

# Do we really want clean air?

## The present – and future indicatives

Project Chambers  
18<sup>th</sup> May 2007



Anthony J Hedley & Sarah M McGhee  
Department of Community Medicine  
School of Public Health  
University of Hong Kong

# Health for all in 21<sup>st</sup> Century

The human right to

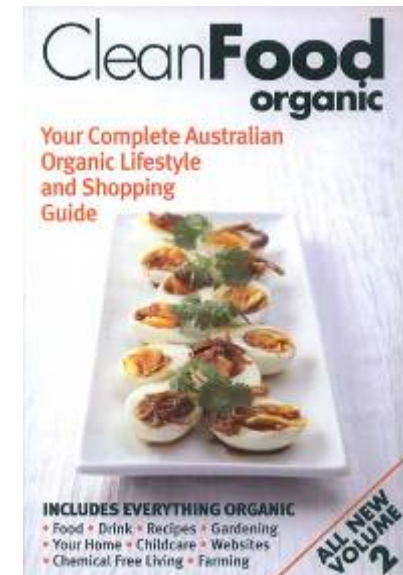
*Clean Water*



*Clean Air*



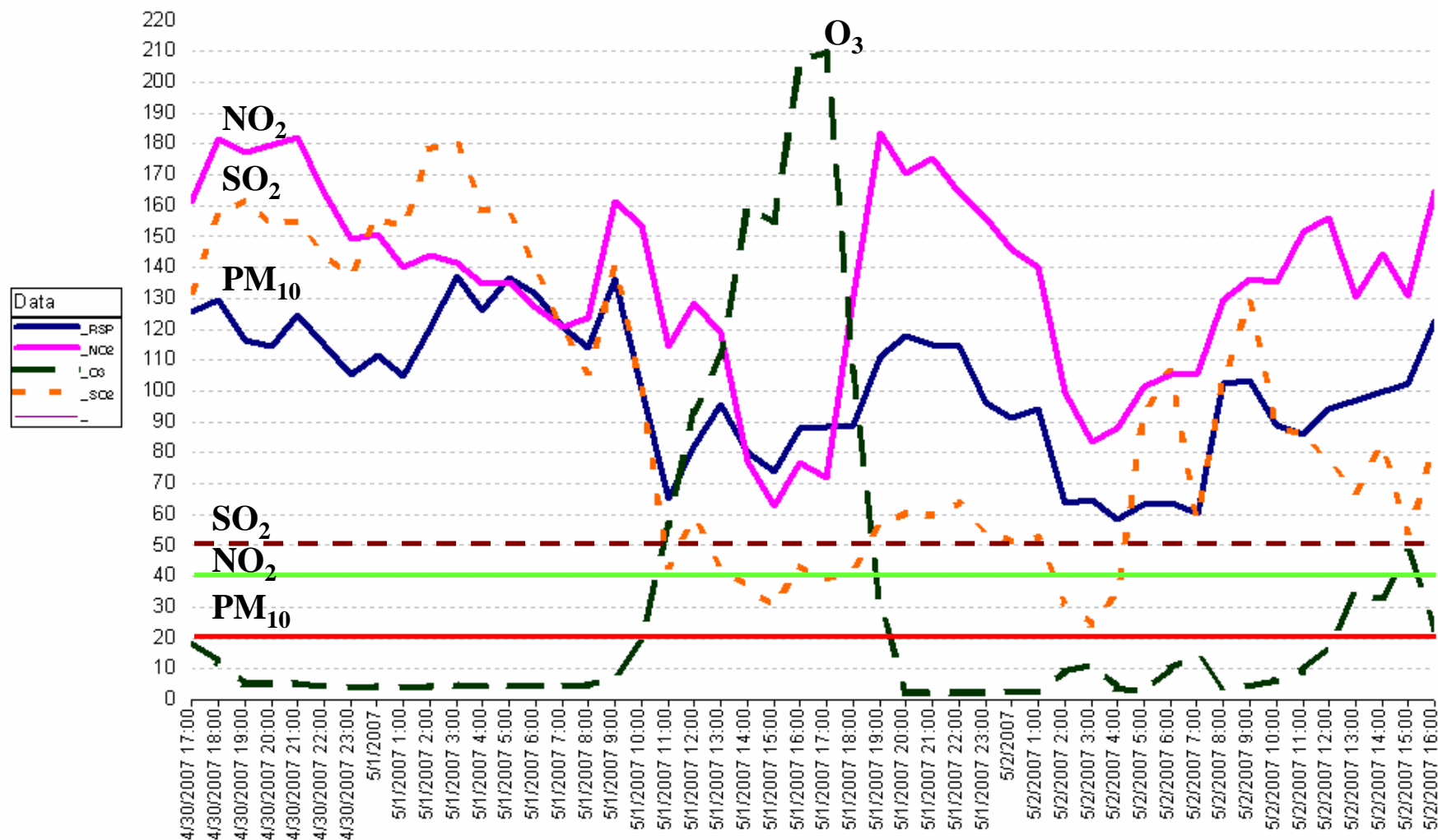
*Clean Food*



# Hourly concentrations of pollutants in Central/Western monitoring station

30 April – 2 May 2007

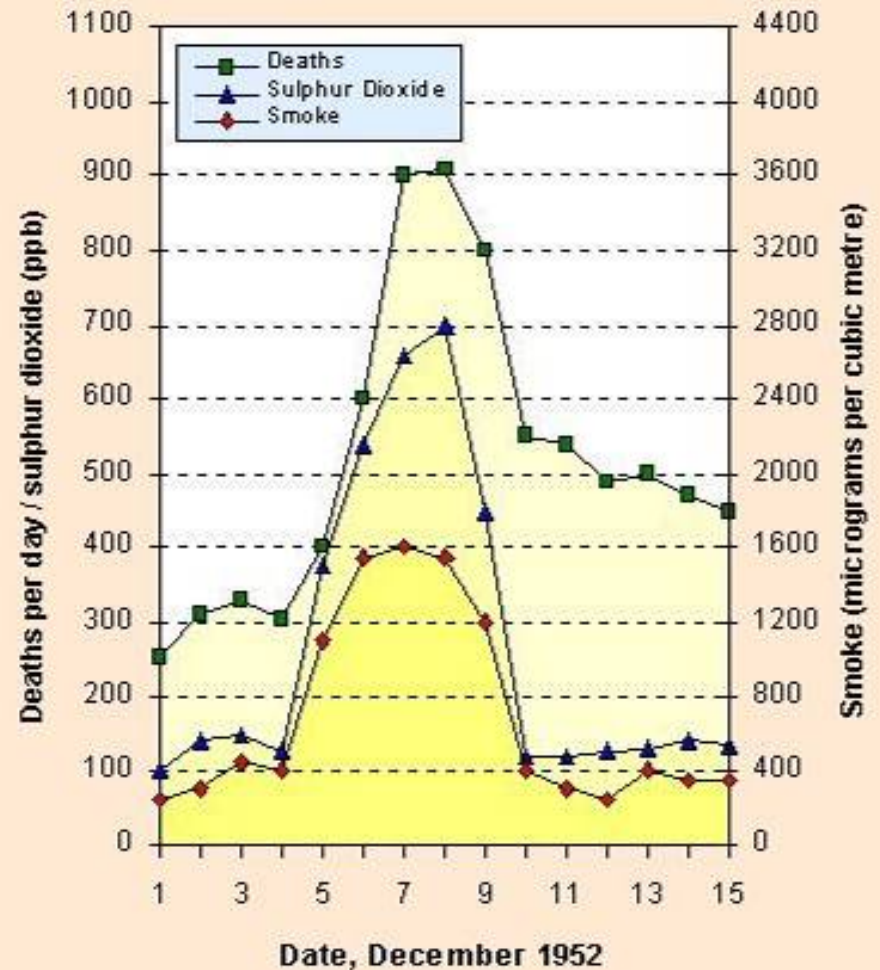
AQMS Central/Western Type (All)



# The Key Issues in Environmental Protection

- *Evidence*                      *Denial*
- *Responsibility*              *Misinformation*
- *Accountability*              *Obfuscation*

In the Great London Smog December 1952, over 4,000 deaths were attributable to particles and SO<sub>2</sub>





# Tai Ping Shan 1890's

## The epicentre of the South China plague epidemic



1853: Colonial Surgeon said: "... so much filth and so many nuisances."

We strongly recommended sewage, drains, scavenging

*Department of Community Medicine, School of Public Health, University of Hong Kong*

# “The Rise of a Sanitary City”



Sir Osbert Chadwick  
Edwin Chadwick's nephew

Eastern,  
No. 38.

*Printed for the use of the Colonial Office.*

---

MR. CHADWICK'S REPORTS

ON THE

SANITARY CONDITION OF HONG KONG;

WITH

APPENDICES AND PLANS.

