Table 7. Ecologic Studies*

Citation	Design	Study Location	Study Period	Study Sample	Exposure	Health Outcome	Summary of Published Findings
Choi KS, Inoue S, Shinozaki R. 1997. Air pollution, temperature, and regional differences in lung cancer mortality in Japan. Arch Environ Health 52:160–168.	Ecologic	47 prefectures, Japan	1970–1990	All lung cancer deaths	NO_2, SO_2, traffic emissions	Lung cancer mortality (every 5 years)	Regional differences in age-adjusted lung cancer death rates were explained by NO_2 and temperature. Temperature increased the effect of NO_2 on lung cancer deaths compared with NO_2 alone in 1 region.
Cui Y, Zhang ZF, Froines J, et al. 2003. Air pollution and case fatality of SARS in the People's Republic of China: an ecologic study. Environ Health 2:15.	Ecologic	Guangdong, Shanxi, Hebei, Beijing, Tianjin, China	2002–2003	5327 probable SARS cases	Ambient air pollution	SARS fatality	Case fatality rate increased with the increment of air pollution index (API). The SARS patients from regions with high APIs were twice as likely to die from SARS compared to those from regions with low APIs.
Deb SK. 1998. Acute respiratory disease survey in Tripura in case of children below five years of age. J Indian Med Assoc 96:111–116.	Ecologic	Tripura, India	1992–1993	800 children (< 5 yr)	Ambient air pollution	Acute respiratory infection–related morbidity and mortality	Air pollution in the urban area was responsible for the higher incidence of acute respiratory illness in all age groups when compared with children in the relatively unpolluted rural area.
Han CZ, Guo Y, Jing JX, et al. 1995. A study on the relationship between malignant tumor mortality and environmental pollution in Beicun countryside of Datong City [in Chinese]. Zhonghua Liu Xing Bing Xue Za Zhi 16:101–104.	Ecologic	Datong, China	1985–1989	103 subjects, 30 controls	TSP, B*a*P	Tumor mortality, serum copper, and zinc levels	Greater levels of nitrate and nitrite in drinking water and airborne levels of B*a*P were associated with significantly higher levels of serum copper and zinc and significantly higher incidence of malignant tumor mortality compared with a control group.
Jin LB, Qin Y, Xu Z et al. 1999. Association between air pollution and mortality in Benxi [in Chinese]. Chin J Public Health 15:211–212.	Ecologic	Benxi, China	1993–1994	667,553 people	TSP, SO_2	All-cause mortality, COPD, CVD, CBVD	Annual daily mean TSP concentrations varied from medium to high in three districts of Benxi, a major center for the iron and steel industry. With each 100 μg/m^3 increase in TSP, mortality from all causes, COPD, CVD, and CBVD were estimated to increase by 8% to 24%.
Li H, Jin S, Shi S, et al. 1994. The trend of mortality of lung cancer and its association with air pollution [in Chinese]. Zhonghua Liu Xing Bing Xue Za Zhi 15:38–41.	Ecologic	Shandong Province, China	1985–1989	All deaths	TSP, SO_2, NO_x, BaP	Lung cancer mortality	Compared with 1970–1974, deaths from lung cancer were higher in 1985–1989. Correlational analyses attributed rate of lung cancer to air pollution.
Li SX. 1984. Air pollution and lung cancer [in Chinese]. Zhonghua Zhong Liu Za Zhi 6:173–176.	Ecologic	Shanxi, China	1979–1980	169,767 residents (>30 yr)	TSP, SO_2, NO_x, B*a*P	Lung cancer	The air pollution levels in the area with high incidence rate of lung cancer were much higher than controls areas with low incidence rate.
Minowa M, Shigematsu I, Nagai M, et al. 1981. Geographical distribution of lung cancer mortality and environmental factors in Japan. Soc Sci Med [Med Geogr] 15D:225–231.	Ecologic	Japan	1969–1974	3297 basic autonomic units (wards, cities, towns, or villages)	Ambient air pollution	Mortality for lung cancer	Urbanization and industrialization were associated with geographical differences of lung cancer motality.

* Last updated June 2005.

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Murata M, Takayama K, Fukuma S, et al. 1988. A comparative epidemiologic study on geographic distributions of cancers of the lung and the large intestine in Japan. Jpn J Cancer Res 79:1005–1016.	Ecologic	11 prefectures and 1 city (583 districts) in Japan	1975–1979	–	TSP, SO_2, NO_2, HC, traffic emissions	Morbidity and mortality for lung and colon cancer	Lung cancer was highly correlated with industrialization-related factors (such as localization of manufacturing industries, automobile traffic, and air pollution), whereas colon cancer was correlated with the population density of workers in the tertiary industries (such as services, trade, and government).
Pan BJ, Hong YJ, Chang GC, et al. 1994. Excess cancer mortality among children and adolescents in residential districts polluted by petrochemical manufacturing plants in Taiwan. J Toxicol Environ Health 43:117–129.	Ecologic	Kaohsiung, Taipei,China	1971–1990	Children (0–19 yr)	Petrochemical air pollution	Cancer death	Review of death certificates of children (0–19 yr) living near petrochemical and petroleum complexes revealed statistically significant excess deaths due to cancers at all sites when compared with national and local reference groups. Excess cancer deaths of bone, brain, and bladder were clustered in the 10–19 yr age group, who had been possibly exposed for a longer period.
Xiao HP, Xu ZY. 1985. Air pollution and lung cancer in Liaoning Province, People's Republic of China. NCI Monogr 69:53–58.	Ecologic	Liaoning Province, China	1976–1978	Residents in 10 Liaoning cities	TSP, industrial pollution (including Cu, Zn)	Lung cancer mortality	Neighborhood air pollution indices correlated significantly with mortality rates in one city, and lung cancer rates were higher near point sources of industrial pollution. Little correlation was found between TSP levels and lung cancer in 10 cities.
Xu ZY, Liu Y, Yu D, et al. 1996. Effect of air pollution mortalities in Shenyang city [in Chinese]. Chin J Public Health 15:61–64.	Ecologic	Shenyang, China	1992	438,600 people	TSP, SO_2	All-cause mortality, COPD, CBVD, CVD, cancer, tuberculosis	Annual daily TSP means in 3 neighborhoods of low, medium, or high pollution were 361, 477, and 518 µg/m^3, respectively. The means for SO_2 were 64, 128, and 235 µg/m^3, respectively. The three neighborhoods differed in rates of mortality from all causes, COPD, CBVD, CVD, cancer, and tuberculosis.
Zhang K, Fei SZ, Chen Z, et al. 1990. Relation between air pollution and laryngeal cancer in Liaoning [in Chinese]. Zhonghua Er Bi Yan Hou Ke Za Zhi 25:240–242.	Ecologic	Liaoning Province, China	1985	Residents of 12 cities	PM, SO_2, B*a*P	Laryngeal cancer	Ambient PM, SO_2, and B*a*P were associated with the incidence of laryngeal cancer, particularly in winter.

* Last updated June 2005.