Results WBGT exceeded threshold limit values for moderate/heavy work for 73% outdoor workers ($28.9^{\circ}\text{C} \pm 2.4^{\circ}\text{C}$) and 67% indoor workers ($28.8^{\circ}\text{C} \pm 3.5^{\circ}\text{C}$). Heat stress and heat-strain indicators were significantly associated ($p=0.0001$) and outdoor workers had 2.2 times greater risk of heat-strain during hot seasons (95% CI: 1.695–2.937). Compared to indoor workers, the outdoor workers ran a higher risk of self-reported health decrements (OR: 6.4; 95% CI: 3.884–10.350; $p=0.0001$), dehydration (OR: 3.0; 95% CI: 2.352–3.999) and productivity losses (OR: 8.0; 95% CI: 4.911–13.382). In select occupations, while indoor workers exposed to chronic high-heat had a higher percentage of kidney stones (9%), the outdoor workers with long years of heat exposures had the higher risk of reduced kidney function (14%) due to repeated dehydration, volume depletion, and Acute Kidney Injury.

Conclusion We discuss implications for workers' health and productivity as climate modeling shows seriously increasing outdoor and indoor heat problems without suitable control measures for cooling. Strong protective labor policies and research are imperative to avoid serious health impacts and to maintain productivity.

07E.3 ABSTRACT WITHDRAWN

07E.4 ESTIMATING ECONOMIC IMPACT OF HEAT ON CHINA'S LABOR PRODUCTIVITY: NEW EVIDENCE FROM A CGE MODEL

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High heat exposure and heat-related health impacts is a well-known occupational health hazard. Though recent studies have quantified high heat impacts on labor productivity in occupational group, little is known about the scale of economic impacts of labor productivity losses, resulting in inadequate policy response. Besides, sectors that suffer most from heat, such as agriculture, service and construction, have extensive inter-dependent relationship with other sectors in the economy. Therefore, it is also important to include these indirect impacts, to avoid the underestimation of the economy-wide impacts.

Computable general equilibrium (CGE) model can capture direct and indirect economic impact of heat on labor productivity and do the comprehensive analysis. In this study, we used WBGT to estimate future labor productivity changes. Meanwhile we employed a China dynamic CGE model (CHEER) with 2012 as base year in the paper to investigate the economic impacts of heat on labor productivity and to find out the specific sectors' losses and the whole-economy losses in China. Taking temperature projections (daily maximum temperature, daily minimum temperature, and daily average temperature) under RCP scenario, population projections (demographic age structure and employment structure) under SSP scenario in China as input

and dividing China's economic sector into 22 sectors in our model, we analyzed 22 sectors' economic impacts in the long term.

Based on these scenarios, our study quantifies the full scope of economic impact of heat on labor productivity and analyze the changes of GDP, specific sectors output and industrial structure in the future. Our study could contribute to the understanding of social cost of carbon in China. A range of measures for different economic sectors were also suggested to reduce future economic loss from heat in China. Future research needs were discussed at the end of the paper.

07E.5 NEW INITIATIVES IN INTERNATIONAL COLLABORATION FOR DESCRIBING THE OCCUPATIONAL HEAT HAZARDS VIA EPIDEMIOLOGICAL STUDIES AND MODELLING

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The negative effects of heat stress on work tolerance are well known. In order to optimise exercise tolerance in the heat, various physiological strategies can be employed to alter heat strain such as optimising work-rest cycles, maximising aerobic fitness, heat acclimatisation, pre-exercise cooling and fluid ingestion. In order to optimise workers' health and productivity in the heat, there is an urgent need for collaborative efforts across various disciplines. A holistic heat management programme requires accurate quantification of the impact due to heat stress before formulating and evaluating the eventual heat mitigation strategies. The International Commission on Occupational Health Scientific Committee on Thermal Factors can serve as an effective platform for dedicated scientists to network and for active research and analysis specific to protection of working people from excessive heat and cold exposures in current and future work environments, including analysis of climate change impact and mitigation analysis. This platform will enable members of Scientific Committee of Thermal Factors to become co-authors on reports in major scientific journals, to collaborate across country boundaries, to get recognition for their own research work, and to be part of future funded global activities.

Occupational Cancer-3

08A.1 ESTIMATING THE BURDEN OF LUNG CANCER DUE TO OCCUPATIONAL EXPOSURE TO RADON GAS

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Background Radon is a well-known cause of lung cancer. Our goal was to estimate the prevalence and level of occupational exposure to radon, and to estimate the current lung cancer burden caused by radon exposure in Canadian workplaces.

Methods Highly exposed (i.e. underground) workers were assigned exposure proportions at the national level using