---

*Colonial Office,  
November 1882.*

# The South China plague 1894 -



The Glassworks "hospital"  
Kennedy Town





Dr PBC Ayres 1840-1899  
Colonial Surgeon 1873-1897

**“What all my reports  
could not do, the  
epidemic has done”**

# Human activities and air pollution: the insatiable quest for productivity



**Power**



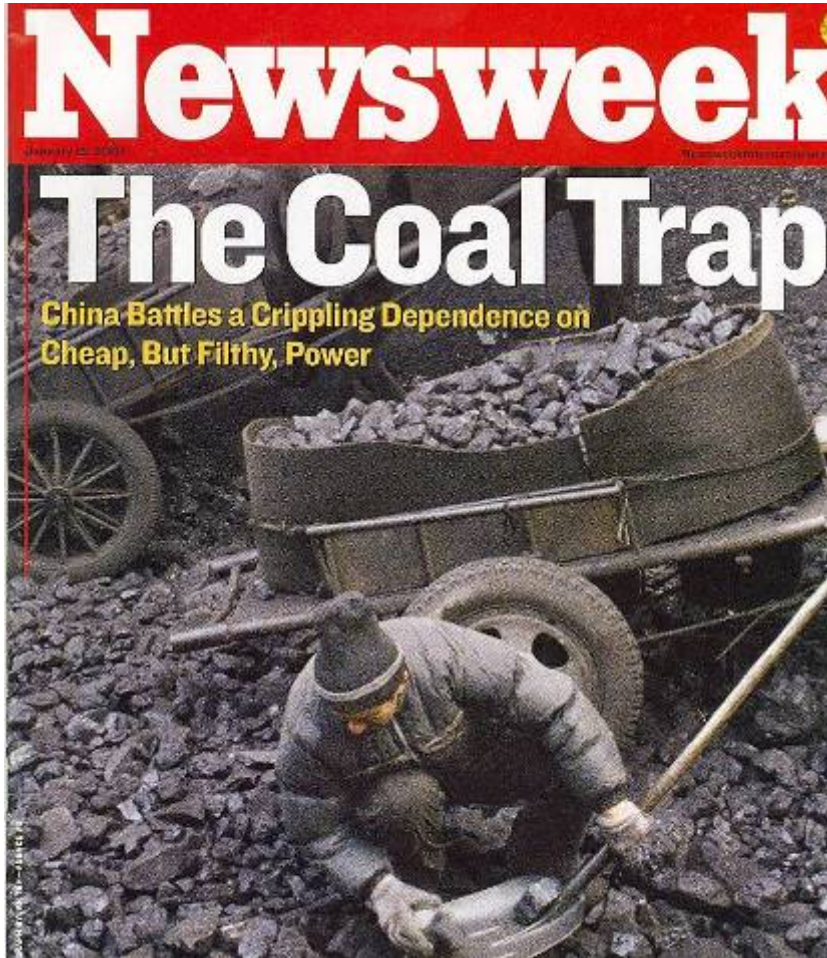
**Manufacturing**



**Transportation**

**From a viewpoint of social and environmental justice :**

**A culture of ruthless trade-offs: dirty fuel vs health**



**We have very high consumption of sulphur rich residual oils**

# We are losing our horizon

This is typical



This is atypical



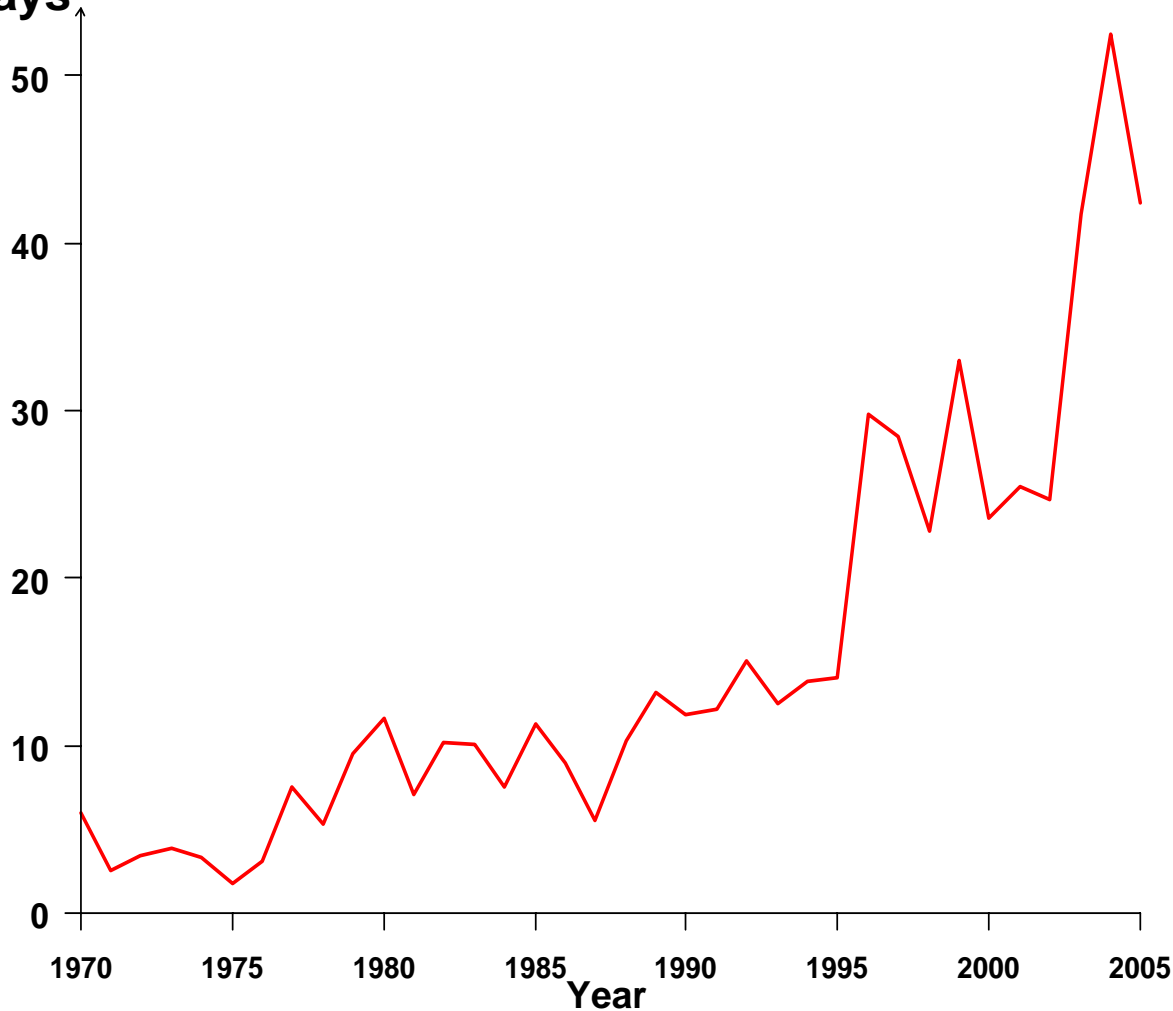
**Photographs: W Barron, HKUST**



# Loss of visibility *is* a serious health hazard

## Hazy days

Number  
per year

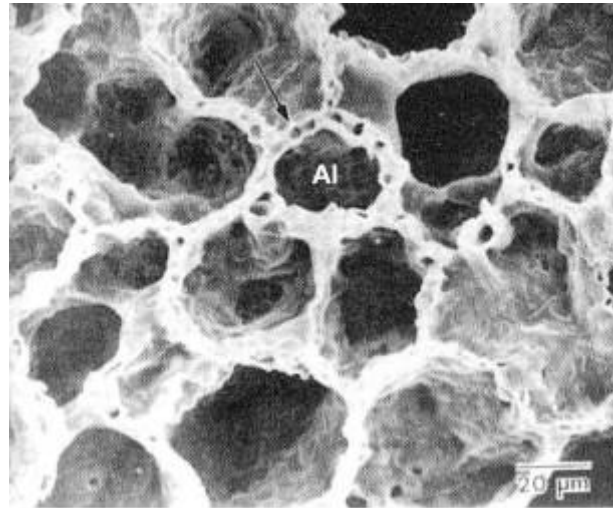


*We are  
looking at the  
emergence of  
a long term  
epidemic*

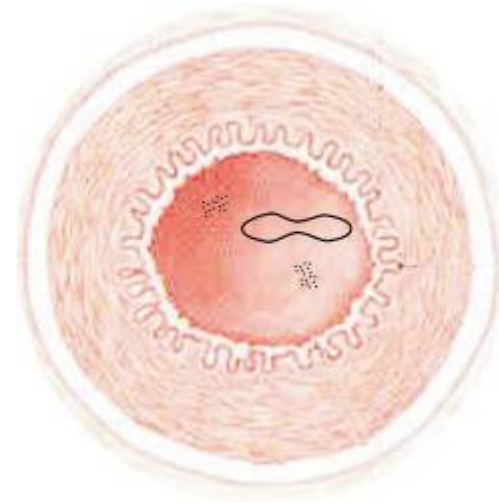
Source: Hong Kong Observatory

# Silent and unobserved injuries to sensitive tissues

Pollutant particles and gases cause an injury to lungs and arteries

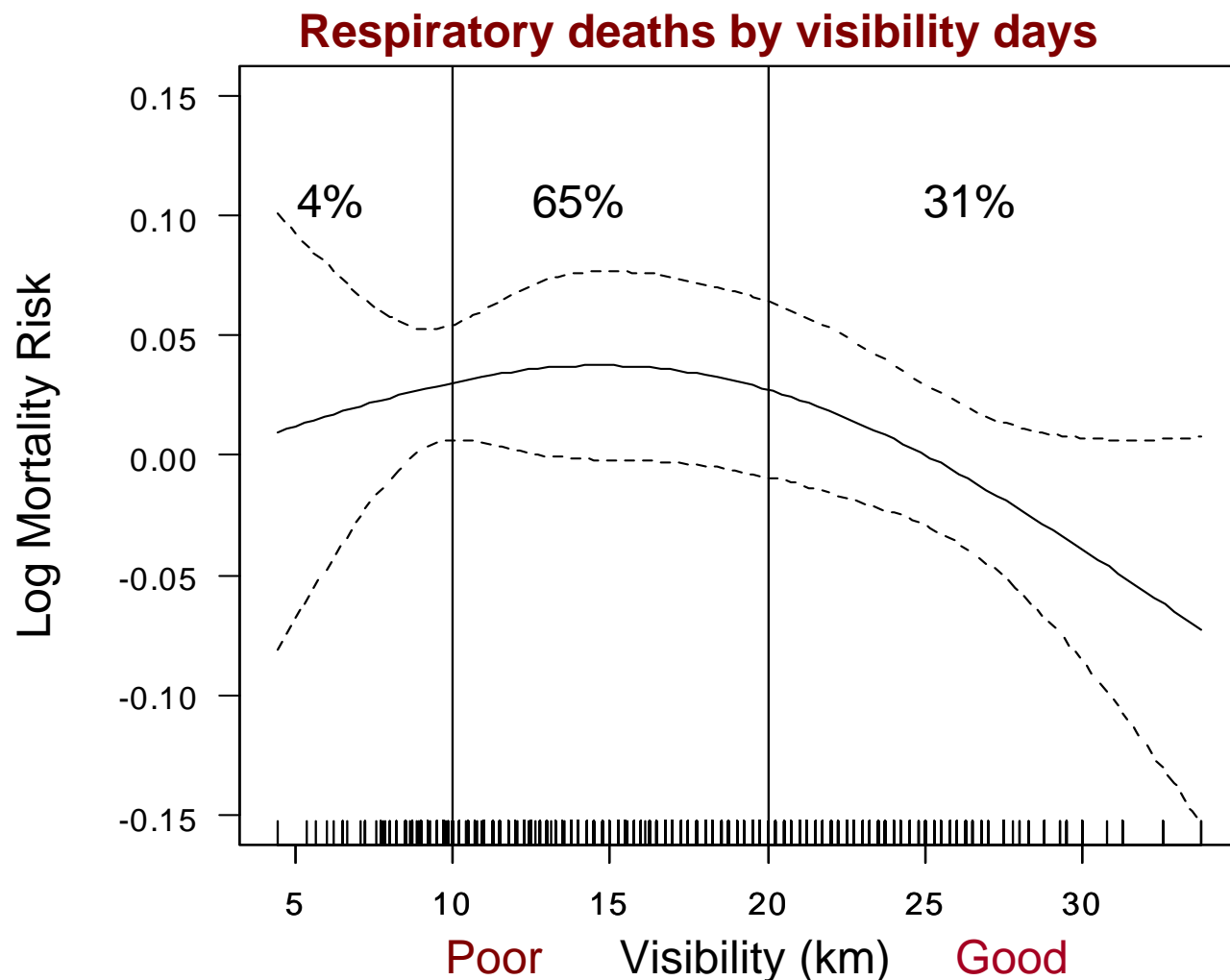


**The air sacs of lungs**



**The lining cells of arteries**

# Better visibility reduces deaths in Hong Kong



Average  
Hong Kong  
International  
Airport and  
Hong Kong  
Observatory  
data 1996-  
2002

TQ Thach, AJ Hedley, CM Wong 2007

# South China Morning Post

南華早報

PUBLISHED SINCE 1903

HONG KONG: \$7.00

FRIDAY, DECEMBER 17, 1993

## Children breathe easier with controls on factory fumes



Clean answer . . . University of Hong Kong Professor Anthony Hedley shows positive results of a survey on outdoor air quality and children's health while Environmental Protection Assistant Director Fred Tromp looks on.

K.Y. Cheng

By KATHY GRIFFIN

**BREATHING** problems among children have improved since controls were put on factory chimney fumes – but the gains were negated for children of families who smoke.

In the first local study to link better health to outdoor air quality, the University of Hong Kong estimates up to 18,000 visits to clinics were averted by having cleaner air.

Children living near industrial areas benefited in particular because they had shown higher levels of coughing, wheezing, sore throats and other ailments prior to the introduction of the controls.

But children exposed to tobacco smoke in the home continued to be at much higher risk than others to breathing problems – the first time such findings on passive smoking have been made in Hong Kong, researchers say.

About 13,500 children in Kwai Tsing and Southern districts were studied in 1989, 1991 and last year.

The controls on factory emissions came into effect on July 1, 1990, and forced

operators to use fuel with a 0.5 per cent sulphur content as opposed to 2.5 per cent before.

The earlier study found children in Kwai Tsing were 50 per cent more likely to wheeze and cough than those in Southern, but this was reduced to about 15 per cent after July 1990.

Professor Anthony Hedley of the university's department of community medicine, which conducted the study, said the results could be applied to the whole population.

"But the black area was the excess risk of living in a smoking home," he said.

Some 44 per cent of children in Kwai Tsing and 50 per cent of children in Southern live in families who smoke.

The risk was even greater for children who smoked. Seven per cent of all the children surveyed had smoked at least once, including 29 per cent of 11-year-olds.

Assistant Director of Environmental Protection Fred Tromp said the department, which funded the \$1.4 million study, hoped to use the results to bolster efforts to control vehicle emissions.



# The Hong Kong air quality intervention 1990

**Before**



**After**

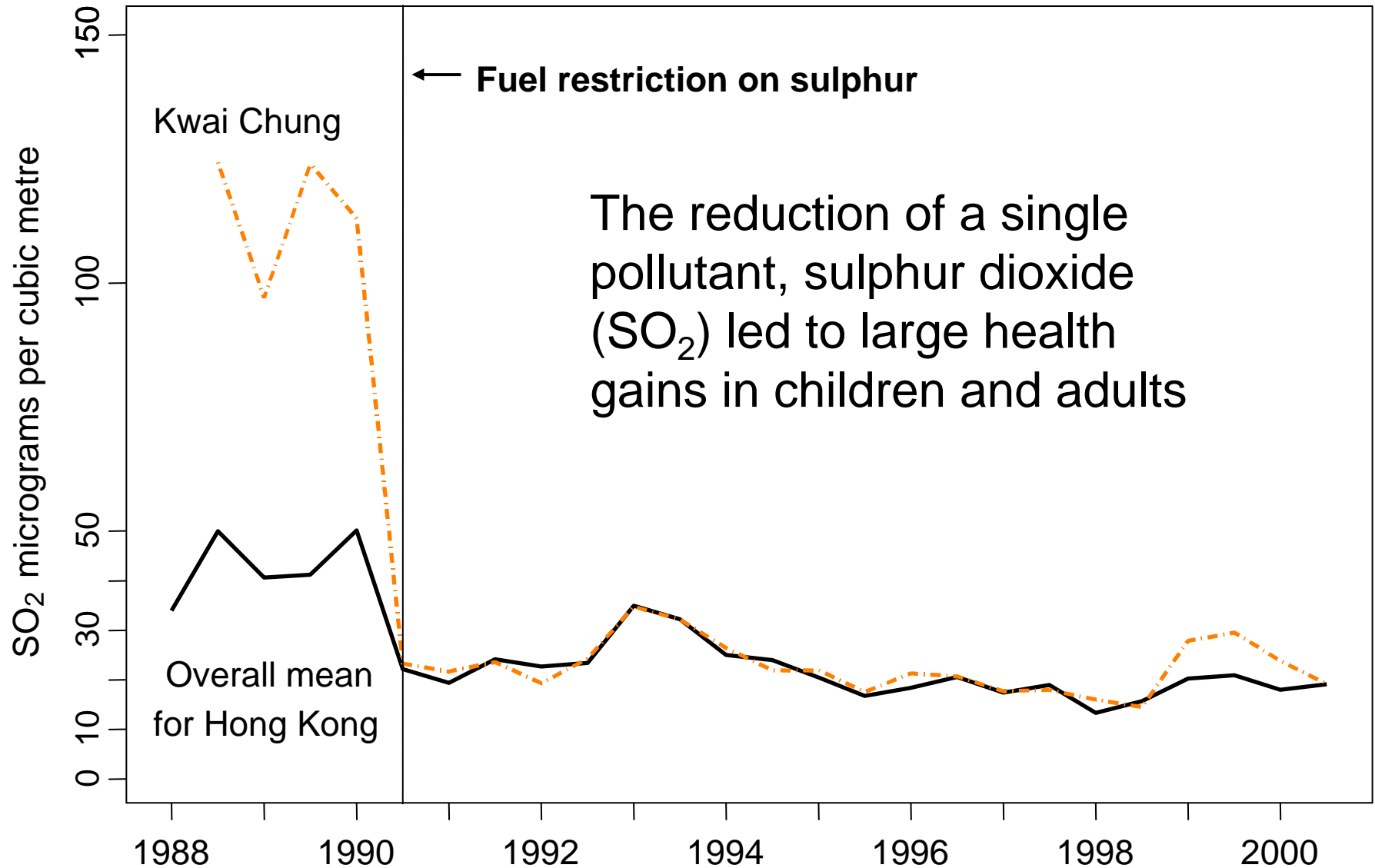


## **Kwai Tsing**

*On July 1<sup>st</sup> 1990 the Environmental Protection Department restricted the sulphur content of fuel to 0.5% by weight*

