

To: Chairman, Panel on Constitutional Affairs, Legislative Council
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Air pollution and child health

Thank you for this opportunity to present issues of concern relating to Article 24 of the CRC-- children's health and environmental safety

The Hong Kong Special Administration Region (HKSAR) Government has much of which to be proud in the provision and delivery of preventive and health care services and in the creation of a safe infrastructure in terms of water, food and a secure social environment for the care and developmental needs of the children of Hong Kong, both before, during and after birth.

Current traditionally collected health indices for our children are amongst the best in the world but they are threatened by the degradation of air quality, especially in the past two decades.

In the area of environmental health, we believe that the HKSAR Government can and must do much more to provide better quality and therefore *safer* air for our children from both a short and longer term perspective. Over the past 20 years Hong Kong's air quality has deteriorated markedly and there are no clear indications that it will improve in the foreseeable future.

There is substantial evidence of the impact of poor quality air on children's health, both locally and internationally. The effect of toxic air may be silent, involving physical changes at the earliest stages of disease, and causing damage mainly to airways, heart and brain. The impact is especially marked for all residents in Hong Kong including children, who have pre-existing health problems such as asthma.

Children are the most vulnerable group as they usually have no choice where they live. The majority of HK parents have limited choices on where they live and cannot protect themselves from polluted air. There are no regions of the territory where the air is safe according to the World Health Organisation Air Quality Guidelines. The most common air pollutants documented, both locally and internationally, are Nitrogen Dioxide (NO₂), Sulphur Dioxide (SO₂), Particulate Matter (PM₁₀) and Ozone (O₃).

The following is a brief summary of the evidence on the harm to health caused by air pollution with particular reference to child health, in support of our statements:

- Hong Kong's air quality is poor by international standards (Figure 1 and Figure 2)
- Air pollution induces DNA damage in children before birth during pregnancy and affects both mother and baby through the fetal-maternal circulation.¹
- Air pollution induces pathophysiological damage to the developing lung in children and adolescents.²
- There is evidence in Hong Kong children of reduced oxygen uptake during exercise in Kwun Tong and Shatin leading to impairment of physical performance during sports activities.³
- Air pollution (NO₂, SO₂, PM₁₀, O₃) in Hong Kong increases paediatric asthma admissions to hospital.⁴
- In Hong Kong high concentrations of air pollutants (NO₂, SO₂, PM₁₀, O₃) are related to higher excess risks of mortality and hospitalization, mainly from cardiopulmonary disease.^{5,6,7} Those in lower socio-economic groups are most affected.⁸
- International studies demonstrate that the lung function of children living within 500-1500 metres of major roads with high traffic volumes is reduced, which is consistent with local studies on the health of children exposed to pollution.⁹ In Hong Kong because of the 'canyon

effect' of buildings, air pollution concentrations measured in roadside monitoring stations are much higher than those measured in general stations and make a major contribution to population exposures.

- In Hong Kong children and their mothers living in polluted districts reported more respiratory symptoms and performed poorer in lung function tests. These findings have major implications for their future health and life expectancy.^{10,11,12}

In Hong Kong there is strong evidence of health benefits of the 1990 regulation to restrict the sulphur content in fuel in July 1990. The benefits of the air quality intervention for children included reduction in cough, phlegm, sore throat, wheezing and nasal symptoms.¹⁰ This is a clear demonstration that even modest air quality interventions government support and action can influence health of children. However air quality has deteriorated in several other respects since the 1990 intervention.

It is recognised that the HK Air Quality Index (API) which has been used for the past 20 years, needs revision. Even using this outdated index, the number of days when roadside stations regularly recorded an index of greater than 100 was very high. These resulted in advice to restrict outdoor sport and leisure activities for those vulnerable groups of children with pre existing respiratory and cardiac diseases. Using internationally accepted 2006 WHO guidelines, HK air is continuously above toxic levels for PM₁₀, NO₂, and frequently for SO₂ in certain locations. (<http://hedleyindex.sph.hku.hk/pollution/home.php#s>). This has a significant impact on quality of life, long term health and community costs for health care for our children at a time when we need to be actively encouraging them to take more exercise and participate in outdoor activities (UN CRC article 31).

What can be done?

