Department of Community Medicine
School of Public Health
The University of Hong Kong

Environmental Health and
Health Economics research groups

Communicating serious health hazards of Hong Kong air
A new version of the Hedley Environmental Index
(http://hedleyindex.sph.hku.hk)

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Founding Funder
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Acknowledgements

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Fu Tak Iam Foundation Limited

Project development

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Data provision

Environmental Protection Department, Hospital Authority,
Census and Statistics Department, Hong Kong Observatory

Design work

Start JudgeGill Ltd (HK) and Civic Exchange

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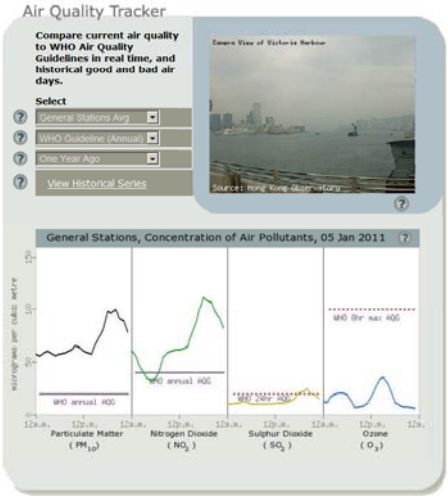
We launched the Hedley Index in 2008 in Hong Kong



http://hei.sph.hku.hk

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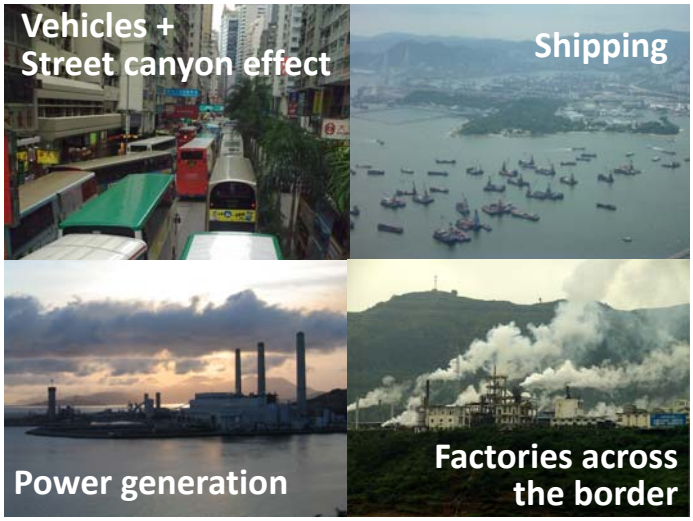
WHO criteria air pollutants
and their sources in Hong Kong

Nitrogen dioxide NO_2



PM_{10}
Particulate matter
$PM_{2.5}$

Ozone
O_3

Sulphur dioxide SO_2

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How can we determine whether air quality is good or bad for health?

Evidence based

WHO Air Quality Guidelines (AQG) [*health protection based* limit values]

HKU's Hedley Environmental Index (HEI) [*valid* health risk communication]

Non-evidence based

EPD's Hong Kong Air Quality Objectives (HKAQO) [*political* limit values]

EPD's Hong Kong Air Pollution Index(HKAPI) [*invalid* health risk communication]

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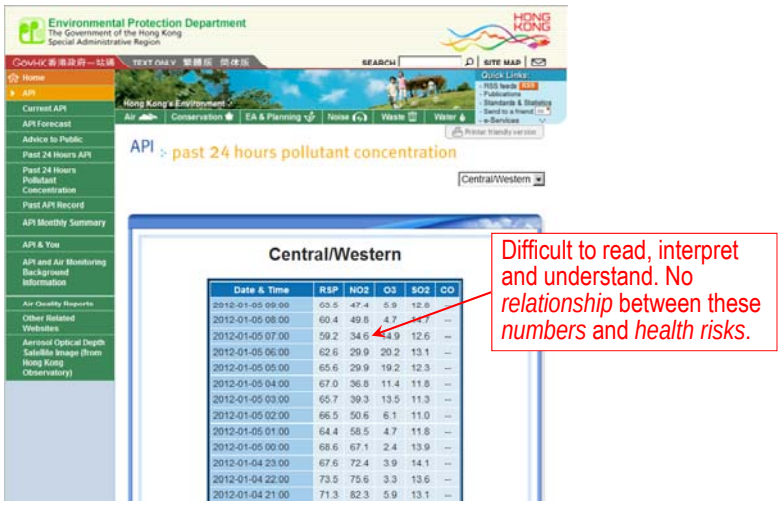
Hong Kong government does not show real-time pollutant levels and health risks **in a user friendly way**

