Lancet Countdown 2018 Report: Briefing for Chinese Policymakers

November 2018

Introduction

This policy brief for China has been designed to provide a unique national analysis and set of policy recommendations for health and climate change. This topic is critical for China as it has the world's largest population, the second largest burden of disease and the largest total carbon dioxide emissions of any country. By presenting three indicators from the Lancet Countdown on Health and Climate Change in order to highlight key impacts in China, this brief hopes to make clear challenges and opportunities for China at the intersection of health and climate change and recommend helpful national response measures regarding:

- Change in labour capacity
- Exposure to ambient air pollution
- Coverage and strength of carbon pricing

Acknowledgements

The concept of this brief was developed by the Lancet Countdown on Health and Climate Change. The draft was written by Wenjia Cai, Xueqin Cui, Peng Gong (Tsinghua University), Tiantian Li, Qing Wang and Xiaoming Shi (National Institute of Environmental Health, Chinese Center for Disease Control and Prevention). Review of the brief and edits were provided by Courtney Howard and Nick Watts (Lancet Countdown).

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About the Lancet Countdown

The Lancet Countdown: Tracking Progress on Health and Climate Change is a global, interdisciplinary research collaboration between 24 academic institutions and inter-governmental organisations. It monitors progress on the relationships between health and climate, and their implications for national governments, reporting annually. It was launched following the 2015 Lancet Commission on Health and Climate Change, which concluded that, left unmitigated, climate change will undermine 50 years of public health gains, whilst responding to it could represent "the greatest global health opportunity of the 21st century."

The 2018 report presents data on the indicators selected following a consultation process in 2017 These span 5 domains, from impacts and adaptation to mitigation, and the economics and politics of climate action.

About Tsinghua University

Tsinghua University is one of China's leading universities, advising the Chinese government on a range of important issues. With the motto of "Self-Discipline and Social Commitment" and the spirit of "Actions Speak Louder than Words," Tsinghua University is dedicated to the wellbeing of Chinese society and global development.

About National Institute of Environmental Health, Chinese Center for Disease Control and Prevention

National Institute of Environmental Health, Chinese Center for Disease Control and Prevention (NIEH) is a national professional institution for environmental health. NIEH's strengths lie in the research areas of air quality, drinking water quality, climate change, environmental chemical pollutants, environmental microbiology, electromagnetic radiation and their health effects. The main responsibilities of NIEH are providing scientific evidence and technological support for formulating laws, rules and regulations related to human health impact and environmental related diseases.

Recommendations

Our key recommendations for Chinese policymakers are as follows:

Recommendation 1

Curb greenhouse gas emissions and take effective adaptation measures to manage heat stress at work and reduce heat-related economic loss.

Recommendation 2

Prioritize measures that both decrease greenhouse gas emissions and reduce air pollution and its related health costs, and incorporate analysis of those benefits into the climate and air pollution control policymaking process.

Recommendation 3

Ensure full operation of the national Emissions Trading Scheme and implement ambitious carbon pricing policy as broadly and as soon as possible.

Indicator 1.4

Change in labour capacity

Rising temperatures will impair occupational health and reduce productivity for hundreds of millions of working people in China.

Lancet Countdown data shows that the reduction of labour productivity caused by occupational heat stress, measured by total hours of labour lost (THLL), reached 21 billion hours (equivalent to the total working hours of 10.5 million employees in one year or 1.4% of the total Chinese working population) in 2017 in China.[1] Despite annual fluctuations, THLL has increased slightly since 2000, as shown in Figure 1. The disproportionate impact of hot weather and its labour productivity effects on vulnerable occupations results in sectoral disparities of THLL in China. People spending much of their working time outdoors in activities requiring a relatively high degree of physical activity, like members of the agricultural and construction labour forces, have a higher average metabolic rate while working, which makes them vulnerable to heat-related stress, resulting in higher THLL.

