



## Road dust: an overlooked urban pollutant

**Particles from vehicle emissions** are not the only traffic-related factor that causes deterioration of air quality in cities. Suspended road dust, caused by studded tyres, road salt and sand used in winter, may be at least as important in contributing to mortality rates, according to a new study in Stockholm, which suggests that these coarse particles should be controlled separately to fine particles.

**Many scientific studies** have linked particulate air pollution to daily death rates in cities. However, most have focused either on fine particles (less than 2.5 micrometres ( $\mu\text{m}$ ) diameter), which originate from vehicle exhausts, or on the combined effect of all particles under 10 $\mu\text{m}$  diameter, collectively termed PM<sub>10</sub>. The total amount of PM<sub>10</sub> is regulated under EU law, but the effects of coarse particles (2.5-10 $\mu\text{m}$ ) are less well known, although laboratory studies suggest that short-term exposure may have serious health effects.

In Stockholm, measures to reduce non tail-pipe emissions have included banning the use of private cars with studded tires in some streets to reduce road wear. The road material is also important - as the harder it is, the lower the emissions (but this results in more noise than soft asphalt).

In the new study, Swedish researchers calculated the concentration of coarse particles at a roof-top monitoring station in central Stockholm, using the difference between measurements of PM<sub>10</sub> and PM<sub>2.5</sub>. They compared the daily averages of coarse particles for 2000-2008 with the number of daily deaths (excluding deaths due to external causes), using information from the Swedish Cause of Death Register.

There were 93,398 deaths during the study period, or, on average, 28.4 per day, and on average coarse particles made up 42% of total PM<sub>10</sub> concentration. The researchers found that an increase in the coarse particle concentration of 10 $\mu\text{g}/\text{m}^3$ , resulted in a 1.7% increase in the daily death rate. This relationship was associated with average levels on the day before death and the actual day, indicating a short-time lag. When these results were corrected for the presence of fine particles and other pollutants (ozone and carbon monoxide), the estimated effect of coarse particles decreased a little, but was still higher than the estimated effect of fine particles. The increase in daily death rate was higher in late winter and spring (November-May) than in summer and autumn (Jun-Oct): 1.69% compared to 1.31%. This corresponded to higher coarse particle levels during this period; concentrations of over 20 $\mu\text{g}/\text{m}^3$  were found on 148 days during November-May compared to just four days at other times of year. Although this study does not examine causes of death, experimental studies have linked exposure to coarse particles with pulmonary inflammation, impairment of the nervous system and development of cardiac arrhythmias.

Having already accounted the effect of factors such as weather (temperature and humidity) on daily mortality, the researchers attribute the higher concentrations of coarse particles during November-May to a greater amount of suspended road sediment caused by the use of studded winter tyres, road salt and traction sand in winter. Previous studies have found that road dust accounts for up to 90% of PM<sub>10</sub> during winter in Stockholm. These results suggest that, alongside vehicle exhausts, exposure to coarse particles via road traffic is an important public health concern. The researchers recommend that the coarse particle fraction of PM<sub>10</sub> is controlled separately under EU legislation to prevent exceeding maximum PM<sub>10</sub> limits, particularly in cities where studded tyres are used. Reducing the use of studded tires by imposing fines in cities has been a successful way to reduce coarse particles in countries such as Norway, but in other countries where the sources are much more diverse and less obvious, there is a lack of efficient abatement strategies. Sources of coarse particles that are difficult to control include wear of brake linings, wear of tires and desert dust transported to cities (such as in Spain) from nearby arid (desert) areas.

**Source:** Meister, K. Johansson, C. & Forsberg, B. (2011) Estimated short-term effects of coarse particles on daily mortality in Stockholm, Sweden. *Environmental Health Perspectives*. DOI 10.1289/ehp.1103995. This study is free to view at: <http://ehp03.niehs.nih.gov/article/info%3Adoi%2F10.1289%2Fehp.1103995>

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