http://www.epd-asg.gov.hk/english/24pollu/Central_Western.html



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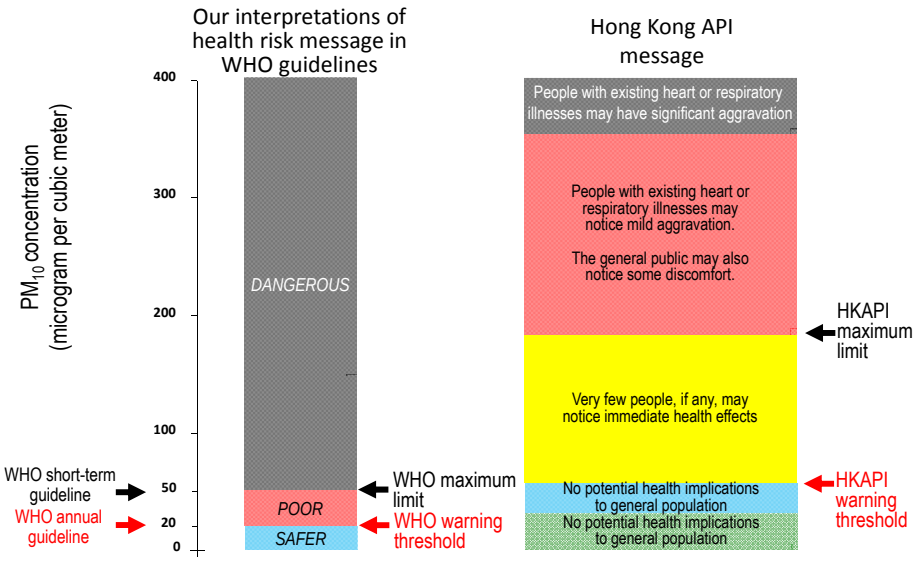
Hong Kong Air Pollution Index (API) is not based on health evidence - PM_{10}



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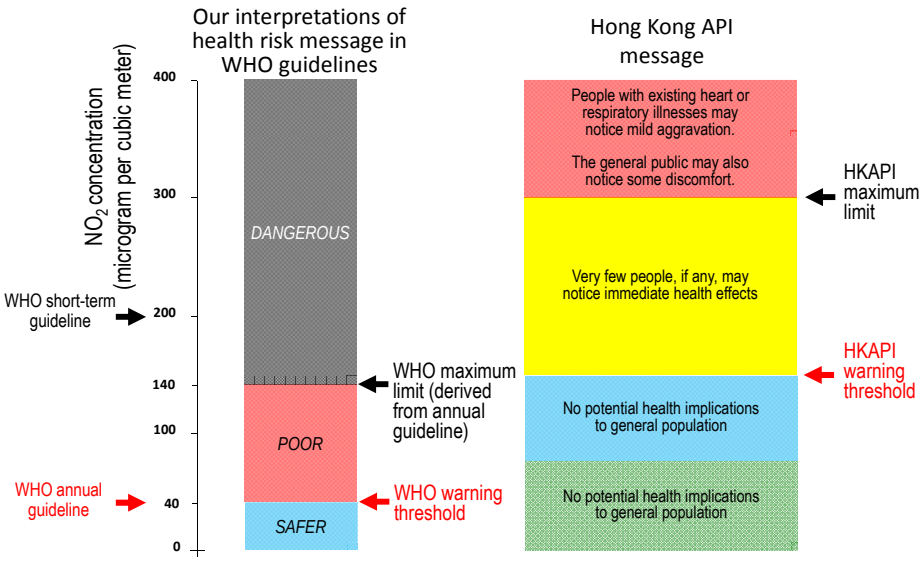
Hong Kong API is not based on health evidence - NO_2



