

## Fruits, vegetables, and legumes: sound prevention tools



Cardiovascular disease is the leading cause of death worldwide, accounting for a third of all deaths. Three of four cardiovascular deaths and more than 80% of premature deaths attributable to non-communicable diseases occur in low-income and middle-income countries.<sup>1</sup> Thus, preventive strategies to tackle premature mortality and, particularly, cardiovascular mortality represent a major public health goal not only for high-income countries, but also for low-income and middle-income countries. The most effective and sustainable preventive strategies should rely on healthy diet and lifestyle. Nutrition is a cornerstone. Observational studies in nutritional epidemiology done in western countries, Japan, and China have found that fruits and vegetables are inversely associated with cardiovascular disease and premature mortality.<sup>2</sup> But the available research done on this topic in low-income and middle-income countries is meagre.

The work of Victoria Miller and colleagues<sup>3</sup> in *The Lancet* deserves credit because it sheds light on the association between fruit and vegetable consumption and the incidence of cardiovascular disease and mortality for a wide range of countries. The main novelty of this large longitudinal study (the Prospective Urban Rural Epidemiology [PURE] cohort) is the inclusion of participants from 18 countries across seven different world regions, including Africa, south Asia, South America, and the Middle East. In all these countries, moderate consumption of fruits, vegetables, and legumes was associated with reduced risk of cardiovascular events and mortality in analyses adjusted for age, sex, and centre. Overall, risk reductions for total mortality in the order of 35%—and specifically of 27% to 39% for cardiovascular and non-cardiovascular death—were found for even three to four servings per day of fruits, vegetables, and legumes compared with fewer than one serving per day, indicating that optimal health benefit can be achieved with even a modest level of consumption.<sup>3</sup> Beyond some isolated, unfounded, and non-constructive criticisms of the methods used by nutritional epidemiology,<sup>4</sup> the consistency of findings for the benefits of fruits and vegetables is well established. It is sufficient to support broad actions of public health to foster their consumption, such as broad agricultural policies targeting a sustainable development that could benefit both the

environment and the population's health by promoting a higher consumption of fruits, vegetables, and legumes. For this consumption to be affordable, policies that lower prices of fruits and vegetables by establishing new alliances between governments and the private sector, consumer groups, the research community, and other non-governmental bodies, especially in low-income and middle-income countries, should be encouraged.

However, when Miller and colleagues<sup>3</sup> adjusted for other potential dietary and non-dietary confounders, the associations were substantially attenuated. In the multivariable adjusted model, the risk of total and non-cardiovascular mortality was in the order of 22–23% lower for participants consuming at least three servings per day of fruits, vegetables, and legumes, compared with participants who consumed less than one serving per day of these foods. The associations remained significant for fruits and legumes but not for vegetables. These findings can be seen as a consequence of focusing the analyses only on the consumption of vegetables; forgetting about the rest of the dietary pattern might be an oversimplification.<sup>5</sup> Although the analyses also considered fruits and legumes as one of the main exposures, one potential limitation is that the approach followed by these authors did not capture in a single variable all the different aspects of the dietary pattern. It seems logical to think that people with a higher consumption of plant-derived foods are more likely to have a lower consumption of animal-derived foods.

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Miller and colleagues' findings raise the important issue of isocaloric replacements: the relevant question is not whether to consume more plant-based foods or not, but to know which are the detrimental foods that should be replaced by fruits, vegetables, and legumes and in what amount. Importantly, fruits and vegetables are consumed as part of an overall dietary pattern. It has been observed that plant-based diets can have differential effects if these plant-based diets fall on the healthier or unhealthier side of the spectrum.<sup>6</sup> Therefore, a healthy diet rich in fruits and vegetables needs to be considered as part of a high-quality overall eating pattern, and this pattern should be based on country-specific dietary traditions to be fostered as an effective tool for prevention of cardiovascular disease and premature mortality. Increased consumption of fruits and vegetables should be at the expense of reducing other foods and drinks, such as sugar-sweetened beverages, red and processed meats, saturated and trans fat, refined cereals, and sugar-rich desserts, not in isolation or as a mere addition to the rest of the dietary pattern.

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