EDITORIAL

Why reduce the speed limit on the périphérique parisien? A Public Health and Environmental Necessity to protect children

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The future of the Paris Ring Road, often referred to simply as the 'Périphérique Parisien', whose speed has been reduced from 70 to 50 km/h - effective since 1 October 2024 - by decision of the Paris City Council, deserves an in-depth discussion that goes beyond the controversy limited to the speed limit. Given the imperative need to reduce greenhouse gas emissions and adapt urban spaces to cope with climate change (1, 2), the project is intended to respect the universal commitment to tackling ecological responsibility and promoting sustainable urban development.

The Paris Ring Road is a 35-kilometre-long urban motorway that encircles Paris, roughly following the city's old fortifications. It is a crucial urban traffic artery, with daily traffic estimated at between 1.1 and 1.2 million vehicles, making it one of the busiest in Europe. Some stretches can exceed 250,000 vehicles a day at peak times. The areas around the Ring Road are densely urbanised, and mostly are considered 'social exclusion zones' due to the isolation caused by this infrastructure. Around 500,000 people live in the immediate vicinity of the Ring Road, where until October 2024 they were significantly exposed to significant noise and air pollution, Particulate Matter (PM) of 2,5 and 10 µm diameter respectively ($PM_{2.5}$ and PM_{10}) and nitrogen dioxide (NO_2). For the record, eight out of ten people living in the Greater Paris region close to the Ring Road are currently exposed to noise and air pollution that greatly exceeds World Health Organisation (WHO) recommendations.

Figure 1. *Périphérique Parisien (Paris Ring Road) in 2024.*

Among the exposed people, children should be a priority population when considering the impact of speed reduction on the Périphérique Parisien. Children are particularly vulnerable to air pollution due to their developing lungs and higher breathing rates (3). The Périphérique is a major source of air pollutants, like NO_2, $PM_{2.5}$, PM_{10} and Black Carbon known as statistically linked to asthma, reduced lung function, and respiratory infections (4, 5). Several studies have shown that children living within 500 meters of major roads, like the Périphérique, are at higher risk of developing asthma due to consistent exposure to pollutants (6). Traffic noise is a known contributor to sleep disturbances, cognitive impairments, and stress in children (7).

For the time being, the impact of reducing the speed limit from 70 to 50 km/h is difficult to assess in terms of air and noise pollution. It is generally considered that reducing speed reduces fuel consumption and unit emissions of pollutants, although several other factors come into play (type and age of vehicles, gradient of the road, load, traffic flow, traffic conditions, etc.), making the relationship between speed and air pollution more complex. According to existing scientific evidence collected in a internal report by the French Agence de la Maîtrise de l'Energie (ADEME), a 20 km/h reduction from 70 km/h only marginally affects emissions of atmospheric pollutants. It is for speeds in excess of 90 km/h that the difference is statistically significant. Actually the average speed during the day on the Paris ring road is currently around 36 km/h (15-20 km/h during busy periods), well below the target limit. This has been the average for several years, characterized by significant air pollution and, in any case, by a failure to comply with the WHO standards. However, since the speed reduction air pollution has slightly diminished in some hot spots according to recent data that unfortunately have not yet been published in peer-reviewed journals. The situation is similar for noise, for which according to Bruit-Parif a reduction of two to three decibels maximum was observed, which is appreciable at night or certain weekends but not during the day. Such noise reductions are still insufficient to significantly improve the quality of life of local residents. A 2–3 dB drop in noise levels might be noticeable in very quiet environments, but it will not make a major difference in everyday loud settings like traffic noise or construction zones.

Although the immediate effectiveness of the speed reduction on the Round Ring is difficult to prove, its long-term benefits cannot be ignored and should play a decisive role in estimating the risks-benefits associated with the measure. First of all, the chronic health effects of air pollution arise not from extreme peaks but from continuous, long-term exposure to even moderate levels of pollutants (8). Chronic exposure can lead to cumulative damage over time, particularly affecting vulnerable populations like children, the elderly, and those with pre-existing conditions. Chronic exposure to environmental noise is increasingly recognized as a major public health issue, even at non-excessive levels. Unlike acute loud noises, which cause immediate hearing damage, long-term exposure to moderate noise levels can lead to physiological and psychological health effects over time (9).

