# Leapfrog to clean air: Kolkata's agenda for action

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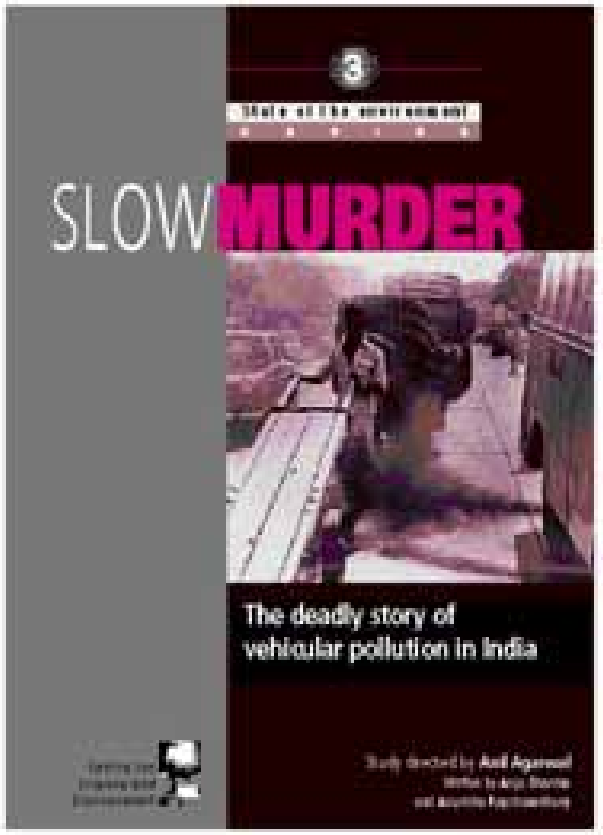
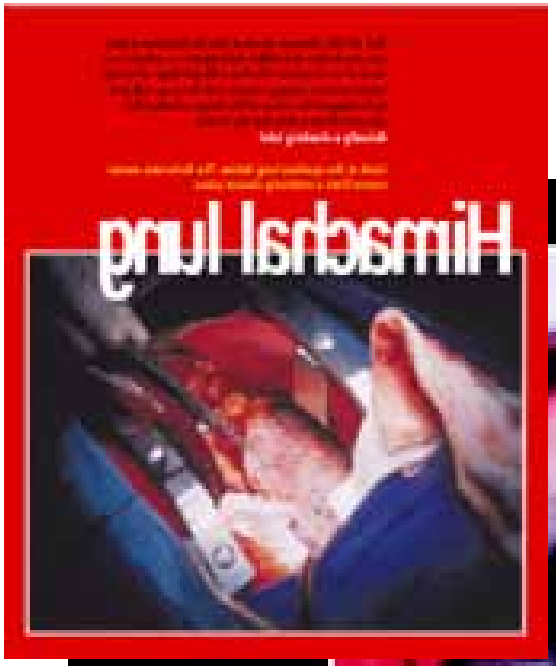
**Centre for Science and Environment,**
Kolkata
February 26, 2009

# Right to clean air campaign: 1996





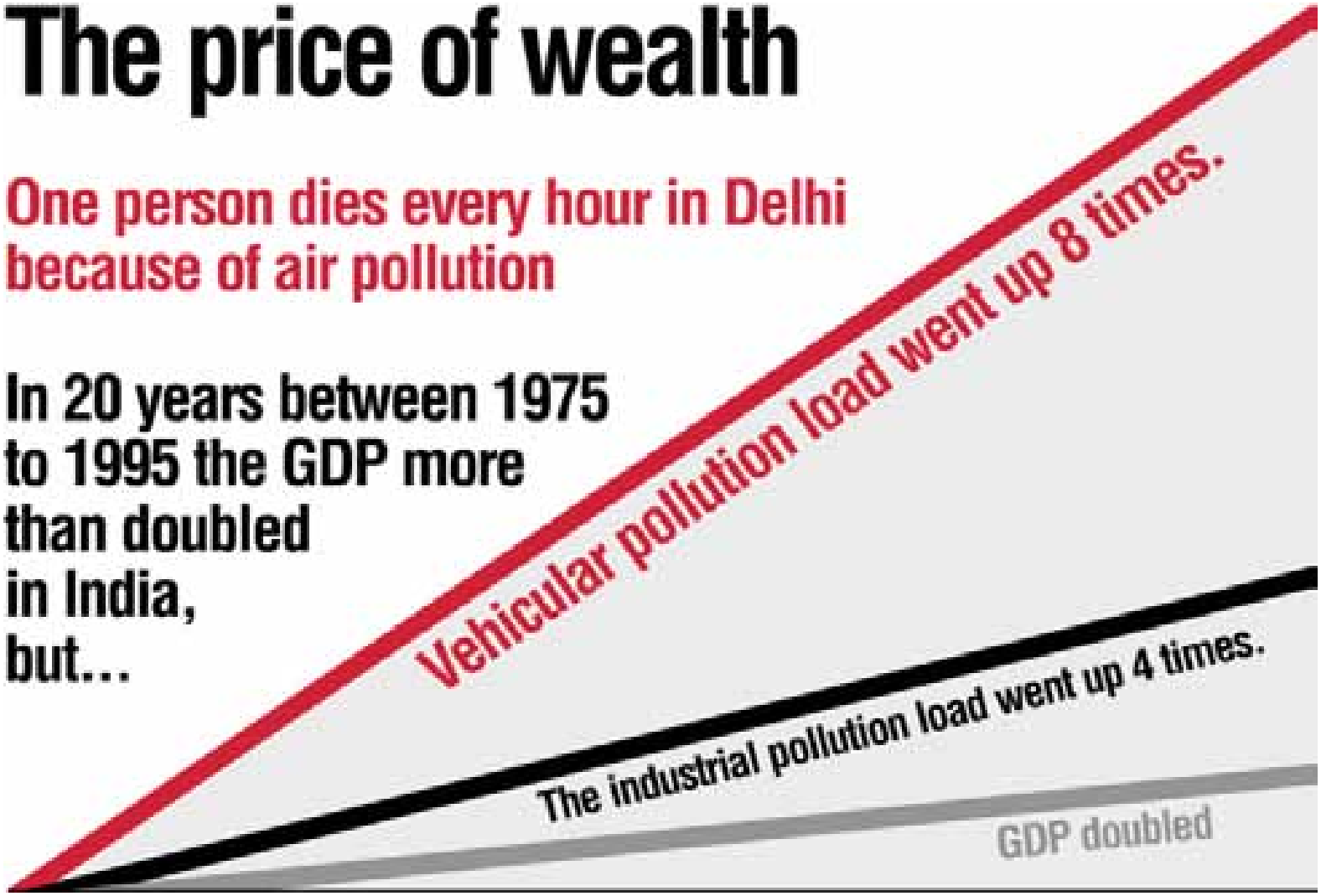
Look at these black spots on the lung. The unfortunate owner lives in Delhi and has been breathing polluted air. Air full of carbon particles which accumulate in the lungs (black spots). What you can't see is a cocktail of gases and tiny particles, even smaller than carbon that get into our bodies.
Actually, you are getting polluted.

# Delhi lung

## Capital punishment

Scary? But those cars are so sexy!

# Vehicles contribution growing. Slow Murder.



# Roll down the window of your bullet-proof car, Mr Prime Minister

# The security threat is not the gun. It's the air of Delhi

Hon'ble Prime Minister,

Here is something that just may convince you: while India's Gross Domestic Product has increased two-and-half times in two decades (1975-1995), the pollution load from industries has gone up four times and from vehicles a shocking eight times.

A study by the Centre for Science and Environment shows that the number of people dying due to air pollution went up by almost 30 per cent in four years between 1991 and 1995. An estimated 52,000 people are dying due to air pollution every year – about 10,000 of them in Delhi itself.

One person dies every hour due to air pollution in the city.

In Delhi vehicles are responsible for 70 per cent of the pollution load. Because of the high toxicity of fumes from transport fuel, one out of every 10-15 people living in Delhi is likely to get cancer.

Your government has failed to arrest this deterioration of air quality in Indian cities. Worse still, it contributes to the pollution in a big way by producing low quality fuel in state-owned refineries. Improving fuel quality is a short-term measure which will go a long way. Vehicles using clean fuel will pollute less.

Seeing your government's inability to tackle air pollution, we present you with a peoples' charter for clean air. This will help to immediately improve the quality of the air we breathe.

Mr Prime Minister, 50 years into Independence, please give us our right to clean air. We hope you will take our concern seriously.

Yours sincerely

Centre for Science and Environment
November 2, 1998

## PEOPLES' CHARTER ON CLEAN AIR

### FOR AN IMMEDIATE IMPACT

✔ **PRODUCE CLEAN DIESEL OR IMPORT**
Diesel emissions contain deadly particulate matter with traces of the strongest carcinogen known till date. Indian diesel is 250 times dirtier than the world's best.

✔ **REMOVE BENZENE FROM PETROL**
India is moving towards unleaded petrol. But this fuel contains too much benzene. Though we use one hundred times less petrol than USA, the total amount of benzene emissions from Indian vehicles is the same as in the US.

Benzene causes blood cancer and air should have no benzene at all, says WHO. Yet the level of benzene in and around Connaught Place in Delhi is 10 times higher than the European safety limit. If you live in Delhi, your chances of getting blood cancer are twice as high as people living in Bangalore, Chennai and Mumbai.

✔ **STOP PRIVATE DIESEL CARS**
Registration of all private diesel models should be banned in cities like Delhi. Cheap government diesel means more diesel cars, including luxury models.

✔ **TAX TO IMPROVE VEHICLE TECHNOLOGY**
Penalise vehicle manufacturers for producing polluting technology. Tax vehicles according to their emission level. Manufacturers will then invest in cleaner technology.

✔ **INTRODUCE EMISSION WARRANTY**
Make the industry accountable for the life-long emission efficiency of all vehicles they produce.

✔ **MAKE EMISSION LEVELS PUBLIC**
Manufacturers must inform buyers of the exact emission levels of their vehicles.

✔ **MONITOR ALL HARMFUL GASES**
Improve air quality assessment. A wide range of poisons are not monitored till date. Alert people about pollution levels in the city. It is done all over the world..

**Register your protest to the Prime Minister today**
PMO, South Block, New Delhi 110 001
Tel: 301 8939 Fax: 301 6857, 301 9817

**Join CSE's Right To Clean Air campaign**

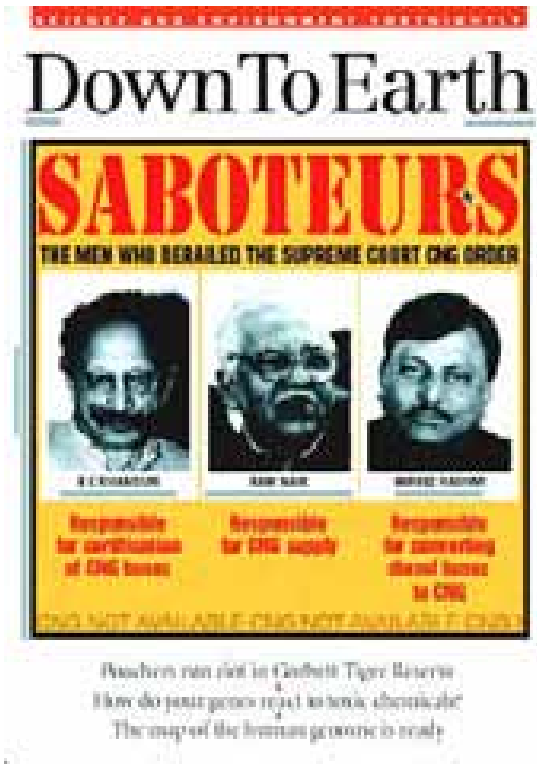
CSE
Centre for Science and Environment
41, Tughlakabad Institutional Area, New Delhi 110 062
**Tel:** 698 3394, 698 1124, 698 6399 **Fax:** 698 5879
**Email:** cse@cseindia.org **Website:** www.cseindia.org

# Supreme Court listens (July 98)

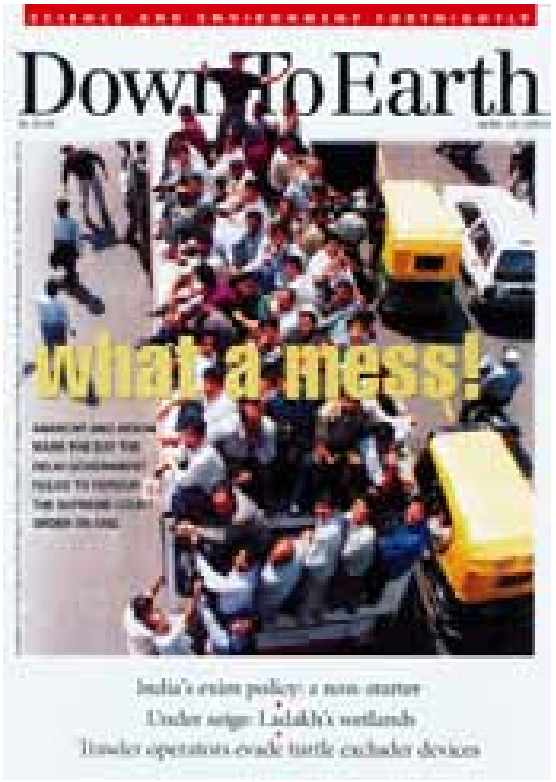
- Government to phase out all diesel buses in Delhi; Convert to CNG;
- All autos in Delhi to move to CNG;
- Advance emission norms by 5 years;
- Clean up the quality of fuel…

- Court proposes. Government disposes

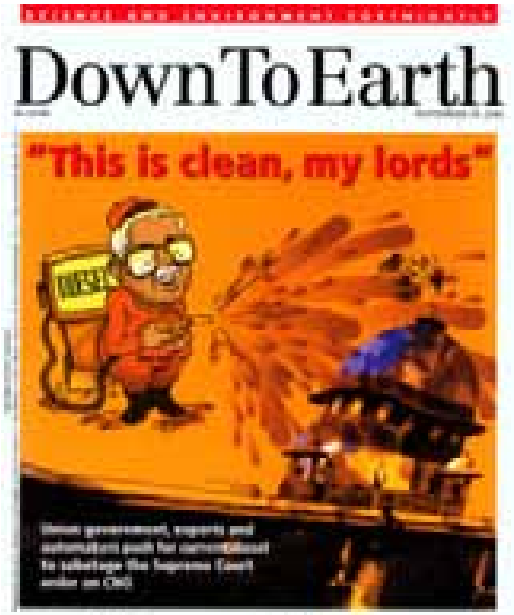
# Sabotage




Poachers run riot in Corbett Tiger Reserve
How do your genes react to toxic chemicals?
The map of the human genome is ready




India's exim policy: a non-starter
Under seige: Ladakh's wetlands
Trawler operators evade turtle excluder devices




