

CO₂ emissions cause lost labor productivity, research shows

October 11 2019, by Patrick Lejtenyi



Credit: CC0 Public Domain

The planet's warming climate has led to countless changes that are affecting all of us. Droughts, hurricanes, rising sea levels and forest fires—all are now regular events in a world that saw close to 40 billion metric tons of carbon dioxide (CO₂) emissions released into our atmosphere last year.

Climate change may also be making outdoor labour more dangerous,

according to a new study published in *Scientific Reports*. It was led by Yann Chavaillaz, a former postdoctoral researcher at Concordia and the Ouranos Institute, and Damon Matthews, professor and Concordia Research Chair in Climate Science and Sustainability in the Department of Geography, Planning and Environment.

The researchers examine how extreme high temperatures caused by CO₂ emissions could lead to losses in labour productivity. Using calculations based on widely used guidelines regarding rest time recommendations per hour of labour and heat exposure, the authors found that every trillion tonnes of CO₂ emitted could cause global GDP losses of about half a percent. They add that we may already be seeing [economic losses](#) of as much as two per cent of global GDP as a result of what we have already emitted.

They identify agriculture, mining and quarrying, manufacturing and construction as the [economic sectors](#) most vulnerable to heat exposure. These sectors account for 73 per cent of low-income countries' output, according to the authors.

Developing countries are hardest hit

"The thresholds of heat exposure leading to labour productivity loss are likely to be exceeded sooner and more extensively in developing countries in warmer parts of the world," says Matthews.

"These countries are also more vulnerable because a higher fraction of their work force is employed in these sectors and because they have less ability to implement infrastructural changes that deal with a changing climate."

The research suggests that lower-income countries will experience much stronger economic impacts than higher-income countries. Worst hit are

tropical areas of the globe such as Southeast Asia, north-central Africa and northern South America.

"The labour productivity loss computed for low- and lower-middle-income countries is approximately nine times higher than the one of high-income countries," reads the report.

(The authors are also careful to point out that health recommendations are not obligatory and are often not seriously or consistently applied at real-world work sites. Their estimates of productivity loss is based on the strict adherence to health guidelines regarding labour in extreme heat.)

From emissions to impacts

Matthews and his co-authors based their calculations of historical and future increases of heat exposure using simulations from eight separate Earth Systems Models. While many academic studies have estimated socioeconomic impacts of [climate change](#), he says this paper is novel because it predicts future impacts as a direct function of CO₂ emissions.

"The relationship between emissions and impact is pretty linear, so we are able to say that this additional quantity of CO₂ emissions will lead to this additional increase in impact," he explains. "The impact scales pretty well with the total amount of emissions we produce."

Cost of business

The authors write that their research linking CO₂ emissions to loss of [labour](#) productivity from heat exposure can help countries adopt mitigating measures. But Matthews says it may also help people change their thinking about the overall consequences of a relentlessly warming planet.

"We can see that every additional ton of CO₂ emission that we produce will have this additional impact, and we can quantify that increase," he says. "So this study can help us point to specific countries that are experiencing a quantifiable share of the economic damages that result from the emissions we produce."

More information: Yann Chavaillaz et al, Exposure to excessive heat and impacts on labour productivity linked to cumulative CO₂ emissions, *Scientific Reports* (2019). [DOI: 10.1038/s41598-019-50047-w](https://doi.org/10.1038/s41598-019-50047-w)

Provided by Concordia University

Citation: CO₂ emissions cause lost labor productivity, research shows (2019, October 11)
retrieved 17 April 2024 from
<https://phys.org/news/2019-10-co2-emissions-lost-labor-productivity.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.