Increasingly frequent heat waves, as predicted under future climate change scenarios, would lead to a growing reduction in labour productivity and soaring associated heat-related financial losses. High-temperature subsidies (HTSs) are paid to workers for each working day in extremely hot environments as compensation in China. The total HTSs are projected to reach 250 billion yuan per year in the 2030s, and increase to 1000 billion yuan per year in 2100 under the moderate climate change scenario (RCP 4.5), with the conservative assumption that the HTS standards (per employee per hot day) remain constant.[2] With the assumption that HTS standards increase along with wages, total HTSs in China would increase from 0.2% to as high as 3% of GDP at the end of the 21st century.[2] Given the fact that total expenditure on health care recently reached 5% of GDP in China,[3] HTSs to compensate employees in hot working environment would become more and more unaffordable in the future.

The Chinese government has not yet paid enough attention to the labour capacity loss driven by climate change. Given the future predicted increasing frequency and severity of heat waves, curbing greenhouse gas emissions and taking effective adaptation measures are essential to help to avoid unaffordable economic losses from heat stress at work.

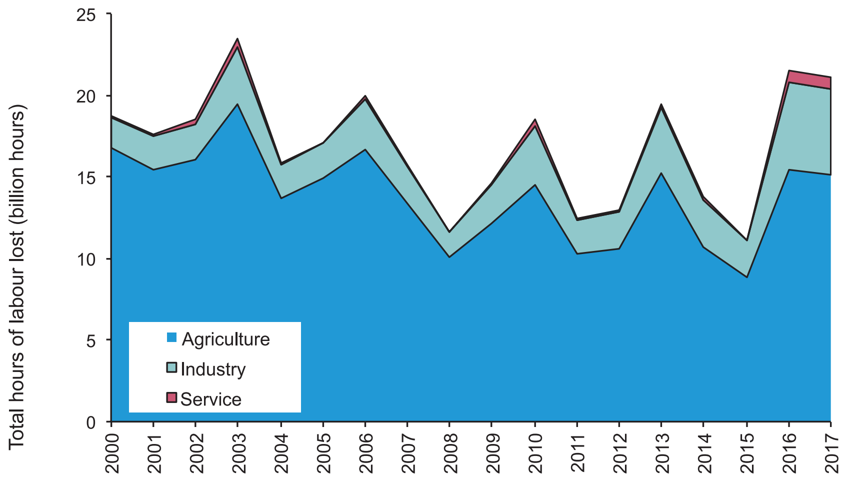

Figure 1. Total hours of labour lost by sector in China from 2000 to 2017

Indicator 3.5

Exposure to ambient air pollution

Substantial reduction in air pollution has been achieved in recent years in China. According to official monitoring data, the average concentration of PM_{10} and SO_2 in cities of prefecture level or above in China decreased by 22.7% and 41.9% respectively in 2017 compared to 2013.[4]

As a result of significant air quality improvement, especially with regards to concentration reductions in $PM_{2.5}$, PM_{10}, SO_2 and CO, it is estimated that in 2017, there were 47,240 (95% CI 25,870-69,990) fewer deaths and 710,020 (420,230-1,025,460) fewer years of life lost (YLL) in 74 key cities than in 2013,[5] which means that approximately 5% of deaths attributable to ambient air pollution in China were avoided.[6] The health benefits in Beijing-Tianjin-Hebei, Yangtze River Delta and Pearl River Delta regions accounted for more than 55% of the national total (Figure 2).

CO_2 mitigation measures have a large degree of overlap with air pollution control actions. Therefore, the same policies which have improved local health via air pollution reduction can be expected to have also improved global health via a reduction in greenhouse gas emissions and reduced health impacts from climate change.

