Table 18. Health-Impact Studies*

Citation	Study Location	Study Period	Study Sample	Pollutants	Health Outcomes	Summary of Published Findings
Alberini A, Krupnick A. 1998. Air quality and episodes of acute respiratory illness in Taiwan cities: Evidence from survey data. J Urban Econ 44:68–92.	Taipei,China Taipei Kaohsiung Hualien	1991–1992	900 cases	PM_{10}, O_3	Acute respiratory illness, willingness to pay	Exposure to PM_{10} was reported to promote new episodes of illness and reduce immune response to infection. PM_{10} also induced irritation of the airways and interfered with respiratory processes. PM_{10} did not affect the duration of an episode after it had started. No effect of exposure to O_3 was found. It was calculated that a one-day 20% reduction in PM_{10} (from an initial concentration of 150 μg/m^3) would lead to health benefits worth U.S.$519,177.
Alberini A, Krupnick A. 2000. Cost-of-illness and willingness-to-pay estimates of the benefits of improved air quality: Evidence from Taiwan. Land Econ 76:37–53.	Taipei,China Taipei Kaohsiung Hualien	1991–1992	602 respondents	PM_{10} (as a measure of air pollution in general)	Cost of illness (COI) and willingness to pay (WTP) to avoid minor respiratory illness	WTP was found to be greater than COI estimates. The ratio of WTP to COI ranged from 1.61 to 2.26, depending on air pollution concentrations. These ratios are similar to those for the United States.
Anjaneyulu Y, Jayakumar I, Hima Bindu V, et al. 2005. Use of multi-objective air pollution monitoring sites and online air pollution monitoring system for total health risk assessment in Hyderabad, India. Int J Environ Res Public Health 2:343–354.	India Hyderabad	2003	Residents of Hyderabad	Total SPM, $PM_{2.5}$, PM_{10}, SO_2, NO_x, CO, O_3	Respiratory disease	Particulate matter was found to be a significant factor in the development and exacerbation of respiratory disease in Hyderabad.
Browne DR, Husni A, Risk MJ. 1999. Airborne lead and particulate levels in Semarang, Indonesia and potential health impacts. Sci Total Environ 227:145–154.	Indonesia Semarang	1996–1997	1.3 million adults and children	TSP, airborne lead	Mortality (total, respiratory disease)	Increased concentrations of TSP near major roads resulted in an estimated 1.6% increase in total mortality and a 7.9% increase in mortality from respiratory disease. Estimated blood lead concentrations indicated possible lead toxicity among Semarang children.
Cai CG, Zheng XY. 2007. A willingness-to-pay study on the health loss due to the air pollution in Beijing [in Chinese]. Economic Science 1:107–115.	China Beijing	2004–2005	632 families living in 7 urban districts of Beijing	PM_{10}, SO_2, NO_2, CO	Respiratory symptoms, dry eye, allergies	Residents of Beijing were willing to pay ¥652.327 annually for the improvement of environmental conditions. Willingness to pay was positively correlated with the socioeconomic status and education of the residents.

* Last updated September 2007. — = not provided.

Table 18. Health-Impact Studies*

Citation	Study Location	Study Period	Study Sample	Pollutants	Health Outcomes	Summary of Published Findings
Cao J. 2004. Comparison of different calculation methods on economic losses of human health from air pollution in Shanxi province [in Chinese]. J Taiyuan Univ Tech 35:86–88.	China Shanxi province	1999	Residents of Shanxi	PM_{10}, TSP	Mortality, COPD, cardiovascular disease, lung cancer, tuberculosis, respiratory disease, emergency-department visits, asthma	The estimated economic cost of air-pollution–related health effects was ¥2.889 billion, or 1.92% of Shanxi's gross domestic product in 1999.
Chen C, Chen B, Wang B, et al. 2007. Low-carbon energy policy and ambient air pollution in Shanghai, China: A health-based economic assessment. Sci Total Environ 373:13–21.	China Shanghai	Projections for 2010 and 2020	The population of Greater Shanghai	Ambient air pollution under various low-carbon energy scenarios, based on current PM_{10} and SO_2 concentrations	Economic benefits, avoidable deaths	It was concluded that implementation of various low-carbon energy scenarios could prevent 2804 to 8249 PM_{10}-related deaths in 2010 and 9870 to 23,100 in 2020. The economic benefits could reach U.S.$507.31 million to U.S.$1.49 billion in 2010 and U.S.$2.64 billion to U.S.$6.19 billion in 2020.
Guo H, Lee SC, Chan LY, et al. 2004. Risk assessment of exposure to volatile organic compounds in different indoor environments. Environ Res 94:57–66.	China Hong Kong	—	Food service workers, office workers, housewives, school-children	VOCs in indoor and commuting environments	Lifetime cancer risk	The lifetime cancer risk from exposures to VOCs was found to be greater than 1×10^{-6} for all groups. The risk was greatest for housewives, followed by food service and office workers. Benzene accounted for about 40% of the total lifetime cancer risk in each indoor environment studied.

