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Health impact from climatic extremes: a case study of Asian dust storms in Taiwan

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Asian dust storm (ADS) originates in the deserts of Mongolia and northern China in every winter and spring seasons, and its impacts on adverse human health were widely investigated and discussed. Recent records show that the frequency and magnitude of ADS are increasing due to changes of environmental and climatic conditions. It is worthwhile to investigate the health impact of these environmental extremes. This study applies a structural spatiotemporal modeling approach to investigate the changes of spatiotemporal variation of a health indicator during and after ADS periods. The health indicator is the daily clinic visits of conjunctivitis in the children population during 2002-2007 among 41 districts across Taipei City and New Taipei City in Taiwan. Results show positively significant effects of children's conjunctivitis clinic visits happened during ADS periods with elevated percentages of relative rate by 1.48% (95% CI = 0.79, 2.17) for preschool children (0∼6 years of age) and 9.48% (95% CI = 9.03, 9.93) for schoolchildren (7∼14 years of age). The impact even lasted one week after ADS finished by 2.32% (95% CI = 1.98, 2.66) for schoolchildren, but not for preschool children. Moreover, air pollutants NO_2 and O_3 also contributed significant influence. The spatial pattern of children's conjunctivitis clinic visits demonstrates that stronger spatial vulnerabilities occurred in most populated metropolitan districts in Taipei. Hence, we concluded that ADS may significantly increase the risks of children's conjunctivitis during ADS periods and one week after ADS periods, especially in schoolchildren.