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Maximizing the Public Health Benefits from Climate Action

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Environmental benefits that could be gained by successful climate change mitigation actions are usually subject to long action-reaction time lags. Furthermore, the links of mitigation efforts to major sources of climate forcing greenhouse gas (GHG) emissions are often complex. Therefore, there is a risk that potentially effective mitigation strategies are discounted by policy-makers and the general public, and not given sufficient weight in economic models.

In contrast, if these mitigation strategies have human health cobenefits, they are much more likely to be appreciated by policy makers and the general public. Effects are more immediate, tangible, and often represent greater motivation for action. We present here the nature, scope, and policy implications of the potential human health and economic cobenefits from climate mitigation actions.

Livestock production for animal-based food is immense, and projections suggest that it could double by 2050.[1] The livestock sector is responsible for 14.5% of global human-induced GHG emissions,[2] particularly through ruminant animals (cattle, sheep, and goat), from enteric fermentation. High meat consumption also contributes to the burden of chronic noncommunicable illnesses, such as cardiovascular disease (CVD). Infectious diseases are also associated with meat production, with emerging infectious diseases (EIDs) being much more likely to be associated with animals and their production than plants, while emerging zoonoses are often related to changes in land-use (e.g., deforestation) and agricultural systems (e.g., intensification) for livestock production. Reducing meat consumption could reduce all of these human health risks, while also reducing a major source of climate forcing methane emissions.

There are several more environmentally friendly—often plant-based—protein alternatives that could replace meat, and contain less saturated fat. These have the potential to decrease the environmental impact of diets while lowering the risk of dying, getting diabetes, and certain types of cancer. A diet switch from red meat to legumes, for example, could provide a substantial reduction in one's diet "carbon footprint", while also improving nutrition.

Worldwide, electricity production is one of the leading contributors to GHG emissions, and many mitigation strategies therefore target this sector. Receiving less attention, however, are the occupational illnesses and deaths associated with energy production. In particular, coal mining is known as a "big killer" when compared to other energy sectors, such as oil and natural gas extraction. The coal extraction phase is responsible for most of the occupational mortality burden. Considering just respiratory diseases, the Global Burden of Disease (GBD) study estimated that in 2013, coal worker's pneumoconiosis (a chronic progressive interstitial lung disease caused by exposure to coal dust) caused a loss of 600 200 (447 600 to 838 600) disability-adjusted life-years (DALYs), and a reduction in healthy life expectancy (HALE) of 9·2 (6·9 to 12·8) years.[3] Phasing out coal combustion could remove the single most

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important source of CO_2 pollution in the world, and substantially reduce the high occupational disease burden associated with coal extraction.

Fossil fuel combustion (e.g., at coal-fired power plants, and in transportation) represents a major environmental polluter that strongly affects air quality as well as GHG emissions.[4] Apart from their climate impacts, air pollutants associated with fossil fuel combustion have well-documented adverse human health effects. This is particularly true for particulate matter from coal-burning facilities, which has been associated with an ischemic heart disease mortality risk that is roughly five times that of the average for $PM_{2.5}$ particles, and more damaging per $\mu g/m^3$ than $PM_{2.5}$ from other common sources.[5] Globally, West et al. (2013) found that GHG mitigation can avoid 0·5 and 1·3 million premature deaths globally in 2030 and 2050, respectively, from improved air quality.[6] Associated global marginal health cobenefits were US$50−$380 per ton of CO_2, exceeding abatement costs in 2030 and 2050.[6]

Quantifications of the monetary valuations of health benefits are needed for policy decision-making. The monetary benefits of preventing early death are often valued at millions of dollars per life saved.[7] However, a key difference to note about the monetary value of health cobenefits of climate mitigation is that they tend to occur more immediately, and nearer to the source, as compared to the direct benefits of avoiding climate change itself, and so are not subject to the same level of psychological, economic, or political discounting. Thus, if a mitigation strategy improves public health, it is also likely to be much more cost-effective when compared to actions that do not.

Available evidence points to the potential for large health-related and economic cobenefits of controlling GHG emissions. Ignoring these benefits has resulted in estimates of economically optimal carbon reductions that are too low. Indeed, Ikefuji et al. (2014) have estimated that the clean air associated with CO_2 mitigation results in optimal global carbon reductions of ∼100−200 GtC higher over this century.[8] Thus, a cost-benefit model that also incorporates the human health benefits from the associated clean air improvements would yield economically optimal carbon reductions that are meaningfully larger than past models that have excluded these clean air benefits.

Existing economic, environmental, dietary, and occupational evidence makes a strong case that well-designed climate mitigation strategies also include major public health benefits, and that these economic cobenefits are often as large, if not larger, than the direct climate change benefits and marginal mitigation costs. If we fail to fully account for the human health cobenefits of mitigation measures, we will choose suboptimal policies from both a human health and climate perspective, and fail to most cost-effectively address the climate crisis we face. Here we presented several examples illustrating that a careful consideration of the complex mechanisms of positive spillover effects from climate mitigation strategies on population health and the economy are crucial imputs for policy development and cost-benefit analyses around climate change mitigation. Scientists, physicians, and economists around the world must speak out to educate the public, and to ensure that their governmental representatives both consider and optimize the public health benefits of climate mitigation measures.

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Notes

The authors declare no competing financial interest.

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