

A Contribution from the Malaysian Institute of Planners (MIP) Sabah-Sarawak Chapter in conjunction with the upcoming International Urban Public Transport Conference 2010 – A Platform for Change (4-6 August 2010) at the Borneo Convention Centre.

Health Risk from Air Pollution

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Today, transport related air-pollutants - nitrogen oxides, carbon monoxide and lead and secondary pollutants, ozone, are posing an even greater health risk (WHO, 1999; Macquire, 2002). More than 1.5 billion urban dwellers are today exposed to the level of ambient air pollution that is often above the maximum recommended level (Whitelegg, 1993; Newman, 1999). Some of the emissions as shown in Table 3.5 include some which are known to be toxic when absorbed at high concentrations into the body (Watkins, 1981, p82; Whitelegg, 1993; Houghton and Hunter, 1994).

Table 1.1: Urban Living Standards – Selected Cities

	City	Population (million)	Level of Ambient Noise	Traffic Flow Peak hr. km/h	Air Quality & Pollution (Exceedence)
1.	Mexico City	20	6	13	0.40 ppmO ₃
2.	Tokyo	18	4	45	0.07 ppmO ₃
3.	Sao Paulo	17	6	24	0.15 ppmO ₃
4.	Shanghai	13	5	24	16 days SO ₂
5.	Calcutta	12	4	21	268 days SO ₃
6.	Buenos Aires	12	3	48	0.06 ppmO ₃
7.	Mumbai	11	5	16	100 days SPM
8.	Seoul	11	7	22	87 days SPM
9.	Beijing	11	4	42	272 days SPM
10	Bangkok	8	2	10	97 days SPM
11	Singapore	3	7	38	45 daysµgm ³ NO ₂

Subjective Rating: 1 – 10; Noisiest Rating 1=>90dBA ; 10=<dBA

Source: Pendukar (1996) p195

As a result of increase in traffic, the World Health Organization (WHO) guidelines and national air quality standards are often exceeded in many cities for many pollutants like sulphur dioxide, nitrogen oxides, suspended particulate matter, ozone and lead (Pendukar, 1996, Newman, 1997). This poses a significant problem for any attempt to work towards sustainability objectives. Table 1.1 shows the pollution level to reflect the noise level and air quality level in some cities of Asia and South America.

There is a wealth of literature documenting that increased mortality; morbidity and impaired health are related to emissions from vehicles (WHO, 1999; Stead, 1999 Girardet, 1996; Whitelegg, 1993). According to the World Health Organisation (WHO), 4%-8% of deaths occurring annually are related to air pollution and those adversely affect human health by other exposure routes, such as drinking water contamination, food

contamination and skin transfer (CEC, 1992; Whitelegg, 1993; OECD, 1996; Kathuria, 2002).

There are three ways in which pollutions from vehicles can have affect on the environment i.e. through local, regional and global effect (trans-boundary). Based on Table 3.6, the key pollutants are suspended particulate matter, lead, nitrogen-oxide, volatile organic compound and ozone. Lead, carbon monoxide, particulate matters, nitrate oxide all have basic adverse health effect, causing cardiovascular and respiratory illnesses (Well, 1975; Whitelegg, 1993; Haughton et al, 1994; Girardet, 1996) and may contribute to the development of diseases including bronchitis, emphysema and cancer (Whitelegg, 1993). In urban areas, carbon monoxide has also been linked to loss of workers' productivity and general discomfort (Haughton and Hunter, 1994). The intake of carbon monoxide can culminate in neuro-behaviourial effects such as impairing physical co-ordination, vision and judgment and can exacer- bate cardio-vascular disease symptoms, particularly angina (Watkins, 1981: OECD, 1988; Whitelegg, 1993; Stead, 1999; Chan, 2001).

High levels of lead in humans are known to cause damage to the kidney, liver, reproductive system, blood formation, basic cellular and brain function (Harrison, 2003; Haughton et al, 1994; WHO, 1999). Research has shown that lead poisoning has always posed great a risk to children in particular and there is a fear that the exposure of children to lead and its impact on health has been underestimated⁷. (Setchell, 1995; Pendukar, 1996) As a result, children who are affected tend to be under-achievers and 'have low standing in school, increased absenteeism, less vocabulary and grammatical reasoning scores, poorer eye-hand co-ordination and longer reaction time" (WHO, 1999, p155). It is now known that in Mexico City, almost 70% of new born babies show excessive levels of lead in their blood (Armstrong-Wright, 1993); while in Cairo, children are found to have the highest blood lead levels in the world, even exceeding the levels found among the children of Mexico City which has long been viewed as the city with the worst air pollution record (El Araby, 2002).