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Citation	Study Location	Study Period	Study Sample	Pollutants	Health Outcomes	Summary of Published Findings
Hammitt JK, Zhou Y. 2006. The economic value of air-pollution–related health risks in China: A contingent valuation study. Environ Res Econ 33:399–423.	China Beijing Anqing Rural areas near Anqing	1999	3700 respondents	Indoor PM_{10}, indoor SO_2	Willingness to pay (WTP) to prevent a cold in the next few days, reduce lifetime chances of chronic bronchitis by 1% or 5%, and reduce chances of death in the next year by 10 in 10,000 and 20 in 10,000	The median WTP to prevent a cold ranged from U.S.$3 to U.S.$6, the median WTP to prevent a case of chronic bronchitis ranged from U.S.$500 to U.S.$1,000, and the value per statistical life ranged from U.S.$4,000 to U.S.$17,000. It was concluded that these estimated values are 10 to 1000 times lower than those in the United States and Taipei,China. Indoor air quality, measured for a subset of respondents, showed no consistent relationship with WTP.
Higashino H, Mita K, Yoshikado H, et al. 2007. Exposure and risk assessment of 1,3-butadiene in Japan. Chem Biol Interact 166:52–62.	Japan	1997–1999, 2002–2003	126 million residents of Japan	1,3-Butadiene	Lifetime cancer risk	The majority of the population of Japan has an excess lifetime cancer risk < 10^{-5}. But the study found that a small number of people living close to sources of industrial pollution had a risk > 10^{-5}; 2.0 excess cancer cases per year are expected.
Hu Y, Bai Z, Zhang L, et al. 2007. Health risk assessment for traffic policemen exposed to polycyclic aromatic hydrocarbons (PAHs) in Tianjin, China. Sci Total Environ 382:240–250.	China Tianjin	2005	Nonsmoking traffic policemen	PAH, TSP, PM_{10}	Incremental lifetime cancer risk	The traffic officers' lifetime cancer risk from occupational exposure (i.e., their total inhalation risk) was found to range from 10–6 to 10–3.
Joseph A, Ad S, Srivastava A. 2003. PM(10) and its impacts on health—a case study in Mumbai. Int J Environ Health Res 13:207–214.	India Mumbai	1995–2000	General population	RSP	Mortality	It was concluded that the use of results from epidemiologic studies in developed countries to estimate health effects in developing countries can underestimate the effects and that these results should not be used for this purpose.
Kan H, Chen B. 2004. Particulate air pollution in urban areas of Shanghai, China: Health-based economic assessment. Sci Total Environ 322:71–79.	China Shanghai	2001	Residents of Shanghai	PM_{10}	Economic cost of health effects	In 2001, the total economic cost of health effects caused by PM air pollution in urban areas of Shanghai was estimated to be approximately U.S.$625.40 million, or 1.03% of the city's gross domestic product.

