From: M
Sent: Thursday, March 26, 2015 3:07 PM
To: Sen. Click Bishop; Jennie Hafele
Subject: SB-50 Testimony New Study finds association between elevated PM 2.5 and stroke

Dear Sen. Bishop, Committee Members:

Re. SB-50

The lack of affordable, clean energy in the Interior has caused many to rely on inexpensive wood heat. Fairbanks and North Pole have dangerously unhealthy air quality as a result of nearly 8,000 wood stoves being used for space heating. During the winter, the atmospheric conditions (little wind, temperature inversions) trap particulates which concentrate to levels that violate air quality standards designed to protect human health.

I know this is an issue that concerns you. These new studies (see attached) published in the British Medical Journal illustrate the importance of why we must deal with the badly polluted air in Fairbanks and North Pole. The evidence of increased morbidity and mortality as a result of exposure to badly polluted air is compelling.

"**Conclusion** Gaseous and particulate air pollutants have a marked and close temporal association with admissions to hospital for stroke or mortality from stroke. Public and environmental health policies to reduce air pollution could reduce the burden of stroke." British Medical Journal March, 2015.

As you consider SB-50 it is essential that this legislation addresses this significant public health issue. Credible estimates of 50 to 100 premature deaths (over a lifetime) are caused every year due to high pollution levels in Fairbanks and North Pole. To fix this problem 3,000 to 5,000 wood stoves will need to be replaced with propane/natural gas stoves. Funding a conversion program to buy out these wood stoves will be essential to getting the conversions as will the investment in the capex (for infrastructure) for a propane solution- as part of a phased approach to the problem.

Thanks for your consideration,

Merrick Peirce

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

Abstract

Objective To review the evidence for the short term association between air pollution and stroke.

Design Systematic review and meta-analysis of observational studies

Data sources Medline, Embase, Global Health, Cumulative Index to Nursing and Allied Health Literature (CINAHL), and Web of Science searched to January 2014 with no language restrictions.

Eligibility criteria Studies investigating the short term associations (up to lag of seven days) between daily increases in gaseous pollutants (carbon monoxide, sulphur dioxide, nitrogen dioxide, ozone) and particulate matter (<2.5 µm or <10 µm diameter ($PM_{2.5}$ and PM_{10})), and admission to hospital for stroke or mortality.

Main outcome measures Admission to hospital and mortality from stroke.

Results From 2748 articles, 238 were reviewed in depth with 103 satisfying our inclusion criteria and 94 contributing to our meta-estimates. This provided a total of 6.2 million events across 28 countries. Admission to hospital for stroke or mortality from stroke was associated with an increase in concentrations of carbon monoxide (relative risk 1.015 per 1 ppm, 95% confidence interval 1.004 to 1.026), sulphur dioxide (1.019 per 10 ppb, 1.011 to 1.027), and nitrogen dioxide (1.014 per 10 ppb, 1.009 to 1.019). Increases in $PM_{2.5}$ and PM_{10}concentration were also associated with admission and mortality (1.011 per 10 µg/m^3 (1.011 to 1.012) and 1.003 per 10 µg/m^3 (1.002 to 1.004), respectively). The weakest association was seen with ozone (1.001 per 10 ppb, 1.000 to 1.002). Strongest associations were observed on the day of exposure with more persistent effects observed for $PM_{2·5}$.

Conclusion Gaseous and particulate air pollutants have a marked and close temporal association with admissions to hospital for stroke or mortality from stroke. Public and environmental health policies to reduce air pollution could reduce the burden of stroke.

Systematic review registration PROSPERO-CRD42014009225.

Introduction

Outdoor air pollution is an important risk factor for cardiovascular disease throughout the world, with particulate air pollution alone responsible for over three million deaths each year.[1] [2] Increases in concentrations of daily air pollution are associated with acute myocardial infarction[3] and admission to hospital or death from heart failure.[4]These associations could be mediated through direct and indirect effects of exposure to air pollutants on vascular tone, endothelial function, thrombosis, and myocardial ischaemia.[5] [6] [7] [8]

Stroke accounts for five million deaths each year and is a major cause of disability.[9] The incidence of stroke is increasing, particularly in low and middle income countries, where two thirds of all strokes occur.[10] The global burden of stroke related disability is therefore high and continues to rise. This has been primarily attributed to an ageing population in high income

countries and the accumulation of risk factors for stroke, such as smoking, hypertension, and obesity, in low and middle income countries.[11] [12] The impact of environmental factors on morbidity and mortality from stroke, however, might be important and is less certain.[13] [14] [15] Given similarities in the pathophysiology of acute coronary syndrome and ischaemic stroke, it is plausible that air pollution is also an important and modifiable risk factor.[3] [4]

To provide global policy makers with the best estimates of the effect of short term exposure to air pollution on risk of stroke, we systematically reviewed studies examining the association between air pollution and admission to hospital for stroke or mortality from stroke.

