* Dutch researchers assessed the relationship between levels of fine particles and likelihood of death. They did this by carrying out a 14-year study on over 300,000 people from across Europe in which people had their levels of exposure to PM10, PM2.5 and NO2 monitored (over 14 years), and the deaths were recorded of those who died due to potentially pollution-related causes. After controlling for factors like smoking, alcohol consumption, eating habits etc, they found that each ***5 microgram per cubic metre increase in PM2.5 concentration was associated with a 7% increase in mortality risk\**.**

[**http://www.nhs.uk/news/2013/12December/Pages/Safe-levels-of-air-pollution-could-still-be-harmful.aspx**](http://www.nhs.uk/news/2013/12December/Pages/Safe-levels-of-air-pollution-could-still-be-harmful.aspx)

\*Important to note that levels of PM2.5 were not solely related to traffic levels, but were heavily dependent on population density, the presence of industrial areas (which polluting industries are present in London?), green space, and elevation above sea level. Only overall averages could be computed, it’s very hard to calculate exposure levels more accurately. However, this link was found across across many areas of Europe, suggesting a definite pattern

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* Researchers at the University of Edinburgh Journal performed a meta-study that collated and examined the results of 103 studies examining the link between ***immediate and raised*** levels of air pollution and stroke. It found the strongest correlations between particulates and stroke-related hospital admissions and deaths. Overall, they found that **each rise of 10 ug/m3 (micrograms per cubic metre of air) in PM2.5 was associated with a rise in the risk of stroke by 1.1%, 1.4% for each extra 10 ppb of NO2, and 0.3% for each extra 10 ug/m3 of PM10.**

<http://www.bmj.com/content/350/bmj.h1295>

* KCL paper - **Forecast gain in life expectancy from 2010 to 2114 (573,145 years) come from calculations assuming a permanent reduction of 1 ug/m3 of PM2.5. For children born in 2010, there is estimated to be an average rise in life expectancy of 19.7 days for females and 21.4 days for males. For those alive in 2010, there’s an estimated gain of 18.1 days for females and 19.6 days in males.** As the age rises, the expected gain falls, as older people will spend a smaller portion of their life enjoying the cleaner air.
* Group of Chinese researchers carried out a study of Wuhan in China. Recording the average concentrations of NO2 and SO2 from 2006 to 2009 (average of 115.60 µg/m3) this looked at the association between rises in these and the risk of death from cardiovascular disease. NO2 had the most significant association, **with a 10ug/m3 increase over a 24 hour period being associated with a 1.9% rise in risk. It** was also noted that this major correlation was found for men and not women, though this is perhaps linked to the greater presence of men working regularly in large industrial cities.

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4410199/>

* However, it’s important to note that short-term exposure to higher levels of air pollution affects mainly the elderly or those already susceptible to some condition. E.g. short-term exposure increases the risk of heart failure, heart attack and stroke in these people. Of course, for a much broader range of ages these risks rise with long-term exposure. So the difference in damage to people differs.
* Strong associations, though exact causal links between PM2.5/NO2 and mortality/respiratory problems are difficult to prove. The number of deaths related to these problems and that have either PM2.5/NO2 as the sole cause is relatively small, in the region of 2 - 5 %.
* Reliably assessing the extent to which our app is improving health may not be that easy, as we’ll need to be sure improvements are attributable mainly to our app, and not, for instance, to reductions in PM2.5/NO2 levels that are forecast to happen as a result of government intervention. There’s also a **time lag** between changes in exposure levels and positive or negative health benefits.