Impacts of climate change on food production and human nutrition

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Food systems contribute a third of all human induced greenhouse gas emissions, but at the same time climate change is causing major challenges to food production. Currently, over 735 million people suffer from hunger, and over 40% of the people globally are not able to access healthy diets. Changes in temperature, precipitation patterns and carbon dioxide concentration in the atmosphere affect both the crop yields and nutritional quality of crops. Climate change has been predicted to reduce yields especially in regions where the prevalence of hunger is already currently high, such as in Africa, South-East Asia and South America. Even though increased carbon dioxide content can improve crop growth, the concentration of nutrients in the crops can decrease (Mayers et al. (2015) Nature 510, 139-142). Climate change also increases issues with pests, weeds and crop/animal diseases. To mitigate the impacts of climate change, the whole food system needs to be addressed (as shown in Tuomisto et al. (2017) Wellcome Open Res. 2, 21). Climate-smart agriculture can help adapt to changing conditions through improvements in the soil properties, for instance, through versatile crop rotations, reducing tillage and increasing organic matter inputs into soils. Crop breeding can improve the resilience of crops to changes in temperatures and precipitation. The new ways of producing food through indoor farming and cellular agriculture (e.g. cultivated meat, microbial proteins and precision fermented foods) are less affected by climatic conditions. Dietary changes towards plant-based diets reduce the climate impacts of food systems and also improve the resilience due to requiring less land for food production (Willet et al. (2019) The Lancet 393, 447-492). To reduce the negative consequences of climate change on human nutrition and health, efforts need to focus both on reducing the greenhouse gas emissions from food systems and improving the resilience of food systems to climate change.