In addition, in the longer term, other benefits affecting various aspects of urban life can be anticipated. Firstly, lower speeds reduce the severity of accidents and enable drivers to react more quickly in an emergency, thereby reducing the risk of serious collisions. The Atelier Parisien d'urbanisme (Apur) has foreseen changes in traffic and noise levels around the Ring Road since the speed limit was reduced to 50 Km/h in October. The number of accidents has fallen by 20%. In the long term, reducing speed helps to limit polluting gas emissions from vehicles. Less hard braking and acceleration reduces fuel consumption and abrasion and wear particles and, consequently, pollutant emissions. All in all, over the long term, a reduction in speed can help traffic flow more smoothly. Vehicles travelling at a constant speed, without jolts or traffic jams, and adopting a more regular driving style make it possible to better regulate the flow of traffic. This has a positive impact on greenhouse gas emissions, which are of vital importance in the context of anthropogenic climate change. Lastly, lower speeds also have repercussions on driving style, which once again has a significant impact on emissions of atmospheric pollutants, with a reduction of up to a factor of 4 in the case of nitrogen dioxides (NOx), according to IFPen (Institut Français du Pétrole Energies nouvelles, GECOAIR application). Reducing speeds should therefore be seen as an indirect approach to promoting a more responsible driving style, respectful of people exposed to pollution and health impacts from the Ring Road. All

these changes will have beneficial effects on the health of city dwellers, reducing chronic illnesses, especially respiratory and cardiovascular diseases, and improving their quality of life. Reducing speed also has positive effects on the protection of biodiversity and wildlife, by creating a more favourable environment for the coexistence of human infrastructures and natural ecosystems. In territorial terms, in the long term, slower and more regular traffic places less stress on road infrastructure (pavements, markings, etc.), which can reduce maintenance costs and extend the life of equipment. In addition, in the long term, as speeds fall, the width of the carriageway can be reduced to allow other vehicles to circulate (by including a protected bus lane, for example). In this context, a lane reserved for taxis and car-pooling can be maintained. In the very long term, we can also envisage putting vehicles at greater distances from each other, and planting trees that trap pollutants and therefore dilute them.

Overall, speed reduction on the Périphérique Parisien alone does not provide much information about the reduction in risks associated with human health. It is the combination of several advantages, belonging to the Ring Road exposome (all the environmental factors in the broad sense of the term that characterise it), that makes speed reduction a measure which, although sometimes unpopular at the outset, may prove to be beneficial to the quality of urban life in the long term. In this respect, from the epidemiological point of view, an experiment is needed to assess the short- and long-term effectiveness of this measure on markers linked to the health of Parisians. It is fair to say that these are just predictions and that they need to be confirmed. This is why, as scientists, we are asking for an experiment to be carried out under real-life conditions to measure changes in air quality, noise and traffic flow, and to identify changes in driving behaviour and mobility choices, etc. This would enable us to assess how all these changes impact on the health of local residents. Would there be fewer acute episodes of pollution-related illness? Fewer asthma attacks, fewer heart attacks, fewer attacks of multiple sclerosis, to name but a few? The data needed to answer these questions are readily available in France from various institutional stakeholders (Airparis, INERIS, Bruitparif, Sécurité Sociale, DGITM (Direction Générale des Infrastructures, des Transports et des Mobilités), OTM (Observatoire des Transports et de la Mobilité), etc.) and ready to be analysed. This should make it possible to sort things out.

To conclude, speed reduction on the Périphérique Parisien should not aim only to decarbonize traffic and reduce noise but also to foster a systemic transformation of mobility and land use by reducing speed and transforming modes of transport (10). This transformation represents a vision for a more resilient, equitable, and sustainable city. To this extent, it requires a far-reaching change that meets the global challenges of energy and land conservation, social and environmental justice, and metropolitan cohesion where children should constitute a priority population.

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