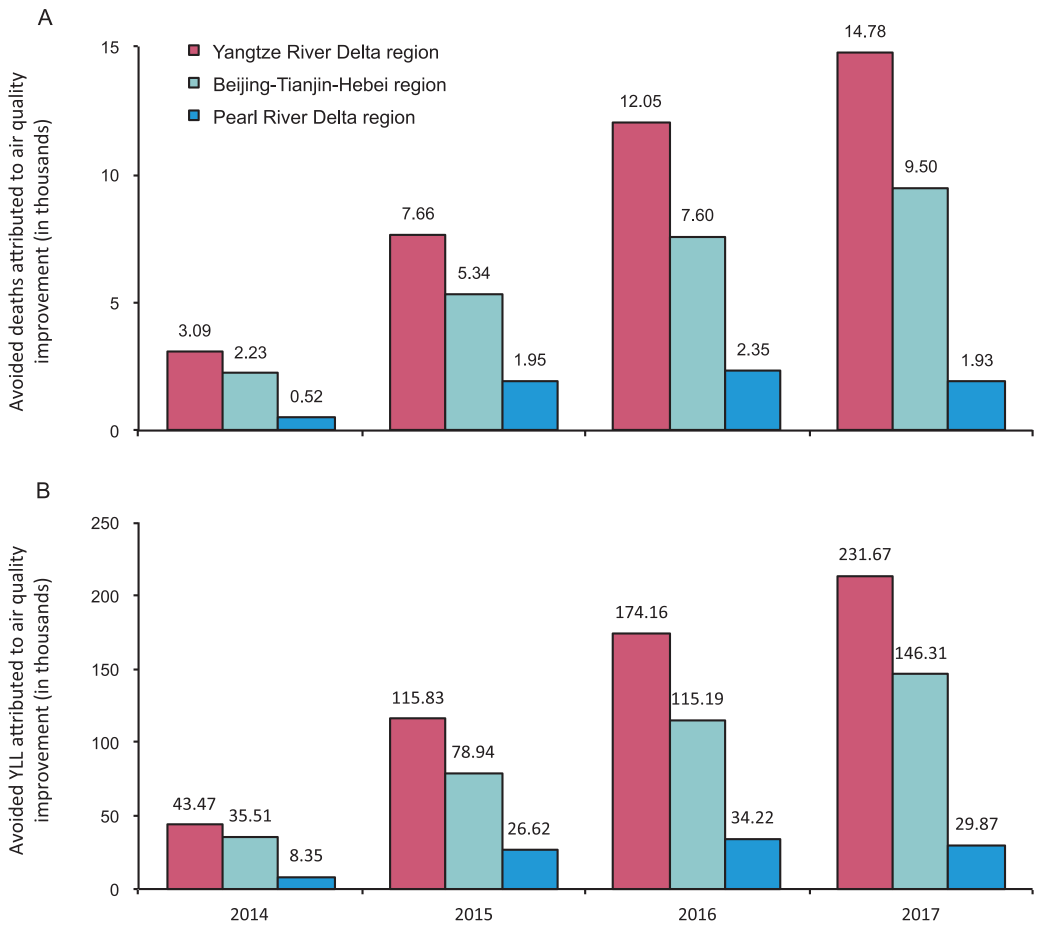

Figure 2. Number of avoided deaths and Years of Life Lost (YLL) attributable to air quality improvements in the three key regions in China from 2014 to 2017 compared with 2013

Anthropogenic climate change may itself exacerbate heavy pollution events by increasing the occurrence of meteorological conditions that accumulate pollutants. Strong evidence exists that both the frequency and persistence of atmospheric stagnation, the weather condition that leads to severe pollution episodes, will increase drastically as a result of global climate change in China.[7-8] Thus, meteorological drivers induced by climate change play a vital role in pollution episodes, meaning that air pollution reduction efforts must continue in order to maintain current levels of air quality, or to improve them further.

Action to reduce greenhouse gas emissions should be given higher priority in China from an air pollution perspective, not only because of the large immediate co-benefit from reduced air pollution, but also in order to prevent a meteorological environment that is unfavourable for pollution control. The air quality and health co-benefits of greenhouse gas reductions must be incorporated into the cost-benefit analysis of climate change policymaking in China, in order to make clear the positive health impacts and immediate healthcare cost savings of many climate change policies.

Indicator 4.7

Coverage and strength of carbon pricing

In December 2017, China initiated its national emissions trading scheme (ETS) after several years of deliberation and pilot trading. It will reach full operation at the national scale around 2020.

