

Executive Summary

Background

The Hong Kong Environmental Protection Department commissioned the Chinese University of Hong Kong in 1996/97 and the University of Hong Kong in 1997/98 to study the short-term effects of ambient air pollution on public health using available local data. Both studies revealed that, similar to other studies overseas, there were significant correlations between the level of individual criteria pollutants (ie. nitrogen dioxide (NO₂), sulphur dioxide (SO₂), respirable suspended particulates (RSP) and ozone (O₃)) and the hospital admissions and mortalities for respiratory and cardiovascular diseases.

Objective

2. Based on the preliminary findings of the two health studies, an economic impact study was conducted with an aim to determine the economic values associated with the morbidity and mortality rates in Hong Kong attributable to ambient air pollution.

Methodology

3. The more robust cost-of-illness (COI) approach has been adopted to calculate the direct cost of hospitalisation and out-patient medical consultation, and indirect cost of loss of earnings and productivity. To address the concern about intangible values such as pain and suffering associated with disease occurrence, a focus group survey was also conducted to estimate individual's willingness-to-pay (WTP) to avoid hospitalisation and for a small reduction in the risk of death. The results so obtained formed the input to the calculation using the willingness-to-pay approach and they are meant strictly for reference only.

Results

4. The results of health-related economic costs for unit increase of the criteria air pollutants are summarised as follows:

	for every µg/m ³ increase	Direct Cost (HK\$ million)	COI (HK\$ million)	WTP (HK\$ million) for reference only
Morbidity	NO ₂	8.9	17.1	29.3
	SO ₂	5.1	9.7	16.7
	RSP	5.1	9.7	16.7
	O ₃	8.9	17.1	29.3
Mortality	NO ₂	N/A	55.9	75.8
	SO ₂	N/A	-	-
	RSP	N/A	18.6	25.3
	O ₁	N/A	32.6	44.2

5. The 'total' cost of illness (ie. morbidity plus mortality) ranged from \$9.7 million (for SO₂) to \$73 million (for NO₂) for every microgram per cubic metre increase in the concentration of the single air pollutant. Higher values are obtained when using the willingness-to-pay approach, ranging from \$16.7 million (for SO₂) to \$105.1 million (for NO₂) for every microgram per cubic metre increase in the concentration level of the pollutant.

6. The public are in fact exposed to a multiple of pollutants in the real situation and for that reason, a composite score model is used (as recommended in the study by the University of Hong Kong) to take into account the cumulative effect. The economic cost of morbidity and mortality is calculated using the composite score based on the concentration levels of the individual criteria air pollutants at the respective annual averages. For 1996, using the COI approach, the economic cost is estimated to be \$3,841 million which is approximately equal to 0.35% of Hong Kong's gross domestic product (GDP). For the purpose of reference only, the figure can be as high as \$5,637 million or 0.51% of the GDP when the willingness-to-pay approach is adopted.

Way Forward

7. This pilot study indicated that rather significant economic cost was attributable to health effects caused by ambient air pollution. Also, through the focus group study, it is evident that the public did attach significant economic values to such disease avoidance. In view of the many assumptions and limitations of this pilot study, it is recommended that a more comprehensive study be conducted to give the government an overall picture of the total economic costs due to ambient air pollution, for development of more effective air pollution management schemes.