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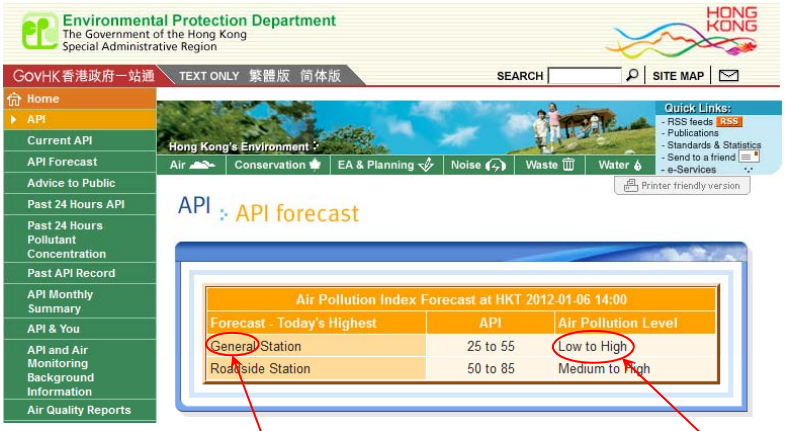
Risk communication based on Hong Kong Air Pollution Index

EPD Website



Why call it "general"? It should be called "rooftop" where pollutants are well dispersed and fewer people live and work there. True exposure is seriously understated.

The description of the daily highest pollution level from "low to high" is meaningless and too vague to be helpful.

Risk communication based on Hong Kong Air Pollution Index

A local TV channel

The Chinese characters "偏高" suggest pollution is less serious than the word "High" or "高". The EPD translation is inaccurate.

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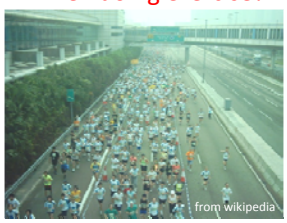
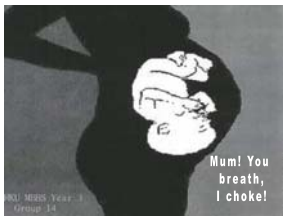
If pollution is described as “low to high”, do we know anything about the health risks….

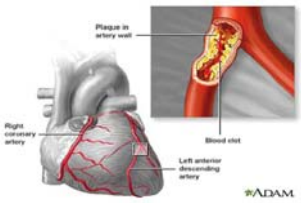
…when doing exercise?



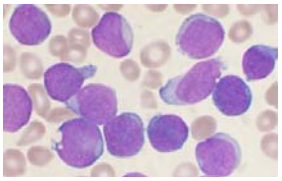
…for foetus?



…for hardening of major arteries?



…for blood cancer in children?



…for genetic damage?

Examples of the latest evidence (2010-2011) of air pollution-related adverse health effects from overseas studies

How can we achieve safer air quality in Hong Kong?

~~Outdated & misleading information~~	Science	Valid health risk information
+		+
~~Poor understanding of real risks~~	Public	Public support & pressure
+		+
~~Government inaction, denial & delays~~	Policy	Political will & accountability
=		=
~~Continuing heavy pollution and unsafe air quality~~	Livable city	Better environmental management and *safer air quality*

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The new face of HEI in Hong Kong

Hedley Environmental Index
Measuring Hong Kong's air pollution costs

OBJECTIVES

- To improve real-time air pollution health risk communication in Hong Kong.
- To inform and assist the public in the interpretation of health risks when air pollution levels exceed WHO limits.

