# Overview of KCL research paper

**Introduction**

The KCL report[[1]](#footnote-0) assesses the contribution of nitrogen dioxide (NO2) and ‘fine particles’ (PM2.5) to mortality in London (the ‘mortality burden’). This is measured in terms of the life years lost as a result of their 2010 levels. From this the economic effects of the short and long term presence of these pollutants are examined.

**Health and mortality**

Total mortality burden for PM2.5  was estimated to be 52,630 years lost, 88,113 years for nitrogen dioxide. Despite the greater number of deaths contributed to by nitrogen dioxide, it has been associated with 420 hospital admissions relating to respiratory illnesses, compared to 1990 for PM2.5. PM2.5 was also found to be associated with another 490 admissions related to cardiovascular disease.

Most of the effects of PM2.5 are caused by sources outside of London, whereas the opposite is true for NO2. NO2’s primary source appears to be transport vehicles, and it makes a greater contribution to mortality.

Between 2008 and 2012, the life years added by changes in nitrogen dioxide concentrations were twice (over a million) those taken away by changes in PM2.5 concentrations (474,000). These facts suggest the greater ease with which we can influence NO2 concentrations, and the greater impact of their presence on mortality. This implies NO2 requires more long-term attention from the authorities, although our app may want to pay more attention to PM2.5 because it clearly has a more serious effect on individuals and companies dependent on them on a more regular basis.

Effects of long-term exposure to NO2 on asthmatic children appears to be smaller than for PM2.5. Additionally it is possible that long-term effects of NO2 are *somewhat* exaggerated, as it’s usually present along with air pollutants from vehicles. It is unlikely to be the sole cause of lower life expectancies.

As government makes efforts to tackle air pollution, levels of Pm2.5 and NO2 are forecast to fall. The benefits from the fall of NO2 are forecast to be vastly greater in terms of life years gained. From 2010 to 2114, it is estimated that the forecast reductions in PM2.5 will gain about a million life years, whereas almost 3 million will be gained with NO2. Again highlights the sensitivity of mortality rates to NO2 concentration levels.

The article discusses a European study that found a rise in concentrations of PM2.5 were accompanied with rises in the mortality rate. This was found even for concentrations below those deemed acceptable by EU standards.[[2]](#footnote-1)

**Economic effects**

Estimated annual economic costs were estimated to be between £1.4 million (assuming both short- and long- term exposure to PM2.5), and £3.7 million (assuming longer term exposure to nitrogen dioxide).

At 2014 prices: For PM2.5, the economic costs were £118,360, £152,884 and £79,540 per tonne for for central, inner and outer London respectively. The costs for NO2, taking only the effects of hospital admissions into account, were very low, reaching at no more than an average of £910 per tonne. These costs drastically increased when mortality effects were included, reaching a maximum of £52,344 in inner London.

Vast discrepancy between PM2.5 and NO2 in terms of economic costs relating to respiratory illness. It’s estimated that in 2010, PM2.5 cost £13.7 million, whereas NO2 cost £2.9 million.

**Other links of interest**

Further research on effects of long-term exposure to PM2.5 on mortality can be found at: <https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/304641/COMEAP_mortality_effects_of_long_term_exposure.pdf>

One interesting result is the fact that reductions in PM2.5 benefit young people more than old people. On average, the gains in life expectancy are distributed more to the former because they will experience cleaner air much more over their lifetime. Therefore there are effects on both the size and age distribution of the population in London, or whatever area, in the long term. Suggestion of a target audience perhaps.

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1. <https://www.london.gov.uk/sites/default/files/HIAinLondon_KingsReport_14072015_final_0.pdf> [↑](#footnote-ref-0)
2. <http://www.nhs.uk/news/2013/12December/Pages/Safe-levels-of-air-pollution-could-still-be-harmful.aspx> [↑](#footnote-ref-1)