

Co-benefits of Air Quality for Human Health from Climate Change Mitigation Through Dietary Change and Food Loss Prevention Policy

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Abstract

Food production, particularly cattle husbandry, significantly contributes to air pollution and its associated health hazards. However, altering dietary habits, such as reducing red meat consumption and minimizing food waste, can lead to substantial improvements in both air quality and human health. In this study, we investigated the influence of dietary changes on future air quality and human wellbeing. We also assessed the effectiveness of dietary transformation policies in conjunction with climate change mitigation efforts. By utilizing a chemical transport model and an integrated assessment model, we quantified changes in fine particulate matter (PM_{2.5}) and Ozone (O₃) concentrations. Subsequently, an exposure model was employed to estimate premature deaths resulting from air pollution. Our findings indicate that dietary changes could play a pivotal role in mitigating air pollution, especially in regions where agricultural activities emit significant quantities of ammonia. For instance, in the European Union, dietary modifications could lead to a projected reduction of 5.34% in PM_{2.5} by 2050. Similarly, in Asia, models project a reduction of 6.23% in PM_{2.5} by 2100. Moreover, ground surface O₃ levels in Southeast Asia are anticipated to decrease by as much as 12.93% by 2100. Furthermore, our results demonstrate significant reductions in global mortality associated with PM_{2.5} and O₃, with an estimated 187,500 and 131,110 avoided deaths per year by 2100, respectively. A combined approach integrating dietary changes with climate change mitigation measures could yield more comprehensive improvements in air quality in specific regions. However, careful consideration is warranted to address potential adverse effects on O₃ concentrations in certain areas.

Early Career Scientist

YES, I am an early career scientist.

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