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Effects of ultra-processed foods on the compositional quality of diets in Australia: a multidimensional analysis

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There has been a proliferation of ultra-processed foods (UPF) in the food environment since the 1980s which have newly been linked to growing number of non-communicable diseases (NCD) including cardiovascular disease, cancers, type 2 diabetes, fatty liver disease, depression, frailty, and hypertension[(1)]. There is intense debate surrounding whether the mechanism for the negative effect on health of consumption of UPF is their nutrition composition or processing[(1)]. There is growing evidence that macronutrient ratios are important for chronic disease risk, predict longevity and may adversely affect micronutrient intakes[(2)]. Intake of macronutrients from ultra-processed sources may lead to macronutrient imbalances and higher energy intakes[(3)] while being deficient in micronutrients, making it difficult to achieve energy balance and meet micronutrient requirements. Using nationally representative nutrition surveillance data on the Australian population, the National Nutrition and Physical Activity Survey, in this paper we employ the Geometric Framework for Nutrition[(2)] to examine the multidimensional dietary composition of UPF. Diet was assessed for adults (n = 9.341) with two 24-hour recalls. Diets were classified by degree of processing according the NOVA classification system and classified as ultra-processed diets (UPD, > 60% energy from UPF), moderate or low in UPF i.e., minimally processed diets (MPD, < 20% energy from UPF). Outcomes included the nutrient rich food index (NRF 9.3 index)[(4)], the Nutri-Score[(5)], and macronutrient and micronutrient intakes. Micronutrients were plotted over macronutrient ratios for MPD and UPD to determine whether micronutrient intakes could be met within the acceptable macronutrient distribution ranges (AMDR). Scheffe's polynomials were fitted to the data for total energy intake, macronutrient intake and micronutrient intake. Vitamin and mineral intakes were higher for MPD compared to UPD ($p < 0.001$). Overall nutrient density decreased and the NRF 9.3 scores were 399.2 for MPD and 297.7 for UPD ($p < 0.001$). For the Nutri-Score, MPD diets scored A (highest quality) and UPD scored C (moderate quality). Poor scores were due to higher energy density, saturated fat, added sugar and sodium increased with UPD, while protein, dietary fibre and micronutrient density and fruit, vegetable, nut and legume ratios decreased. Diets met the estimated average requirement (EAR) for all micronutrients within AMDR for MPD but not for UPD. Regardless of processing, in almost all nutritional indicators of health, diets high in UPF were unsatisfactory relative to nutritional recommendations. We conclude that compositional factors alone point to the mechanisms through which ultra-processed dietary patterns could lead to poor health, in the full understanding that processing likely has additional effects over and above composition that exacerbates the problem.

References

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