

## Combining Population-Specific Dietary Patterns in Meta-analyses: True or False?

Dear Editor:

We read with great interest the article by Fabiani et al. on the association of dietary patterns and low bone mineral density and risk of fracture (1). Several other meta-analyses have been published on the association of dietary patterns and health outcomes. Despite providing interesting data, such studies, including the study by Fabiani et al., should take into account that dietary patterns included in these studies are derived empirically using principal component analysis. Therefore, despite similar labels of dietary patterns and some similarities in their content, the factor loadings of components in a given dietary pattern are different across studies, which indicates that the contribution of these foods to a given dietary pattern is different. Thus, despite similar names and labels of these dietary patterns, their combination in a meta-analysis might be methodologically misleading. To overcome this problem, Fabiani et al. mentioned that they considered only those patterns sharing most foods with similar factor loadings. In these studies, the Western dietary patterns are not exactly the same; however, they share some similarities. For instance, they are characterized by high intake of red meat. Although this approach might help in resolving the concerns in this regard, this could not be done completely for all dietary patterns. For instance, the Western dietary pattern in the studies by Fung et al. (2), Park et al. (3), Denova-Gutierrez et al. (4), and Shin et al. (5) had different components with different factor loadings. In the study by Fung et al., a Western dietary pattern was characterized by higher intakes of red and processed meats, refined grains, sweets and desserts, and full-fat dairy products, while in the study by Park et al., the Western dietary pattern was characterized by high intakes of noodles, breads, sugar, and fat. Denova-Gutierrez et al. (4) identified a “refined foods” pattern, characterized by red meat, fats, sugar and sweets, soft drinks, eggs, refined grains, and alcoholic beverages. In addition, in the study by Shin et al. (5), a “meat, alcohol, and sugar” pattern was characterized by higher factor loadings of oils, starch syrup and sugar, meat and its products, and alcohol. This is also the case for a healthy dietary pattern. In addition, even if this point was taken into account, some important information about the association of dietary patterns with the outcome might be missed because some dietary patterns are not the same across the studies and such dietary patterns were not included in the meta-analysis.

In summary, despite the importance of meta-analyses as strong evidence on diet–disease associations, we believe that pooling information on the link between dietary patterns and several health-related outcomes might result in misleading findings because dietary patterns are population-specific and their combination as a single exposure variable in meta-analyses might not be appropriate.

Supported by Tehran University of Medical Sciences, Tehran, Iran.

Author disclosures: AS-M, BL, and AE, no conflicts of interest.

The authors' responsibilities were as follows—AS-M, BL, and AE: contributed to the manuscript drafting; and all authors: read and approved the final manuscript.

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doi: <https://doi.org/10.1093/advances/nmz071>