Here's the second study abstract from the British Medical Journal:

Abstract

Objective To determine whether higher past exposure to particulate air pollution is associated with prevalent high symptoms of anxiety.

Design Observational cohort study.

Setting Nurses' Health Study.

Participants 71 271 women enrolled in the Nurses' Health Study residing throughout the contiguous United States who had valid estimates on exposure to particulate matter for at least one exposure period of interest and data on anxiety symptoms.

Main outcome measures Meaningfully high symptoms of anxiety, defined as a score of 6 points or greater on the phobic anxiety subscale of the Crown-Crisp index, administered in 2004.

Results The 71 271 eligible women were aged between 57 and 85 years (mean 70 years) at the time of assessment of anxiety symptoms, with a prevalence of high anxiety symptoms of 15%. Exposure to particulate matter was characterized using estimated average exposure to particulate matter <2.5 μm in diameter ($PM_{2.5}$) and 2.5 to 10 μm in diameter ($PM_{2.5-10}$) in the one month, three months, six months, one year, and 15 years prior to assessment of anxiety symptoms, and residential distance to the nearest major road two years prior to assessment. Significantly increased odds of high anxiety symptoms were observed with higher exposure to $PM_{2.5}$ for multiple averaging periods (for example, odds ratio per 10 $\mu g/m^3$ increase in prior one month average $PM_{2.5}$: 1.12, 95% confidence interval 1.06 to 1.19; in prior 12 month average $PM_{2.5}$: 1.15, 1.06 to 1.26). Models including multiple exposure windows suggested short term averaging periods were more relevant than long term averaging periods. There was no association between anxiety and exposure to $PM_{2.5-10}$. Residential proximity to major roads was not related to anxiety symptoms in a dose dependent manner.

Conclusions Exposure to fine particulate matter ($PM_{2.5}$) was associated with high symptoms of anxiety, with more recent exposures potentially more relevant than more distant exposures. Research evaluating whether reductions in exposure to ambient $PM_{2.5}$ would reduce the population level burden of clinically relevant symptoms of anxiety is warranted

http://www.bmj.com/content/350/bmj.h1111

This is an account of the BMJ research in the popular press:

Air pollution linked to raised stroke risk: Studies reveal smog connected to death, anxiety and hospital admissions

- **Exposure to air pollution increases risk of dying by stroke, researchers say**
- **A new review found a link with short-term exposure to pollution particles**
- **Second study revealed a link between anxiety and those recently exposed**
- **The studies mount pressure on the Government to deal with smog problem**

Exposure to air pollution increases the risk of dying from stroke say British researchers.

A new review found a link with short-term exposure to carbon monoxide, nitrogen dioxide, sulphur dioxide and soot particles.

The review shows a rising risk of hospital admission or death from stroke over the week following exposure, in line with higher concentrations of pollutants.

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Strokes, which have been linked to exposure to pollution, are a leading cause of disability and cause more than 40,000 deaths in the UK each year. Pictured is London in 2011 covered in heavy smog

A second study from US researchers shows a possible link with anxiety in people recently exposed to air pollution.

The studies add to mounting pressure on the Government, which faces a Supreme Court hearing next month to explain why it has persistently failed to deal with the problem.

New findings come from a review of data in 100 studies including six million stroke events in 28 countries published in The BMJ.

Air pollution, mostly caused by traffic fumes and factory emissions, is estimated to contribute to the deaths of 29,000 people every year in Britain.

Microscopic particles have been shown to cause lung damage and harmful changes in blood vessels and clotting.

Sixteen cities in Britain - including London, Manchester, Glasgow, Sheffield and Birmingham - have been failing to hit EU air quality targets since 2011.

The European Court of Justice ruled last November that UK was in breach of EU law and should have created plans to tackle air pollution in the 16 cities by January 2015 at the latest.

Under existing plans, some British cities will not meet the pollution limits until 2030.

The UK's Supreme Court now has jurisdiction over the matter and will hear the case on April 16.

Simon Gillespie, chief executive at the British Heart Foundation which funded the study said 'It's deeply concerning that in many areas in the UK, air pollution may not meet the required EU limits until 2020.

'It is absolutely staggering that the Government accepts that some may not meet the limit until 2030, a full 20 years after the EU deadline.

'This puts hundreds of thousands of people across the UK at higher but totally avoidable risk of having a stroke.

'This new research only compounds what we already know, that air pollution is a blight on public health.'

Prof Jon Ayres, Professor of Environmental & Respiratory Medicine at the University of Birmingham, said 'It has long been thought that exposure to air pollution is associated with stroke and this meta analysis confirms the association with a range of pollutants.'

Read more: http://www.dailymail.co.uk/health/article-3010309/Air-pollution-linked-raised-stroke-risk-Studies-reveal-smog-connected-death-anxiety-hospital-admissions.html#ixzz3VQdWguML