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Citation	Study Location	Study Period	Study Sample	Pollutants	Health Outcomes	Summary of Published Findings
Kan HD, Chen BH. 2002. Impact of long-term exposure to air particulate matter on life expectancy and survival rate of Shanghai residents. Biomed Environ Sci 15:209–214.	China Shanghai	1999	Residents of Shanghai	TSP (converted into PM_{10} and $PM_{2.5}$)	Life expectancy, survival rate	Long-term exposure to PM in air was found to cause a reduction of 1.34 to 1.69 years in life expectancy and a decrease in survival rate.
Kan HD, Chen BH, Chen CG, et al. 2004. An evaluation of public health impact of ambient air pollution under various energy scenarios in Shanghai, China. Atmos Environ 38:95–102.	China Shanghai	Projections for 2010, 2020	Residents of Shanghai	Air pollution in various energy scenarios	Premature death, chronic bronchitis, hospital admissions for respiratory and cardiovascular disease, outpatient visits (internal medicine, pediatrics), acute bronchitis, asthma attack	It was estimated that implementation of various energy scenarios could prevent 608 to 5144 and 1189 to 10,462 PM_{10}-related avoidable deaths in 2010 and 2020, respectively. A substantial decrease in morbidity would occur as well.
Li J, Guttikunda SK, Carmichael GR, et al. 2004. Quantifying the human health benefits of curbing air pollution in Shanghai. J Environ Manage 70:49–62.	China Shanghai	Projections for 1995–2020	Residents of Shanghai	PM_{10} emissions in various coal-use policy scenarios	Human health benefit	The benefit-to-cost ratio ranged from 1 to 5 for a power-sector initiative and from 2 to 15 for an industrial-sector initiative. Considerable net health benefits could result from supporting investment in air pollution controls in developing cities like Shanghai.
Liao Y, Wang W, Zhang L. 2007. GIS-based study on urban NO_x induced health risk assessment [in Chinese]. Progress in Geography 26:44–52.	China Fuzhou	—	Residents of Fuzhou	NO_x	Health risks	NO_x exposure, distribution, and health risks were classified using GIS (geographic information systems) models to assess the health risks of urban air pollution.
Lin S-L, Lin K-H. 2007. The valuation of health effects caused by stationary sources-related SO_2 emissions: The adaptation of impact pathway approach in Taiwan. Environ Monit Assess 131:163–176.	Taipei,China Taichung	2002	—	SO_2	Estimated cost of health effects caused by SO_2	For the Taichung area, the cost of health effects caused by SO_2 in 2002 was estimated at U.S.$28.5 million (range, U.S.$6.61 million to U.S.$72.0 million). Based on 2002 emission data, the cost was estimated to range from U.S.$0.56 to U.S.$7.38 per kg of SO_2.

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Table 18. Health-Impact Studies*

Citation	Study Location	Study Period	Study Sample	Pollutants	Health Outcomes	Summary of Published Findings
Mead RW, Brajer V. 2005. Protecting China's children: Valuing the health impacts of reduced air pollution in Chinese cities. Environ Dev Econ 10:745–768.	China Anshan Beijing Changsha Chengdu Chongqing Dalian Fushun Fuzhou Guangzhou Guiyang Handan Hangzhou Harbin Hengshui Jilin City Jining Lanzhou Maanshan Nanjing Nanning Pingxiang Qingdao Qinghuangdao Sanming Shanghai Shantou Shenyang Shenzhen Shijiazhuang Taiyuan Tianjin Wenzhou Wuhan Wulumuqi Xiamen Xinyi Zhuhai Zibo	2001, projections for 2002–2011	Approximately 35 million children	TSP, SO_2, NO_2	Averted cases of cold, bronchitis, asthma, respiratory-related hospital visits; cost in U.S. dollars	It was projected that, for children living in Chinese cities from 2002 to 2011, more than 7 million colds, 25 million cases of bronchitis, nearly 1 million asthma episodes, and close to a million respiratory-related hospital visits could be averted if urban air pollution concentrations were lowered. The child morbidity benefits might be substantial, with a value of nearly U.S.$3.5 billion (range, U.S.$2 billion to U.S.$6 billion) over the period.