Although developed countries have already introduced legislation to limit the lead content and attempted to change to unleaded petrol, it was only in the past three decades that people in developing countries begin to appreciate the adverse effect lead could have on people (OECD, 1988; Lee, 2000). The greatest concern of transport planners today regarding health risks by vehicles' emissions are those people who have no access to any form of transport and are exposed to air pollution every time they travel on foot (Wells, 1975; Whitelegg, 1993; OECD, 1996).

There are arguments that motor vehicles fitted with catalytic converters emit less pollution or much lower pollution than cars of similar size (Porter, 1996; OECD, 1996; Stead, 1999). However, pollution levels have not fallen; instead they have increased due to the increased number of vehicles on the road and also of the increased use of bigger vehicles than before (OECD, 1996, p20). On the road, performances of the vehicles frequency deviate from the test performances especially when the exhaust catalyts are old (Porter, 1996). It is generally agreed that in most developing countries, people turn to

diesel (cheaper fuel) driven cars without catalytic converters (OECD, 1999; Chan, 2001) and this may have offset any effort to reduce emissions from vehicles through the reduction of enhancing compounds for fuel.



Plate 1.0: Traffic Police and others in Bangkok are exposed to motor-vehicles' emission on regular basis like this street vendor at Silom Street who resorts to using a surgical mask to filter highly polluted air

Source: Photo. Taken by researcher in June 2003

In Manila and Mexico, it is found that the level of exposure of pedestrians and vendors along busy roads to both noise and air pollutants such as carbon monoxide, lead and particulate were found to be higher than the acceptable WHO level (Pendukar, 1996). This is also the case in Bangkok where it was reported that the most people who are most exposed to air pollution are the traffic police, people who use 'tuk-tuk' and motorcycles, taxi drivers/passengers and street vendors (Setchell, 1995; Cervero, 1998) (see Plate 1.1 and Plate 1.2).

An earlier study in 1993 shows that of the 1,758 Traffic Police in Bangkok city, 753 (42.8%) of them suffered from respiratory diseases and of these, 450 (25.5%) had been suffering for the last five years (Pendakur, 1996, p192). This means that the problem had been around for a long time.

Table 1.4.: Pollutants from Motor Vehicles (Whitelegg ,1993; Houghton and Hunter, 1994)

Pollutant	Types of Impact						Source of Emission	Health effect of Pollutants
	Local High concentration	Regional		Global				
		Acidi - fication	Photo-chemical Oxidants	Indirect Green-house Effect	Direct Green-house Effect	Staro-spheric Ozone Deplet-ion		
Suspended particulate matter (SPM)	X		X				product from incomplete combustion of fuel; also from wear of brake and tyres	irritates mucuos membrane
Lead (Pb)	X			X			Added to gasoline to enhance performance	Affects circulatory, reproductive, and nervous system
Carbon Monoxide (CO)	X		X	X			Incomplete combustion	Reduced oxygen-carrying capacity of red blood cells
Nitrgen Oxide (NO _x)	X	X	X	X		X	Formed during fuel compression at high temperature	Irritates lungs; Increases susceptibility to viruses
Volatile Organic Compound (VOC)	X		X	X			Combustion of petroleum products; also evaporation of unburnt fuel	Irritates eyes, causes intoxication carcinogenic
Tropospheric Ozone		X	X	X			Not an exhaust gas; product of photochemical reaction of NO _x and VOC in sunlight	Irritates mucous membrane of respiratory system; impairs immunities
Methane (CH ₄)					X		Leakage during production, transport and use of natural gas	
Carbon Dioxide (CO ₂)					X		Combustion products of carbon-based fuel	
Nitrous Oxide (N ₂ O)				X	X	X	Combustion product of fuel and biomass; also formed in catalytic converters	

Chlorofluoro carbon (CFCs)					X	X	Leakage of coolant from air con. system	
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The Malaysian Institute of Planners (Sarawak and Sabah Chapter) is organising an International Public Transport Conference with the theme “A Platform for Change” at the Borneo Convention Centre, Kuching on 4-6 August 2010. A total of 10 speakers will be sharing their knowledge and experiences on this subject.

The focus is on the practical strategies, collaboration of the stakeholders and exchange of workable ideas that will assist the conference participants in carrying out the works - ranged from the planning of the urban transport strategies to the implementation of the urban transport projects. The Institute invites you to join us for this international gathering of experts, practitioners and campaigners dedicated to promote sustainable urban public transport.

Please see the official website at www.kuchingptc.com for details.

The writer is a members of the Malaysian Institute of Planners. Opinions expressed are his own and information quoted are from various sources and literatures used by the writer in his academic research.