In December 2017, China initiated its national emissions trading scheme (ETS) after several years of deliberation and pilot trading. It will reach full operation at the national scale around 2020. Once operational in the electricity sector, the ETS is expected to cover around 3 $GtCO_2$ per year, which makes it 1.7 times larger than EU ETS[9], the world's largest ETS to date. Though the sectoral coverage of the national ETS is planned to expand gradually after 2020, no clear timetable has yet been set.

The carbon prices in seven pilot regions ($1.5-10 per ton of CO_2) were relatively lower compared with global weighted average carbon price of existing instruments ($11.58 in 2018), suggesting that China's ETS would need to evolve to raise ambition, so as to provide larger incentives to low carbon investment and fossil fuel divestment.

In designing the national ETS, ancillary benefits of carbon pricing, such as reduced adverse human health impacts, have not been considered by policy makers in China. Studies show that higher carbon prices would result in larger avoided mortality as shown in Figure 3.[10] This avoided damage to health could partially or even fully offset carbon pricing costs.[10-12] Furthermore, studies also show that health co-benefits are larger at the early stages when pollution levels are higher, and will diminish with increasing climate policy stringency.[13-14] Therefore, when fully taking into consideration the health co-benefits of carbon pricing, the Chinese government would do well to speed up the capacity building process, apply carbon pricing instruments as soon and as broadly as possible, and enhance its ambition gradually.

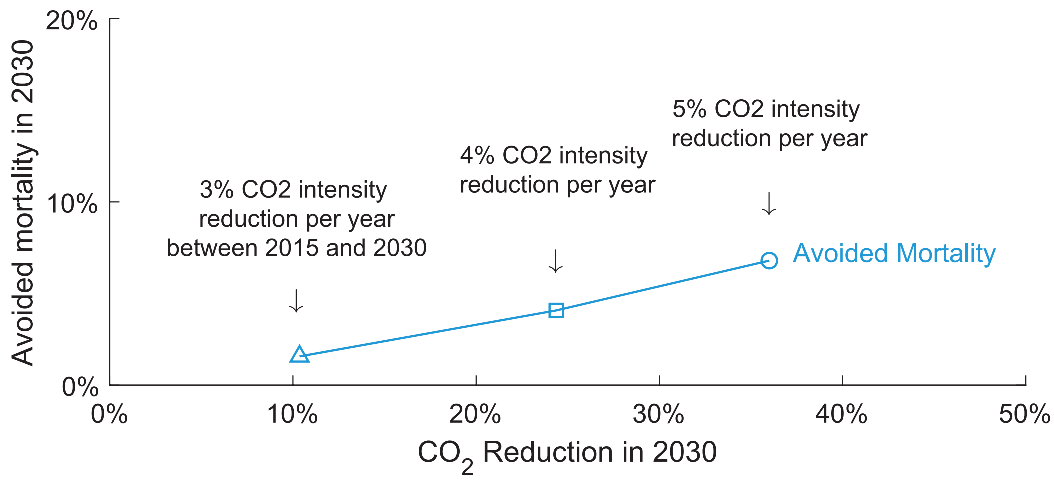

Figure 3. More stringent climate policy would bring larger health co-benefits

Recommendations

Our key recommendations for Chinese policymakers are as follows:

Recommendation 1

Curb greenhouse gas emissions and take effective adaptation measures to manage heat stress at work and reduce heat-related economic loss. Pay more attention to the labour capacity loss driven by climate change in the policymaking process..

Recommendation 2

Prioritize measures that both decrease greenhouse gas emissions and reduce air pollution and its related health costs, and incorporate analysis of those benefits into the climate and air pollution control policymaking process in order to fully realize co-benefits and prevent climate-change-related meteorological conditions that will worsen air pollution.

Recommendation 3

Ensure full operation of the national ETS and implement ambitious carbon pricing policy as soon as possible. Fully consider the health co-benefits of carbon pricing, speed up the capacity building process, apply carbon pricing broadly across China without delay, and enhance ambition gradually.

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