- We request that HKSAR Government acknowledge that air quality is a problem with serious implications for the current and future child health in the community.
- We need commitment by HKSAR Government to the adoption of international monitoring standards for air quality in HK, since those currently in use are not protecting public health in the general population. We want to see urgent and radical solutions to improve air quality for all HK residents, including children, who are a special vulnerable group and do not have a political voice of their own. Hong Kong should adopt the World Health Organisation 2006 Air Quality Guidelines as the basis for risk assessment and risk communication.
- The HK SAR government should adopt measures to immediately reduce the impact of the current transport policy on air quality and child health and develop feasible options for improvement, including clean transportation options, infrastructure planning and building designs to reduce canyon effects and amplification of air pollutant exposures.
- The Department of Health promotes the World Health Organisation *Healthy City* concept to District Councils. We urge local councils to press government for urgent action to protect children in Hong Kong's inner city conurbation.
- There is a need for more comprehensive research (and funding commensurate with this need) on the long term implications of toxic air on children's health and well being, with effective solutions – not only for children but also for the long term benefit of our whole community

Children need our continuing commitment to their ongoing health and future wellbeing. Good health care in a positive and nurturing environment, with safe water, food and air are all important for our children now and in the future.

However, Hong Kong's poor air quality and its impact on our children's health, remains an outstanding and major cause for concern. We advocate a full and effective response to the *Convention on Rights of the Child* by the HKSAR government on the issue of environmental pollution.

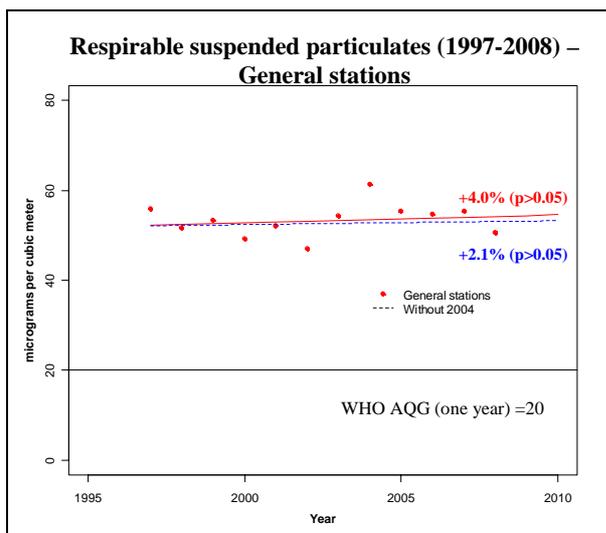


Figure 1a: Trends at general monitoring stations for particulates (PM_{10}) showing that levels are very high and stable, or increasing, in relation to the World Health Organisation annual Guideline of $20 \mu\text{g}$ per cubic metre

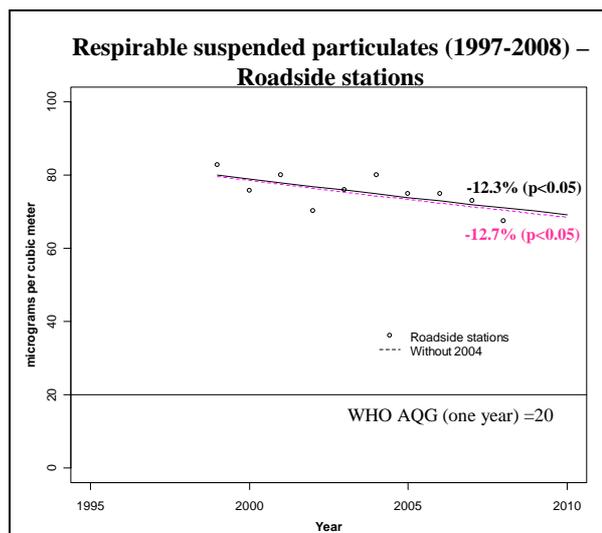


Figure 1b: Roadside levels of particulates showing that current annual mean levels are about 350% above the World Health Organisation Guideline. The apparent downward trend in particulates will not reach the guideline level for several decades at this rate of decline

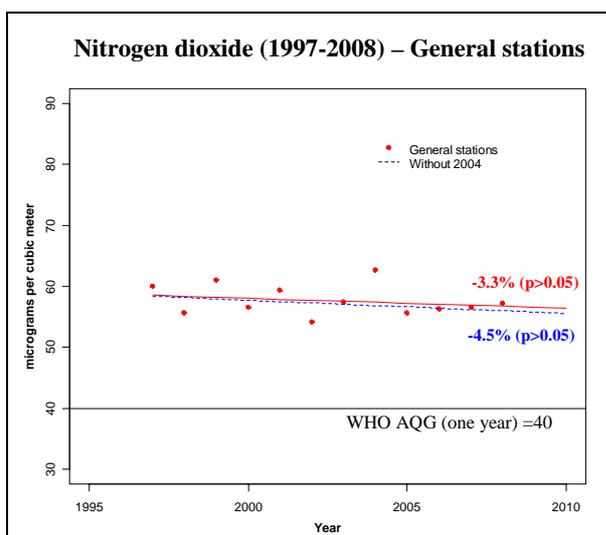


Figure 2a: High levels of nitrogen dioxide, about 40% above the World Health Organisation guideline, show no significant change over 10 years