Selective passage to Nanda Devi Reserve
The joys and perils of building check dams
Mithila paintings: propagating ecocare

# The verdict
# April 5, 2002

> Orders of this court cannot be nullified or altered in any way by administrative order

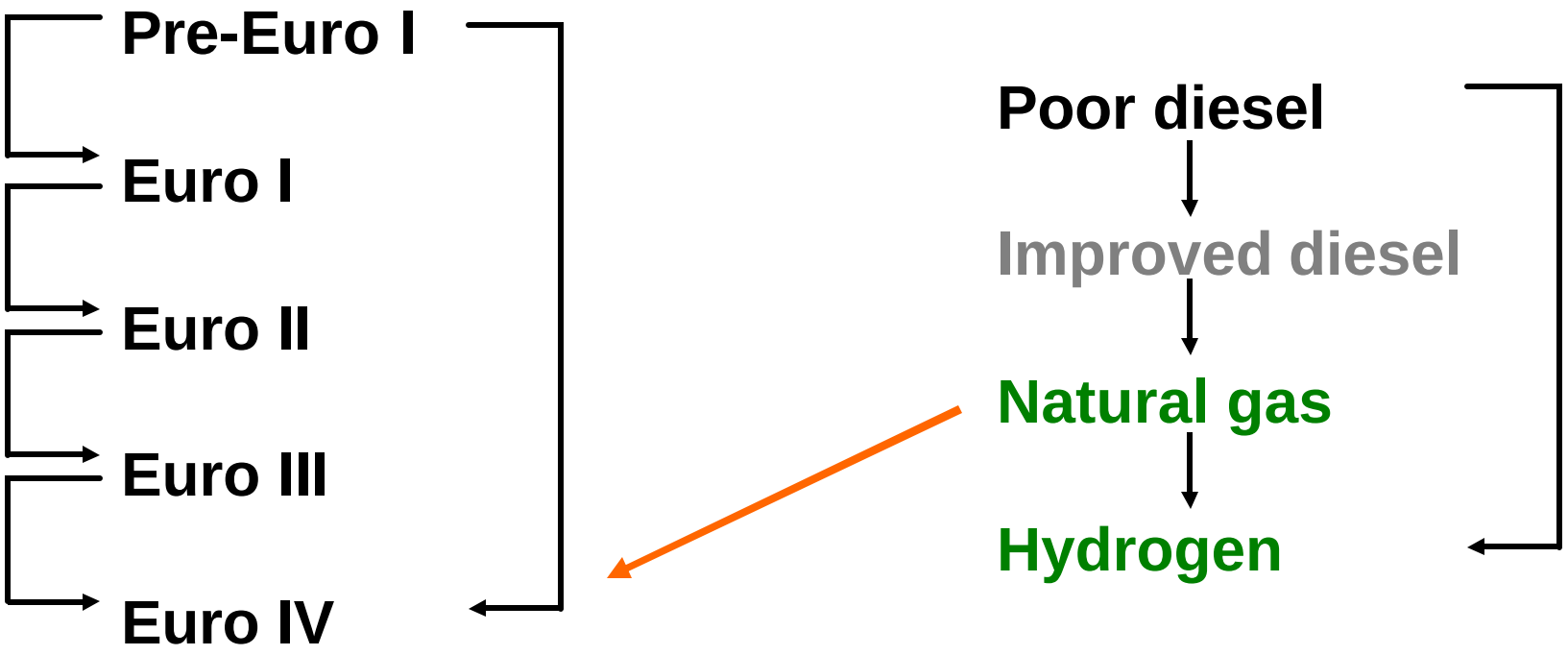
> Give priority to transport - allocate 16.1 lakh kg of CNG per day

> Phase out 800 diesel buses every month.

> Diesel buses to pay a penalty per bus per day

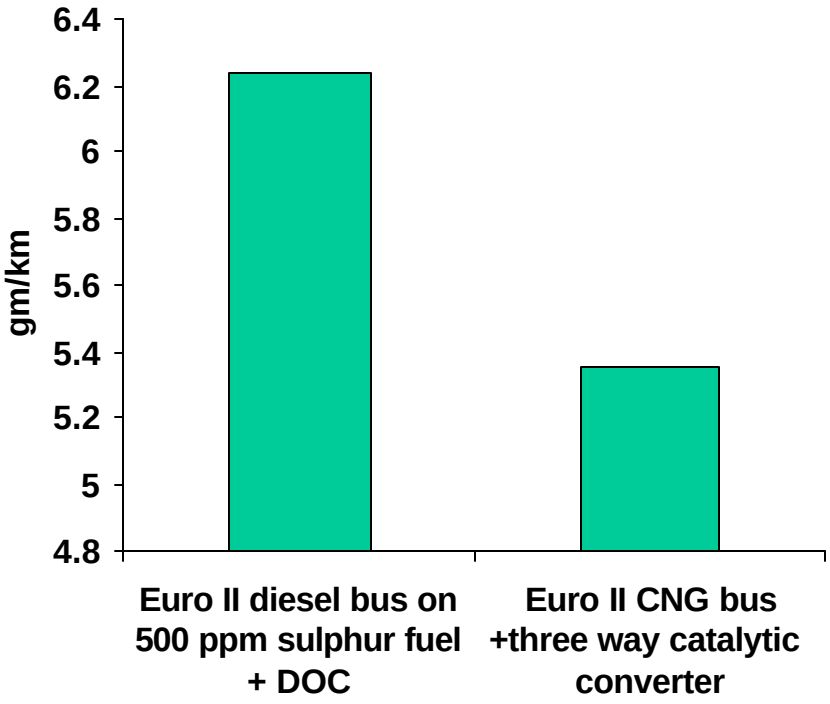
# Strategies to technology leapfrogging

Do we have to go through the same stages of environmental management that the West went through or can we leapfrog?

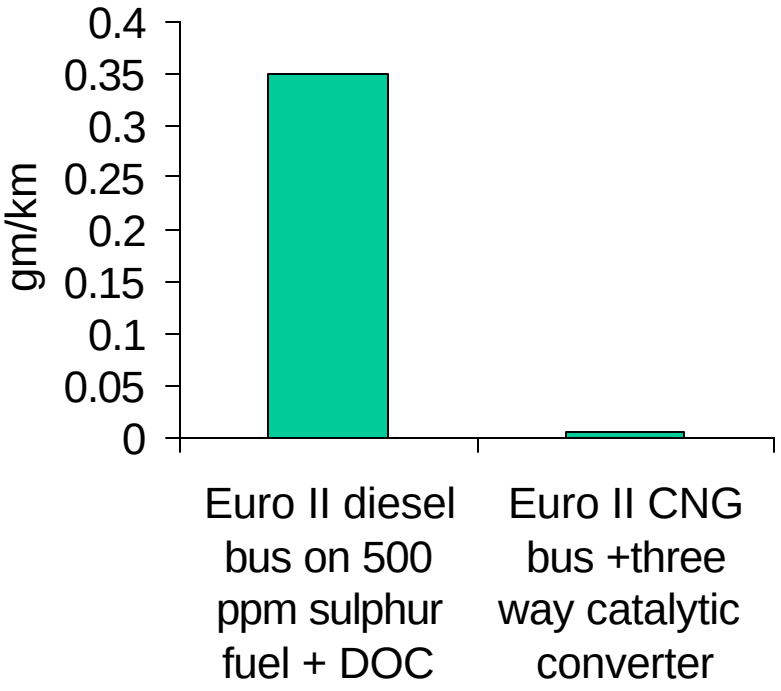


# CNG buses: big gains

## NOx emissions from Euro II CNG bus: 1.2 times lower than diesel buses



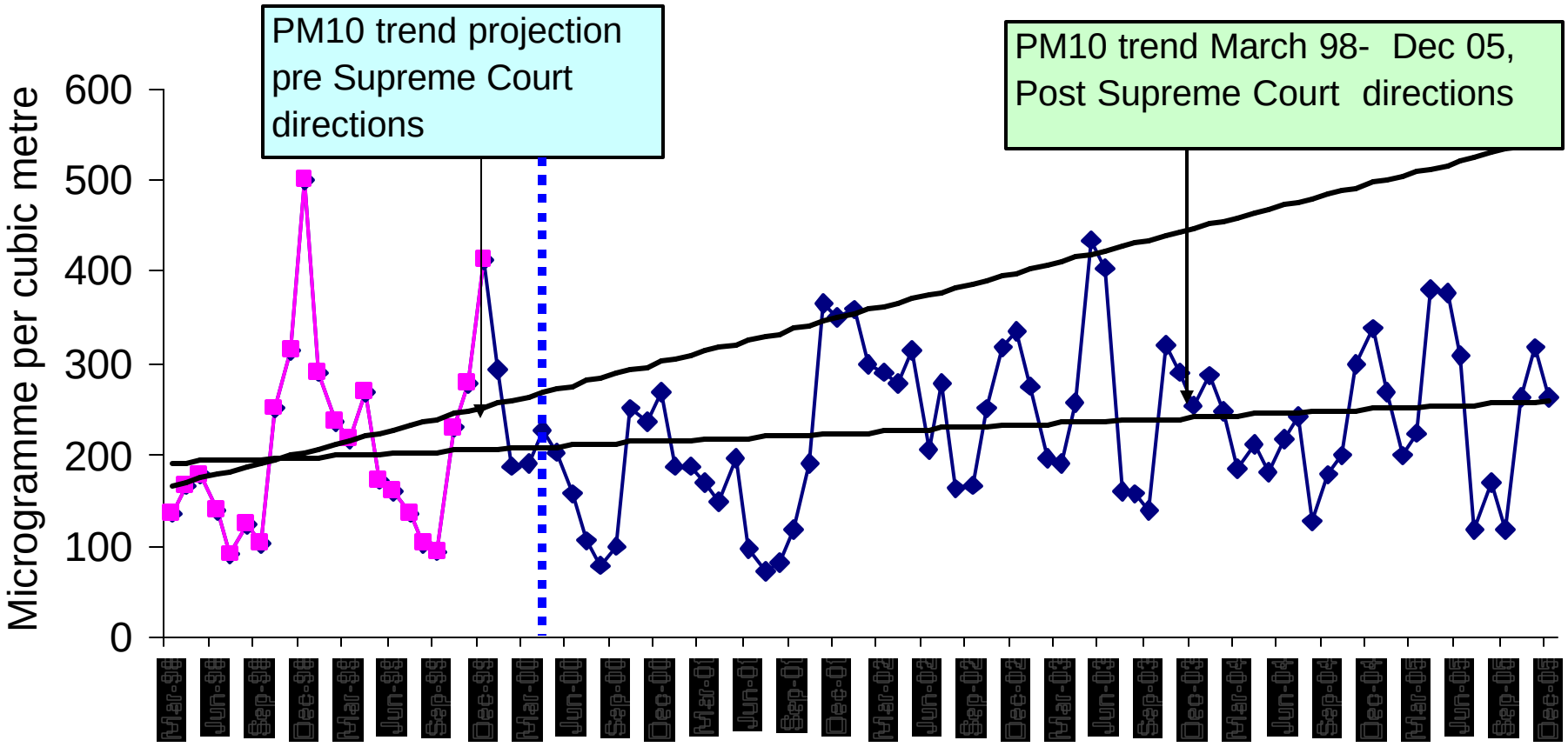

## PM emissions from Euro II CNG bus: more than 50 times lower than Euro II diesel buses




Source: Teri

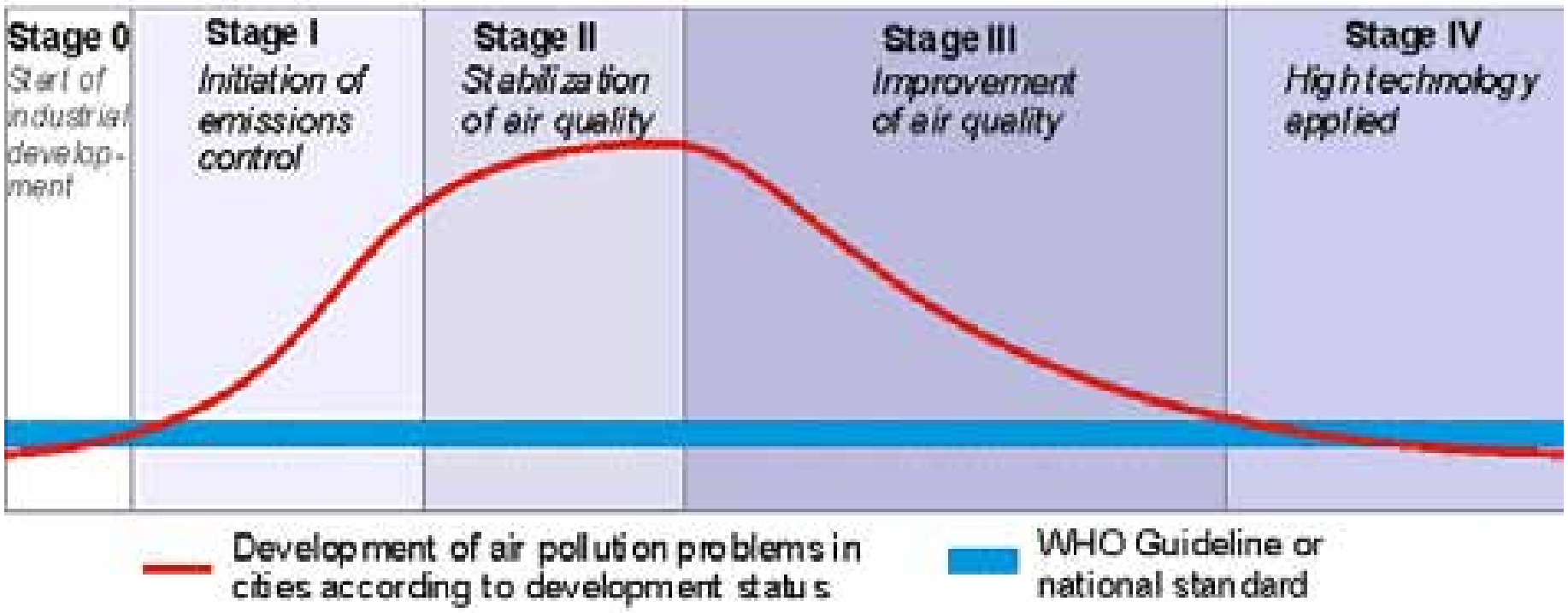
# Delhi got cleaner air: it avoided pollution; got health benefits