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Citation	Study Location	Study Period	Study Sample	Pollutants	Health Outcomes	Summary of Published Findings
Mead RW, Brajer V. 2006. Valuing the adult health effects of air pollution in Chinese cities. Ann NY Acad Sci 1076:882–892.	China 95 cities	2003, projection for 2012	—	TSP, SO_2, NO_2	Averted mortality and morbidity, associated costs	It was estimated that, if Chinese clean-air standards (200 μg/m^3 TSP, 60 μg/m^3 SO_2, and 80 μg/m^3 NO_2) were met, a billion instances of morbidity (valued at more than U.S.$12 billion) and more than 138,000 deaths (valued at U.S.$57 billion) could be averted. If WHO clean-air standards were met, more than three billion instances of morbidity (valued at more than U.S.$40 billion) and more than 333,000 deaths (valued at more than U.S.$200 billion) could be averted.
Mukhopadhyay K, Forssell O. 2005. An empirical investigation of air pollution from fossil fuel combustion and its impact on health in India during 1973–1974 to 1996–1997. Ecol Econ 55:235–250.	India	1973–1997	Residents of India	SO_2, NO_x, CO	Death, asthma, respiratory disease	Air pollution was found to have severe effects on respiratory health in India. Fossil-fuel emissions were the source of the air pollution.
Ostro B. 1994. Estimating the health effects of air pollutants: A method with an application to Jakarta. Policy Research Working Paper 1301. The World Bank, Washington, D.C. http://econ.worldbank.org	Indonesia Jakarta	—	—	PM, SO_2, NO_2, O_3, lead	Health benefits	A method for quantifying the benefits of reduced air pollution was proposed and applied to data from Jakarta.
Pan X, Yue W, He K, Tong S. 2007. Health benefit evaluation of the energy use scenarios in Beijing, China. Sci Total Environ 374:242–251.	China Beijing	Baseline 1999, projections for 2010, 2020, 2030	6,589,175 residents	PM_{10}, SO_2	Total mortality rate, disease (chronic bronchitis, asthma attacks), hospital visits (admissions for respiratory disease, cardiovascular disease, and COPD; emergency and outpatient care by internal medicine and pediatrics)	It was projected that, under a clean-energy-use scenario compared with a baseline scenario, PM_{10} concentrations in Beijing will decrease significantly. As a result, there will be, by 2010, 2020, and 2030, respectively, a decrease of 29 to 152, 30 to 212, and 39 to 287 acute excess deaths and 340 to 1811, 356 to 2529, and 462 to 3424 chronic excess deaths. There will also be a decrease of 237 to 331, 285 to 371, and 400 to 554 short-term excess deaths associated with a decrease in SO_2 concentrations. The number of hospital admissions, emergency visits, outpatient visits, and asthma attacks will also decline.

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Citation	Study Location	Study Period	Study Sample	Pollutants	Health Outcomes	Summary of Published Findings
Pandey JS, Kumar R, Devotta S. 2005. Health risks of NO_2, SPM and SO_2 in Delhi (India). Atmos Environ 39:6868–6874.	India Delhi	—	—	SPM, NO_2, SO_2	Health risks	Health risks from air pollution in Delhi were highest for children. For all age categories, health risks from SO_2 were the lowest.
Parikh JK, Hadker N. 2003. Economic impacts of urban air pollution: Valuation for Mumbai, India. Int J Environ Pollut 19:498-515.	India Mumbai	—	Residents of Mumbai	Ambient air pollution	Mortality, morbidity	The average cost of the health effects of air pollution was 0.26% of income. However, the 5% of residents who suffer severe attacks might pay as much as 19% of their income.
Peng CY, Wu XD, Liu G, et al. 2002. Urban air quality and health in China. Urban Studies 39:2283–2299.	China Shijiazhuang	2000	1.5 million residents of Shijiazhuang	Sulfate aerosols (as particulates)	Premature deaths, morbidity in general, associated costs	It was estimated that, if the city had met China's national ambient air quality standards, 251 premature deaths, 7.7 million cases of acute and chronic morbidity, and 6589 person-years of restricted activities would have been avoided. An economic valuation suggested a cost of U.S.$40 million for premature deaths and U.S.$31 million for morbidity.
See SW, Balasubramanian R, Yang TS, et al. 2006. Assessing exposure to diesel exhaust particles: A case study. J Toxicol Environ Health A 69:1909–1925.	Singapore Boon Lay bus interchange	2003–2004	—	$PM_{2.5}$, PAHs	Lifetime cancer risk	A lifetime cancer risk of 1.64×10^{-6} to 2.70×10^{-6} was reported, based on the assumption that the amount of air inhaled was 20 m^3/day. Taking the deposition fraction into account, the risk was still higher (1.11×10^{-6} to 1.82×10^{-6}).
Srivastava A, Kumar R. 2002. Economic valuation of health impacts of air pollution in Mumbai. Environ Monit Assess 75:135–143.	India Mumbai	1997	Residents	Ambient air pollution	Health damage cost	A dose–response relation between air pollution and human health was established, based on a day spent by an individual in various microenvironments. An economic valuation of morbidity and mortality was estimated through lost salary. Results showed that the avoidance cost was 29% of the total health damage cost.