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New features of the HEI

Hedley Environmental Index
Measuring Hong Kong's air pollution costs

- A health risk warning meter
- HKSAR map of real-time air quality
- Chart of avoidable harm to the community
- Calendar of high pollution days
- Tools to analyze long-term pollution and health impact trends

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Website demonstration

Hedley Environmental Index
Measuring Hong Kong's air pollution costs

http://hedleyindex.sph.hku.hk

Project Development

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The calculation is based on the levels of pollutants including PM_{10} $PM_{2.5}$ NO_2 SO_2 and O_3

If any one of the pollutant exceeds the maximum allowable limit (short-term AQG), the meter will then point to "dangerous" because the level is unacceptable

Advantages

- Provides a short and simple risk message describing the current risk level due to air pollution in Hong Kong
- Allows distribution of the message through social networks

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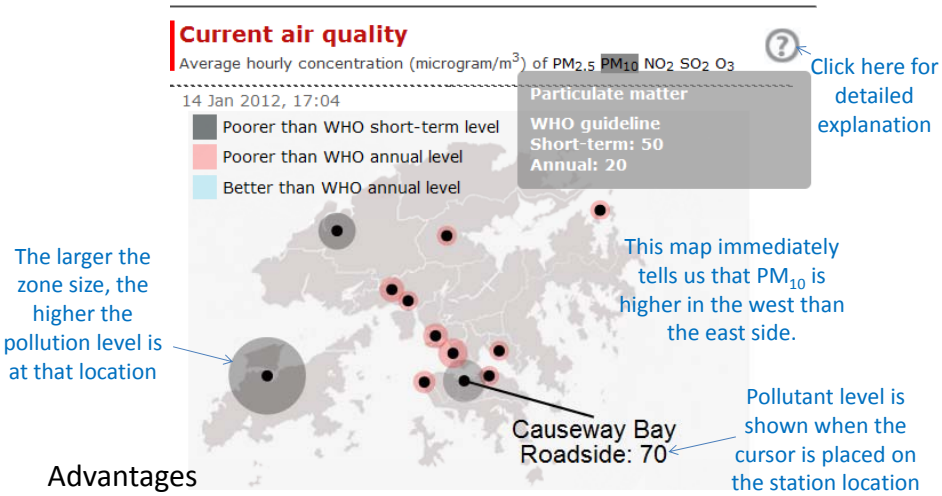

Advantages

- Provides a quick understanding of the geographical variation of multiple air pollutant levels
- Users do not need to digest numerical information about air pollutant concentration and WHOAQG values

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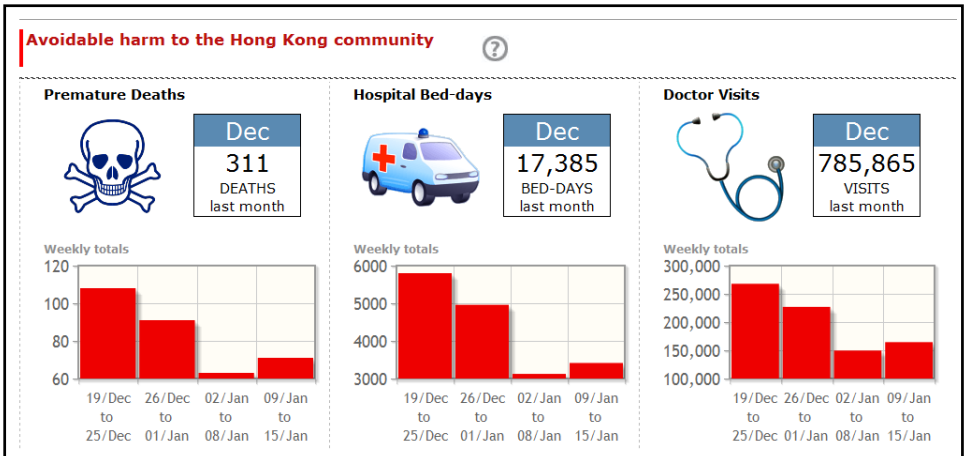