PM10 at ITO Traffic Intersection



# Stages of clean air

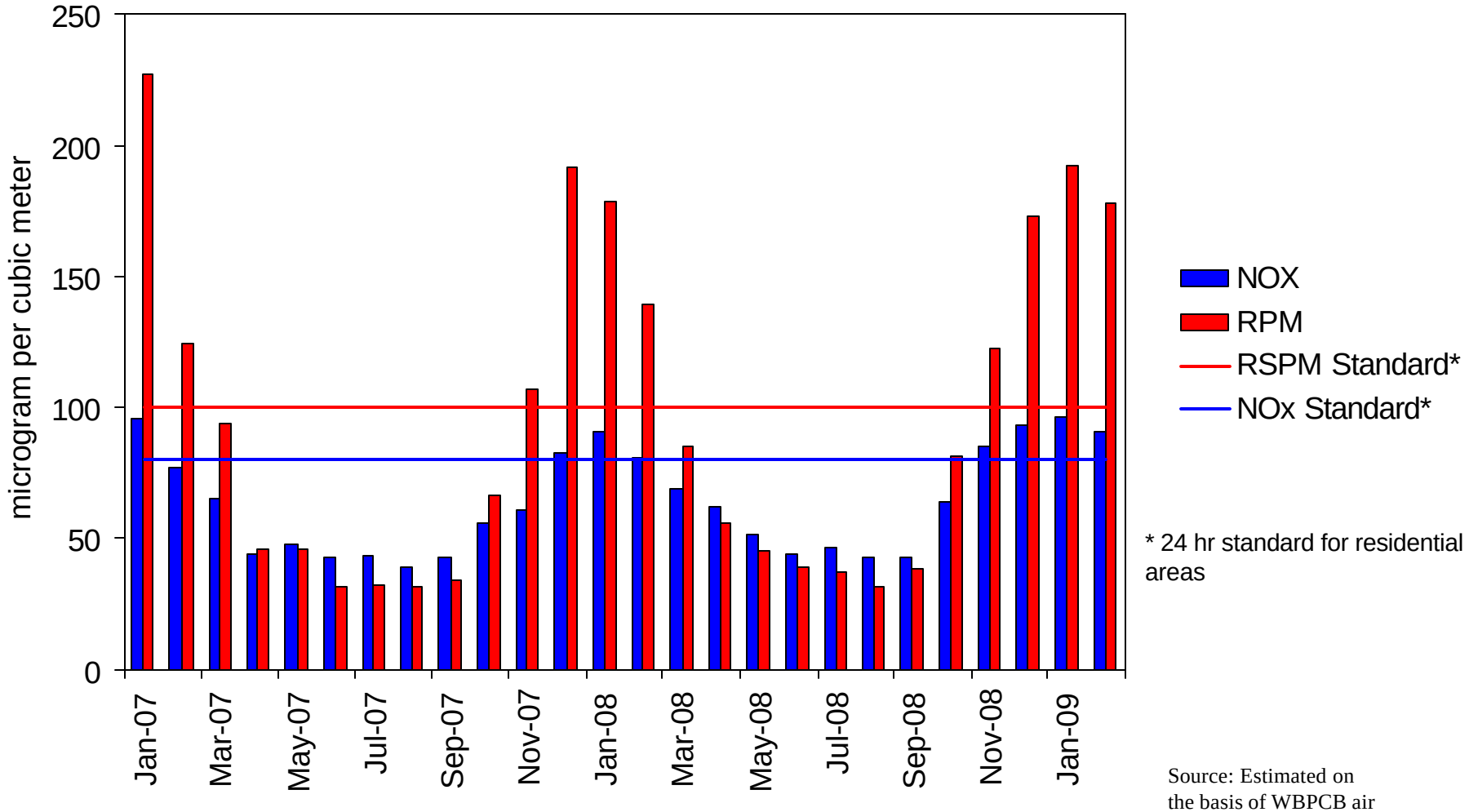
## Growth in air pollution problem with development status




CORNIELIUS HUIZENGA, Clean Air Initiative for Asian cities, Manila, Philippines
CSE conference: The leapfrog factor, New Delhi, April 2004

# Winter woes

## RSPM and NOx trend in Kolkata (January 2008 to February 2009)

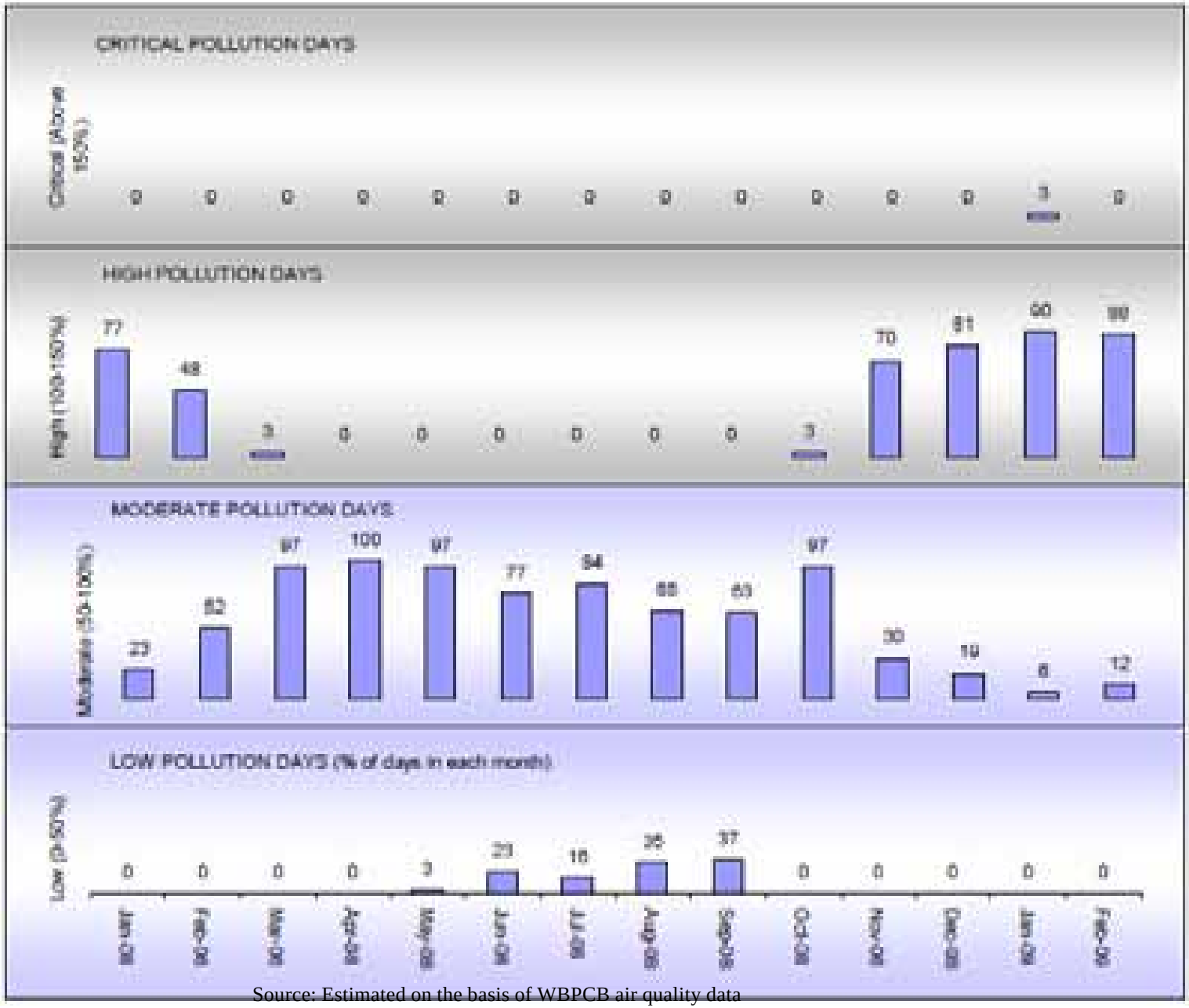



* 24 hr standard for residential areas

Source: Estimated on the basis of WBPCB air quality data

# Kolkata: NOx levels (January 2008 to February 2009)

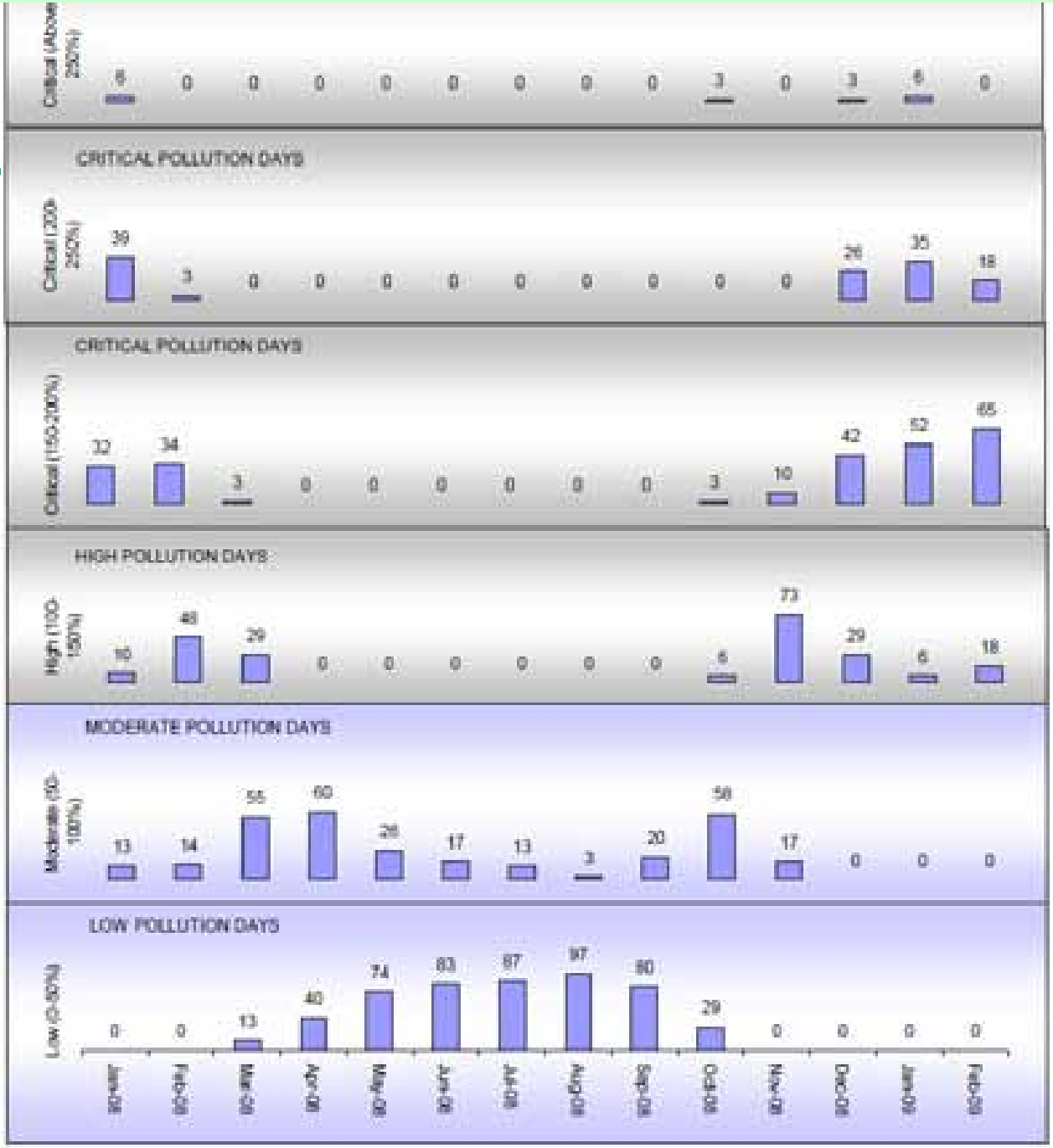
NO2 can reach high levels during winter months




Source: Estimated on the basis of WBPCB air quality data

# Kolkata: PM10 exceedance (January 2008 to February 2009)

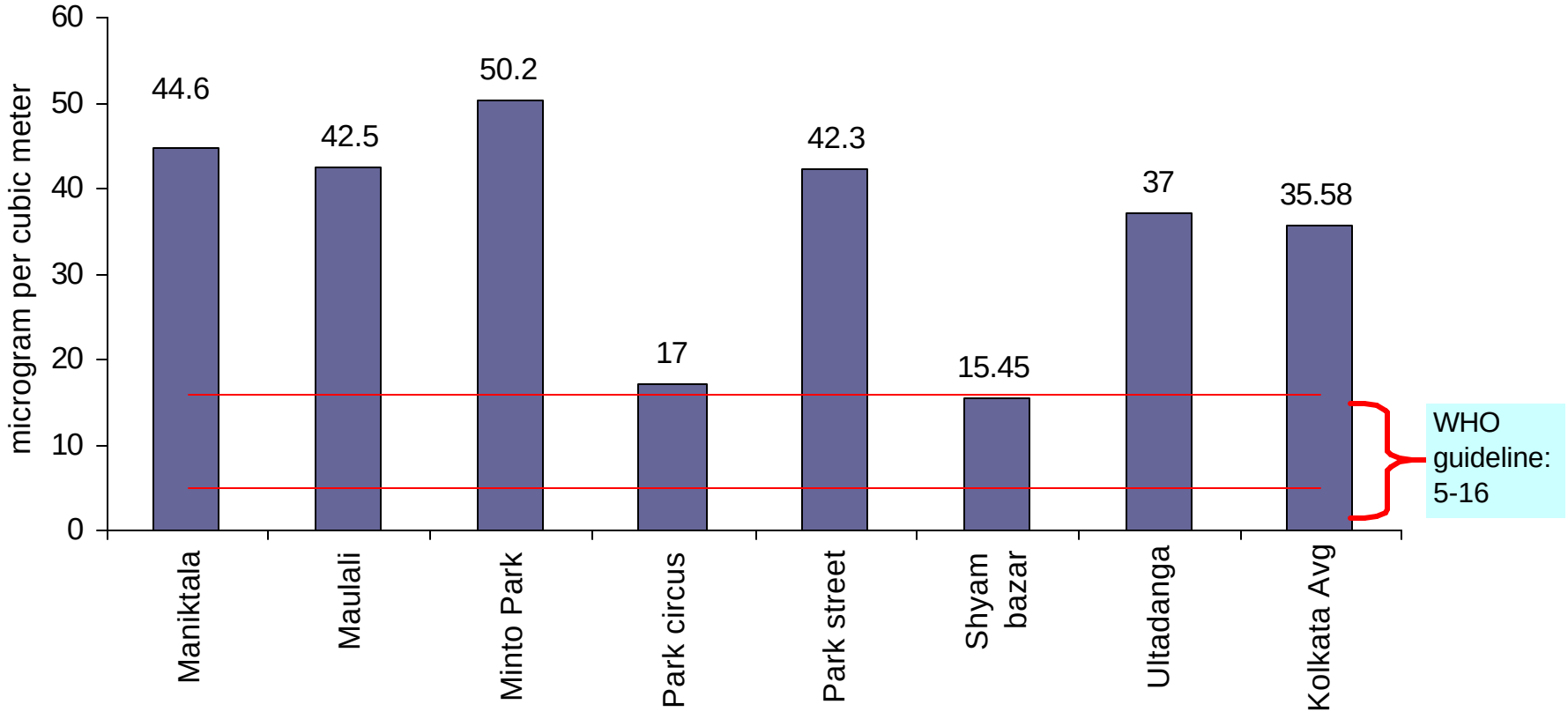
**Days with high and critical PM10 levels increase during winter in Kolkata**