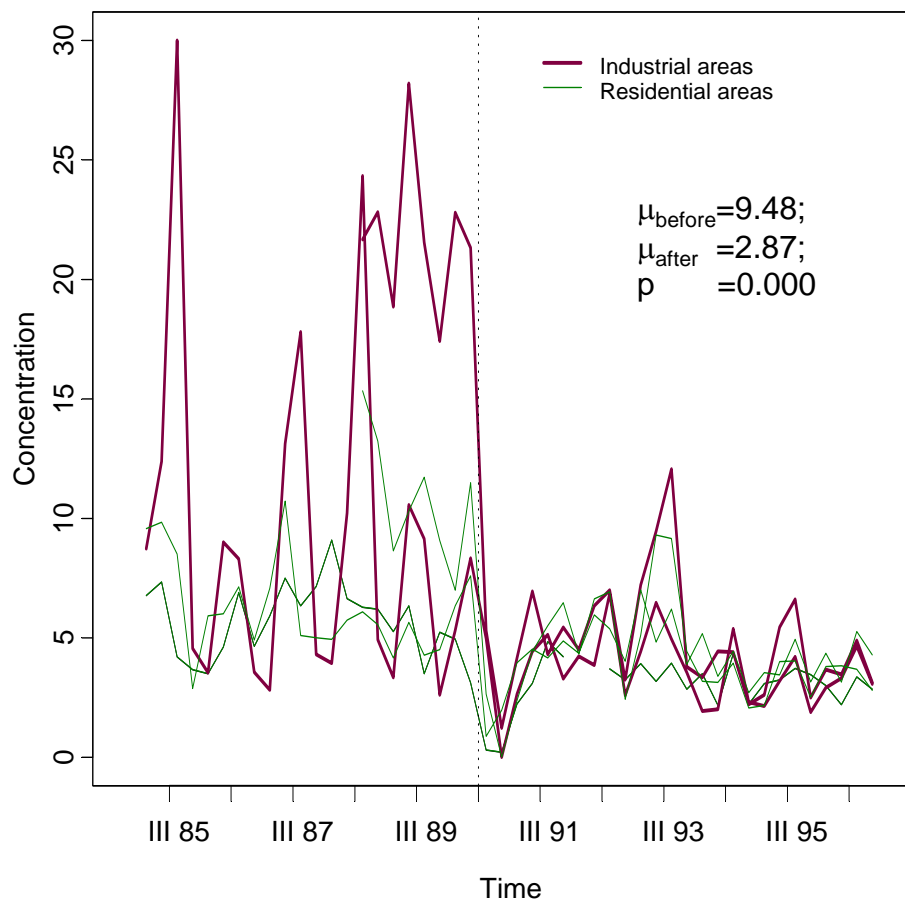
Source: Photographs by EPD Hong Kong

# The Hong Kong air quality intervention 1990

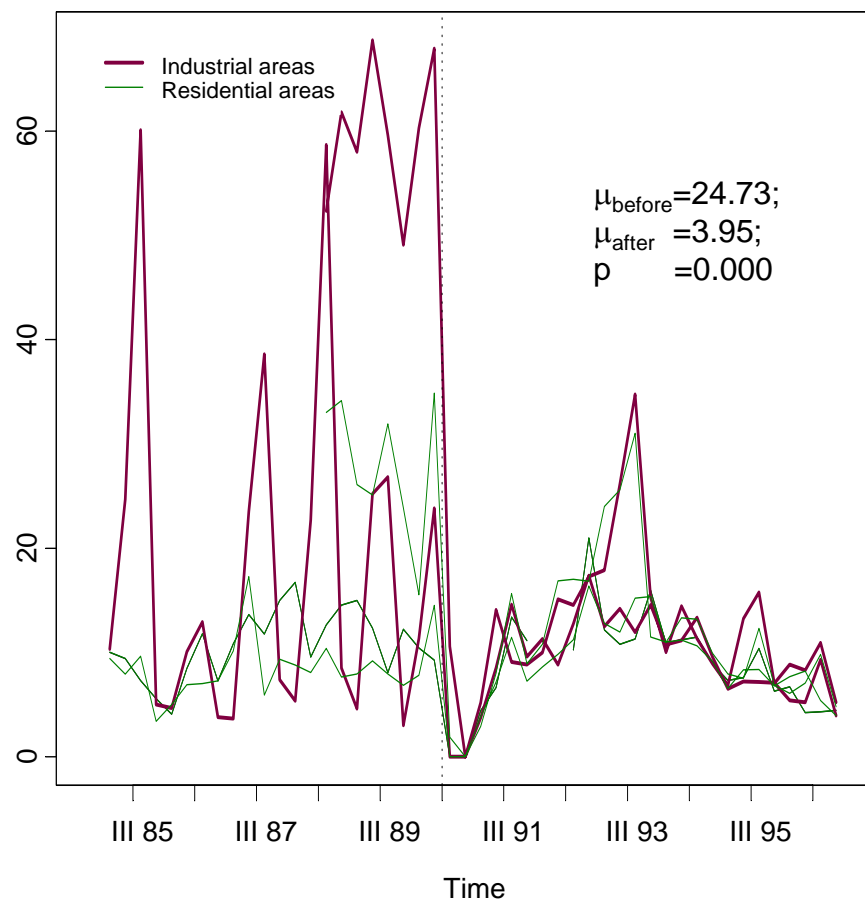


# Effect of conversion to low sulfur fuel (0.5%) on transition metals

## Nickel (Ni)

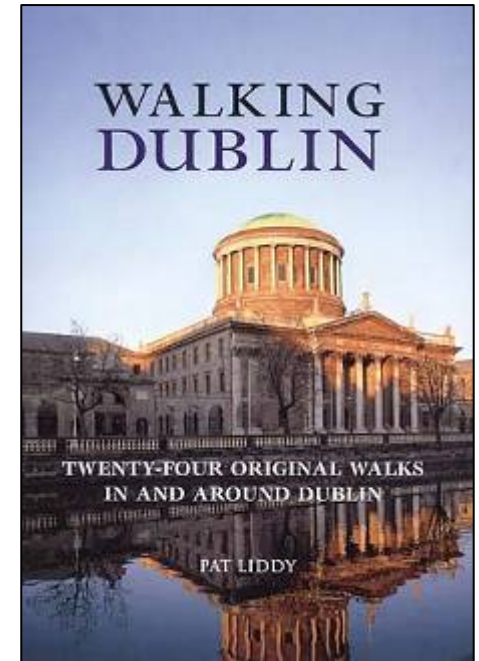
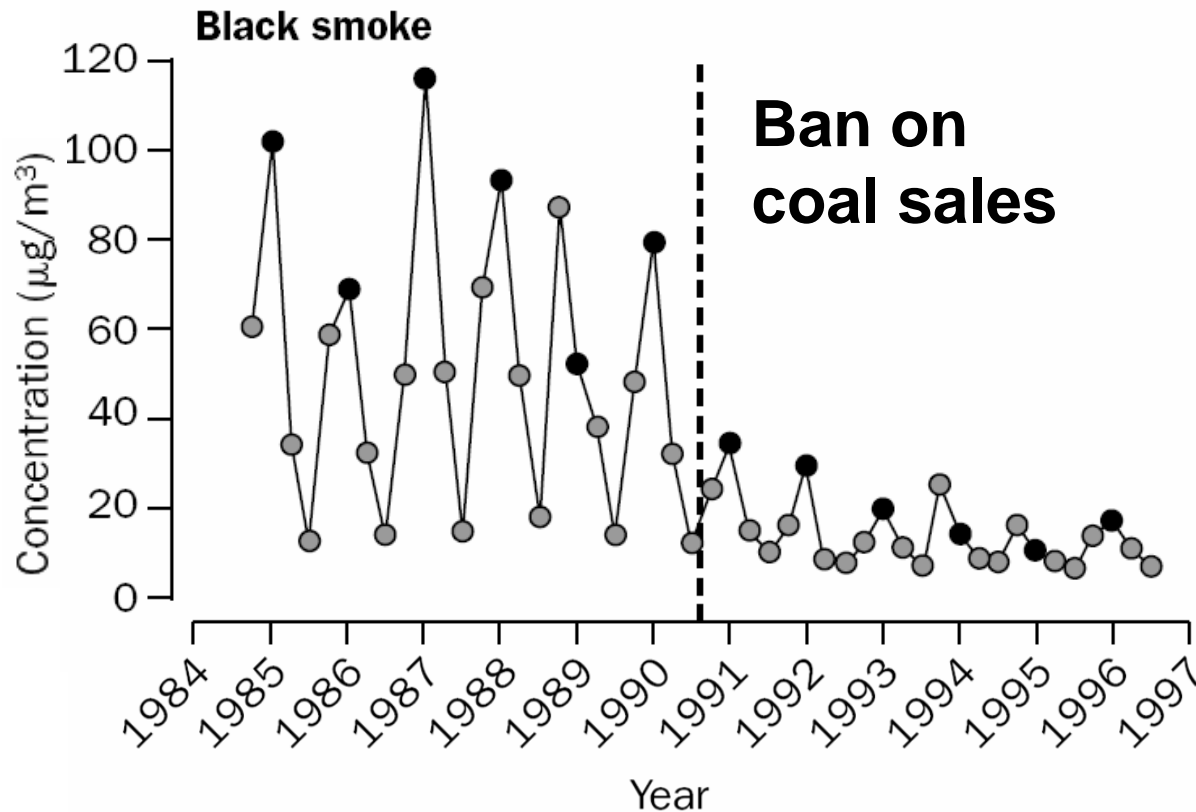