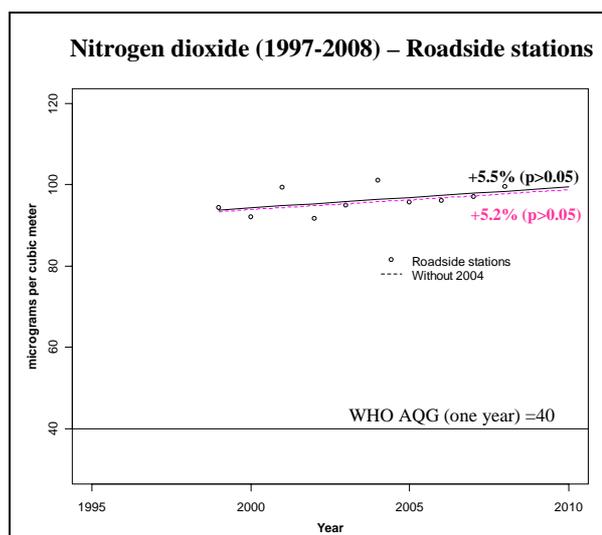


Figure 2b: Roadside nitrogen dioxide levels are high at about 250% above the guideline and show no improvement over 10 years

References

1. Salvi S. Health effects of ambient air pollution in children. *Paediatric Respiratory Reviews* 2007; 8:275-80.
2. Gauderman WJ, Avol E, Gilliland F, Vora H, Thomas D, Berhane K, McConnell R, Kuenzli N, Lurmann F, Rappaport E, Margolis H, Bates D, Peters J. The effect of air pollution on lung development from 10 to 18 years of age. *New England Journal of Medicine* 2004; 351:1057-67.
3. Yu TS, Wong TW, Wang XR, Song H, Wong SL, Tang JL. Adverse effects of low-level air pollution on respiratory health of school children in Hong Kong. *Journal of Occupational and Environmental Medicine* 2001; 43:310-16.
4. Lee SL, Wong WH, Lau YL. Association between air pollution and asthma admission among children in Hong Kong. *Clinical and Experimental Allergy* 2006; 36:1138-46.
5. Wong CM, Ma S, Hedley AJ, Lam TH. Effect of air pollution on daily mortality in Hong Kong. *Environmental Health Perspectives* 2001; 109: 335-40.

6. Wong CM, Atkinson RW, Anderson HR, Hedley AJ, Ma S, Chau PYK, Lam TH. A tale of two cities: Effects of air pollution on hospital admissions in Hong Kong and London compared. *Environmental Health Perspectives* 2002; 110:67-77.
7. Hedley AJ, Wong CM, Thach TQ, Ma S, Lam TH, Anderson HR. Cardiorespiratory and all-cause mortality after restrictions on sulphur content of fuel in Hong Kong: an intervention study. *The Lancet* 2002; 360:1646-52.
8. Wong CM, Ou CQ, Chan KP, Chau YK, Thach TQ, Yang L, Chung RYN, Thomas GN, Peiris JSM, Wong TW, Hedley AJ, Lam TH. The effects of air pollution on mortality in socially deprived urban areas in Hong Kong. *Environmental Health Perspectives* 2008; 116:1189-94.
9. Gauderman WJ, Vora H, McConnell R, Berhane K, Gilliland F, Thomas D, Lurmann F, Avol E, Kunzli N, Jerrett M, Peters J. Effect of exposure to traffic on lung development from 10 to 18 years of age: a cohort study. *Lancet* 2007; 369:571-7.
10. Peters J, Hedley AJ, Wong CM, Lam TH, Ong SG, Liu J, Spiegelhalter DJ. Effects of an ambient air pollution intervention and environmental tobacco smoke on children's respiratory health in Hong Kong. *International Journal of Epidemiology* 1996; 25:821-8
11. Wong CM, Hu ZG, Lam TH, Hedley AJ, Peters J. Effects of ambient air pollution and environmental tobacco smoke on respiratory health of non-smoking women in Hong Kong. *International Journal of Epidemiology* 1999; 28:859-64.
12. Wong CM, Lam TH, Peters J, Hedley AJ, Ong SG, Tam AYC, Liu J, Spiegelhalter DJ. Comparison between two districts of the effects of an air pollution intervention on bronchial responsiveness in primary school children in Hong Kong. *Journal of Epidemiology and Community Health* 1998; 52:571-8