



## Invited Commentary

# Measuring the nutrition transition and its dynamics

In the past several decades, many scholars have used broad definitions of the dietary shift from traditional, localised diets to those composed of more ultra-processed foods high in refined carbohydrates, added sodium, added sugar and added saturated fat. Some have focused on increased consumption of edible oils or sugar-sweetened beverages in low- and middle-income countries (LMIC)<sup>(1–3)</sup>. Others have focused on junk foods in regions or across all LMIC<sup>(4–7)</sup>. The latter studies have concentrated more directly on measuring separate components that reflect the Westernisation of the diet.

In contrast, other scholars have focused on all aspects of a diet and have applied the readily available but crude food balance sheet data that the FAO of the UN provides. These data are based on country reports of production, exports and imports of food that often are not carefully collected. The data are converted according to global estimates of food loss due to milling losses, unusable animal carcasses, and so on. Though they lack precision when it comes to production or consumption measures, the data give a general picture of consumption trends that can be applied to food available for consumption for most nations. Many use these data, including the authors of a paper in this issue on the homogenisation of global diets into a Western diet whose results question the convergence of global diets to the diets of 16 high-income Western countries<sup>(8)</sup>. While scholars have focused on regions, such as Asia<sup>(6)</sup> or when exploring global trends do so by grouping LMIC into regional sub-groupings, that is not the case for Dr Azzeddine Azzam in this issue who pose the question above group all countries into 16 Western higher-income countries and the rest of the globe

The FAO UN food balance sheet data have many flaws, and Dr Azzam uses aggregate data as best as possible. They attempt to relate the data approximations to actual food consumed by adding a measure of food waste. They do not address the issues that make applying those data to ultra-processed food inadequate. In fact, even processing that produces bread, a moderately processed food in the NOVA classification, may add sodium or sugar to the bread along with flour and water<sup>(9)</sup>. In addition, the flour can be refined, a key component of ultra-processed food, or whole grain, which is common in some countries. In all cases, bread does not

fall in the ultra-processed category. The NOVA classification omits flour, so it excluded both all the ultra-processed food that contain refined flours from many sources while excluding appropriately bread. To explain further, the NOVA classification developed by Monteiro and colleagues classifies all food into levels of processing: freezing, drying, milling, canning, mixing, or adding salt, sugar, fat or other additives<sup>(10,11)</sup>. They create a set of levels of degrees of processing with ultra-processed food being the most highly processed with inclusion of many additives and other ingredients that enhance satiety and make these items hyper-palatable. This is the type of problem with using the crude food balance sheet data. The combination of elements, such as animal source foods, oils and fats, and sweeteners used by these authors, does not tell us if the product is moderately processed or ultra-processed as C. A. Monteiro and others define it<sup>(9,12)</sup>. I personally feel this is the wrong database for the analysis of the overall diet and the shift towards ultra-processed food.

This current study has some strengths. The authors link important underlying determinants of dietary shifts with their measure of a Westernised diet (a Western diet similarity index). Thus, the authors show that income per capita, urbanisation, and a measure of globalisation are all significantly linked with increases in the Western diet similarity index. However, they go on to compare the 156 countries that are not high-income Western countries with the 16 Western countries, and they fall into a trap. That is, the 156 countries are at different stages of the shift to higher consumption of ultra-processed foods. To combine very poor countries with high double burdens of malnutrition with middle-income countries, such as Mexico, Brazil, Thailand, China, and South Africa, ignores the complexities and realities of the nutrition transition. For example, Latin America has already shifted to significant levels of ultra-processed food consumption, while much of sub-Saharan Africa is at an earlier stage with minimal intake but just recently starting to shift rapidly<sup>(7,13)</sup>.

The authors should have learned from regional studies, such as those of Barry Popkin and Tom Reardon in Latin America and sub-Saharan Africa and P. Pingali and P. Baker in Asia, that regions and countries within the regions vary greatly<sup>(4,6,7,13)</sup>. International studies,



such as Baker's on junk food dynamics and several on sugar-sweetened beverage trends, have highlighted these regional variations<sup>(1,3,5)</sup>.

When answering their question about whether the globe is shifting towards a Westernised diet, the authors applied one key measure often used, but they combined all LMIC. They should have looked at clusters of countries at different stages of change. As Tom Reardon, this author, and others will show in a forthcoming extensive review of these issues for sub-Saharan Africa, the progression from barely processing food to milling more refined food to ultra-processed food in this region started in the 1980s and continues, as the combination of away-from-home food consumption and ultra-processed food consumption is rapidly growing<sup>(13)</sup>. Men and women in the region have joined the informal and formal labour sectors at great rates in urban and rural areas, and they demand convenient food. Underlying conditions such as this ultimately will be the primary drivers of diet Westernisation, and they are happening at various rates, as is income growth in the world.

The patterns and trends of global overweight and obesity highlight these complex shifts. At this point globally in all LMIC more than 20% of adult women are overweight or obese, and the prevalence is growing in most countries<sup>(14,15)</sup>. In fact, in many LMIC, rural areas are seeing large and accelerating increases in overweight and obesity than the urban areas<sup>(16)</sup>. While reduced physical activity levels explain part of this increase, more recently a large component also linked to diet shifts. Ultra-processed foods certainly represent a major causal factor as a major random controlled trial (RCT) and many cohort studies highlight. A key US National Institutes of Health (NIH) clinical trial showed that when adults were fed real food the adults lost 0.9 kilograms, but when fed the ultra-processed food they gained the same 0.9 kilograms<sup>(17)</sup>. A large number of studies published earlier reported longitudinal data from children and adults that associated ultra-processed food intake with increased weight gain and risk of obesity<sup>(18-25)</sup>.

Overall, we think a nuanced approach to determining the speed of diet changes and the speed of the shift to ultra-processed food is needed. We think regions and sub-regions must be examined and countries finely clustered. Moreover, we think either actual food consumption, food purchase or sales data must be used to obtain the granularity to try measure the shift towards a Western diet with excessive ultra-processed food.

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