

# Exposure of Pedestrians and Cyclists to Air Pollution in the City

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## Extended Abstract

In society it is a popular belief that walking or cycling is healthy. Air quality studies conducted in many countries indicate a significant impact of route selection on exposure to air pollution, especially in highly urbanised areas. The research most often concerns dust pollution [1], mainly due to the relative ease of making mobile measurements with high frequency. However, many studies do not analyze the composition of the molecules studied. As a result, these analyzes are quantitative rather than qualitative. One of the molecules that have a very harmful effect on the respiratory system is black carbon (BC) [2]. There are few studies focused specifically on BC that there is still a need for a large number of local analyzes to determine the spreading patterns of BC in the air in cities. Due to different climatic and meteorological conditions, different building infrastructure and road networks, as well as driving culture and social habits, it is worth conducting research in different countries and cities. In this study, we measured the concentration of BC on three routes within the city of Wrocław (Poland) using microAeth® / AE51 sensors in the period September-October 2021. The routes were 6-10 km long and ran along bicycle paths located differently in the city infrastructure: on the road as a separate lane, parallel to the road at various distances, through green areas, along the river. Measurements were performed in over 20 repetitions in order to eliminate weather conditions and temporally local peaks [6]. The results show a significant influence of the distance from the road to the bicycle path on the observed BC concentrations. Separating the bicycle path from the road with a several-meter green belt, other than the lawn, for example with bushes, significantly reduces the concentration of dust pollutants. The highest concentrations were observed at crossings and in tunnels under railway embankments. As expected, the lowest exposure was recorded while driving along the routes leading through urban green areas and along the river. The obtained data will be used to create models of the dependence of BC concentration on land use specification and meteorological conditions. It will be a continuation of research conducted in Wrocław so far in only one location [3,4]. The research results can be used as guidelines for more efficient city planning in line with the concept of Transit-Oriented Development for more sustainable urban mobility [5] and minimize social conflicts associated with transport planning by supporting knowledge-based policy design.

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