
Short summary of the study on short term effects of PM10 on daily counts of emergency hospital admissions and deaths in 13 regions of Switzerland.

This study was mandated by a consortium of 21 Swiss Cantons and coordinated by the Office of Waste, Water, Energy and Air (WWEA/AWEL) of the canton of Zurich. It aimed to evaluate the short term effects of PM10 and NO₂ on daily deaths and of PM10 on emergency hospital admissions for any medical, cardiovascular and respiratory causes. The study was conducted over 13 geographical regions across Switzerland during the period 2001-2010 and included separate analyses for different age categories (entire population, population of persons between 15 and 65 years, population of persons above 65 years and population of persons above 75 years). This study was focused on the evaluation of short-term effects of air pollution only. We found that despite a decline in levels of PM10 through the study period across most of the study regions, the associations between PM10 and daily emergency hospital admissions persisted. For the entire population, there was a 0.17% (95%-CI: 0.01 to 0.33%) increase in medical emergency hospitalizations for a 10 µg/m³-increment in the two day mean of PM10. When extrapolated to the whole of Switzerland, this corresponds to 1 to 2 additional cases of medical emergency admissions per day. The daily number of cardiovascular emergency admissions increased by 0.43% (95%-CI: 0.12 to 0.73%) for a 10 µg/m³ increment in the two day mean of PM10. The daily number of respiratory emergency admissions increased by 0.22% (95%-CI: -0.43 to 0.87%) for a 10 µg/m³-increment in the four-day mean of PM10. Associations were of considerable size also among persons between 15 and 65 years and they were highest in the subpopulation of persons aged 75 or more. In this subpopulation, a 10 µg/m³ increment in the four day mean of PM10 was associated with an increase in respiratory emergency admissions of 1.11% (95%-CI: 0 to 2.23%). These associations did not significantly change over the years and thus results from the previous study covering the years 2001 to 2005 were largely reproduced. Similar estimates were found for daily mortality and PM10 and when using NO₂ as marker of pollution. However, the lag patterns of effects were different for emergency hospital admissions and mortality. While effects of PM10 on daily medical and cardiovascular emergencies occurred within 1 to 2 days, they showed a time lag of about two days for the respective numbers of deaths. On the other hand, immediate effects of PM10 on respiratory deaths could be observed while the corresponding effects on respiratory emergencies showed a time lag of two days.

Altogether, these findings suggest that the toxicity of air pollution has not substantially changed during the last 10 to 15 years in Switzerland, despite various changes in vehicle fleet and engine technology. The fact that short term increases in air pollutant levels were followed by comparable increases in numbers of emergency admissions or deaths from the beginning to the end of the study period, despite some overall improvements in air quality, supports the concept that there is no “safe level of air pollution” or “threshold of no effect”. However, results from cohort studies -such as SAPALDIA conducted over 8 cities in Switzerland- that follow a population over several years and measure changes in health or mortality rates during these periods show that sustainable improvements in air quality have beneficial effects on health in the long-term. It can thus be expected that efforts to further reduce air pollution will result in further acute and long-term health benefits across all regions of Switzerland. In particular, traffic-related air pollution ought to be the target of future policies as only minimal improvements in NO₂ were observed during the last 10 years and the effects of NO₂ on mortality were seen to be quite strong in the present study.