## Vanadium (V)



# Air quality improvements lead to health gains in Dublin 1984-96

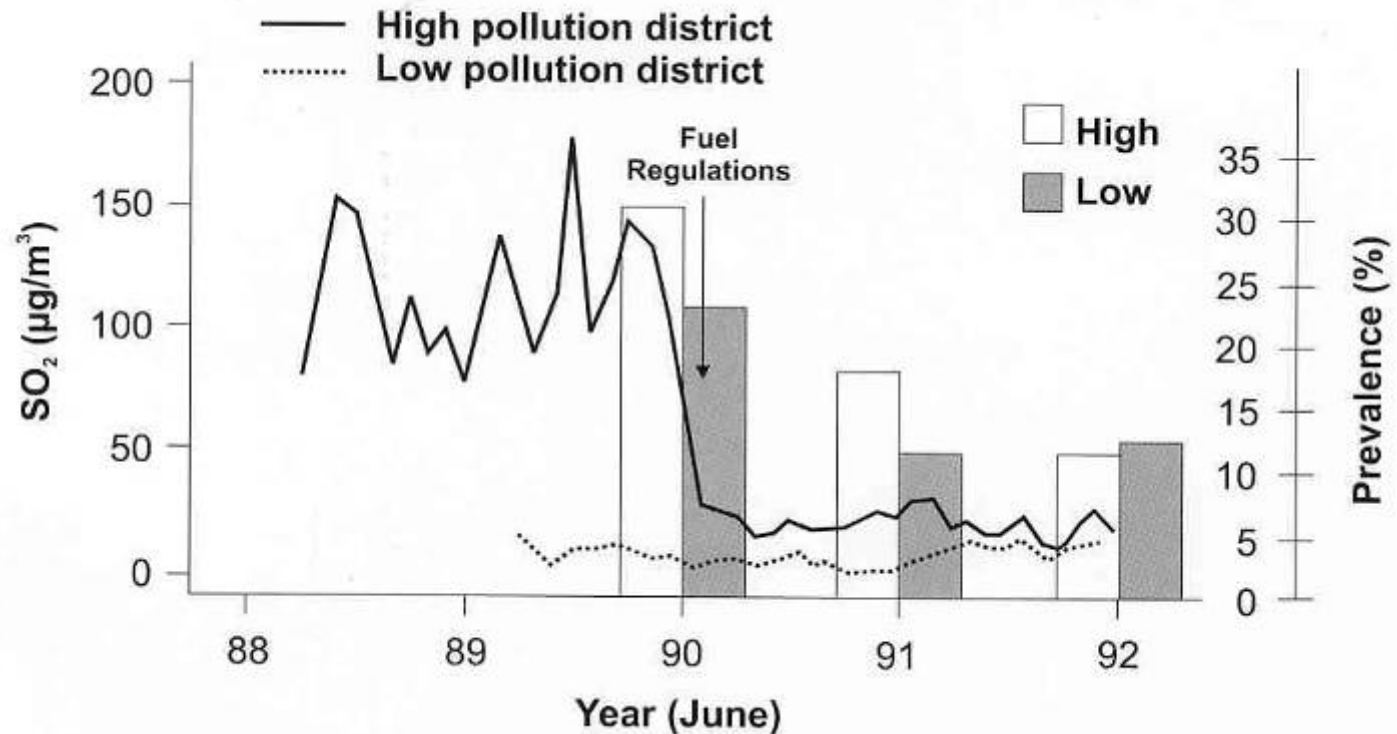
## DUBLIN



Clancy L et al. *Lancet* 2002; 360:1210-4

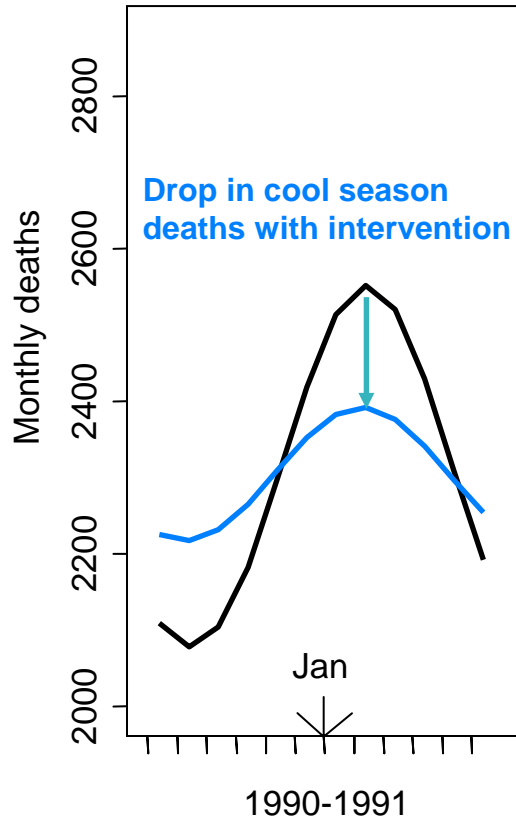


# Improved respiratory health of primary school children reduction in bronchial hyper-reactivity

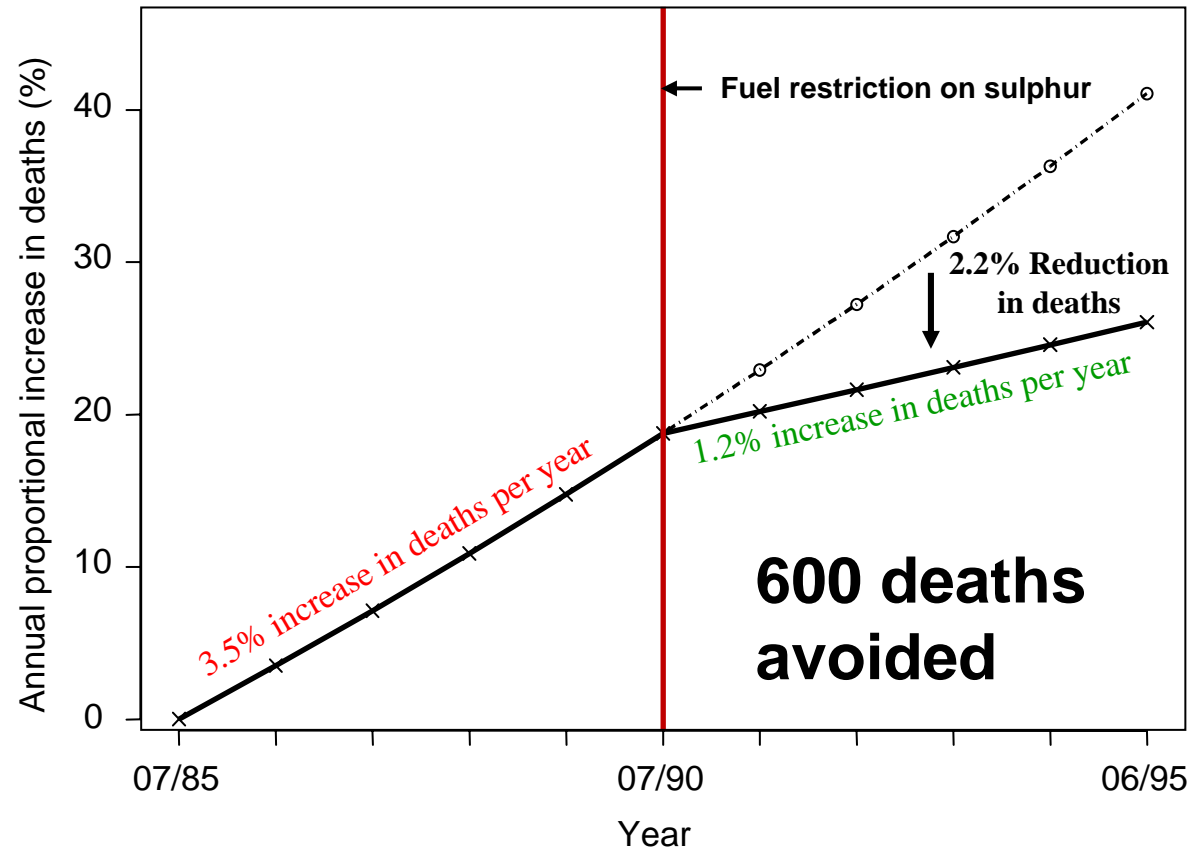


# Lower deaths from heart and lung disease

## Seasonal deaths observed after sulphur restriction

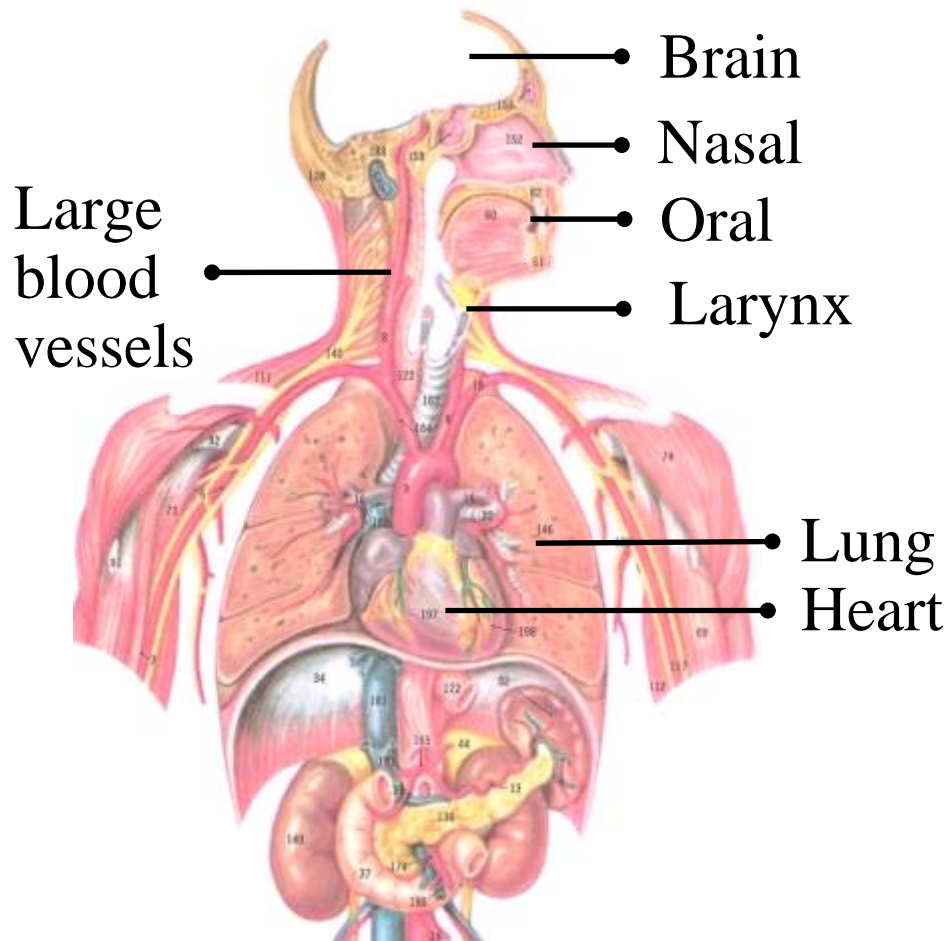


## Effects of sulphur restriction: Long term trends in deaths



Hedley AJ, Wong CM, Thach TQ et al. Lancet 2002; 360:1646-1652

# Air pollution targets vital organs

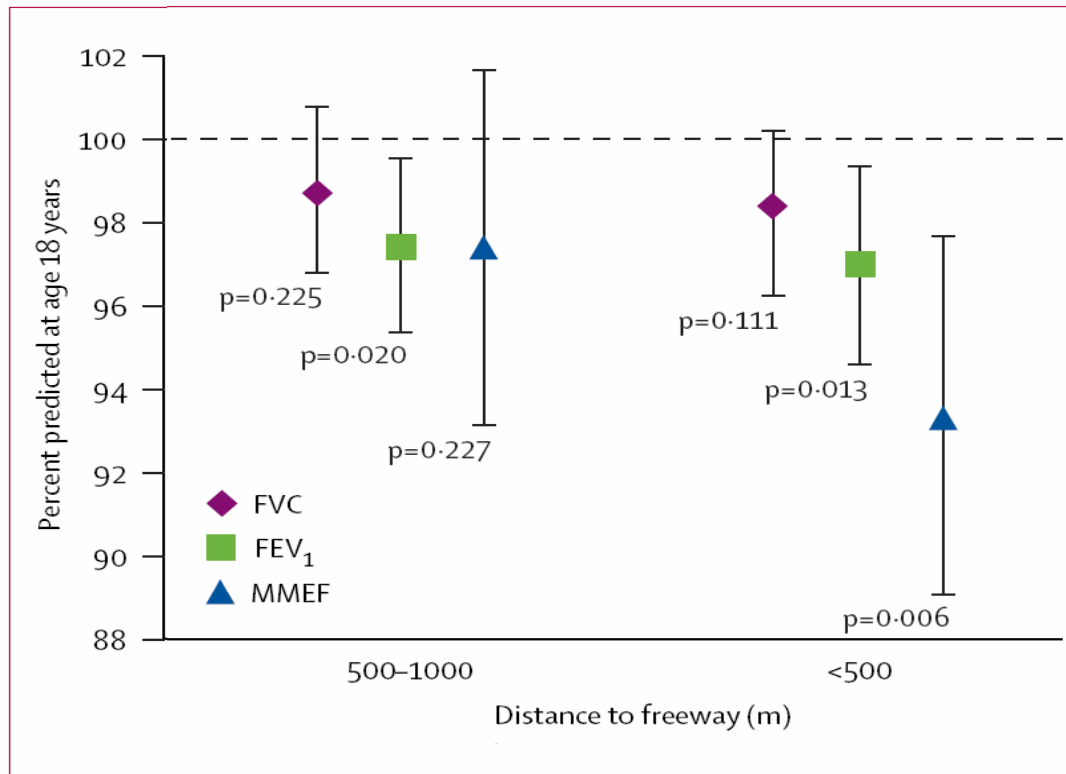


Encyclopaedia Britannica, Inc.



# Living in polluted air damages young people for life

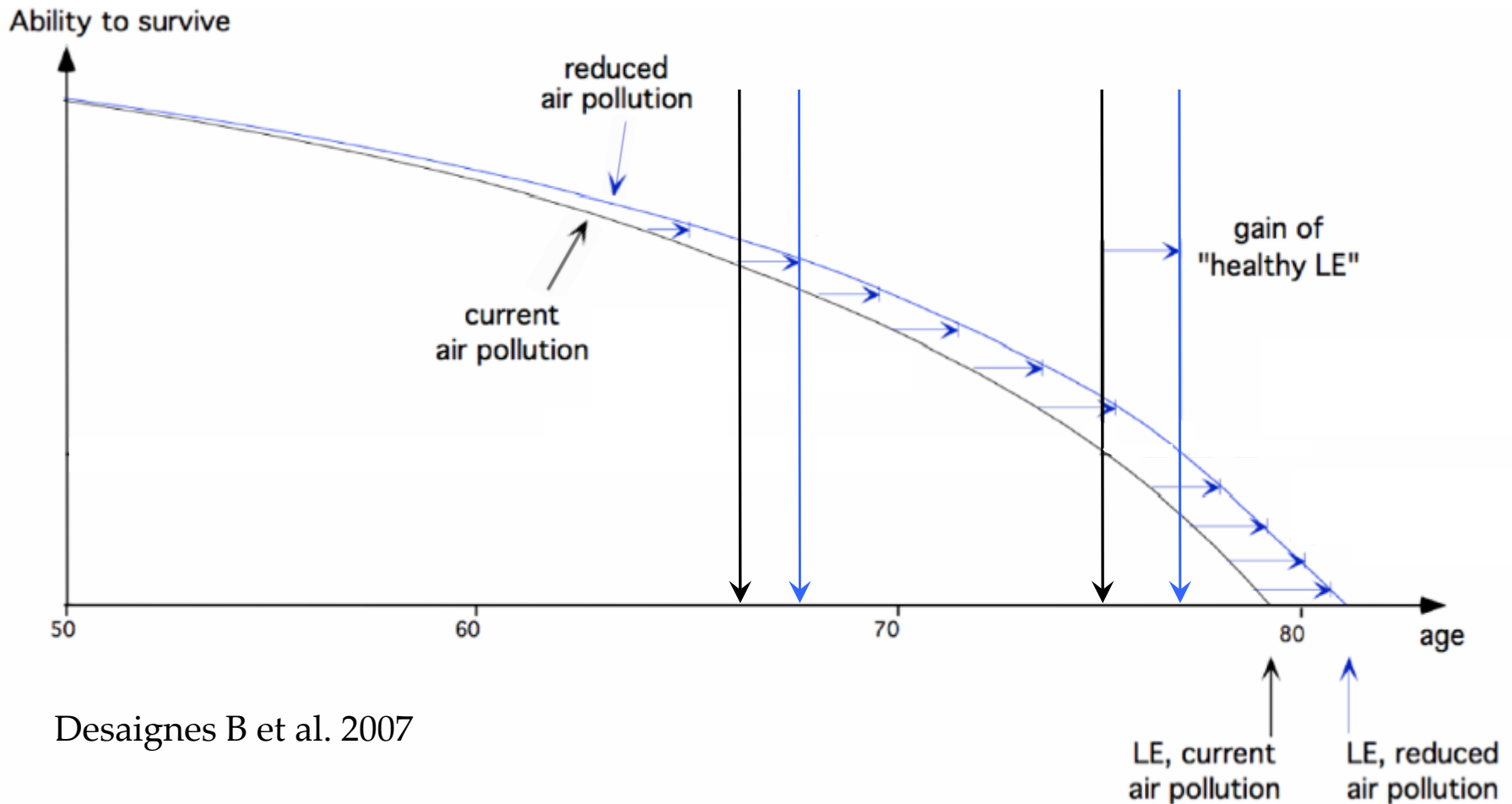
Gauderman WJ, *et al.* Lancet 2007 Feb 17; 369: 571-7



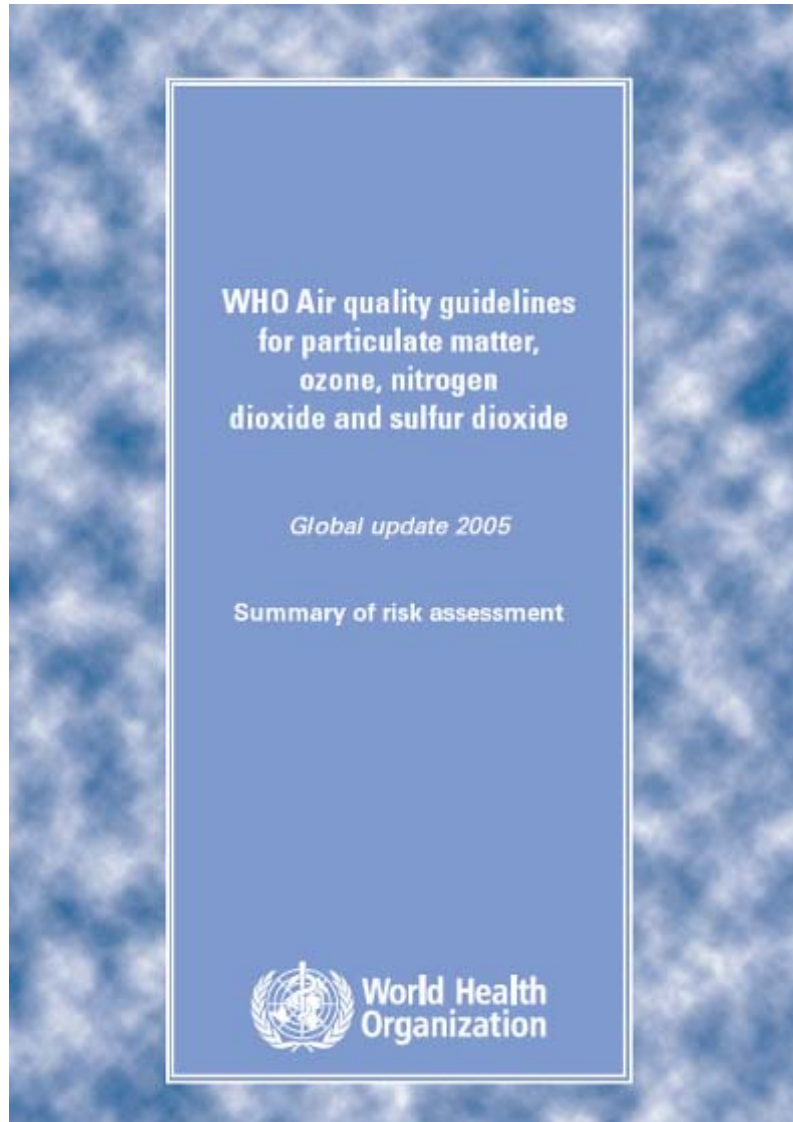
Living near a US freeway impairs lung function in adolescents



# What is the value of life years lost from air pollution?



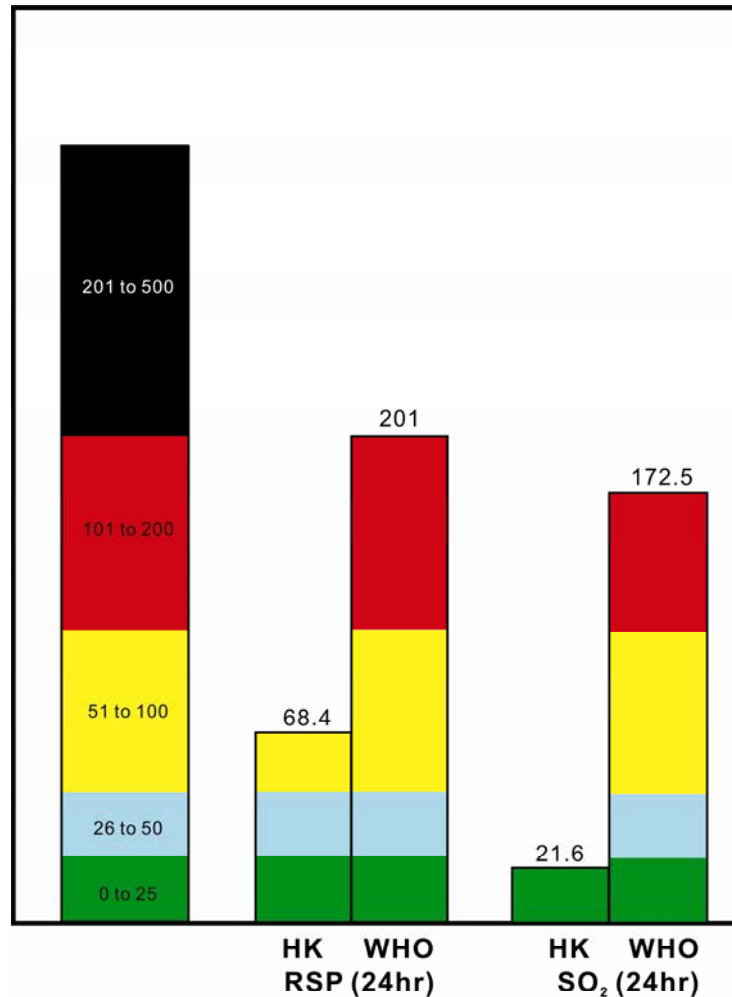
# Do we need more evidence before action?



