

Ultra-processed food consumption and renal function decline in ELSA-Brasil

Background

Chronic Kidney Disease (CKD) is a major public health problem worldwide, associated with high morbidity, mortality, and substantial economic burden. Estimated glomerular filtration rate (eGFR) is the primary clinical marker of renal function, and its progressive decline represents a key pathway to advanced stages of CKD. Over recent decades, there has been a marked increase in the consumption of ultra-processed foods (UPF), as defined by the NOVA classification system in Brazil and around the world. Evidence from observational studies, systematic reviews, and meta-analyses suggests that diets rich in UPF are associated with impaired renal function and increased risk of CKD. However, longitudinal studies addressing this association in Brazilian populations remain scarce. In this context, the Brazilian Longitudinal Study of Adult Health (ELSA-Brasil) provides a unique opportunity to investigate the relationship between UPF consumption and renal function trajectories in a large national cohort.

Research questions/hypotheses

Furthermore, clinical, and behavioral factors, and to vary across clinical subgroups such as hypertension, diabetes mellitus, and obesity.

Statistical analysis

Linear Mixed-Effects Models will be used to assess the longitudinal association between UPF consumption, expressed as a percentage of total energy intake, and eGFR trajectories across ELSA-Brasil waves. Models will include random intercepts and slopes at the individual level, allowing for interindividual heterogeneity in baseline renal function and rate of decline. Crude and multivariable-adjusted models will be fitted, controlling for age, sex, income, body mass index, hypertension, diabetes mellitus, dyslipidemia, smoking status, alcohol consumption, and physical activity. Model adequacy will be evaluated using information criteria and residual diagnostics.

Variables

Outcomes include estimated glomerular filtration rate, serum creatinine, and urinary albumin-to-creatinine ratio. The main exposure variable is ultra-processed food consumption, classified according to the NOVA system and expressed as a percentage of total energy intake. Covariates encompass sociodemographic, anthropometric, clinical, and lifestyle characteristics.

Expected relevance

This study may provide robust national evidence on the role of ultra-processed food consumption in renal function decline, contributing to epidemiological knowledge and supporting clinical practice and public health policies aimed at CKD prevention through healthier dietary patterns.

References

1. Monteiro CA et al. Ultra-processed foods: what they are and how to identify them. *Public Health Nutrition*, 2019.
2. Canhada SL et al. Ultra-processed foods and longitudinal changes in weight: ELSA-Brasil. *Public Health Nutrition*, 2020.
3. Costa CS et al. NOVA score for ultra-processed food consumption in Brazil. *Revista de Saúde Pública*, 2021.
4. Rey-García J et al. Ultra-processed food consumption and renal function decline. *Nutrients*, 2021.
5. Avesani CM et al. Ultra-processed foods and chronic kidney disease. *Clinical Kidney Journal*, 2023.
6. He X et al. Ultra-processed food consumption and CKD risk: systematic review and meta-analysis. *Frontiers in Nutrition*, 2024.
7. Leonberg KE et al. Trends in CKD and calories from ultra-processed foods. *Discover Public Health*, 2025.