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Citation	Study Location	Study Period	Study Sample	Pollutants	Health Outcomes	Summary of Published Findings
Sultan ZM. 2007. Estimates of associated outdoor particulate matter health risk and costs reductions from alternative building, ventilation and filtration scenarios. Sci Total Environ 377:1–11.	Singapore	2002	—	Outdoor PM	Savings from reduced health risks associated with improved building design, ventilation, and filtration	Findings suggested that nationwide adoption of improved building, ventilation, and filtration strategies would reduce the number of health cases attributable to PM pollution by approximately half, amounting to savings of U.S.$17.7 billion. For residential buildings, closed residences and air-conditioning would be associated with fewer cases of mortality (10% and 6%, respectively) and morbidity (8% and 4%, respectively) as well as savings of U.S.$1.5 billion and U.S.$0.9 billion, respectively. Mechanical ventilation and filtration in schools would be associated with fewer hospital admissions for asthma and its exacerbations. Enhanced workplace filtration would reduce cases of mortality and morbidity by 14% and 13%, respectively, amounting to savings of up to U.S.$2.4 billion.
Thanh BD, Lefevre T. 2001. Assessing health benefits of controlling air pollution from power generation: The case of a lignite-fired power plant in Thailand. Environ Manage 27:303–317.	Thailand	1992–1995	Residents of Thailand	Power-plant emissions (PM_{10}, SO_2)	Health and monetary benefits from flue-gas desulfurization of a power plant	The advent of flue-gas desulfurization to control SO_2 emission at the Mae Moh power plant significantly reduced adverse effects on health not only in people living near the plant but also all over the country. The benefit was much greater than the investment and operating costs of the equipment.
Voorhees AS, Araki S, Sakai R, et al. 2000. An ex post cost-benefit analysis of the nitrogen dioxide air pollution control program in Tokyo. J Air Waste Manag Assoc 50:391–410.	Japan Tokyo	1973–1994	All residents of Tokyo	Costs and benefits of Tokyo's NO_2-control programs (1973–1994)	Medical costs, cost of lost wages	Net estimates of the averted medical costs of pollution-related phlegm and sputum in adults and of respiratory illnesses in children were U.S.$6.08 billion and U.S.$775 million, respectively. Net estimates of the averted costs of lost wages in workers and in mothers caring for sick children were U.S.$6.33 billion and U.S.$833 million, respectively.
Wan Y, Yang H, Masui T. 2005. Air pollution-induced health impacts on the national economy of China: Demonstration of a computable general equilibrium approach. Rev Environ Health 20:119–140.	China	2000	Residents of China	PM_{10}	Economic loss	Various approaches were used to estimate the economic losses resulting from premature death and disease associated with air pollution. The human capital model estimated that the economic loss was equivalent to 1.26% of China's GDP. The computable general equilibrium model's estimate was 0.38%.

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Citation	Study Location	Study Period	Study Sample	Pollutants	Health Outcomes	Summary of Published Findings
Wan Y, Yang HW, Masui T. 2005. Health and economic impacts of air pollution in China: A comparison of the general equilibrium approach and human capital approach. Biomed Environ Sci. 18:427–441.	China	2000	Residents of China	PM_{10}	Economic loss	The economic loss resulting from premature death and disease associated with air pollution was estimated to be 0.38% of China's GDP, using a computable general equlibrium model. The human capital model's estimate was 1.26%. A major implication of the study was that air pollution can slow down China's economic growth by decreasing the health and vitality of its people.
Wang H, Mullahy J. 2006. Willingness to pay for reducing fatal risk by improving air quality: A contingent valuation study in Chongqing, China. Sci Total Environ 367:50–57.	China Chongqing	1998	500 residents of Chongqing (15–80 yr)	Ambient air pollution	Willingness-to-pay (WTP) to reduce mortality from air pollution	The study subjects' WTP to save one statistical life was U.S.$34,458; their mean annual income was U.S.$490. It was concluded that clean air might still be considered a "luxury good" in China.
Wang XP, Mauzerall DL. 2006. Evaluating impacts of air pollution in China on public health: Implications for future air pollution and energy policies. Atmos Environ 40:1706–1721.	China Zaozhuang	2000, with projections for 2020	281 million residents of Zaozhuang	PM in various energy-technology scenarios	Health impact (morbidity, mortality, years of life lost)	Substantial benefits to public health could be achieved through the use of additional pollution controls, particularly advanced coal-gasification technology.
Wu BZ, Hsieh LL, Sree U, et al. 2006. Determination and impact of volatile organics emitted during rush hours in the ambient air around gasoline stations. J Air Waste Manag Assoc 56:1342–1348.	Taipei,China Taoyuan	2002	People living near 4 gas stations	VOCs	Cancer risk, general health hazard	Higher concentrations of methyl tertiary butyl ether (MTBE) and benzene were observed in proximity to gas stations without vapor-recovery systems. Using published estimates of cancer risk, it was estimated that 8- to 12-fold increases in cancer of the reproductive system would occur among those living near such gas stations. The general-health-hazard index was 3.8 times higher for those living near such gas stations.
Xiao F, Brajer V, Mead RW. 2006. Blowing in the wind: The impact of China's Pearl River Delta on Hong Kong's air quality. Sci Total Environ 367:96–111.	China Hong Kong	1999–2003	—	PM_{10}, NO_2	Potential benefits of reducing air pollution	The potential health benefits of reducing air pollution in southern mainland China were estimated to be small. The economic benefits of averted mortality from such a reduction would be approximately U.S.$40 million. The benefits of a more modest effort focused on Hong Kong would be nearly U.S.$200 million.