Source: Estimated on the basis of WBPCB air quality data

# Toxic air

## Benzene level (microgram/cum) Kolkata (Dec 2006-Feb 2007)

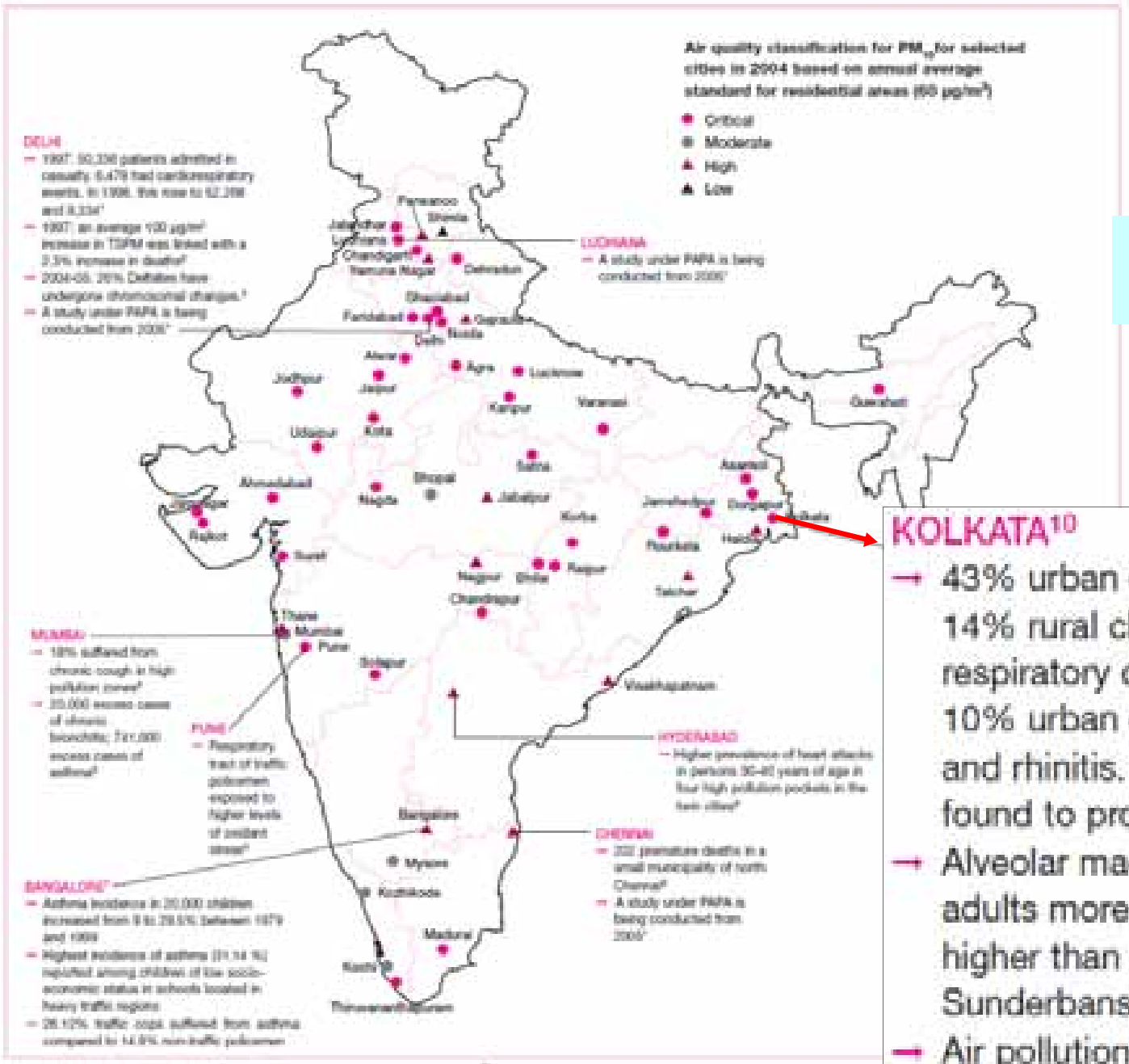



Source: D Chakraborty 2008, Alarming air quality of Kolkata – a real health concern, presentation by West Bengal Pollution Control Board, Kolkata

# Trends and toxins: worrying

- Annual average PM 10 standards exceeding standards by **1.5 times** -- but many times higher in winter months
- Annual average Nox levels are below national standard; but **increasing** and exceed standards in winter
- Benzene levels **very high** -- sign of adulteration; two-wheeler and vehicles without cat-converters

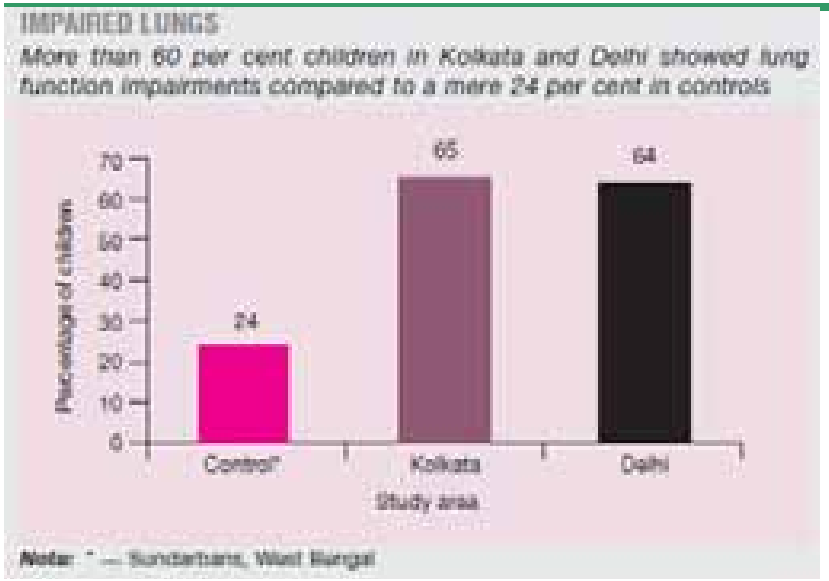
# Scourge

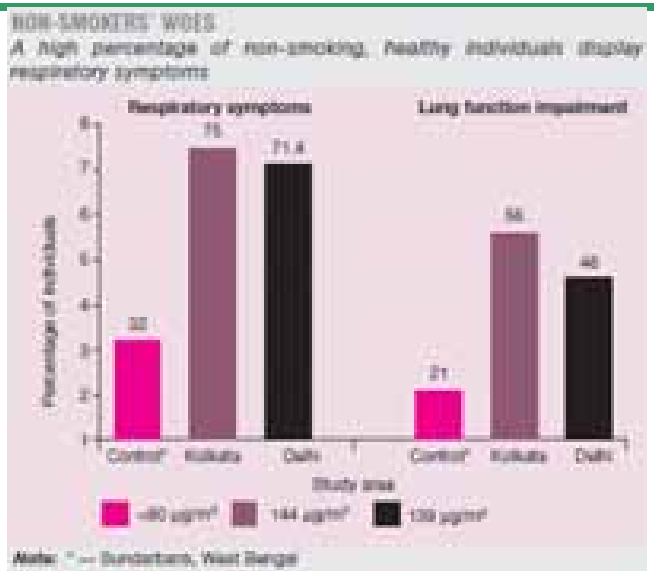


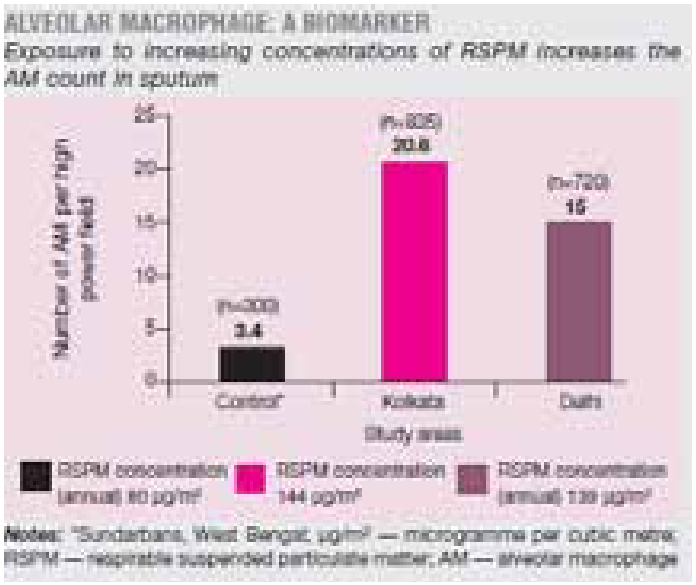

**KOLKATA**[10]

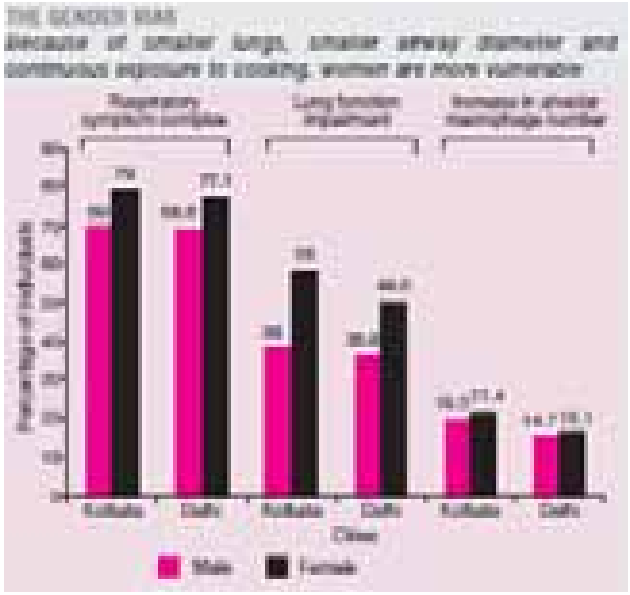
- 43% urban children and 14% rural children have respiratory disorders. 19% and 10% urban children have cough and rhinitis. 94-96% children found to produce sputum
- Alveolar macrophage counts of adults more than eight times higher than the people in the Sunderbans
- Air pollution related allergies seven times higher

# Health Effects of Air Pollution in Kolkata



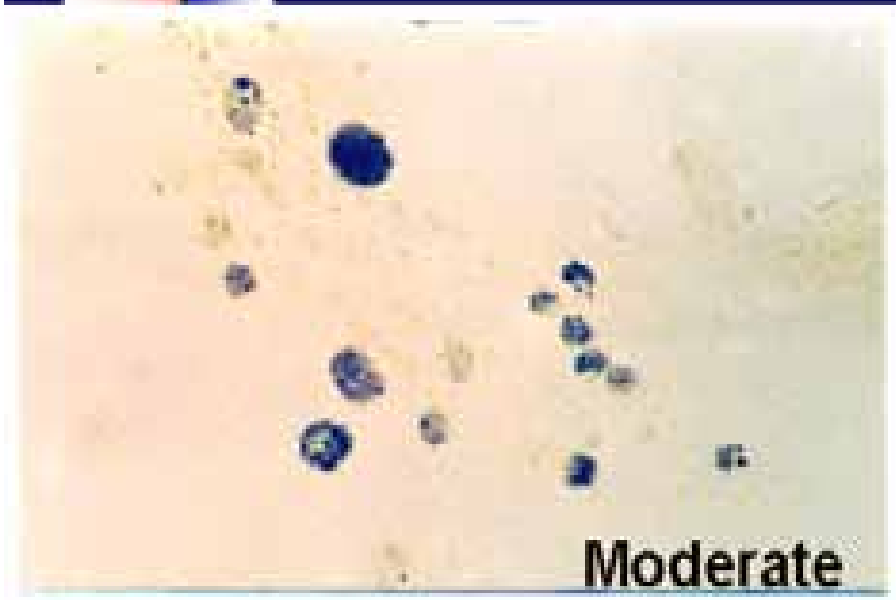



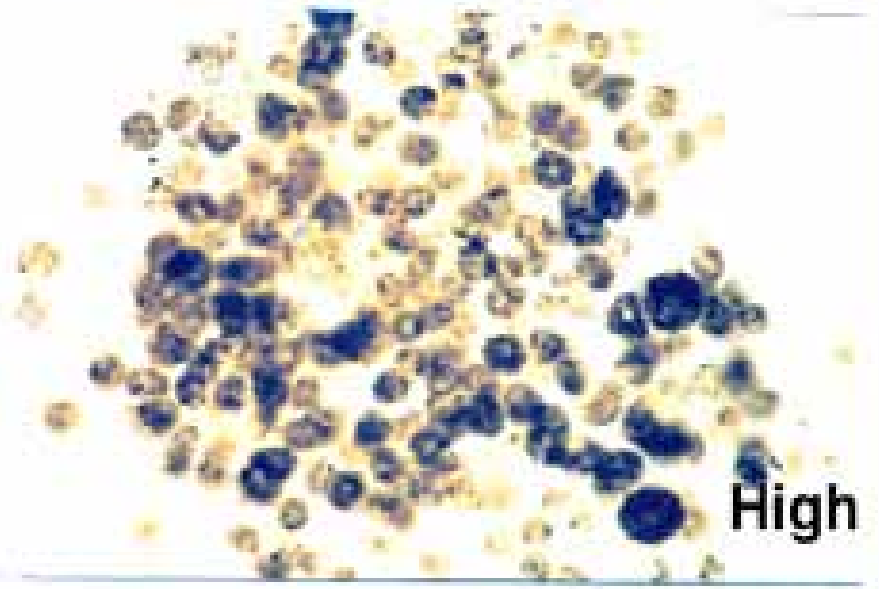




Source: TWISHA LAHIRI
assistant director and head, department of neuroendocrinology
Chittaranjan National Cancer Institute, Kolkata
CSE conference: The leapfrog factor, New Delhi, April 2004