- WHO reviewed thousands of reports
- WHO AQG: a definitive multinational consensus statement
- Asia and Hong Kong strongly represented
- Two out of 16 references in the Executive Summary are from HKU

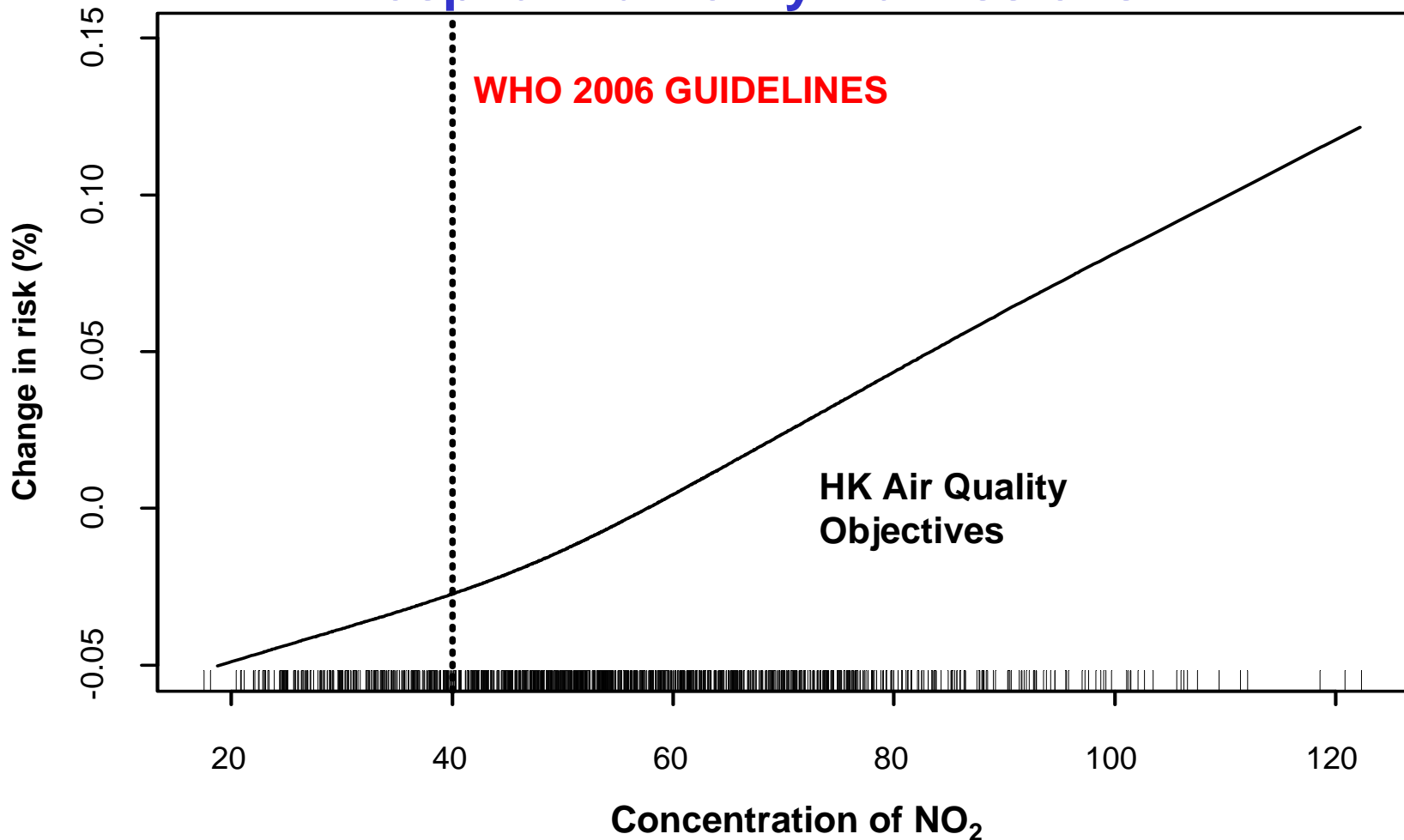
# An example of API calculation based on the measurement in Central/West monitoring station on Monday, 8 Jan 2007 at 0:00

Hong Kong  
API Scale



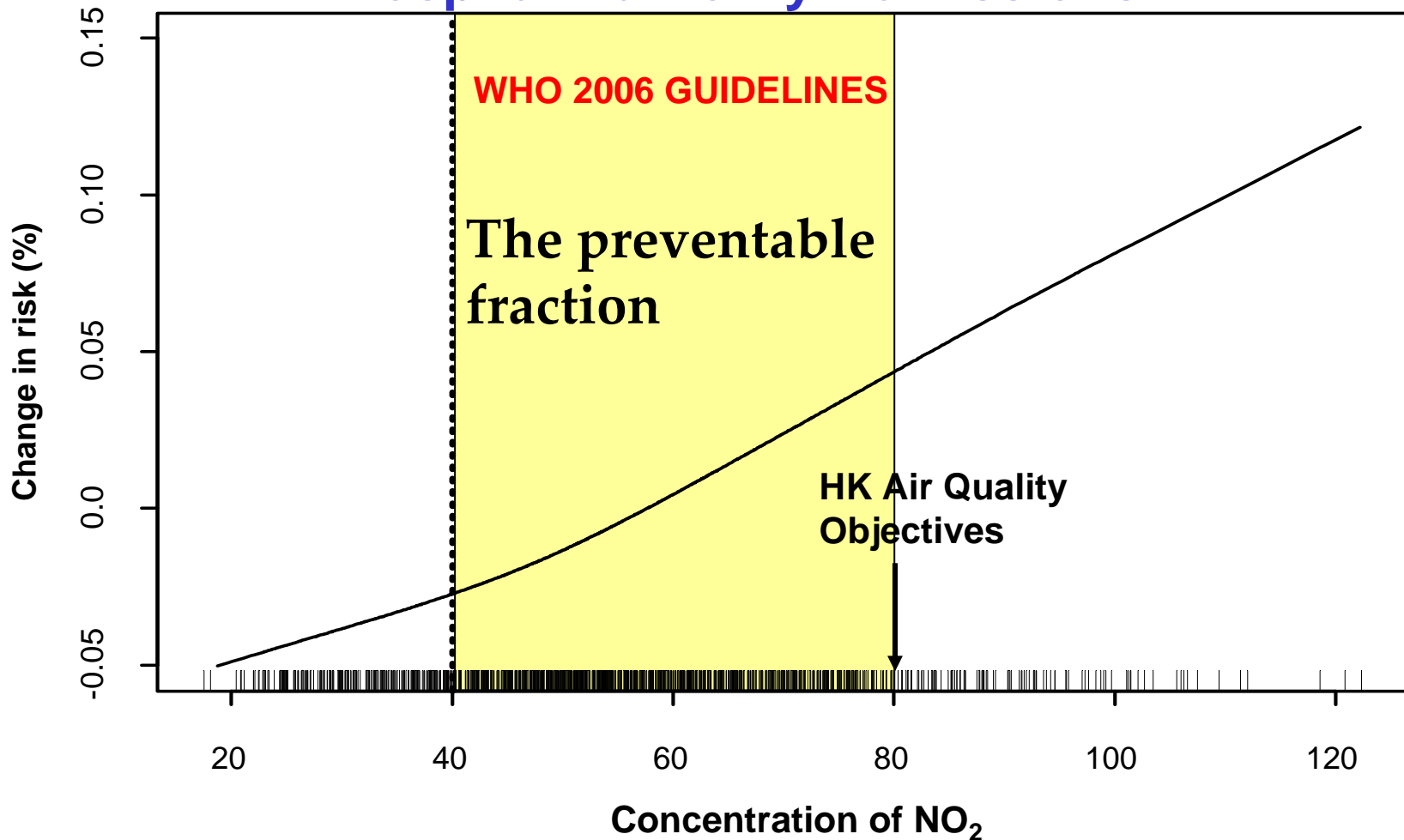
HK: Based on HK AQO; WHO: Based on WHO AQG

# Pollution & risk of respiratory disease: dose-response Hong Kong: Hospital Authority Admissions



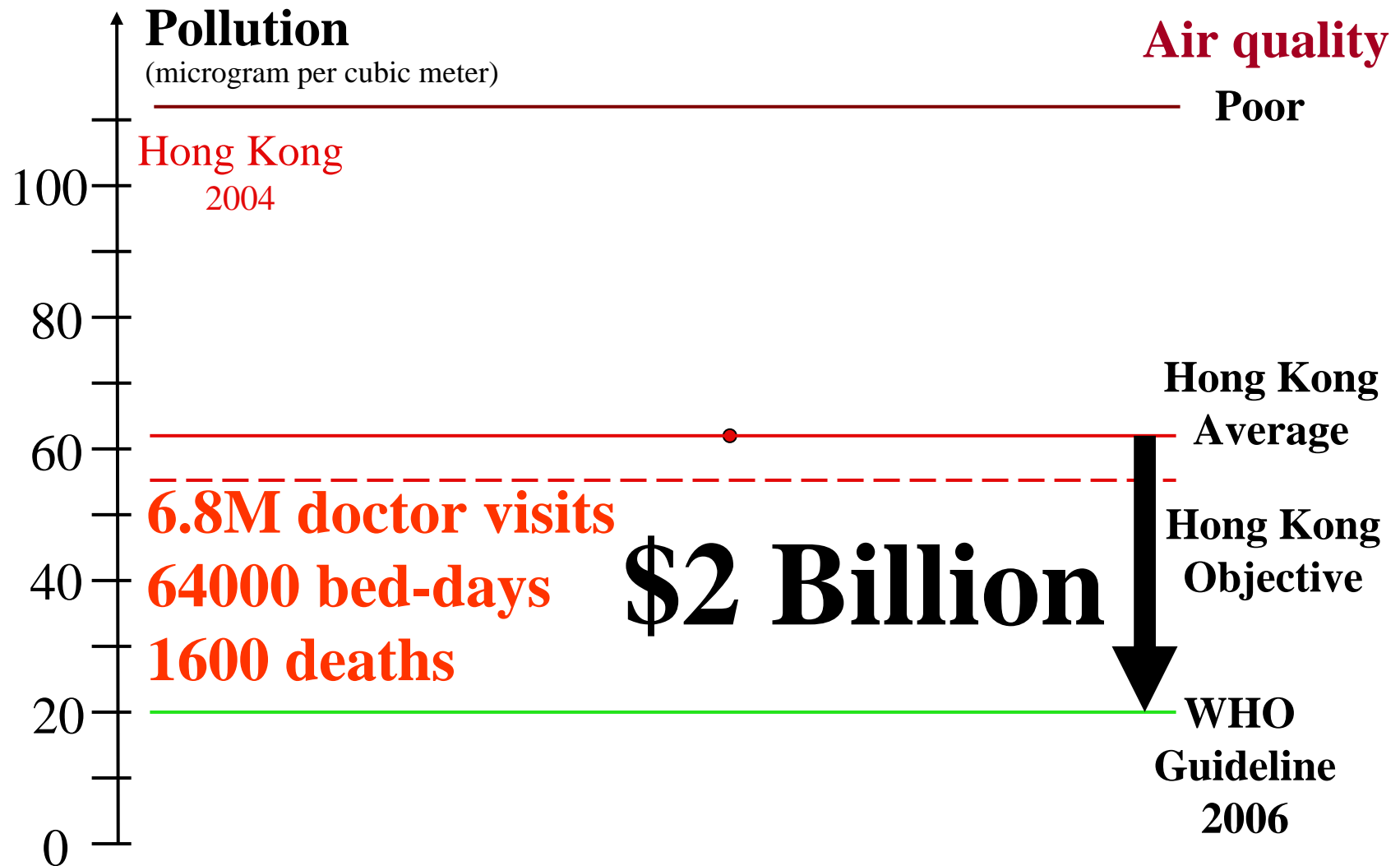


# Pollution & risk of respiratory disease: dose-response Hong Kong: Hospital Authority Admissions



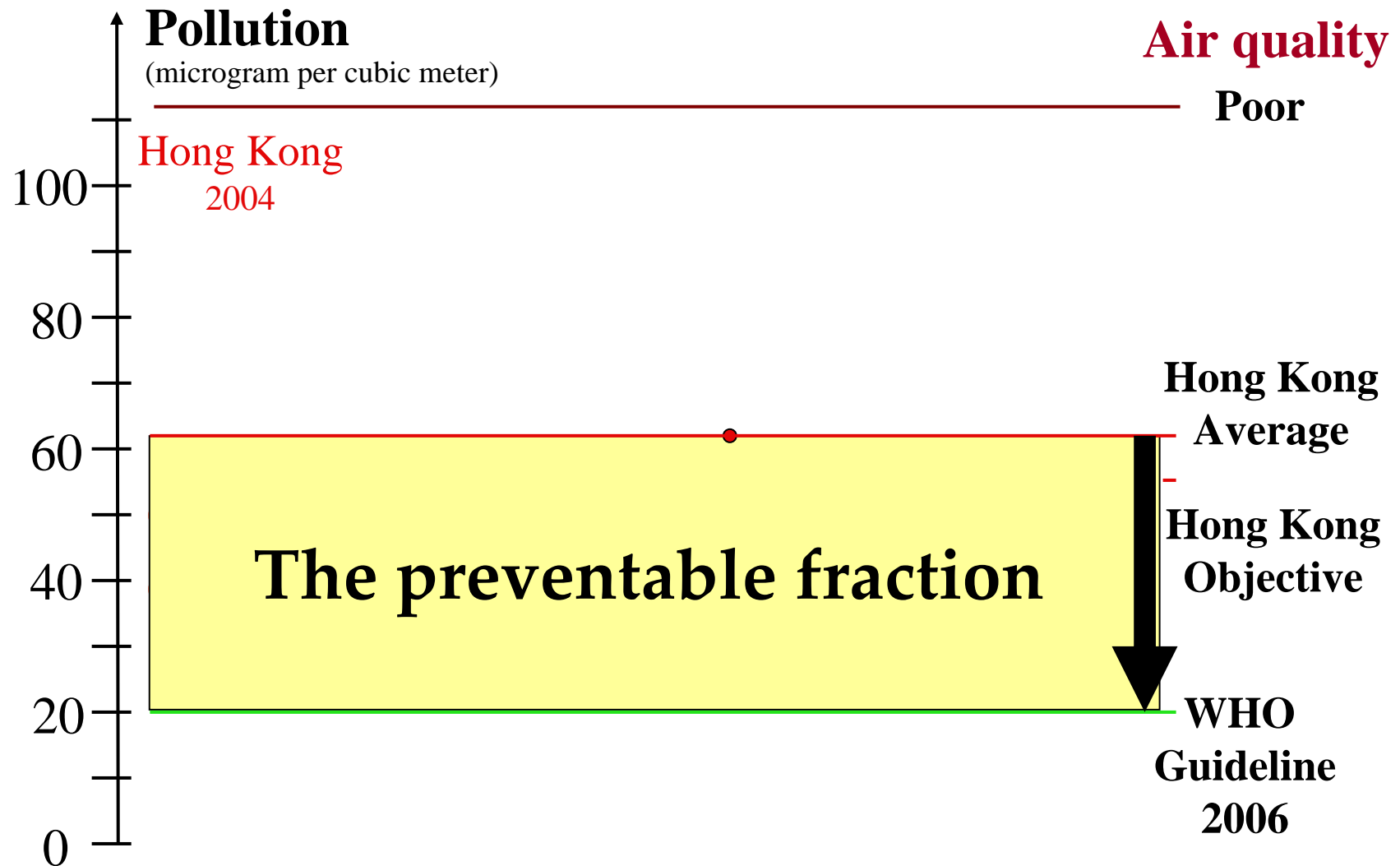
# Avoidable events caused by pollution:

