Increased concentrations of atmospheric carbon dioxide and zinc deficiency

Inadequate dietary zinc contributes to stunting in young children, which WHO identifies as “one of the most significant impediments to human development”. Stunting’s long-term effects include “diminished cognitive and physical development, reduced productive capacity and poor health, and an increased risk of degenerative diseases such as diabetes”. In The Lancet Global Health, Samuel Myers and colleagues estimate that 138 million additional people will be at risk of zinc deficiency in 2050 on the assumption that elevated atmospheric carbon dioxide (CO₂) concentrations lower the zinc content of key food crops. The paper postulates that the biggest increases in zinc deficiency will occur in regions where the contribution of staple crops to the diet is highest—south Asia and sub-Saharan Africa; these regions currently have the world’s highest prevalence of stunting. Myers and colleagues point out that, whereas wealthier people will be responsible for most of the projected increases in CO₂ emissions, people with lower incomes will bear the brunt of the resulting zinc deficiency, making this an issue of social justice.

The study makes an important contribution to our knowledge of the effects of climate change on human nutrition. However, we do find that certain aspects are problematic. First, Myers and colleagues indicate that there is evidence that elevated CO₂ concentrations will also mean reduced iron and protein content in key food crops. The paper’s single-nutrient focus and policy recommendations are not in keeping with current best practice. The 2014 Rome Declaration on Nutrition, endorsed at the Second International Conference on Nutrition, summarises this ethos, calling for a holistic approach to “the elimination of malnutrition in all its forms”, with “nutrition policies [that] promote a diversified, balanced, and healthy diet at all stages of life”.

Second, despite the paper’s emphasis on social justice, its policy recommendations (zinc supplementation, fortification of staple foods, application of zinc-containing fertilisers to food crops, biofortification of staple crops, and cross-breeding of staples with varieties with less nutritional sensitivity to rising CO₂ levels) are all top-down in nature. A rights-based approach to addressing the effect of climate change on food security and nutrition would also focus on empowering poor farmers and food consumers to improve their own nutrition and make informed choices about combatting malnutrition. It would include community-based promotion of good nutrition, balanced diets, and healthy practices.

Third, Myers and colleagues assert that “Anticipating how the global diet is likely to change over the coming decades is difficult.” However, several studies have examined various scenarios of future food consumption, and the paper’s failure to engage with this literature is a noticeable shortcoming. Related to this oversight, the paper bases its conclusions on a dietary model that remains unchanged with respect to calories and composition, an assumption Myers and colleagues acknowledge as being simplistic, and despite the above-mentioned studies, which indicate that future dietary composition is likely to involve a reduction in staples and increases in vegetable oils and animal-sourced foods which are expected to increase zinc intake. Furthermore, the paper does not take population growth or urbanisation into consideration, despite the considerable evidence that these factors will have a considerable bearing on the composition and quality of diets, including the adequacy of zinc and other micronutrient intakes. Additionally, the paper suggests in passing that economic growth might improve the quality of diets, but does not explore this point adequately.

Finally, the data used in the paper are not disaggregated below the national level, between urban and rural regions, or between males and females. Myers and colleagues obviously could not control this problem, but further research should explore whether there are substantial within-country, urban–rural, or gender differences in growing vulnerability to malnutrition.

In summary, the paper grapples with key public health issues and pressing matters that global policy makers need to address. As we have argued elsewhere, agriculture, food security, and nutrition need to have a high place on the agenda of policy discussions about
climate change and sustainable development. The high-level meetings on these topics in New York and Paris later this year need to address the effects of a changing climate on nutrition and the implications for development.

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We declare no competing interests.

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