# Alveolar macrophage distribution in sputum

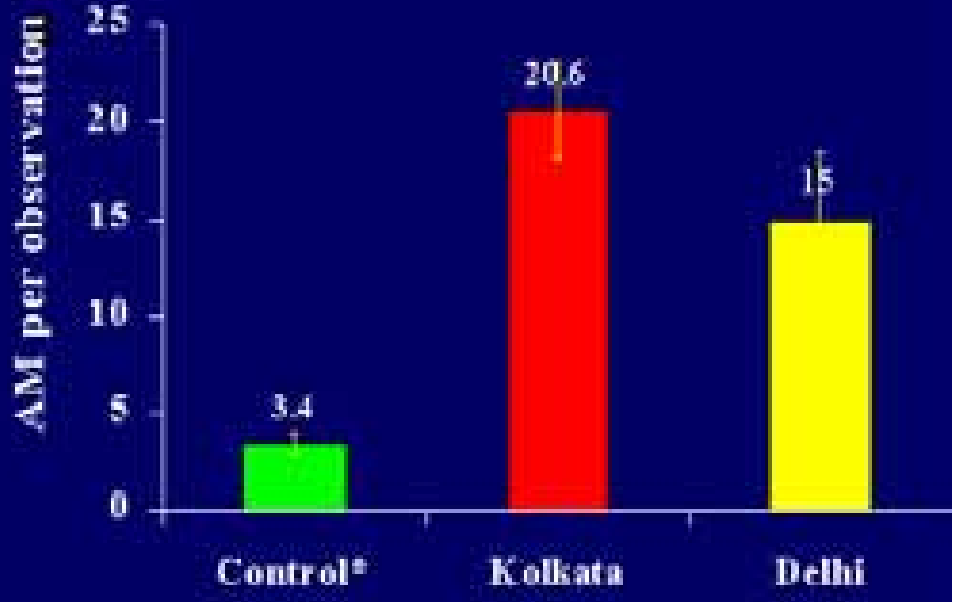



*NSE stained*

**RSPM concentration (annual)**

- 80 µg/m³
- 144 µg/m³
- 139 µg/m³




*n= 300 control, 835 Kolkata, 720 Delhi*

Source: T. Lahiri, Kolkata

# Health benefits of improving air quality

Health benefits of RSPM reduction in five cities of India (between 1993 to 2002)

| | Population (in millions) | Live saved per year |
|---|---|---|
| Delhi | 12.8 | 3,629 |
| Kolkata | 13.2 | 3,293 |
| Mumbai | 11.9 | 5,308 |
| Hyderabad | 5.5 | 125 |
| Chennai | 6.4 | 484 |

Source: For a breath of fresh air, The World Bank, June 2005

Trend in RSPM levels in three areas of Kolkata

# First generation reforms..

1. Bharat stage III introduced+low benzene fuel (less than 1%)
2. Industrial units directed to control air pollution by installing after-treatment devices
3. Decision to ban 15-year old commercial vehicles in Kolkata metropolitan area

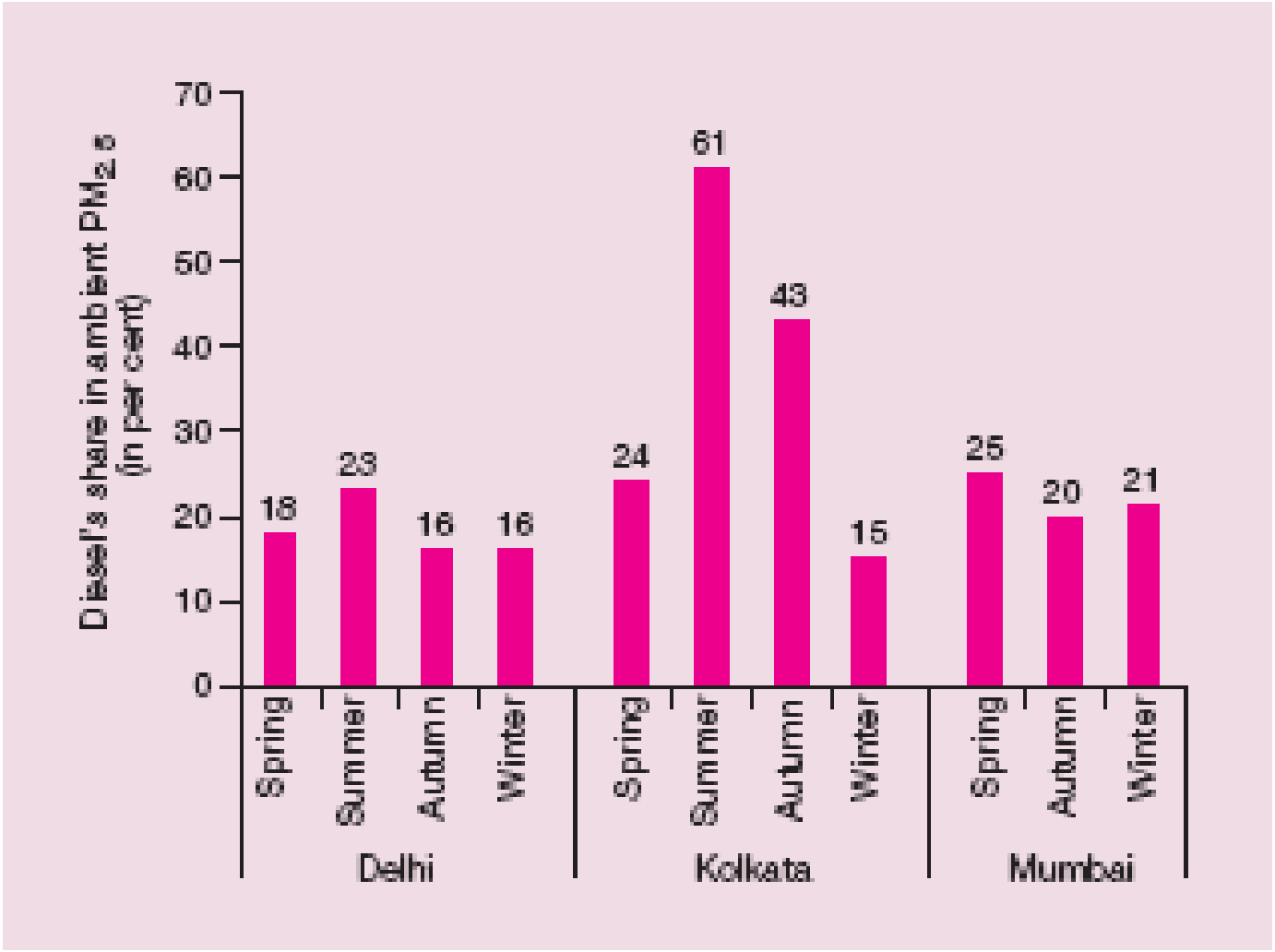
But not enough…

# Time for next-generation steps

- Big fleet of old two-stoke three-wheelers; possibility of running on adulterated fuel with high benzene and other pollutants;
- Big fleet of old diesel vehicles -- taxis, buses and cars;
- Limited road space
- Growing numbers of cars in city, adding to congestion and so pollution

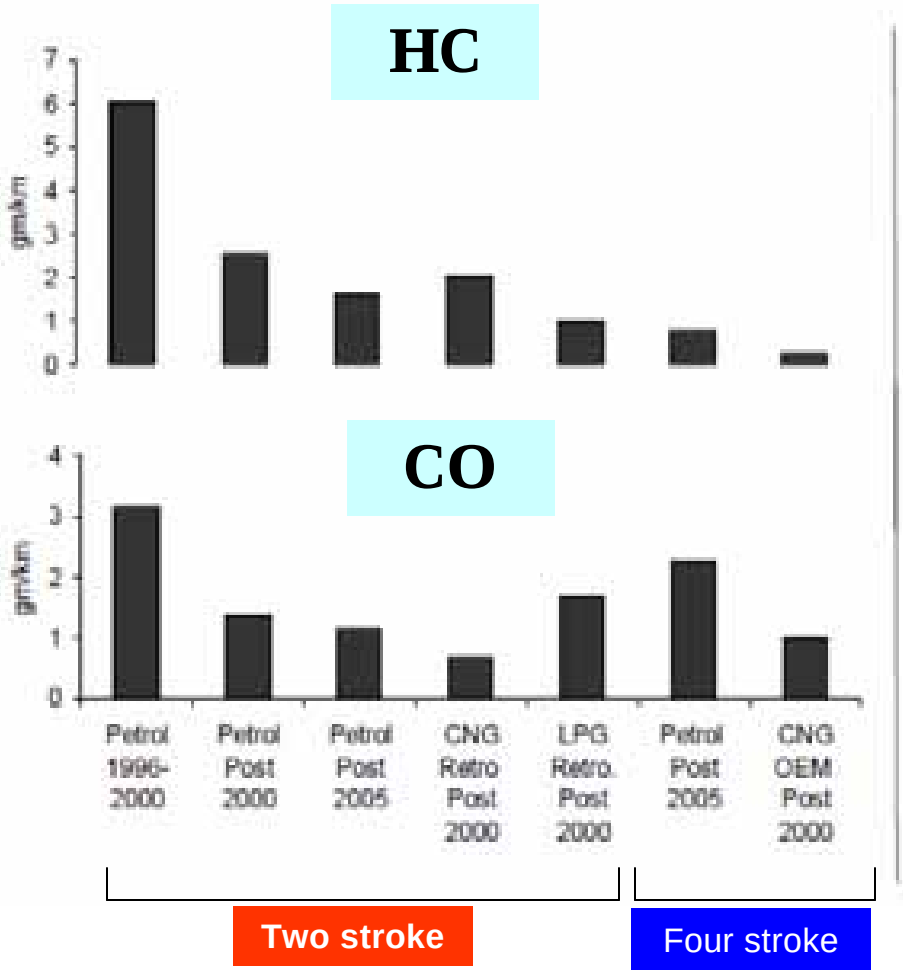
# Diesel's contribution to PM2.5 in Kolkata

*Highest amongst other metros, up to 61 per cent*



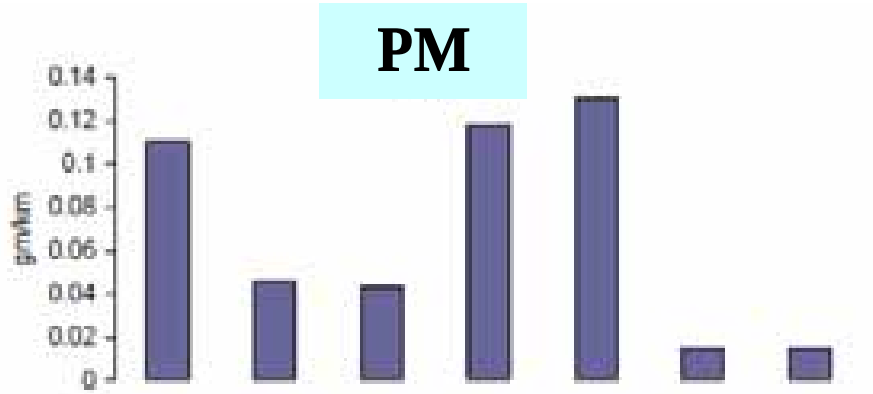

Source: World Bank, 2004

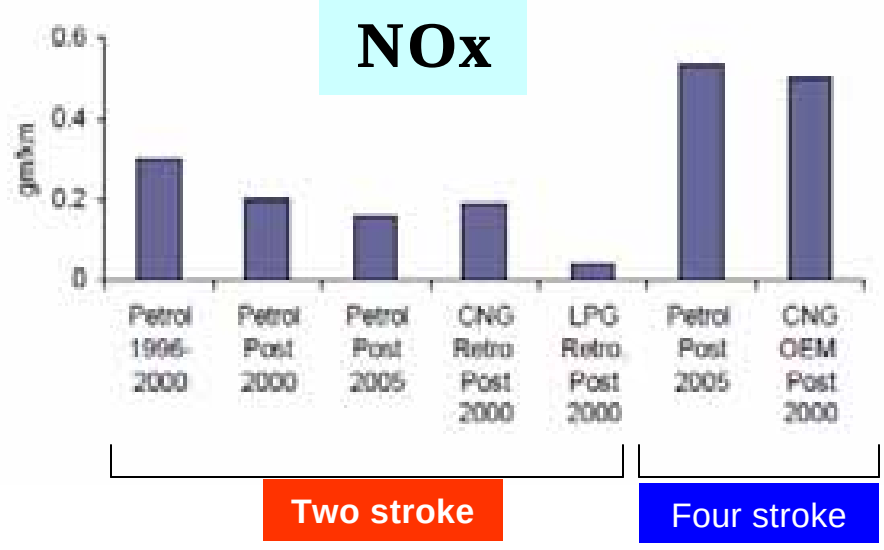
# Two-stroke with adulteration even more deadly









# + Kolkata is diesel capital of world

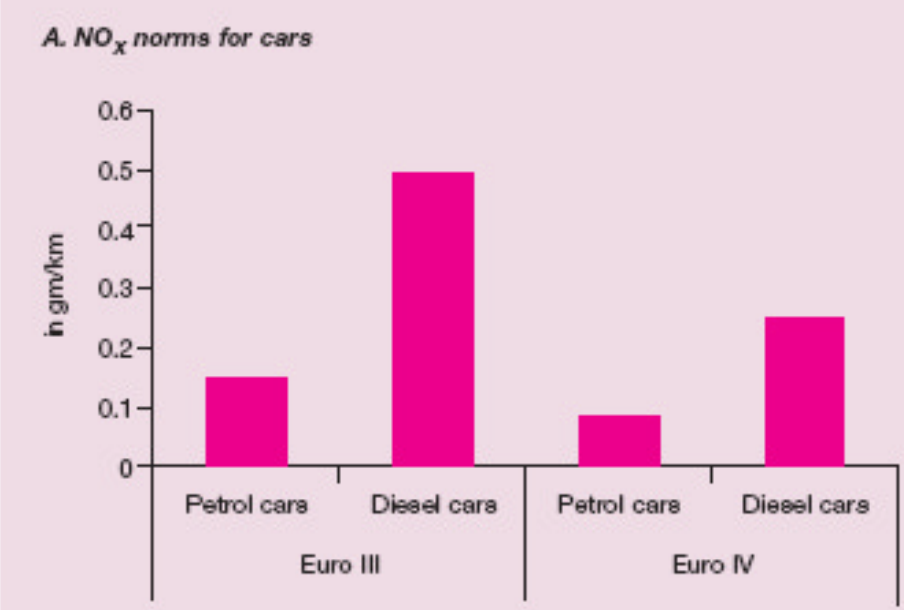
- **Nationally, 30% of new car sales are on diesel -- a worrying trend**
- **Nearly 65% of the Kolkata's vehicular population and nearly 99% of commercial vehicles are diesel-run**
- **Huge fleet of diesel taxis**
- **Depending on the seasons, contribution of diesel fuel combustion to ambient PM2.5 can be as high as 23 per cent in Delhi, 25 per cent in Mumbai to an astounding 61 per cent in Kolkata (World Bank).**

