



To: Place Directorate
From: Adrian Davis
Date: 12/05/2016
Subject: Essential Evidence on a page: Can air pollution negate the health benefits of cycling and walking?

Top line: The benefits from active travel generally outweigh health risks from air pollution and therefore should be further encouraged. When weighing long-term health benefits from physical activity against possible risks from increased exposure to air pollution, promoting cycling and walking is justified in the vast majority of settings.

Active travel (cycling, walking) is beneficial for health due to increased physical activity (PA). However, active travel may increase the intake of air pollution, leading to negative health consequences. In most of the studies to date, the health benefits due to PA from increased active travel are significantly larger than the health risks caused by increases in exposure to air pollution.

In 2016 researchers examined the risk – benefit balance between active travel related PA and exposure to air pollution across a range of air pollution and PA scenarios.¹ Air pollution exposures due to active travel were quantified by estimating the differences in the inhaled dose of fine particulate matter (PM2.5) air pollution. The health effects of active travel and air pollution were then estimated through changes in deaths from all causes for different levels of active travel and air pollution. Air pollution exposure was estimated through changes in background concentrations of fine particulate matter (PM2.5), ranging from 5 to 200 µg/m³. For active travel exposure, the researchers estimated cycling and walking from 0 up to 16 hours per day, respectively. These refer to long-term average levels of active travel and PM2.5 exposure.

The tipping point (beyond which additional PA will not lead to higher health benefits) and break-even point (beyond which additional PA will cause adverse health effects) for different average cycling times and background PM2.5 concentrations were calculated. For half an hour of cycling every day, less than 1% of cities have PM2.5 annual concentrations reached above the tipping point level. The tipping point would only be reached after 7 h of cycling and 16 h of walking per day.

In the most polluted city in the World Health Organization (WHO) Ambient Air Pollution Database (Delhi, India) the tipping and break-even points were 30 and 45 min of cycling per day, respectively. In most global regions the tipping points for the most polluted cities varied between 30 and 120 min per day for cycling, and 90 min to 6 h 15 min per day for walking.

This study indicates that, practically, air pollution risks will not negate the health benefits of active travel in urban areas in the vast majority of settings worldwide. This result is supported by epidemiological studies² that have found the statistically significant protective effects of PA even in high air pollution environments.

¹ Tainio et al, 2016 Can air pollution negate the health benefits of cycling and walking? *Preventive Medicine*, DOI: 10.1016/j.ypmed.2016.02.002

² Andersen, Z.J., de Nazelle, A., Mendez, M.A., et al., 2015. A study of the combined effects of physical activity and air pollution on mortality in elderly urban residents: the Danish diet, cancer, and health cohort. *Environmental Health Perspectives*. 123 (6), 557–563. <http://dx.doi.org/10.1289/ehp.1408698>