## *Doctor visits, Hospital bed-days & Deaths*

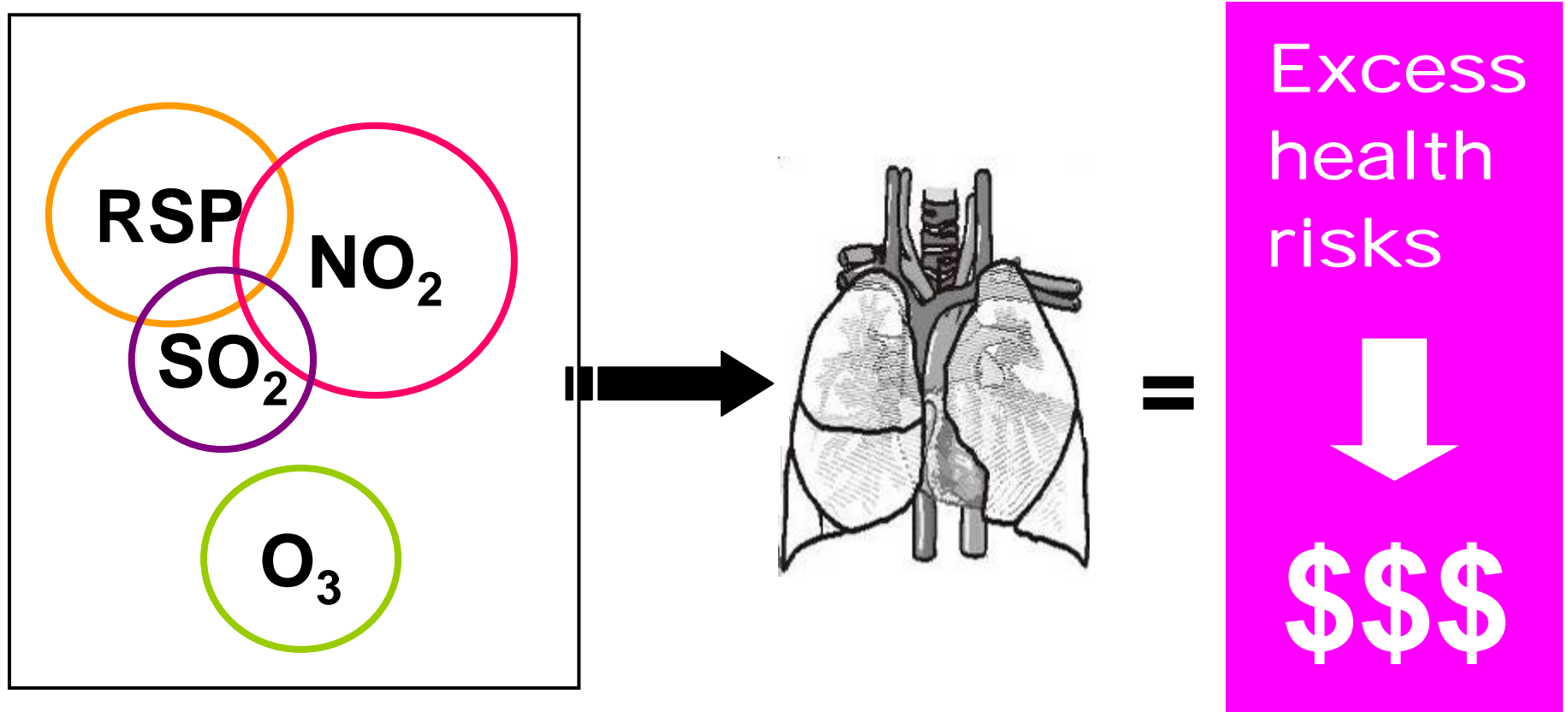


# Avoidable events caused by pollution:

## *Doctor visits, Hospital bed-days & Deaths*



# Pollution = Health Effects = Costs



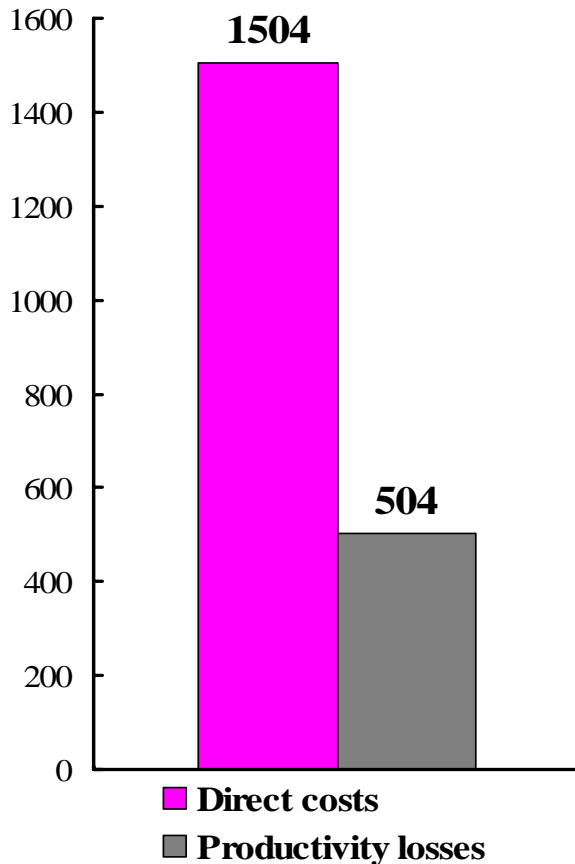


# Annual \$ Value of air quality improvement

**Direct health costs &  
productivity loss avoided**

**Total: HK\$2008M**

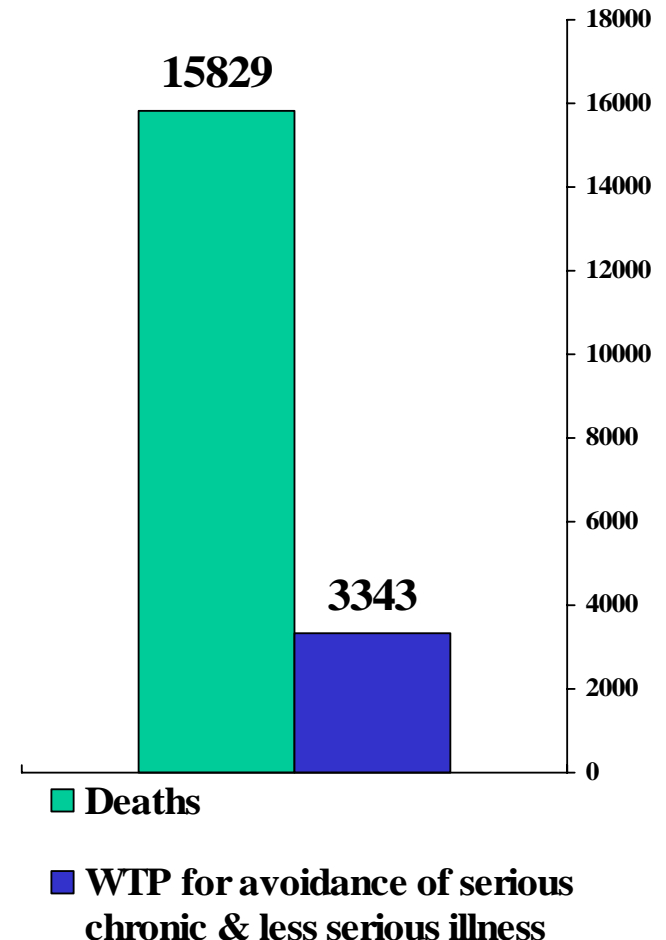
HK\$ M



**Intangible costs for  
pain & suffering**

**Total: HK\$19172M**

HK\$ M



Are daily newspapers the only platform for the dissemination and assessment of environmental science?

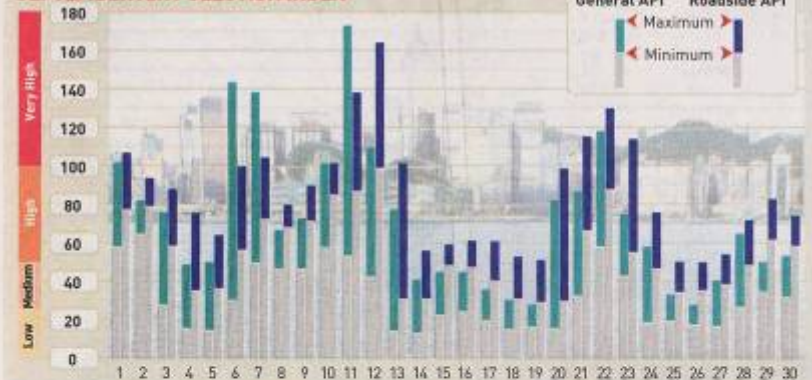
*Department of Community Medicine, Scho*

# Sunday Morning Post

A SOUTH CHINA MORNING POST PUBLICATION

OCTOBER 30, 2005

## SEPTEMBER AIR POLLUTION INDEX



## HK's smog a medical emergency, says scientist

**Richard Holdcroft**

As the central government this week announced sweeping new measures to combat air pollution, an internationally respected local scientist described Hong Kong's air quality as nothing short of a medical emergency.

Anthony Hedley, of Hong Kong University's department of community medicine, returned this week from a World Health Organisation meeting held in Bonn, Germany, to draw up air quality guidelines for the 21st century. Data gathered in Hong Kong featured prominently in the deliberations in Bonn.

Professor Hedley, who served on the advisory panel that reviewed the guidelines, said it was high time the government stopped pretending that pollution levels stipulated in our air quality objectives were safe. He said the new WHO guidelines, slated for release in December, are expected to be 200 to 300 per cent more stringent than those currently in use in Hong Kong.

"But even these are just numbers," he said. "It is now generally accepted that there are no safe minimum exposure levels."

Professor Hedley said that by

using these obsolete guidelines to assess proposed developments, such as new roads, Hong Kong continued to raise pollution levels dangerously high.

But he reserved his strongest criticism for those who described pollution as an unavoidable cost of progress, saying that our health was effectively being stolen and sold by powerful economic inter-

**"We all want progress, yes, but at what price – our children's lungs?"**

**Professor Anthony Hedley**  
HKU Department of  
Community Medicine

ests that exert control over the government through, for example, the functional constituencies.

"We all want progress, yes, but at what price – our children's lungs? When all the hidden costs are taken into account, this is not economic development. It is economic disaster," he said.

"We are all probably suffering

from chronic inflammatory changes in our pulmonary and cardiovascular systems. I can feel it right now, can't you? My eyes are stinging, and I am wheezing."

Professor Hedley also called on scientists in the public sector to speak out.

The government regarded academics in the private sector as "a damn nuisance", he said, so if those in the public sector could not afford to be critical "then where does the advocacy come from?"

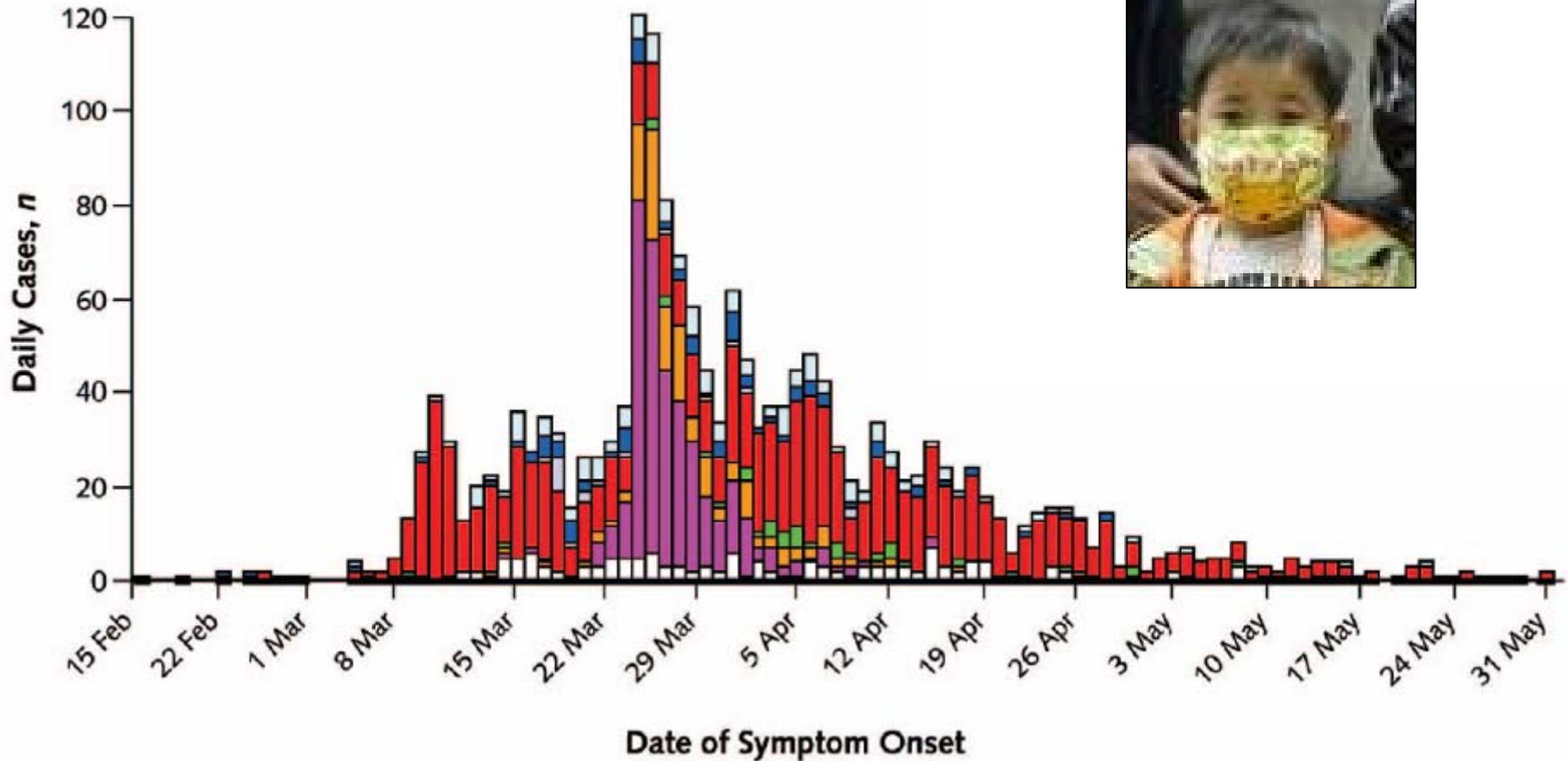
Earlier in the week, the mainland's Academy on Environmental Planning said it estimated that more than 1,000 people die from air pollution each day in China. And the State Environmental Protection Administration announced in Beijing that government measures to combat air pollution would include blacklisting of heavily polluted cities for foreign investment.

Professor Hedley called on the Hong Kong government to show more leadership in combatting air pollution together with mainland authorities.

Nobody in the government had a clear brief to tackle air pollution, he said, and as long as this was the case he expected progress to be limited.