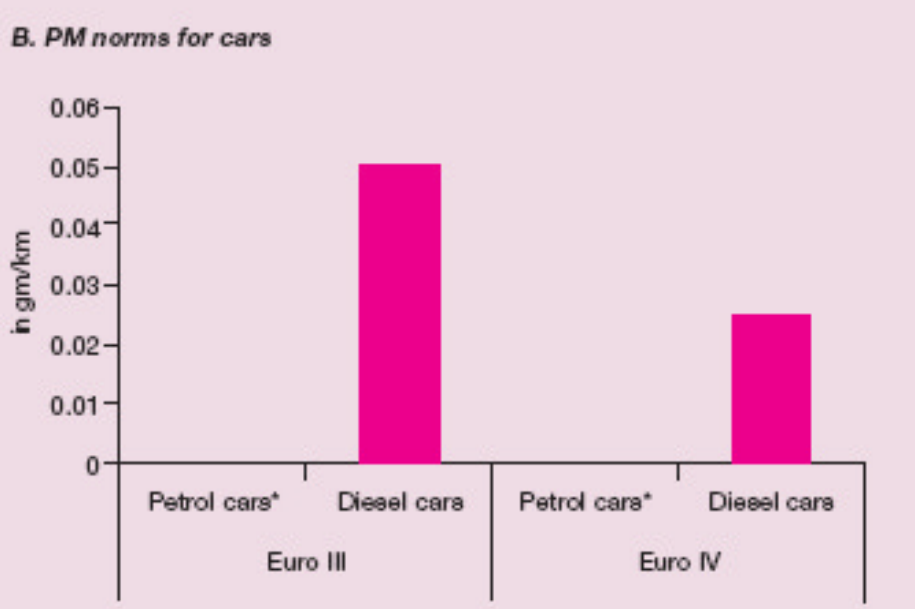
# License to pollute

**One diesel car emits as much NOx as 3 to 5 petrol cars. PM is several times higher**

NOx norms for cars

PM norms for cars



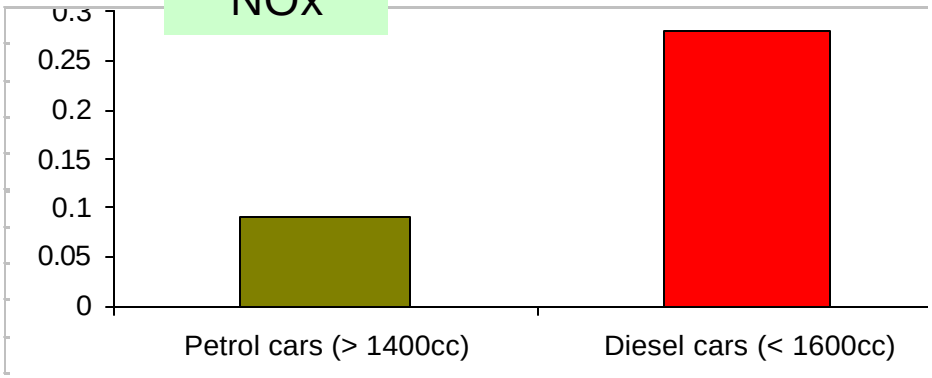




Source: MP Walsh

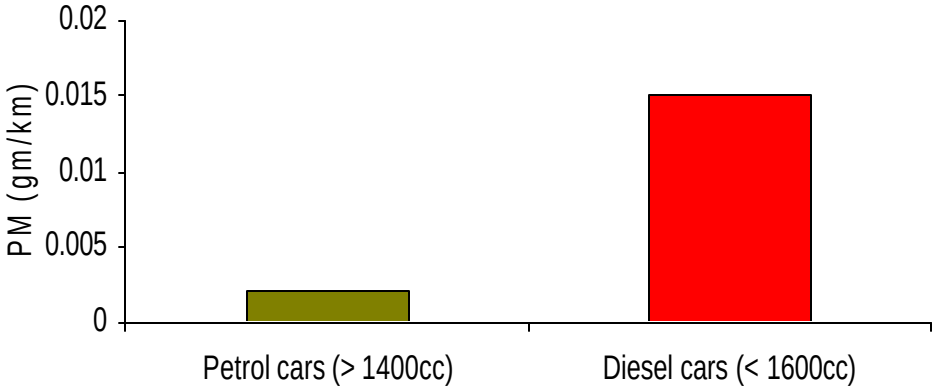
# "New diesel cars in India are clean" - A Myth?

Post 2005 diesel car model: High levels of PM, NOx and air toxics; Overwhelms the CO2 advantage: A crippling trade-off

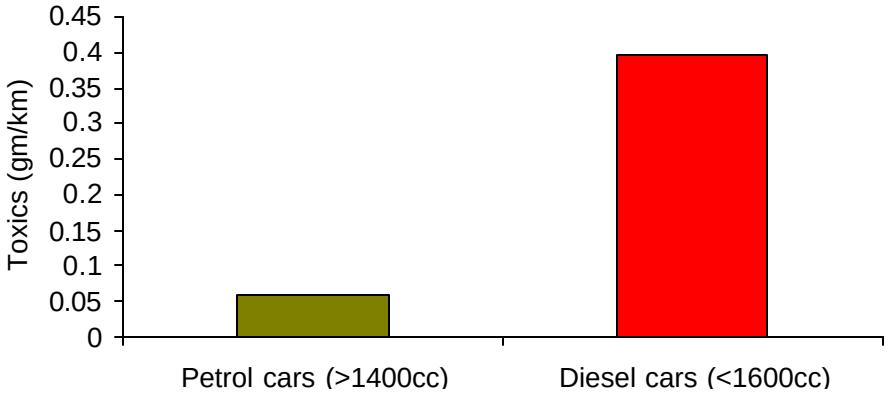
## NOx



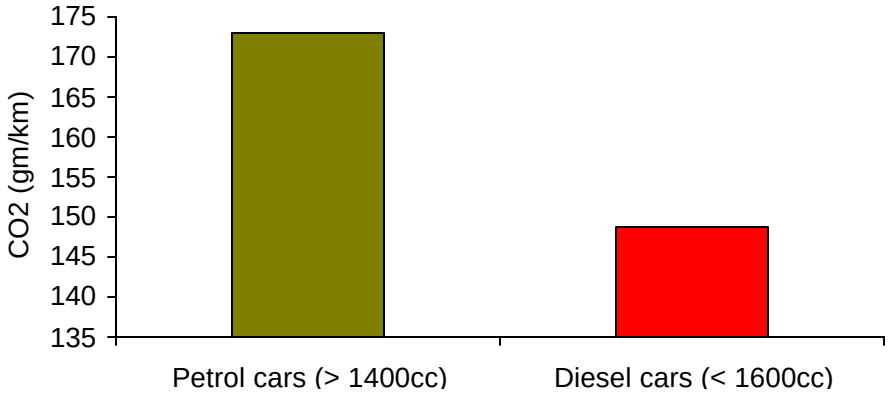

## PM



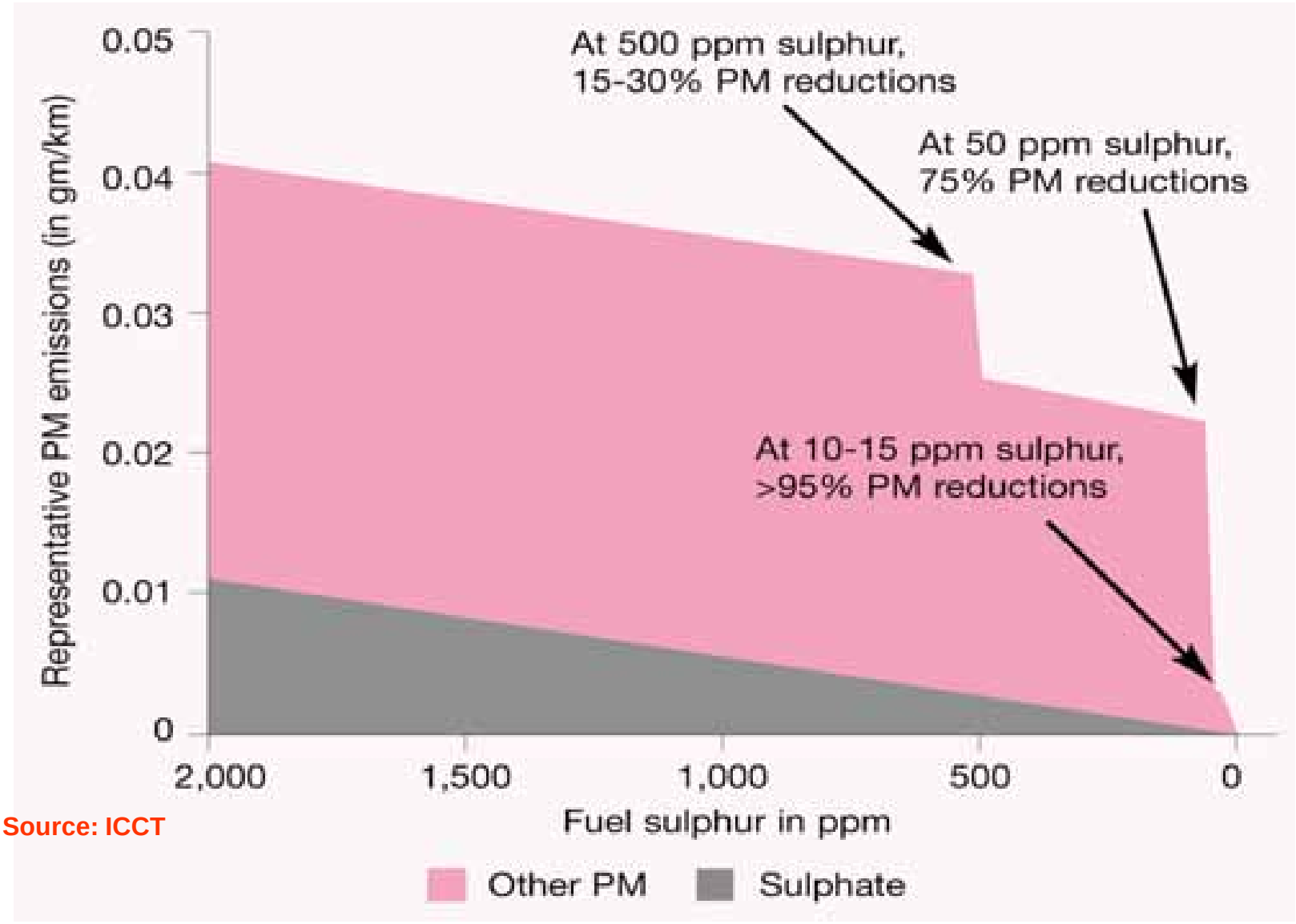

## Toxics




## CO2



# Clean diesel technology and fuel that can reduce emissions by 90% are not available in India



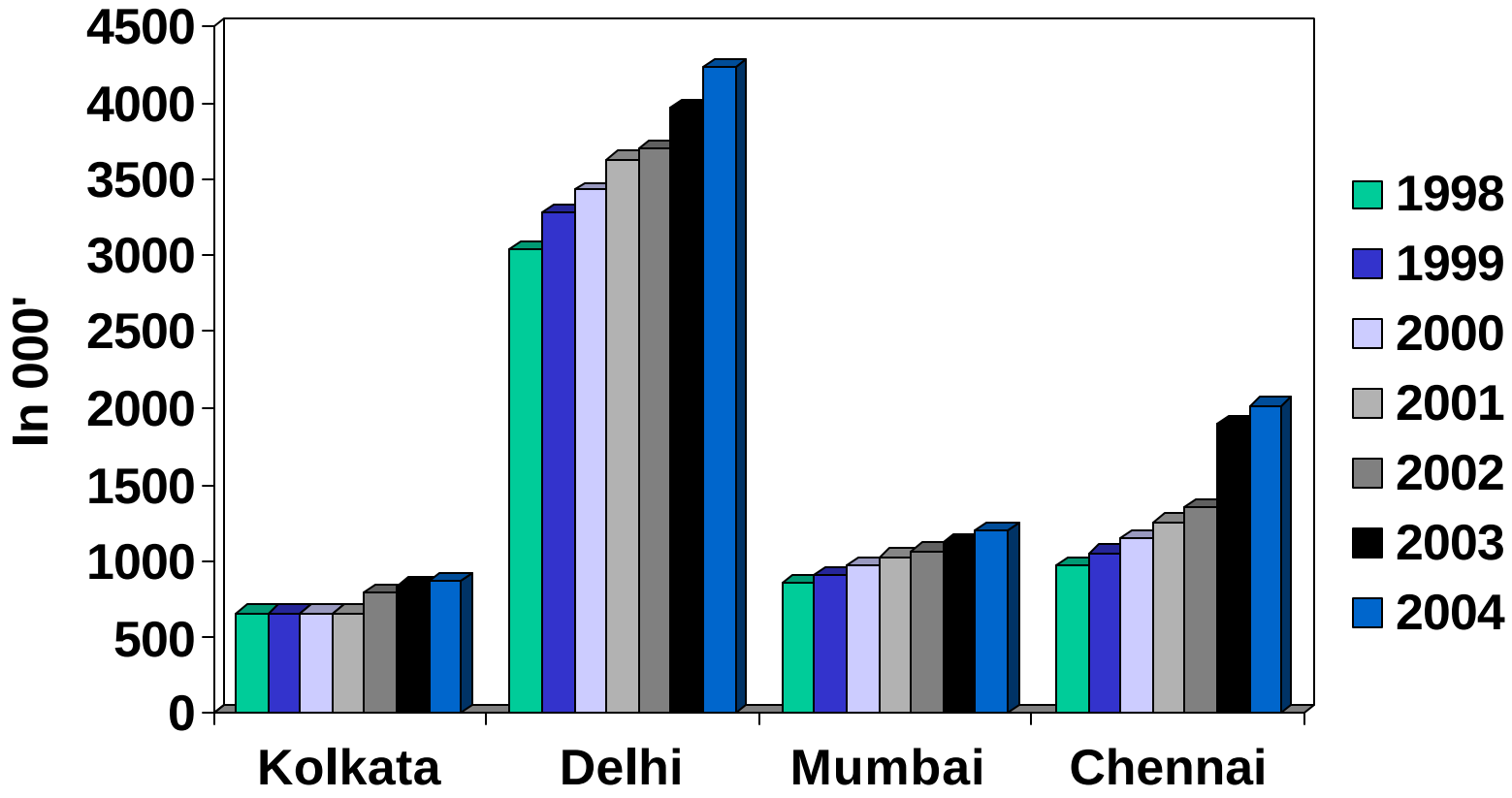

Source: ICCT

# Dieselised and clogged: deadly

- Kolkata has little less than 2000 km of roads – just 6 per cent of its area
- Delhi has 31,000 km of roads – 21% of its area
- **But**
- Also completely gridlocked. Adds roads and flyovers; cars fill it up (registers 1000 vehicles/day)
- More roads; flyovers is not the answer
- Congestion adds to pollution

# Registered motor vehicles in key metropolitan cities

In Kolkata, according to CIRT study, the average speed during peak hours in the central business district (CBD) area is as low as seven km/hour



