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Title: Impact of traffic-related pollution on respiratory function in children living in London's low emission zone: A sequential cross sectional study

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Body: Background Low emission zones (LEZ) are a new approach to improving air quality and respiratory health in cities, but their benefits have not been robustly evaluated. We examined the impact of the initial phases of London's LEZ on the health of children aged 8-9 years, living in east London, where 83% of the sampled population live in areas failing to meet the EU annual limit for NO₂ (40 mg/m³). Methods From 2008 we prospectively assessed respiratory health of sequential yearly cross-sectional samples of children at 23 east London schools. We examined relationships between modelled traffic derived pollutant exposures (NO_x, NO₂, PM_{2.5}, PM₁₀) and lung function (FEV₁, FVC). Chronic annual exposures were assigned at residential address level, with adjustments for periods spent at home and school. Acute exposures were assessed by scaling annual mean concentrations by averaged background and roadside measurements for each pollutant for sub-acute (7 days) and acute (24 hr) periods immediately prior to school visits. Findings Technically acceptable post-bronchodilator lung function data was obtained for 887 children. We found no evidence of year-on-year improvements in lung function in the three years following LEZ introduction. Higher annual exposures for all four pollutants across the first three years of the LEZ were associated with significantly reduced FVC, with no influence of acute and sub-acute exposures. Conclusions We found no improvement in children's respiratory health in the initial years of London's LEZ. We observed evidence of reduced lung volume related to long term exposure to traffic pollutants consistent with impaired lung growth.

