

Predicted environmental changes could significantly reduce global production of vegetables

June 11 2018



Credit: CC0 Public Domain

The study, led by the London School of Hygiene & Tropical Medicine (LSHTM), is the first systematically to examine the extent to which

projected changes such as increases in temperature and reduced water availability could affect the production and nutritional quality of common crops such as tomatoes, leafy vegetables and pulses.

If no action is taken to reduce the negative impacts on [agricultural yields](#), the researchers estimate that the environmental changes predicted to occur by mid- to end-century in water availability and ozone concentrations would reduce average yields of vegetables and legumes by 35% and 9% respectively. In hot settings such as Southern Europe and large parts of Africa and South Asia, increased air temperatures would reduce average [vegetable](#) yields by an estimated 31%.

Environmental changes, including climate change, [water scarcity](#) and biodiversity loss, are predicted to become more profound in the 21st century—posing significant challenges to global agriculture, food security and nutrition. While there is growing evidence that predicted future changes in temperature and rainfall will lead to significant reductions in the yields of many staple crops such as rice and wheat, the impacts on vegetables and legumes—important constituents of healthy diets -are largely unknown.

To address this evidence gap the researchers conducted a systematic review of all the available evidence from experimental studies published since 1975 on the impacts of changes in environmental exposures on the yield and [nutritional quality](#) of vegetables and legumes. Experiments included in the review were conducted in 40 countries.

The team then estimated the effects on the yields and nutritional quality of crops of changes in key environmental exposures, including increases in greenhouse gases (tropospheric [carbon dioxide](#) and ozone), reduced water availability for irrigation and rising ambient temperatures.

Previous research has shown that raised levels of carbon dioxide would

increase crop yields, but this study identified for the first time that these potential yield benefits are likely to be cancelled out in the presence of simultaneous changes in other [environmental exposures](#).

The researchers warn that in the absence of substantial efforts to respond to predicted future environmental changes, reductions in the yields of vegetables and legumes will substantially alter their availability globally. Such changes may affect the affordability and consumption of vegetables and legumes in the mid- to long-term and this could have significant impacts on population health all around the world.

Dr. Pauline Scheelbeek, lead author at LSHTM, said: "Our study shows that environmental changes such as increased temperature and water scarcity may pose a real threat to global agricultural production, with likely further impacts on [food security](#) and population health.

"Vegetables and legumes are vital components of a healthy, balanced and sustainable diet and nutritional guidelines consistently advise people to incorporate more vegetables and legumes into their diet. Our new analysis suggests, however, that this advice conflicts with the potential impacts of environmental changes that will decrease the availability of these important crops unless action is taken."

To mitigate the risks that future environmental changes pose to these crops, researchers say that innovations to improve agricultural production must be a priority, including the development of new crop varieties as well as enhanced agricultural management and mechanisation.

Professor Alan Dangour, senior author at LSHTM, said: "We have brought together all the available evidence on the impact of environmental change on yields and quality of vegetables and legumes for the first time.

"Our analysis suggests that if we take a 'business as usual' approach, environmental changes will substantially reduce the global availability of these important foods. Urgent action needs to be taken, including working to support the agriculture sector to increase its resilience to environmental changes and this must be a priority for governments across the world.

"But our study also identifies the broader policy relevance of environmental change. Vegetables and legumes are essential constituents of healthy diets and so efforts to ensure that their global availability is not threatened by predicted environmental changes must also be high on the global public health agenda."

The authors acknowledge limitations of the study, including the fact that collated evidence on the impact of [environmental changes](#) on the nutritional quality of vegetables and [legumes](#) was limited and the research team identified this as an area requiring more evidence generation.

The study was funded by the Wellcome Trust as part of its Our Planet, Our Health programme.

Dr. Howie Frumkin, Head of Our Planet, Our Health at Wellcome, said: "Improvements in agricultural technology have dramatically boosted the world's food production over the last 80 or so years. But we mustn't be complacent. Environmental changes, including more chaotic weather patterns and a warming climate, threaten our ability to feed the world's people.

"This excellent review highlights that some of the most important foods, and some of the world's most vulnerable people, are at highest risk. This research is a wake-up call, underlining the urgency of tackling climate change and of improving agricultural practices."

More information: Pauline F. D. Scheelbeek et al., "Effect of environmental changes on vegetable and legume yields and nutritional quality," *PNAS* (2018). www.pnas.org/cgi/doi/10.1073/pnas.1800442115

Provided by London School of Hygiene & Tropical Medicine

Citation: Predicted environmental changes could significantly reduce global production of vegetables (2018, June 11) retrieved 20 April 2024 from <https://phys.org/news/2018-06-environmental-significantly-global-production-vegetables.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.