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Eating up the world's food web and the human trophic level

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Significance

Here we combine ecological theory, demography, and socio-economics to calculate the human trophic level (HTL) and position humans in the context of the food web. Trophic levels are a measure of diet composition and are a basic metric in ecology, but have never been calculated for humans. In the global food web, we discover that humans are similar to anchovy or pigs and cannot be considered apex predators. In addition, we show that, although countries have diverse diets, there are just five major groups of countries with similar dietary trends. We find significant links between HTL and important World Bank development indicators, giving insights into the relationship between socio-economic, environmental, and health conditions and changing dietary patterns.

Abstract

Trophic levels are critical for synthesizing species' diets, depicting energy pathways, understanding food web dynamics and ecosystem functioning, and monitoring ecosystem health. Specifically, trophic levels describe the position of species in a food web, from primary producers to apex predators (range, 1–5). Small differences in trophic level can reflect large differences in diet. Although trophic levels are among the most basic information collected for animals in ecosystems, a human trophic level (HTL) has never been defined. Here, we find a global HTL of 2.21, i.e., the trophic level of anchoveta. This value has increased with time, consistent with the global trend toward diets higher in meat. National HTLs ranging between 2.04 and 2.57 reflect a broad diversity of diet, although cluster analysis of countries with similar dietary trends reveals only five major groups. We find significant links between socio-economic and environmental indicators and global dietary trends. We demonstrate that the HTL is a synthetic index to monitor human diets and provides a baseline to compare diets between countries.

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Footnotes

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