Advantages

- Provides more accurate estimation of the adverse health impacts attributable to air pollution
- Both monthly and weekly data will be shown
- Provides trends of total health impacts recently

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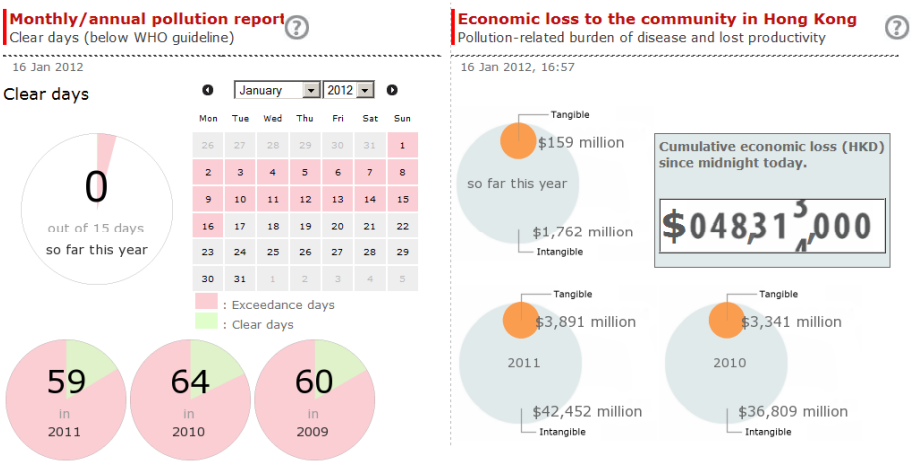

Advantages

- Provides information on violation of WHO guidelines using the same counting method applied by the Hong Kong government
- Provides total economic loss by combining both tangible and intangible loss into one non-stop rolling meter

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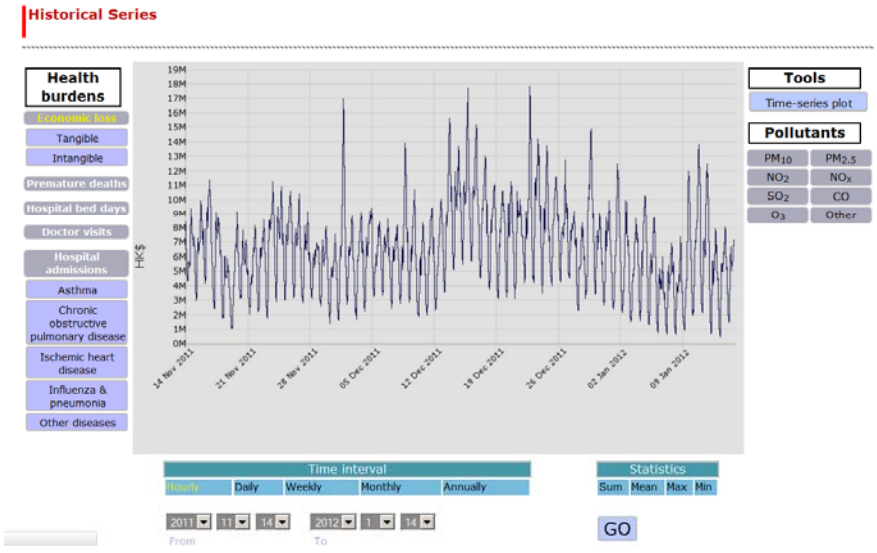

Advantages

- Allows users to gain in-depth understanding of current risks, trends and recent history of pollution in Hong Kong.