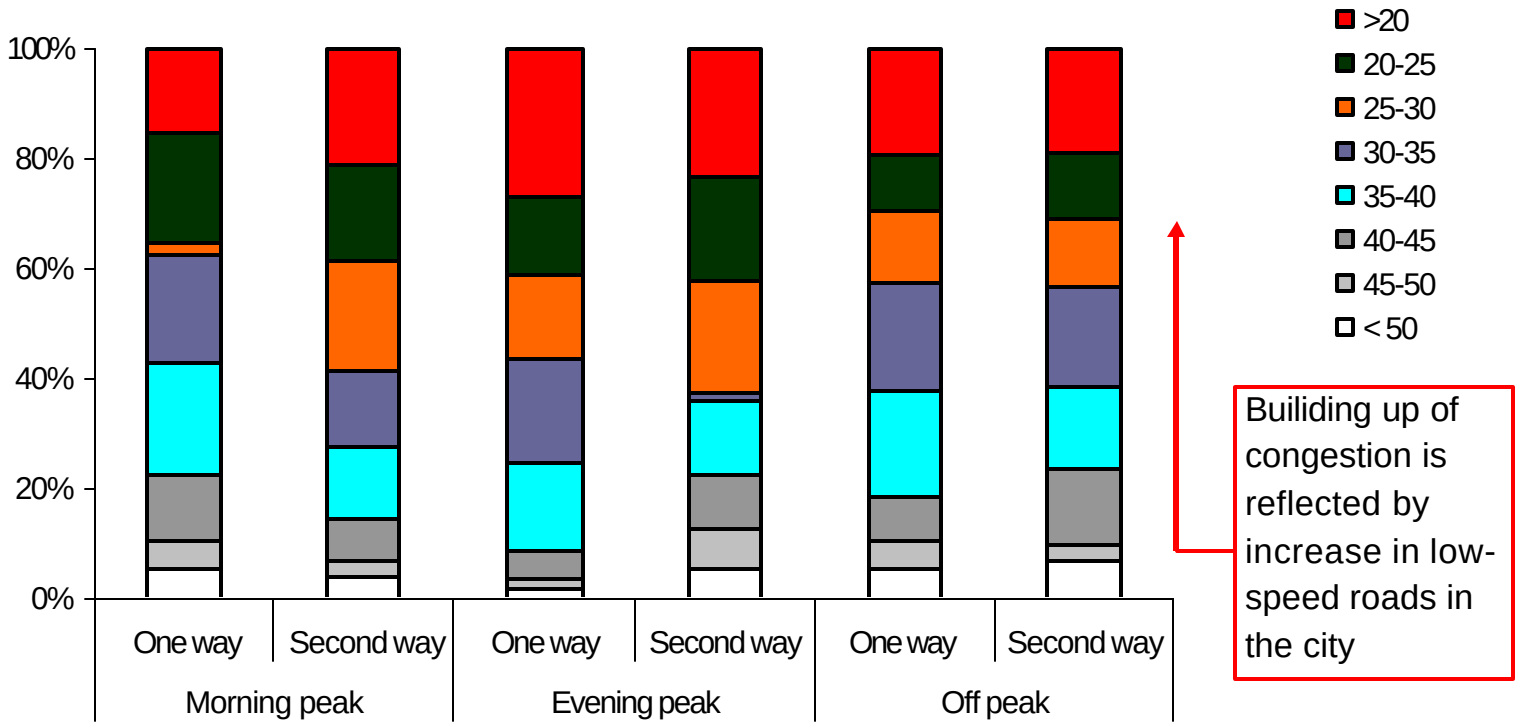

Source: Road transport year book (2004-05), MOSRTH

# Delhi: roads but no speed

-- During the morning and evening peak -- 55-60 per cent of the roads have travel speeds less than 30 kmph.

-- Even during off-peak hours 40-45 per cent of the roads have travel speeds less than 30 kmph.

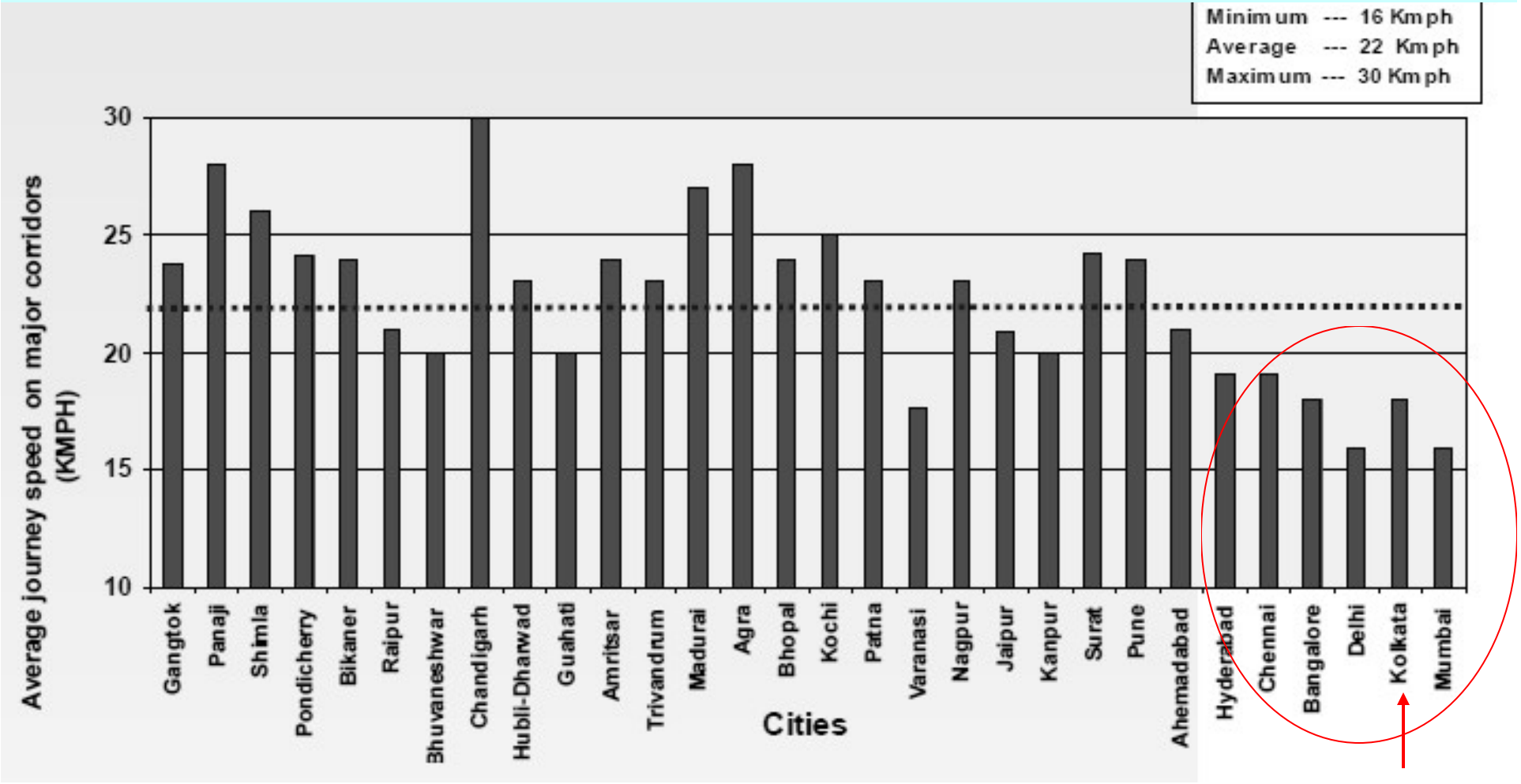
-- About 20 per cent have travel speeds less than 20 kmph throughout the day.




Source: City Development Plan

# Cities are Paralyzed
## The Crawling Traffic

The average journey speed in Delhi (16 km/hr), Mumbai (16 km/hr) and Kolkata (18 km/hr): Abysmally poor compared to smaller cities




Source: Anon 2008, Study on traffic and transportation policies and Strategies in Urban Areas in India, MOUD, p63

# Congestion leads to more pollution

## Vehicle Emissions vis-à-vis Speed

| Speed (kilometer per hour) | Autos Change in emissions with speed (gm/km) | | | Buses Change in emissions with speed (gm/km) | | |
|---|---|---|---|---|---|---|
| | CO | HC | NOx | CO | HC | NOx |
| **10 km/hr** | **33.02** | **4.47** | **2.53** | **22.60** | **5.70** | **22.30** |
| 25 km/hr | 21.20 | 2.60 | 2.17 | 14.40 | 2.30 | 16.40 |
| **50 km/hr** | **9.80** | **1.30** | **2.24** | **8.20** | **0.00** | **11.90** |
| 75 km/hr | 6.40 | 0.93 | 2.97 | - | - | - |

Source: E A Vasconcellos, 2002, Urban Transport, Environment and Equity — the Case for Developing Countries, Earthscam Publications Ltd, London

# Pollution trajectory of cities

1. Pollution increases because vehicles are old; bad technology; use adulterated fuel; use diesel (**Kolkata)**
2. Pollution increases because number of vehicles increase; cleaner but numbers negate the gains (**Delhi**)
3. Pollution increases if city has more cars as congestion grows -- takes 18 sq metre of space on road…(**Beijing**)

# Need leapfrog solutions

- Phase out two-stroke three wheelers;
- Phase out old vehicles
- Simultaneous make the transition to public transport

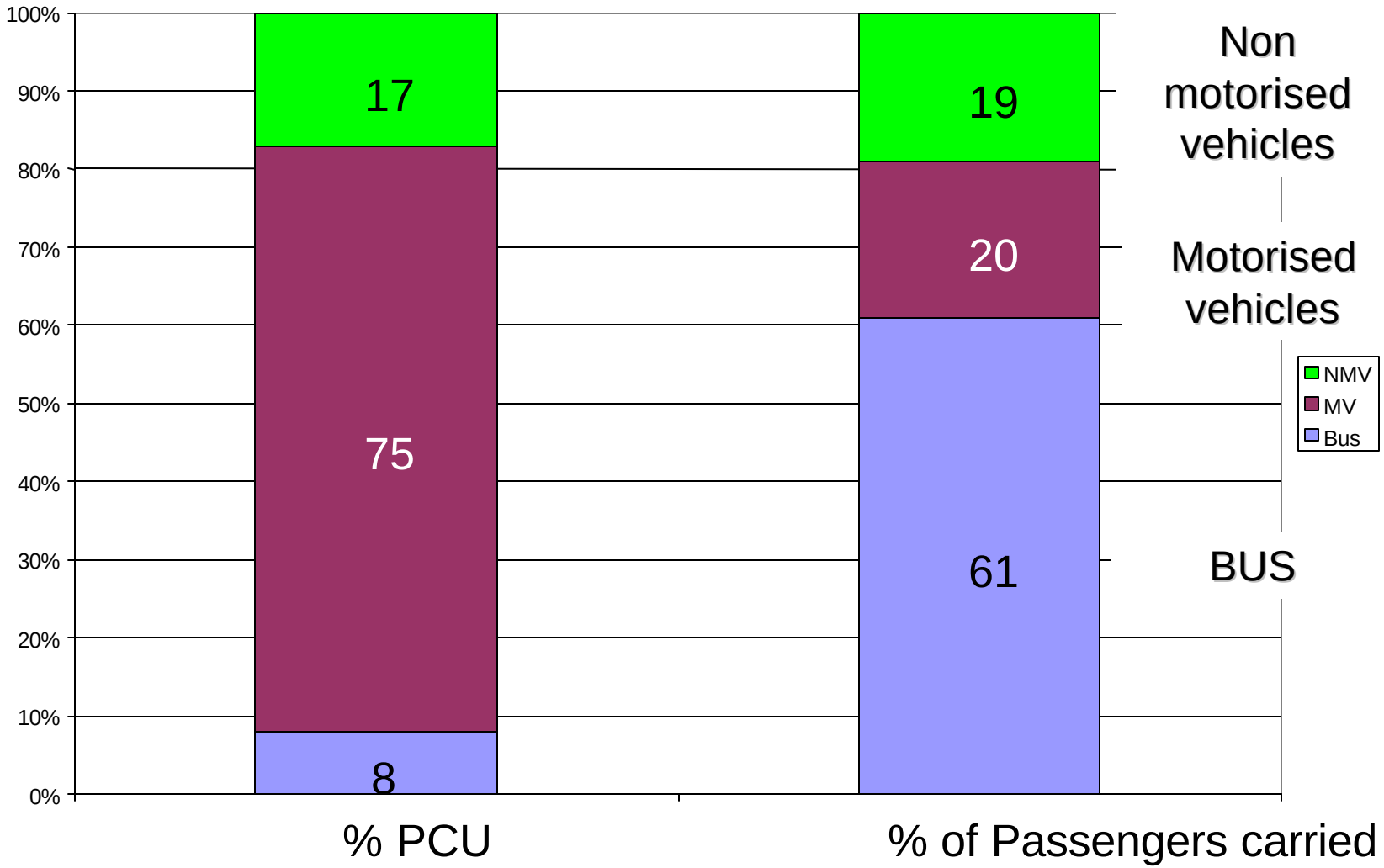
**You can lead**

- In our cities car has **not replaced** the bus
- In our cities car **has marginalised** the bus

