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Wider gaps between cycle paths and traffic reduce active commuters' air pollution dose

Setting cycle and footpaths further back from the road can significantly lower the amount of air pollution that cyclists and pedestrians inhale, suggests new research. While wide gaps are not always practical, the study shows that even small increases in distance could substantially reduce the dose of pollution.

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'Active commuting' is being promoted in cities across the world. Rather than taking the car, citizens are urged to cycle or walk to work, improving their fitness as well as reducing air pollution and greenhouse gas emissions. However, while there are many benefits of cycling and walking, there is a danger that active commuters may inhale high levels of air pollution, as their breathing rates are higher than those of sedentary motorists.

This study examines how far away cycle and footpaths need to be from the centre of the road for active commuters to receive the same air pollution dose as motorists. The researchers chose a 2600 m loop of road in Auckland, New Zealand, as a study site. This major commuter route is surrounded by green space, therefore the road is the primary source of air pollution.

To measure air pollution, a cyclist, a walker and a car driver were each given a carbon monoxide monitor and travelled the loop over eight hour-long sessions during rush hour, in a variety of different weather conditions. Carbon monoxide was used because it is a good indicator of combined exhaust emissions. To calculate the dose actually inhaled by the three types of commuters, the readings from the monitors were converted using data on the breathing rates of someone with average fitness.

The results show that carbon monoxide levels in the air were higher nearer the centre of the road. The centre of the car was, on average, 1.5 m from the centre of the road, and car commuters were exposed to the highest average concentrations (0.8 ppm (parts per million)), followed by the cyclist, who was 2.5 m from the centre (0.5 ppm), and then the pedestrian who was 6 m away (0.1 ppm).

However, because of the different breathing rates and travel times, the actual dose received by the commuters showed a different pattern. The average dose for the cyclist travelling the 2600 m was 3.9 times greater than for the motorists, and for pedestrian it was 2.3 times greater.

The researchers then analysed how far from the centre of the road the cyclist and pedestrian would need to be, based on the pollution levels measured, in order to receive doses no higher than those received in the car. To do this they quantified how the carbon monoxide doses for the different types of commuters would decline as they moved further from the centre of the road.

In this example, cycle lanes would need to be, on average, 5.8 m from the centre of the road and footpaths 6.4 m away to ensure that active commuters received no greater dose of air pollution than commuters in cars. However, the researchers note that during one monitoring session, when light winds and low temperatures caused air pollution to be particularly high, these distances would need to be extended to 12.6 m and 14.2 m away.

In conclusion, the authors acknowledge that more research is needed, over more extended time periods, in other cities and especially in more built-up areas which may trap pollution. However, this study shows that even small increases in distance from the road-centre can substantially decrease the dose of pollution received.