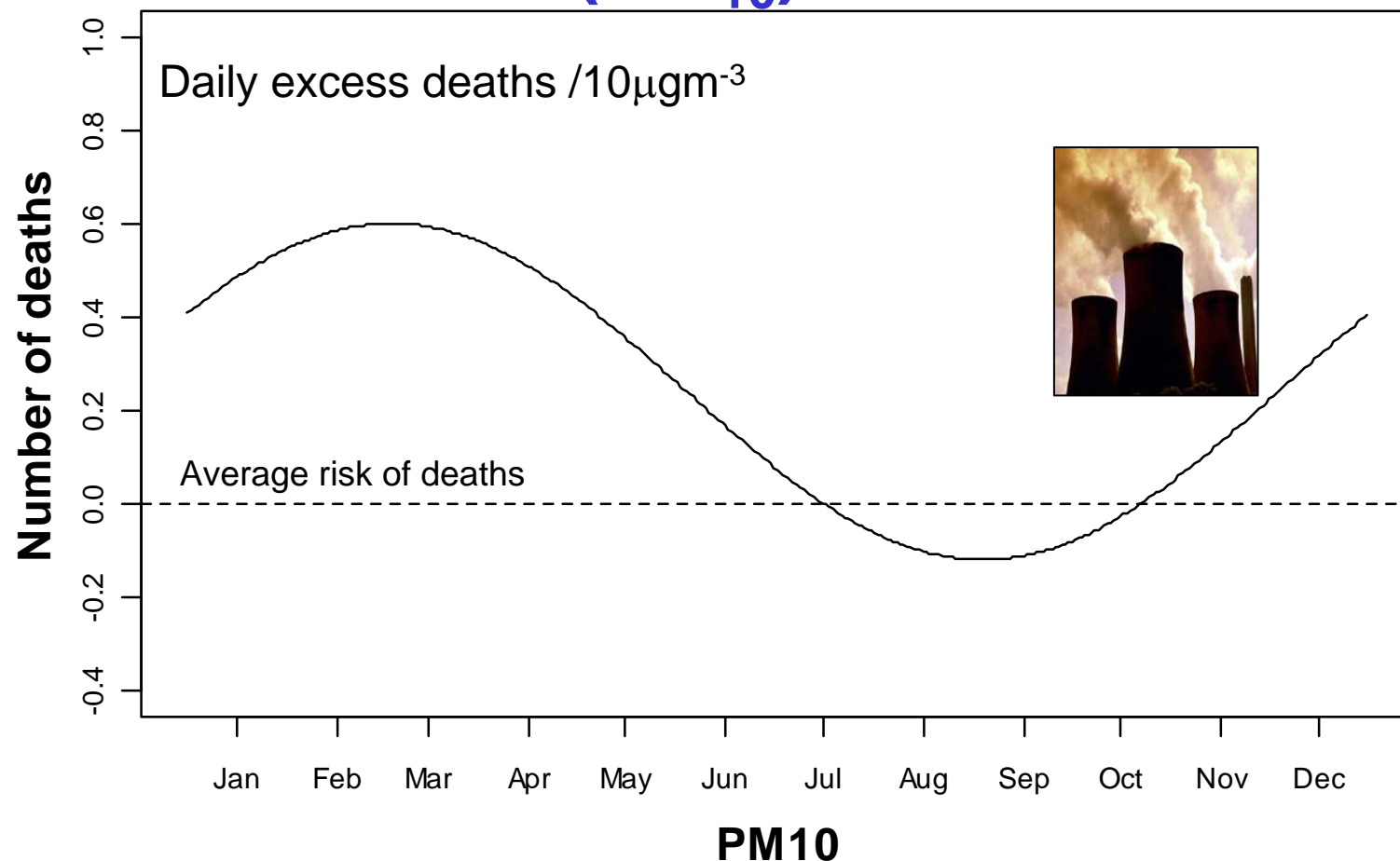
# Attribution – 1

## Epidemic curve for SARS cases and deaths 2003



# Attribution – 2

## Annual epidemic curve for air pollution deaths (PM<sub>10</sub>) 1996-2002





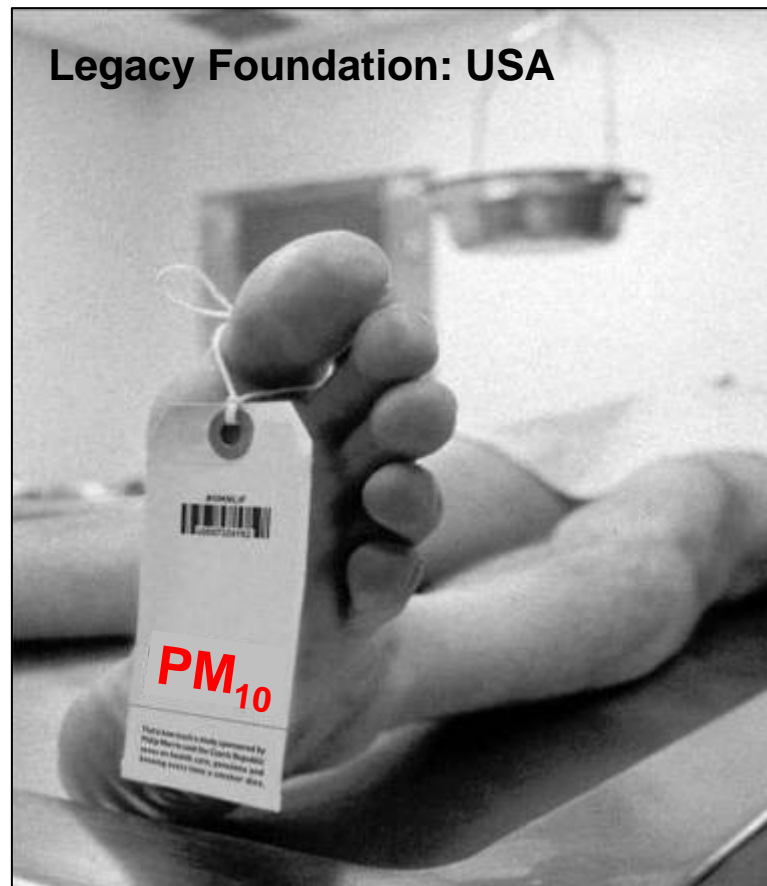
# The problem of attribution

# Risk estimates for air pollution and health are based on

- clinical observation
- molecular biology
- epidemiology

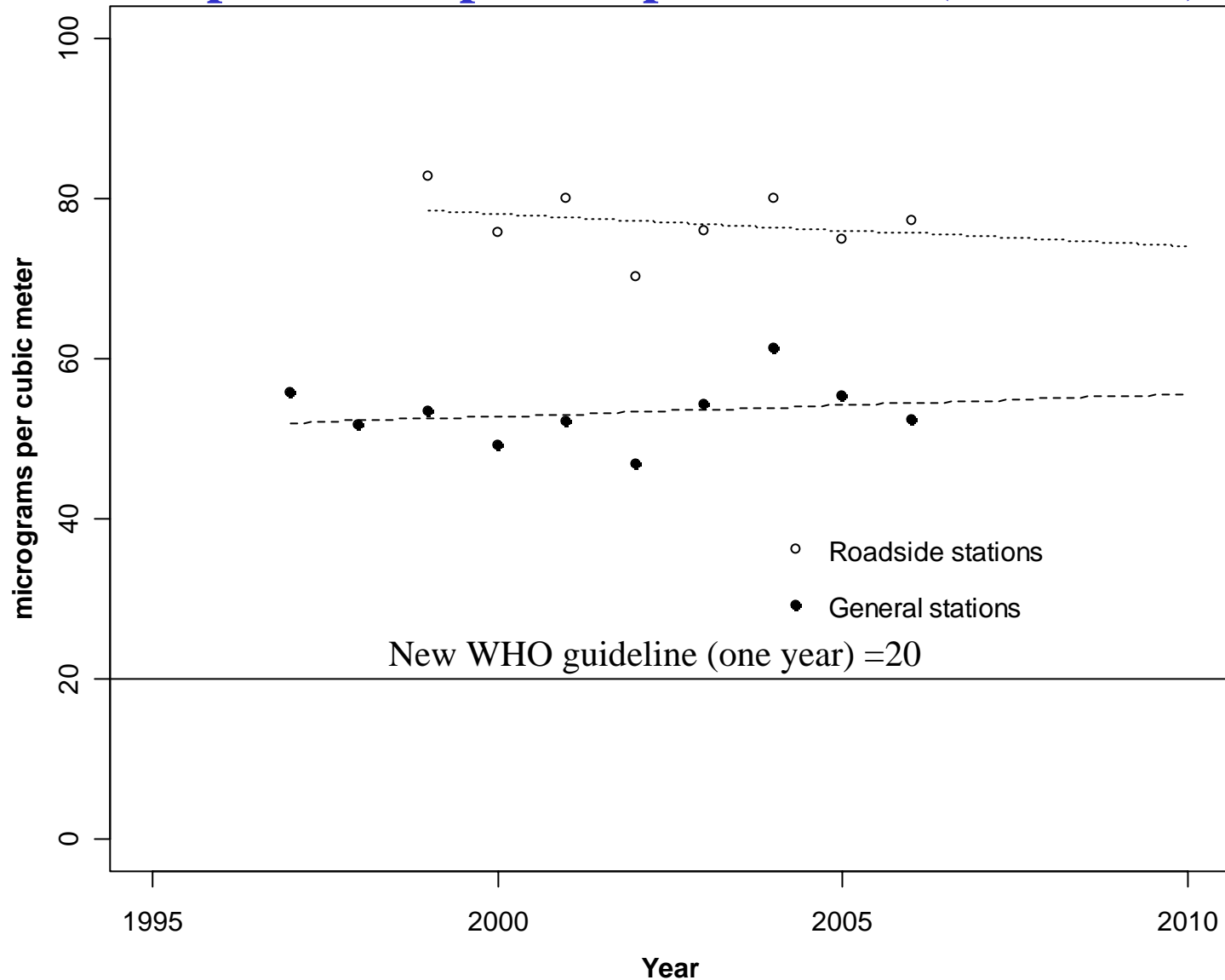
*but body bags do not  
carry the label*

## ***“Killed By Air Pollutants”***

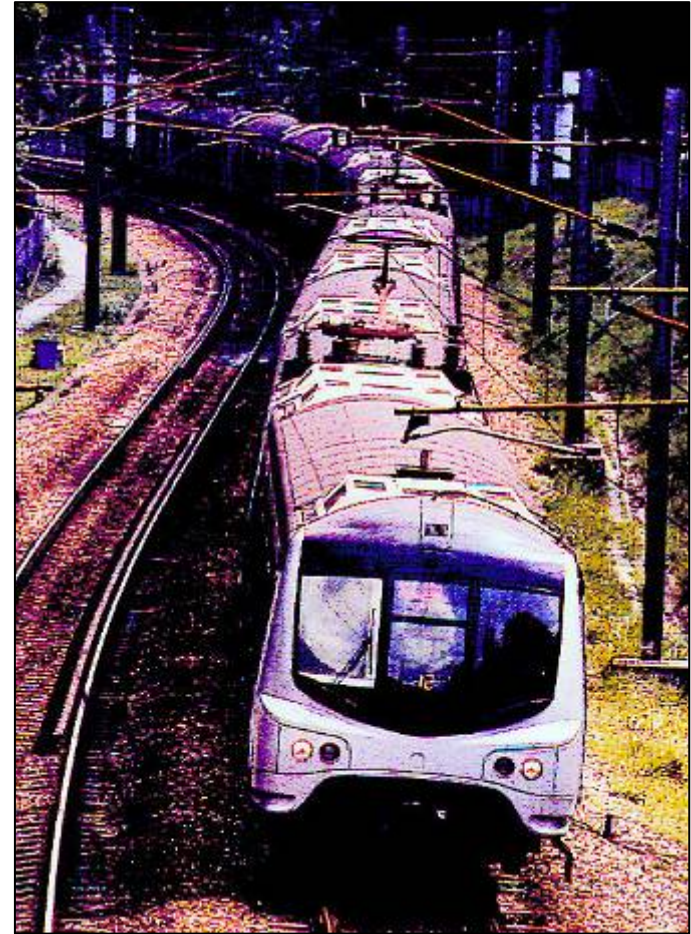


# Where is air quality heading?

## Respirable suspended particulates (1997-2006)



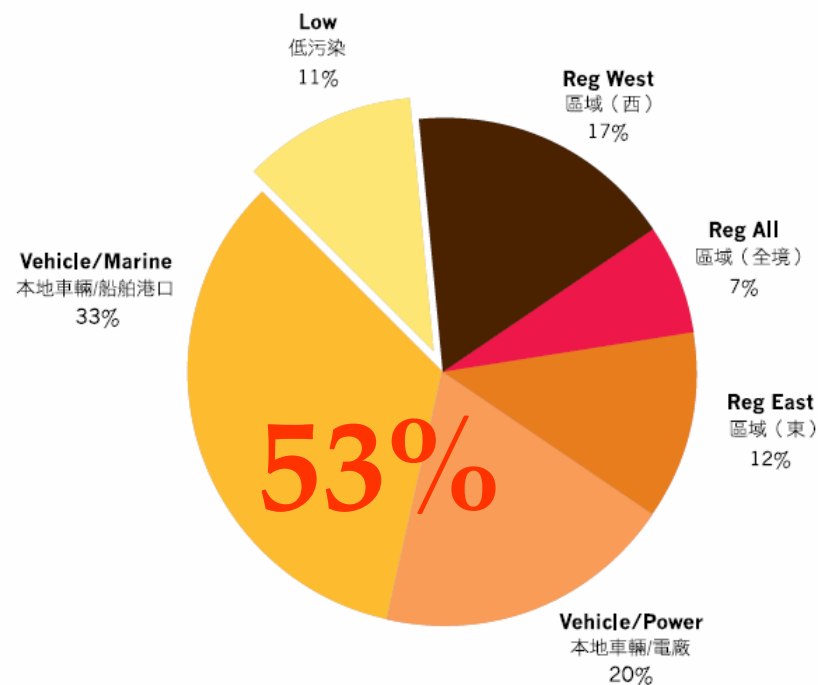
# Dirty roads are preferred to clean rail



# Hong Kong makes a large contribution to PRD pollution



Shipping in Lamma Channel



Percentage of total days of the year that each mode was dominant

Source: A Lau et al. Relative significance of local vs. regional sources: Hong Kong's air pollution, HKUST, 2007



# Sunday Morning Post

APRIL 29, 2007

Ideas to cut causes of smog aired, but for one leading figure they're too late

## Bad-air alarm proposed to protect health

Quinton Chan

A new colour-coded air pollution alert system similar to the rainstorm warning system – with mandatory action at the highest level – is proposed in Hong Kong's first public consultation paper on clean air.

Mandatory actions could include ordering a stop to pollution-causing activity and asking businesses to take voluntary actions such as halting vehicle use or having employees work from home.

The paper also says the controversial idea of electronic road pricing should be considered again and suggests use of eco-friendly light bulbs be made mandatory.

Prepared by the semi-official Council for Sustainable Development, the paper says the alert would need to be issued in advance of high levels of air pollution but acknowledges this could cause problems in the event of a false alarm.

Council sources said the current daily air pollution index readings were only educational and were not prompting people to take positive action.

At present, children, the elderly and people with respiratory diseases are advised not to be exposed outdoors or do exercise when the index reaches above 100. These are only positive actions, a source said.

"There is a sense of helplessness among the public when high-API days are announced, because they have no option but to carry on with normal daily activities."

He said a "clear and strong forward alert system" was needed, like rainstorm warning signals which were simple and easy to understand.

"How about a colour coding scheme, where green means the air quality is good, amber means some action must be taken, and red denotes urgent action must be taken?"

"Of course, we should consider what needs to be done should there be a false alert. More importantly we have to ensure the public appreciates the urgency in taking action on days of high alert, just like when the black rainstorm warning signal is hoisted, people go home. We need some mandatory and voluntary measures to go with the alert system."

The council's paper, to be released next month, cited the example of Toronto, where a smog alert is issued when periods of poor air quality are expected within 24 hours.

On high-smog days, people in Toronto are advised to car-pool, travel by train or walk from home. They are advised to avoid strenuous outdoor activities, while those with breathing and heart problems are requested to pay special attention to a worsening of their symptoms.

Most air  
and health  
2  
editorial,  
King's view  
12

Terron's action plan also requires government departments to reduce the use of non-essential petrol- and diesel-powered vehicles, oil-based paints, solvents and cleaners, as well as postponing the use of petrol-powered equipment and delaying the refueling of vehicles until nightfall. Government staff are asked to use public transport or walk to work, and to wear casual clothes. Some non-essential services are temporarily reduced or suspended.

The sources said Hong Kong should adopt some of these measures, as well as introduce road pricing to discourage private vehicle use.

The council, headed by Chief Secretary Rafael Hui Si-yun, will seek public views on electronic road pricing and ways to reduce energy consumption, such as the mandatory use of eco-friendly light bulbs.

But the existing API may not need to be replaced.

"The API could be used to complement the new alert system," the source said. "And there could be different alerts for different types of impending pollution, such as one for haze or low visibility, and another for air pollution levels. The public will be asked about all these questions."



Edo de Waart and son Sebastian, four, at home in Wisconsin. The boy has needed hospital treatment for asthma. Photo: Wisconsin State Journal

## HK orchestra chief moves family to US to escape pollution

Conductor Edo de Waart is moving his family out of Hong Kong after just three years here, to protect them from the "terrible" air pollution.

The Dutch maestro, who has repeatedly stressed his commitment to the city since taking up the baton of the Hong Kong Philharmonic Orchestra in 2004, is in the middle of relocating the family home to the United States.

De Waart and his wife Rebecca, a singer, have bought a house in her home town of Middleton, Wisconsin, and were there last week looking at schools for their two children.