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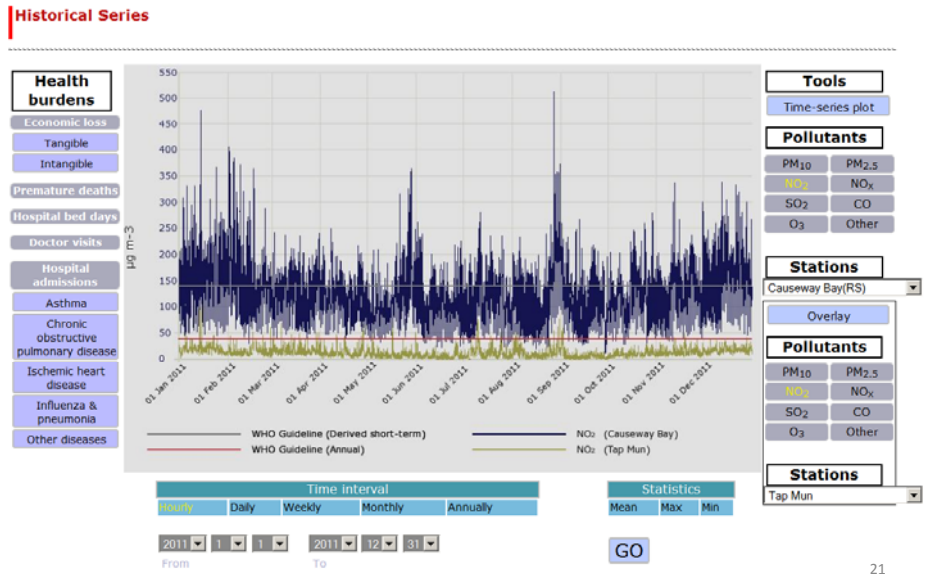
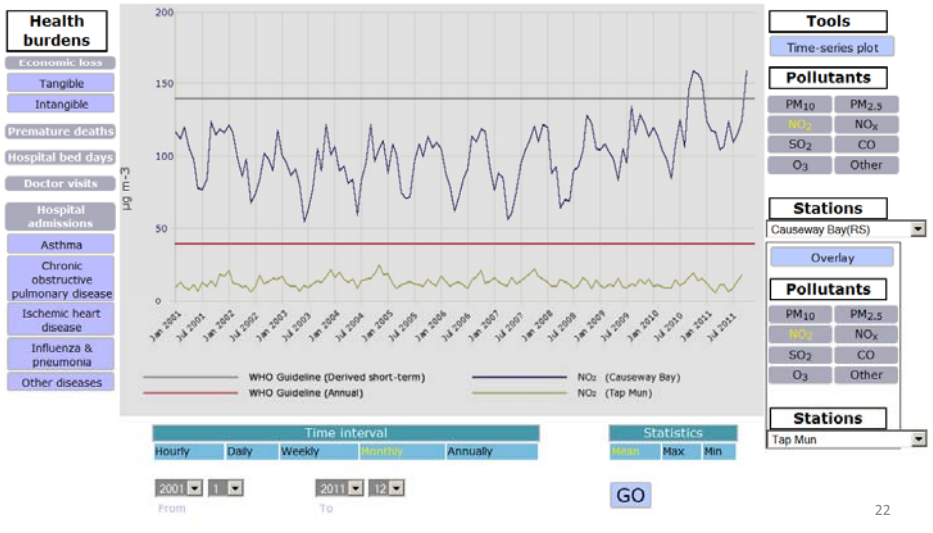
Scenario 1: NO_2 levels at the urban roadside and in a remote rural area in 2011



Scenario 2: Trends for monthly NO_2 at urban roadside and a remote rural area (2001-2011)



What do we learn from Scenario 1 and 2?

In the *absence* of traffic emissions, as in the location of the rural background monitor in Tap Mun, air quality could be well below the WHO annual AQG of 40 μgm^{-3}.

This shows exactly what is achievable with appropriate actions.

It is clear that large fraction of air pollution is generated locally and the government effort in air pollution control is very poor.

