

The importance of pollinators for human nutrition and health

Hannah Rice (Senior Researcher)

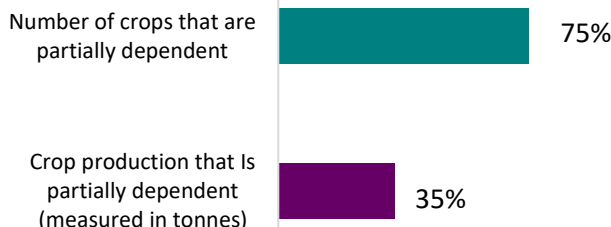
Pollinators are vital for food, economy and environmental health.

The **decline of pollinators** could decrease the number of nutrient-rich foods available. A reduction in intake of nutrient-rich foods is a risk factor for disease.

Pollinator communities are changing and declining, being driven by changes in land management, use of GM crops, pollution, disease, exotic species and climate change ¹.

And...

How much of global food production depends on pollinators?^{2,3}



75% of crops depend on pollinators, whereas 35% of crop-production does

Aizen, et al. (2019) using data from the Food and Agriculture Organisation Corporate statistical database⁴

The pollinator dependence of global agriculture **increased by 70%** from 1961 to 2016.

Decreases in animal pollinators could result in **significant global health burdens** from micronutrient deficiencies and chronic diseases.

Effects of decreases of animal pollinators on human nutrition and global health: a modelling analysis ⁵

Objective

- ❖ To provide quantitative estimates of the contribution of pollination to overall human health.

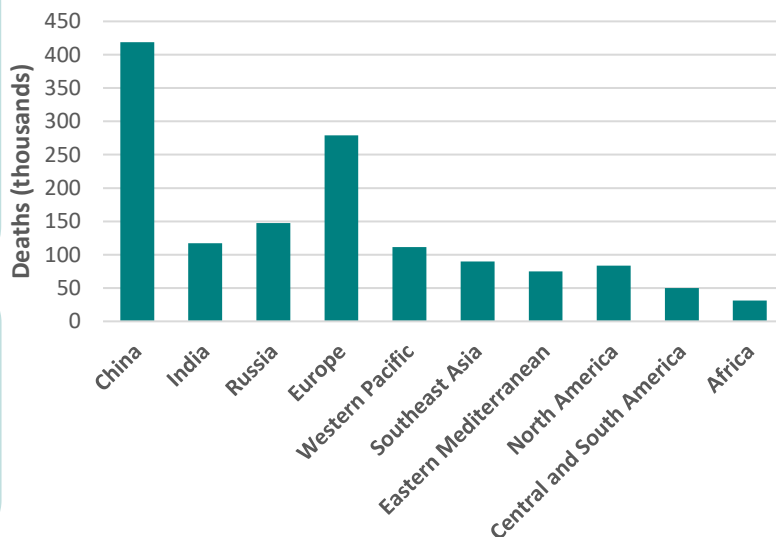
Methods

- A database of supplies of **224 types of food in 156 countries** was assembled (including food supplies per person for 177 countries from 2009 Food and Agriculture Organization).
- All calories lost from pollinator declines were replaced by **consuming increased quantities of staple foods**.
- Dietary and health effects for both 50% and 75% loss of pollinators **were modelled as sensitivity analyses**.

Results

- ✓ Under full pollinator service loss, average global **fruit supplies could decline by 22.9%**, **vegetables by 16.3%**, and **nuts and seeds by 22.1%**.
- ✓ A 100% loss of pollination services would lead to **1.42 million additional annual deaths from non-communicable and malnutrition-related diseases**, as shown in the bar plot.

Burden of disease caused by pollinator removal



Our thoughts:

- This model does not consider **socioeconomic status**, or those who are already nutrient deficient. It also assumes that calorie intake remains constant, so no drops in overall food production are considered. Therefore, **these results are likely underestimating the impact** the loss of pollinators would have on human health.
- Regions that are especially at risk for health outcomes associated with a loss of pollinators such as central and eastern Europe, south and southeast Asia, and sub-Saharan Africa, also lack data about status and trends for local pollinators.

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3. Klein AM, Vaissière BE, Cane JH, Steffan-Dewenter I, Cunningham SA, Kremen C, et al. Importance of pollinators in changing landscapes for world crops. *Proc R Soc B Biol Sci* [Internet]. 2007 Feb 7;274(1608):303–13. Available from: <https://royalsocietypublishing.org/doi/10.1098/rspb.2006.3721>

4. Aizen MA, Aguiar S, Biesmeijer JC, Garibaldi LA, Inouye DW, Jung C, et al. Global agricultural productivity is threatened by increasing pollinator dependence without a parallel increase in crop diversification. *Glob Chang Biol* [Internet]. 2019 Oct 10;25(10):3516–27. Available from: <https://onlinelibrary.wiley.com/doi/10.1111/gcb.14736>

5. Smith MR, Singh GM, Mozaffarian D, Myers SS. Effects of decreases of animal pollinators on human nutrition and global health: a modelling analysis. *Lancet* [Internet]. 2015 Nov;386(10007):1964–72. Available from: <https://linkinghub.elsevier.com/retrieve/pii/S0140673615610856>