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Citation	Study Location	Study Period	Study Sample	Pollutants	Health Outcomes	Summary of Published Findings
Yang ZF, Xu LY. 2004. Valuing health effects from the industrial air pollution in rural Tianjin, China [in Chinese]. J Environ Sci (China) 16:157–160.	China Tianjin	2000	277 residents, 274 workers	TSP, SO_2	Willingness-to-pay (WTP) to prevent respiratory illness	The WTP of Tianjin residents and workers to avoid the health effects of township-village industrial air pollution could be U.S.$65 million per year.
Yoon SJ, Ha BM, Kang JW, et al. 2002. Quantifying the burden of cardiovascular disease attributable to total suspended particulate and sulfur dioxide using years lived with disability [in Korean]. Korean J Prev Med 35:92–98.	South Korea	1995	Residents of South Korea	TSP, SO_2	Congestive heart failure, myocardial-infarction incidence and mortality	The numbers of person-years lived with a disability (YLDs) for congestive heart failure attributable to TSP and SO_2 were 94.4 and 35.0, respectively. The YLDs for myocardial infarction attributable to TSP and SO_2 were 148.4 and 27.6, respectively.
Yorifuji T, Yamamoto E, Tsuda T, et al. 2005. Health impact assessment of particulate matter in Tokyo, Japan. Arch Environ Occup Health 60:179–185.	Japan Tokyo	2001–2003 (exposure data), 2002 (outcome data)	7.8 million residents of Tokyo (>30 yr)	PM (SPM, assumed to be PM_{10})	All-cause mortality from PM exposure (excluding violent deaths and accidents)	Achieving stricter PM-exposure guidelines would increase the number of deaths prevented. If the long-term reference concentration of $PM_{2.5}$ were reduced to 12 μg/m^3, 8% of all-cause mortality (6700 deaths) could be prevented per year.
Zhang M, Song Y, Cai X. 2007. A health-based assessment of particulate air pollution in urban areas of Beijing in 2000–2004. Sci Total Environ 376:100–108.	China Beijing	2000–2004	Residents of Beijing	PM_{10}	Economic costs of mortality and morbidity from exposure to PM_{10}	The economic costs of mortality and morbidity from exposure to PM_{10} were estimated to range from U.S.$1670 million to U.S.$3655 million per year, or approximately 6.55% of Beijing's annual gross domestic product.
Zhang M, Song Y, Cai X, et al. 2007. Economic assessment of the health effects related to particulate matter pollution in 111 Chinese cities by using economic burden of disease analysis. J Environ Manage. In press. DOI:10.1016/j.jenvman.2007.04.019	China 111 cities	2004	—	PM_{10}	Mortality and morbidity (acute and chronic bronchitis, asthma attacks, hospital admissions for respiratory and cardiovascular ailments, outpatient visits for internal medicine and pediatrics)	A significant number of cases of mortality and morbidity were attributable to PM_{10} air pollution. The total economic cost associated with PM_{10} pollution was estimated to be more than U.S.$29 million.

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Zhang YH, Chen CH, Chen GH, et al. 2006. Application of DALYs in measuring health effect of ambient air pollution: A case study in Shanghai, China. Biomed Environ Sci 19:268–272.	China Shanghai	2000	Residents of Greater Shanghai	PM_{10}	Disability-adjusted life years (DALYs) lost	Ambient air pollution was estimated to have caused the loss of 103,064 DALYs in Shanghai in 2000. Most of these were attributable to premature deaths and chronic bronchitis.

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