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Economic impacts from PM2.5 pollution-related health effects in China: A provincial-level analysis

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This study evaluates the PM2.5-pollution-related health impacts on the national and provincial economy of China using GAINS-China model and a Computable General Equilibrium (CGE) model. Applying our approach to 30 provinces in China shows that the health and economic impacts may be substantial in provinces with high PM2.5 concentration. In the WoAir scenario in 2030, we estimate that China experiences a 1.94% GDP loss and 140 billion Yuan in health expenditure from PM2.5 pollution. In the WAir scenario in 2030, we estimate a control cost of 883 billion Yuan versus a net benefit from the control technology of 0.80% of China's GDP. At the provincial level in 2030, GDP loss in the WoAir scenario is high in Tianjin (3.12%), Shanghai (2.81% GDP), Henan (2.71% GDP), Beijing (2.65% GDP), and Hebei (2.57% GDP). The total health expenditure in 2030 is 18 billion (12.8% GDP) in Henan, 14.2 billion in Sichuan (10.0% GDP), 12.4 billion (8.8% GDP) in Shandong, 11.8 billion (8.4% GDP) in Hebei, and 11.2 billion (8.0% GDP) in Jiangsu. These five provinces account for 50% of the health expenditure in China. The net benefit in the WAir scenario in 2030 is high in Tianjin (2.1% GDP), Shanghai (2.07% GDP), Beijing (1.9% GDP), Henan (1.6% GDP), Jiangsu (1.6% GDP), and Hebei (1.2% GDP), respectively. The net benefit in 2030 is negative in Ningxia, InnerMong, Guizhou, Gansu and Heilongjiang, provinces with low GDP loss but relatively high cost.