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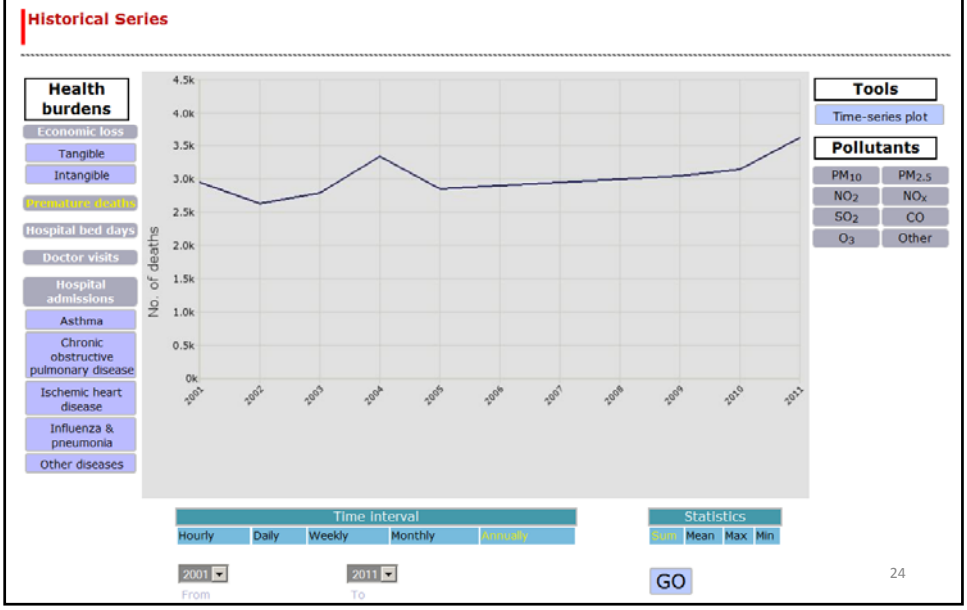
Scenario 3: Checking the trend of annual total number of excess pollution-attributable deaths (2001-2011)



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Example of differences in pollution impacts

-the estimated annual average in the past 5 years (2007-2011)

Hedley Environmental Index	Old Hedley Index	New Hedley Index
Premature deaths per year	1,000	3,200
Hospital bed days per year	71,100	160,000
Doctor visits per year	6,700,000	7,400,000
Economic loss per year (HK$)	16,000,000,000	40,000,000,000
Trend in the past five years	Remaining high	Increasing

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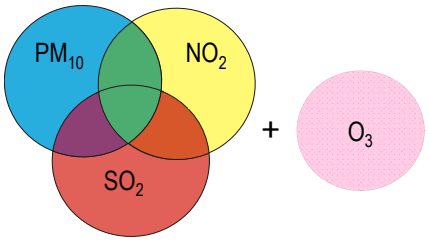
Our new Hedley Index is still conservative

because we used:

- short-term health risk estimates which are much smaller than the long-term risks.
- a limited number of bad health effects out of a wide spectrum of health problems demonstrated by international studies.
- the safer WHO annual guidelines rather than zero pollution.
- partial correlation method to adjust for overlaps between multiple pollutants.



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Media citations of the Hedley Index (2008-2011)

85 citations so far.
About 2-3 citations per month

An average of 60,000 visits per month

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Hedley Environmental Index
達理指數
Measuring Hong Kong's air pollution costs

Thank you

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Major revision of the Hedley Index

	Hedley Environmental Index	Old Hedley Index	New Hedley Index	% change in estimated excess deaths
Display of risk	Summary health risk message	Implicit	Explicit	Not applicable
	Major format of risk information	Numeric	Info-graphics	Not applicable
	Rolling $ meter shows the monetary value of	Tangible or intangible loss	Tangible + intangible loss	Not applicable
	Short-term guideline limit for NO_2	200 μg m^{-3}	140 μg m^{-3}	Not applicable
Health impact estimation	Risk estimates for excess deaths and hospital admissions	Wong *et al* 2002	Wong *et al* 2008 and 2010	+37%
	Primary pollutant in combining multiple pollutant effects	PM_{10}	NO_2	+28%
	Reference levels for SO_2 and O_3	Short-term AQG	Annual AQG	+15%
	Total numbers of mortality and morbidity available for analysis	Year 2004 (mortality: 34,619)	After 2008 (mortality: 39,799)	+11%
	Roadside:rooftop exposure ratio	50:50	61:39	+8%

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