, the high attributable burden of low whole-grain intake needs to be considered alongside the substantial geographical variation in carbohydrate intakes,[10] with Asian diets being particularly rich in carbohydrates, especially refined forms.

Limitations notwithstanding, the current GBD findings provide evidence to shift the focus, as the authors argue, from an emphasis on dietary restriction to promoting healthy food components in a global context. This evidence largely endorses a case for moving from nutrient-based to food-based guidelines. Their findings also reinforce those of the EAT–*Lancet* Commission on optimising diets for sustainable food systems, achievable through predominantly plant-based diets.[1] There are of course considerable challenges in shifting populations' diets in this direction, illustrated by the cost of fruits and vegetables being disproportionately prohibitive: two servings of fruits and three servings of vegetables per day per individual accounted for 52% of household income in low-income countries, 18% in low to middle income countries, 16% in middle to upper income countries, and 2% in high-income countries.[11] A menu of integrated policy interventions across whole food systems, internationally and within countries, is essential to support the radical shift in diets needed to optimise human, and protect planetary, health.[12] Important food for thought.

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