

Abstract

Bicycle trailers represent a popular way of transporting children during cycling, however increased exposure to aerosol particles due to the location of the trailer in the immediate vicinity of the cycle path surface and of the bike tire may pose a health risk. Some aerosol particles can cause respiratory as well as other severe diseases, since the surface of the paths may also contain toxic substances, such as those produced by traffic. Children are more prone to developing respiratory and other diseases than adults, and therefore more attention is needed. The aim of this project is to find out how many times are the concentrations of PM_{10} , PM_4 , $PM_{2.5}$ and PM_1 aerosol size fractions and the particle number concentrations higher in the trailer in comparison to the cyclist in front of it at different driving speeds while driving on dusty roads and to confirm the hypothesis that the particles are resuspended from the surface of the road and penetrate into the trailer, which has not been quantified so far. The possible health consequences are also discussed in this project. We did three measurements on two roughly 200 m long dusty sections of cycle paths (Stromovka park, cycle path A22 in Braník) in Prague. For the measurement, the trailer (Chariot Cougar 2, Thule) and the box placed on the handlebar holder were modified. There was an identical set of DustTrak DRX (8533, TSI) and P-Trak (8525, TSI) in the box and in the trailer with inlets placed in the cyclist's and baby's breathing zone. GPS (GPSMAP 64s, Garmin) and camera (Sony HDR AS200V) were used to register the location. A meteorological station (WMR 300, Oregon Scientific) was placed at an outlying site of the initial measurement section along with P-Trak (8525, TSI) and optical particle sizer (OPS 3330, TSI) to monitor meteorological conditions and background airborne concentrations. It has been found that PM_x concentrations in the trailer are higher at all speeds than in the breathing zone of the cyclist. The ratio of PM_x concentrations in the trailer and in the breathing zone of the cyclist increases with increasing speed and also with increasing aerodynamic diameter of the particles. The PNC ratio at locations without significant resources of UFP does not change much with the speed. Measurement of rides of trailer with waterproof shield has surprisingly shown that the concentrations (and also the ratios) in the trailer with the waterproof shield are significantly higher than in the trailer with the net.

Key words: aerosol, PM, exposure, cycling, bicycle trailer, urban air quality, health