

Pollution risks of megacity 'street canyons' examined in unique new research

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People living in Hong Kong's towering skyscrapers may be away from the hustle and bustle of its notorious traffic-snarled streets but the effects of traffic emissions should not be ignored, says a ground-breaking research project led by King's College London.

Researchers are investigating how much of the toxic exhaust fumes at street level are, in fact, still reaching residents living inside high-rise buildings hundreds of feet above.

Findings from the two and a half year pilot research project could prove vital for the increasing number of people now living in crowded and severely polluted megacities as buildings continue to be constructed skywards.

Scientists from King's College London, The University of Hong Kong, Simon Fraser University, Vancouver, and the University of British Columbia, are examining pollution at 100 selected polluted sites and a further 200 'passive' locations across the archipelago. Small sensors continuously measuring a range of [air pollutants](#) have been positioned inside and outside high-rise apartment blocks in the city where more than 40% of people live up higher than the 14th floor. The tallest building in Hong Kong is 118 stories tall (484 m/1,588ft) and there are scores of blocks of 50 to 70 stories plus.

Dr Benjamin Barratt of King's Environmental Research Group said: 'This is a first. City-scale three dimensional models have never been explored before (in urban pollution monitoring) and monitoring pollution in such environments can be quite challenging. Developments in miniature air sensors, coupled with rapid advancements in 2D urban pollution modelling mean that this ambitious project is now feasible.

'Urban laboratory'

'Hong Kong is an ideal urban laboratory for this research. It has very high canyons and very high population density. Pollution becomes trapped between the buildings and it is likely that this infiltrates into homes.

Sensors will be placed both inside and outside high-rise adjoining buildings ('street canyons') to measure pollution levels. The next stage is to map the pollution levels against existing hospital records of residents – where harmful fine particles from pollution are the suspected cause behind many respiratory and cardiovascular problems.

'That will be possible as the address usually includes the floor – so we know how high above the street residents are living,' said Dr Barratt.

The research team's overall objective is to develop a three-dimensional modelling methodology that can be translated to other street canyons and megacities across the world.

But Dr Barratt says caution is needed. 'Hong Kong is a city with its own unique character. We therefore have the challenge of creating a method that not just effective in this city, but in many others as well. A challenge that we hope to test in future studies.'

He said that Hong Kong authorities and architects are already attempting to lessen the impact of pollution and heat upon residents with measures such as high rise buildings built at a slant to the road, or with holes designed to improve air flow.

'Blanket of pollution'

The research is also likely to help answer an important question - how much of the pollution in Hong Kong is coming from Hong Kong's own vehicles streets and how much is blown in from the Chinese mainland. To this end, two research campaigns will be carried out – in summer and in winter.

'During the winter, seasonal winds blow a blanket of pollution haze from the north. Our measurements will help reveal the impact of this imported pollution on the health of the population, relative to [pollution](#) from local vehicle emissions at street level' said Dr Barratt.

Provided by King's College London

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