She will be based in Middleton with the children, who start school in September; de Waart will divide his time between there, Hong Kong and international touring.

His five-year contract as chief conductor and artistic director – he has an option on a further five years – requires him to work with the orchestra for 14 weeks a year.

"We have a four-year-old son Sebastian who has some asthma problems," he said. "We have been at the doctor on an unbelievable number of times – 30 or 40 times – and even stayed over at the hospital in Happy Valley for two nights about four months ago. It was just horrendous."

"The air quality is terrible in Hong Kong. I don't know what, at the end of their life, it does to little kids who grow up there, and we just don't want to take that risk. It is that simple."

De Waart said the move had been 85 per cent motivated by their concern about Sebastian and 15 per cent by the fact that "you can just walk out on the grass" in the small Midwestern town.

During stints in Amsterdam, San Francisco and Minneapolis, he found those cities "quite civilised".

"Hong Kong is an incredibly vital and exciting city and I would tell anybody to live there for a while, but you lose your overall picture of what life is all about."

"And I don't think that for four- and six-year-olds it's as fascinating as for someone like me. I would like them to hear birdsong and walk on the grass. I hear birdsong here."

In a report in the Wisconsin State Journal on April 26, de Waart, 46, was quoted as saying that the city was "incredibly polluted" and it was "pretty stressful" to go to school.

But as Sebastian and Olivia, six, who attends Chinese International School, flew back to Hong Kong with their mother last week, he told the Sunday Morning Post he would not

**Air quality is terrible. I don't know what it does to little kids who grow up [here], and we just don't want to take that risk**

Edo de Waart

"discredit the whole Hong Kong education system" over the phone.

It was too early to say how much of his five-to-10 year contract he would serve but he had no further "big ambitions" and Hong Kong was likely to be his last major posting before he scales back work commitments.

Asked whether it was appropriate to criticise Hong Kong's air quality and education in the US press, while receiving a large salary that is partly funded by the city government, de Waart said that if Hong Kong wanted real democracy, people would be happy for him to comment as he saw fit.

Liz Heron and Quinton Chan

Conductor hits at letters Page 5



# The Sustainable Development Council Public Consultation

- Bad air alerts
- Electronic Road Pricing
- Demand side change in behaviour and consumption

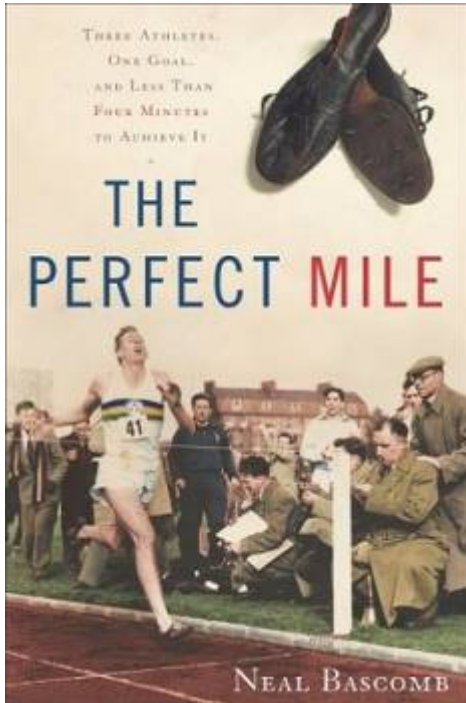
# Do alarms have a scientific basis?

## Do they work?



- Need for a multiple pollutant API
- Post hoc in terms of pollutants
- Lack of cost-benefit in exposure reduction

# Exercise, pollution and health protection: where is the boundary for benefit?



Air quality  
in China  
will have a  
major effect  
on the 2008  
Olympics

*Perfect miles cannot be run in polluted air*

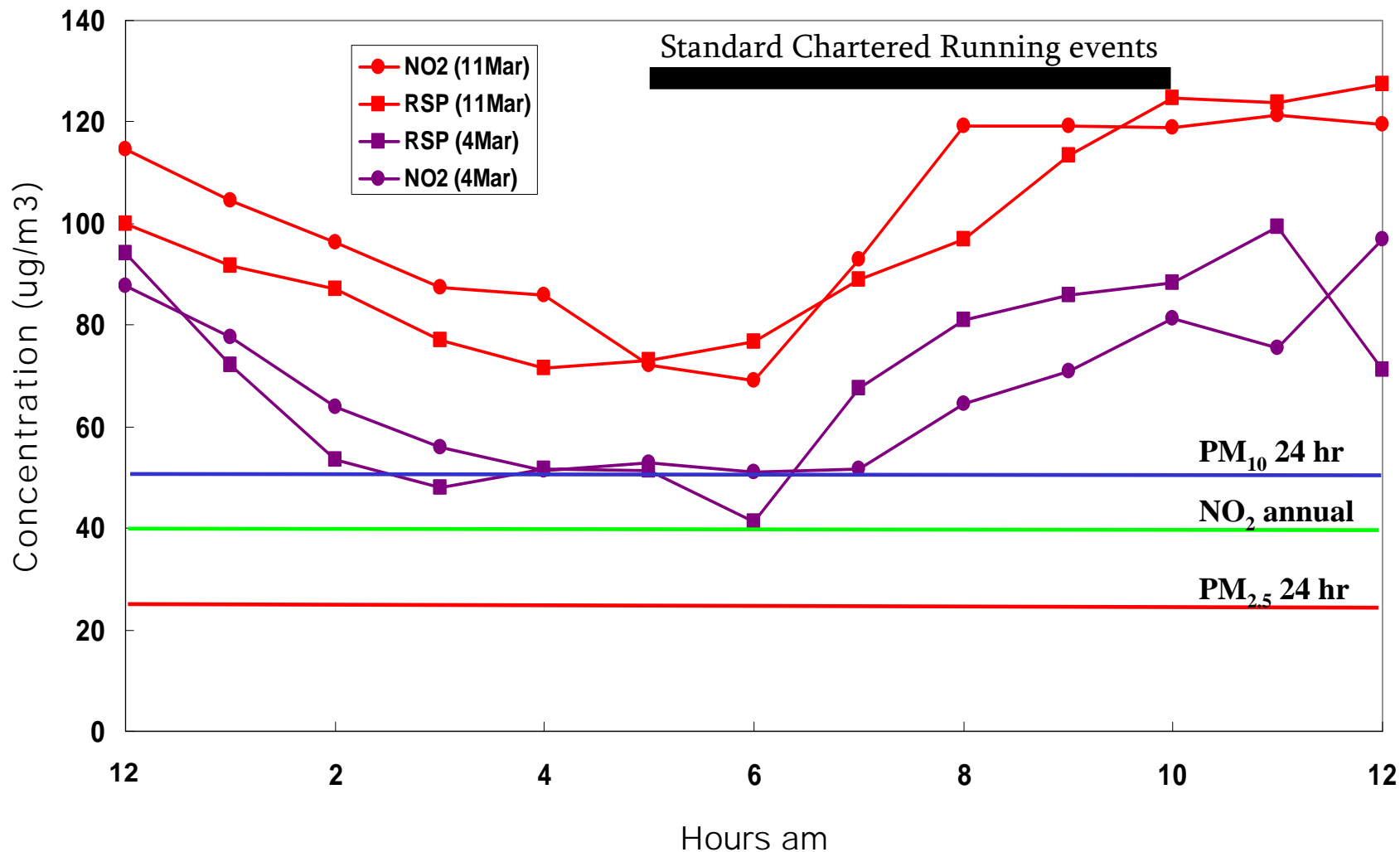
# The Hong Kong marathon: Health protection needs environmental protection



Running 2 miles  
or 26 miles 385  
yards demands  
clean air for  
health  
protection

# The Hong Kong Marathon

## Air pollution: Sunday 4 March 2007





# South China Morning Post

南華早報

PUBLISHED SINCE 1903

HONG KONG: \$7.00

WEDNESDAY, FEBRUARY 28, 2006

## Run at your peril, warns health expert

Competing in HK Marathon 'not a good idea', says Hedley

# The Standard

Monday, March 5, 2007

*“athletes risk serious heart problems by running in Hong Kong's intensely polluted air”*

*Anthony Hedley*

*“That to me was a negative approach”*

*William Ko Wai Lam*

*Chairman Hong Kong Marathon*

*“We will make announcements  
at the start about the air  
pollution index so people know”*

**SCMP February 28, 2007**

William Ko Wai-lam, Chairman, Hong Kong Amateur Athletic  
Association, Hong Kong Marathon



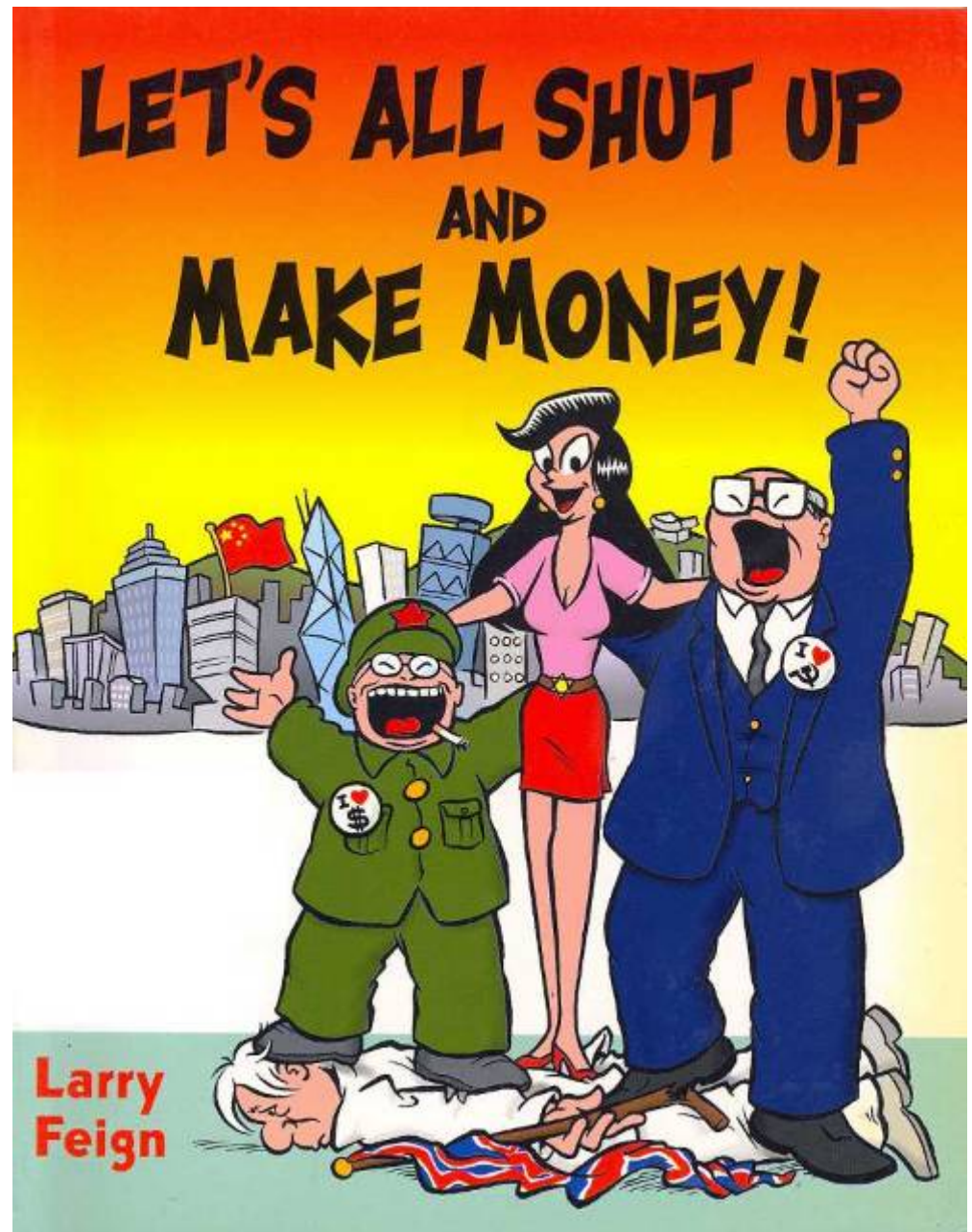
*“I think the levels of pollution  
are a concern for everyone, but  
... cannot be fixed overnight”*

**SCMP March 3, 2007**

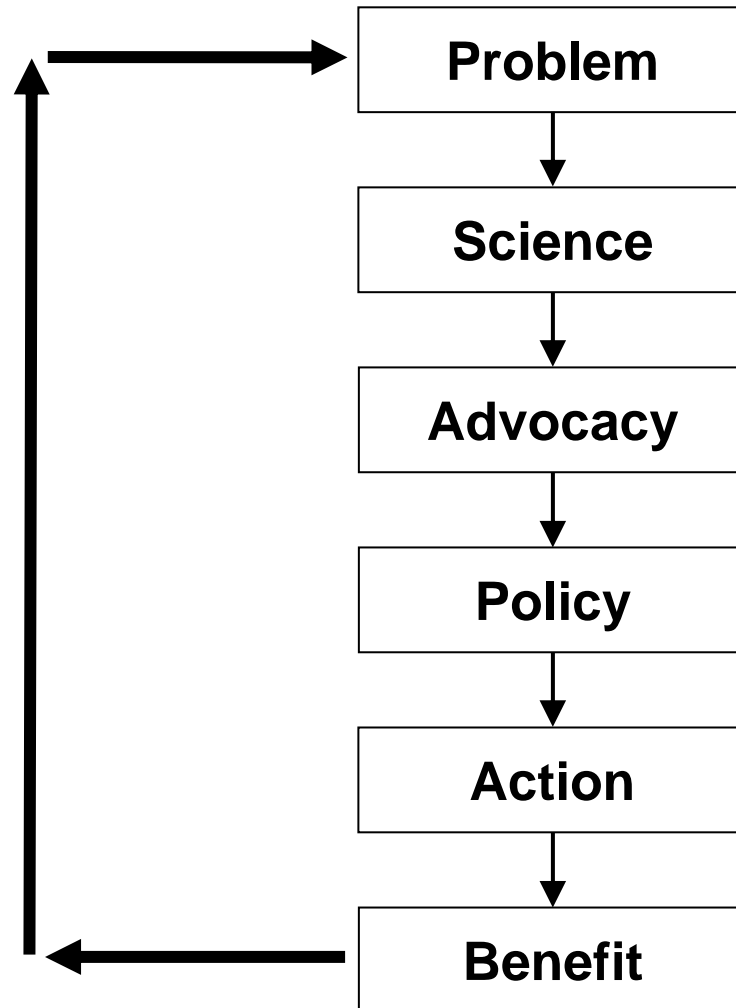
Peter Sullivan CEO, Standard Chartered



***What should  
we do next to  
improve our  
environment?***



# The translation of public health research into policy and practice



# A question of accountability

- Why does a major and universal threat to health not prompt radical and urgent action
- Ignorance or cynicism?
- Different value systems in which intangible costs are not monetized or otherwise valued?
- ***Political philosophy which holds that external costs of population health injuries are readily and justifiably discounted?***

# FOR DEBATE

## Obstacles to blue skies and clean air

- Air quality is out of control and neither clinical science nor epidemiology has made any meaningful impact so far on decision- making in environmental health
- *The evidence is lost in translation*
- Air pollution and health exposes the biggest weakness in the *public health function*



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## Obstacles to blue skies and clean air

- A philosophy of evidence-based health protection is seriously lacking in the HKSAR government
- No Director of Health or SHW has ever issued an advisory on air pollution and health
- There is no one in government with responsibility for air pollution from a *public health viewpoint*