

Science for Environment Policy

Time spent in traffic has major effect on personal exposure to cancer-causing chemicals

Our lifestyles determine how often we are exposed to cancer-causing chemicals, such as those in traffic emissions and cigarette smoke. A Swedish study reveals how exposure to these chemicals varies from person to person. Among its findings, the amount of time a person spends in traffic or refuelling their car significantly affects how much benzene and butadiene they could inhale.

Many studies measure environmental levels of [air pollutants](#), but these levels do not correspond to personal exposure levels. It is not easy to estimate personal exposure levels because they vary depending on factors which may change within a person's lifetime, or even the course of a day, such as where they live, their habits and their activities.

However, since 2000, the [Swedish Environmental Protection Agency](#) has been conducting surveys of exposure to airborne carcinogens for randomly selected people in five cities. The surveys take place on a five-year cycle, so that each city is surveyed once every five years. In the current study, results were available for eight surveys conducted across Gothenburg, Umeå, Malmö, Stockholm and Lindsberg.

In each survey, 40 participants answered questions about their home and working life, and filled in activity diaries detailing time spent indoors or outdoors. Each participant wore a personal exposure sampler around their neck for a week, hanging it close to their bed at night. These samplers measured exposure to nitrogen dioxide, benzene, butadiene and formaldehyde.

The results suggest that, on average, people were exposed to levels of benzene higher than the recommended low-risk level set by the [World Health Organization](#). The variation in benzene exposure between people in the same city was as large as the variation of the mean levels between cities. For butadiene and formaldehyde, the largest variation in exposure was between people in the same city. However, for nitrogen dioxide the largest differences in exposure were between cities.

Benzene and butadiene exposure levels were higher in smokers and passive smokers. However, they were also increased for non-smokers who spent more time outdoors, who refuelled their vehicles during the seven days of monitoring and who spent more time 'in traffic' (i.e. on roads, along pavements, in a car, in a bus, walking or cycling).

Nitrogen dioxide exposure levels were higher for people who were exposed at their place of work or who had gas stoves at home. They were lower for people living in houses with oil heating. The researchers suggest this may be because houses with oil heating tend to be older and situated outside of areas affected by traffic.

Formaldehyde is emitted from building materials as well as produced by cooking and cigarette smoke. Exposure levels were higher for people living in houses compared to apartments - perhaps because apartments are better ventilated, say the researchers. Non-smokers were exposed to higher levels of formaldehyde than smokers. This could be explained by smokers opening windows more often. Formaldehyde also sticks to particles in cigarette smoke, making it difficult to detect.



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