Unequal Environmental Burdens of Food Loss and Waste in global food supply chain

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Research question: Global food trade drives economic growth but also exacerbates food loss and waste (FLW) and environmental burdens, challenging the achievement of sustainable development goals. Existing studies primarily focus on the total volume of FLW and its environmental impact, with limited attention to its unequal distribution across income groups. We explored the disparities in FLW and it environmental burdens within the global food supply chain and proposes policy recommendations that balance equity and sustainability.
Methodology: We constructed a global agri-food trade matrix covering 98 agri-food products and five utilization categories across 49 countries/regions to estimate FLW embedded in the global food supply chain and quantify its direct and indirect environmental impacts based on satellite accounts and the matrix we constructed. Furthermore, we applied structural decomposition analysis (SDA) and counterfactual simulations to examine its driving factors and trade effects. Finally, we developed an inequality index to assess the unequal distribution of environmental burdens associated with FLW in global food supply chain.
Data: We constructed an agri-food matrix based on FAOSTAT food balance sheets and Exiobase input-output data and developed the FSC-FLW database for the 49 countries/regions based on the FAO Food Loss and Waste Database and existing literature on FLW rates.
Novelty: We developed a novel and comprehensive modeling framework and constructed a global food trade matrix to estimate the FLW embedded in different stages of the global food supply chain. By integrating structural decomposition analysis (SDA) and counterfactual simulations, we extended the analysis to identify the key drivers of food loss and its trade-related impacts. Based on this framework, we developed an inequality index to explore the hidden disparities in environmental burdens within the global food supply chain, providing a novel perspective distinct from previous research.