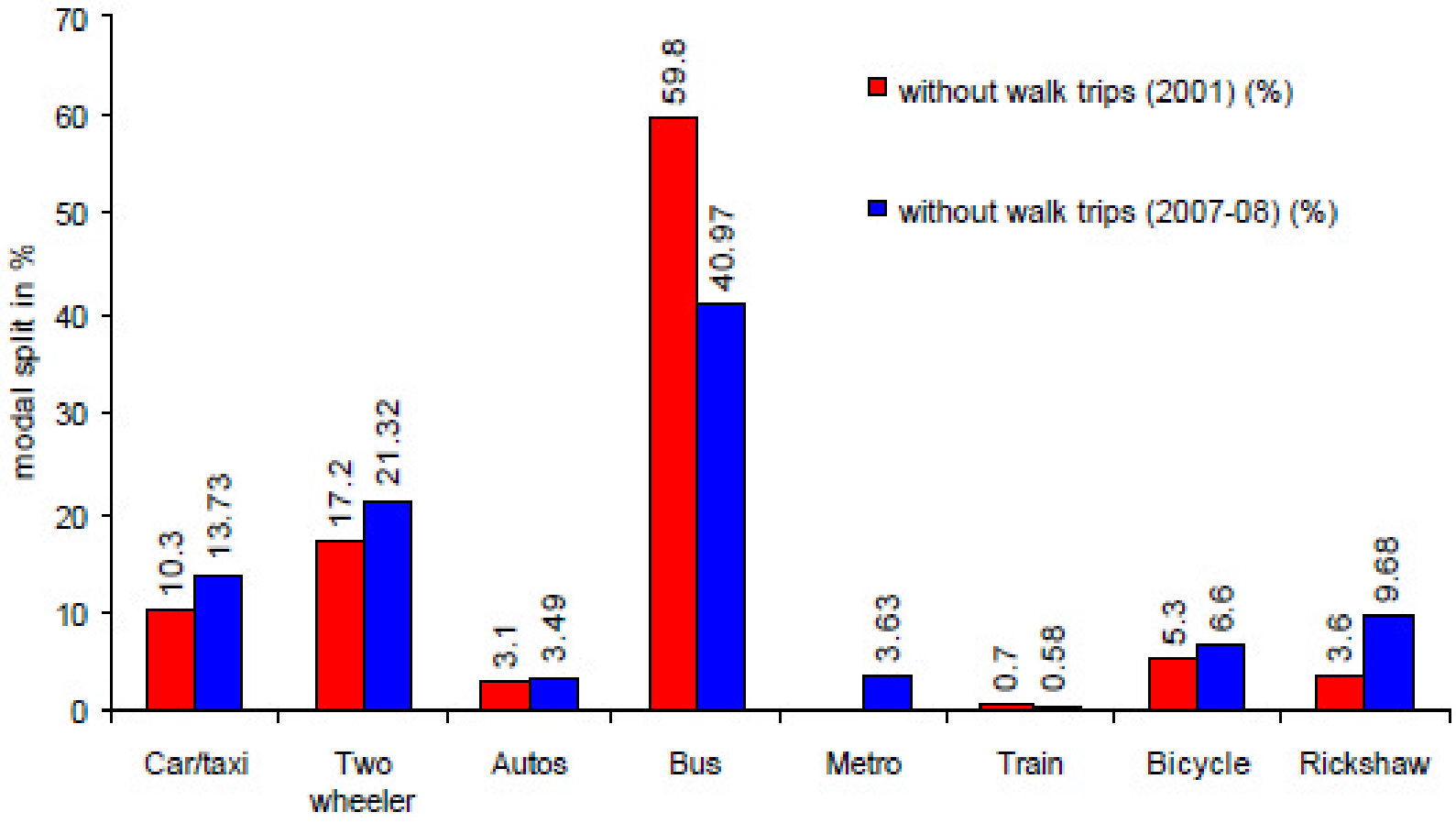
# Public transport is our strength

There are areas in Delhi where buses still carry 60% of passenger trips

***MODAL SHARE BY VOLUME AND PASSENGERS CARRIED AT AMBEDKAR NAGAR***



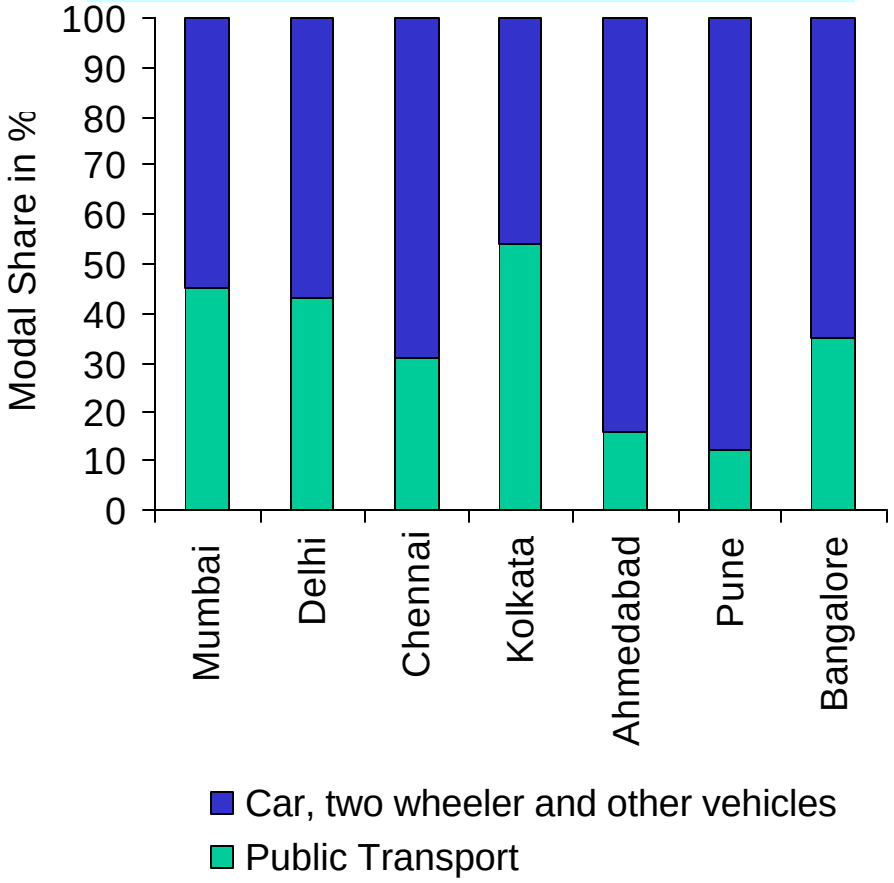
# Cars commute 14% in Delhi; take up 70-80 per cent of road space



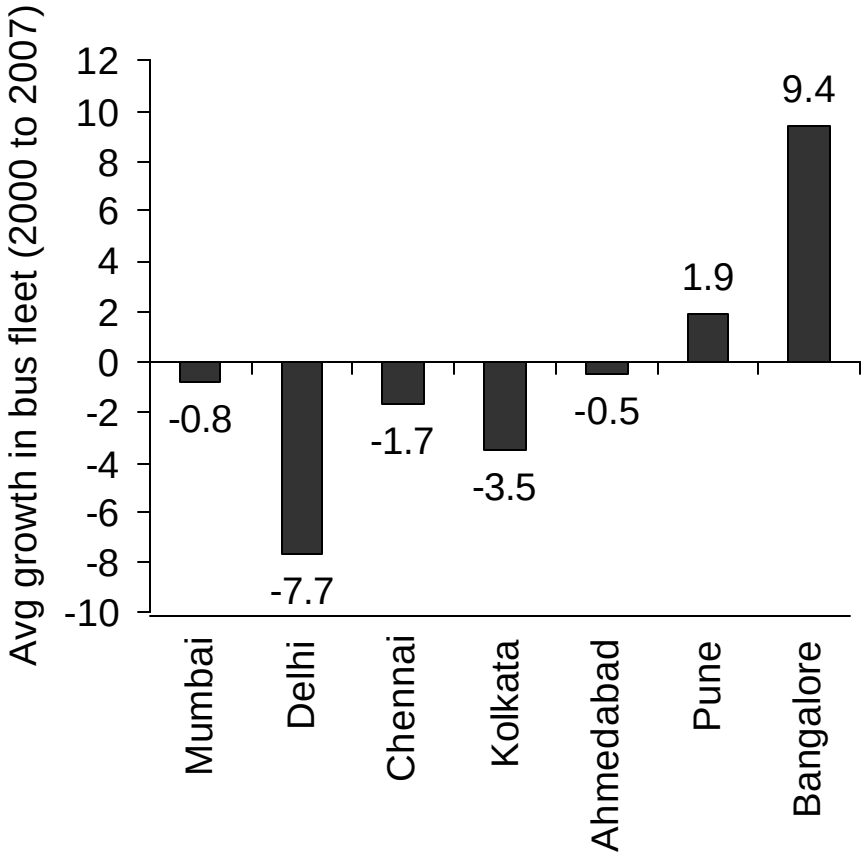

Source: Anon 2008, transport demand forecast study: study and development of an integrated cum multi modal public transport netw ork for NCT of Delhi, RITES, MVA Asia Ltd, TERI, September

# Kolkata can lead but is bleeding

Modal share of public transport and other vehicles (2007)

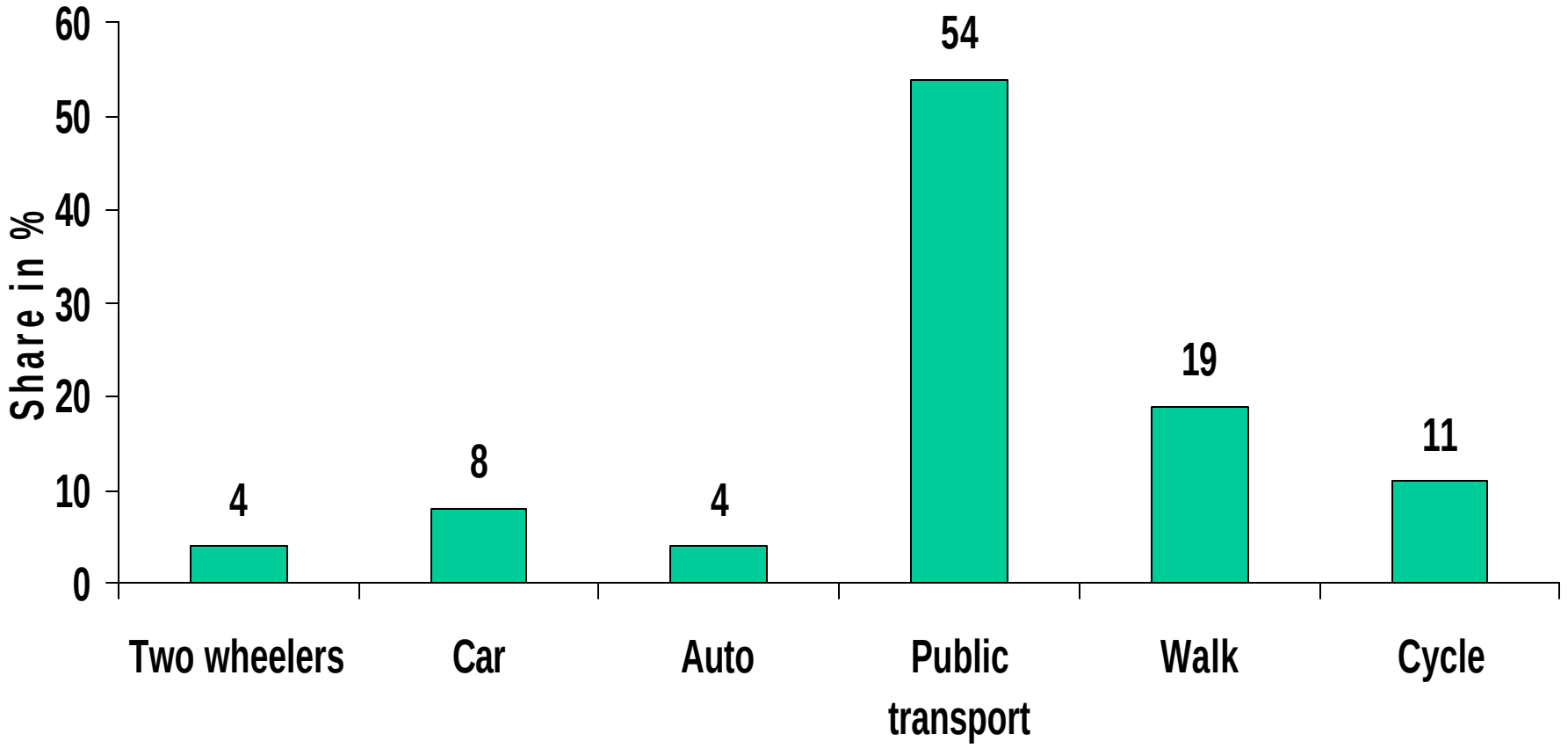



The Annual Average Growth in % in STU Bus Fleet (2000 to 2007)




Source: Anon 2008, Study on traffic and transportation policies and Strategies in Urban Areas in India, MOUD

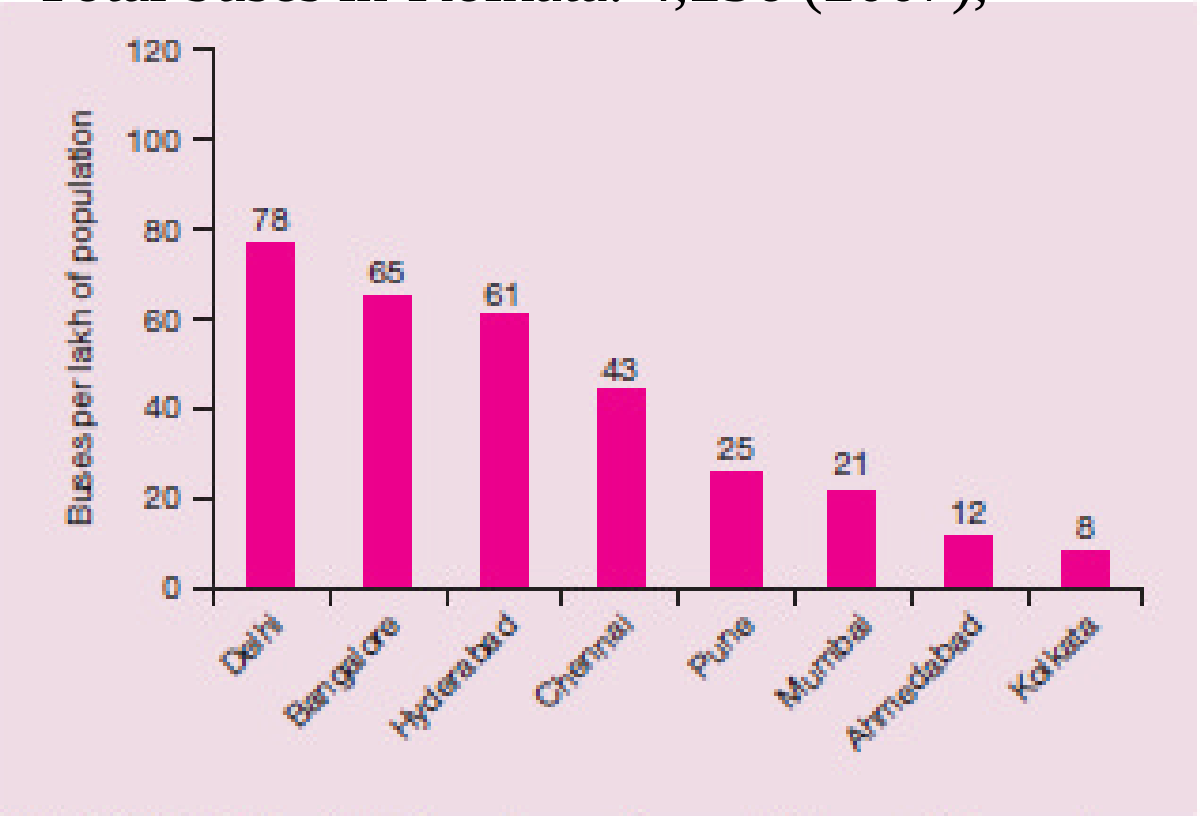
# Kolkata -- public+walk+cycle




Source: Anon 2008, Study on traffic and transportation policies and Strategies in Urban Areas in India, MOUD

# Kolkata has lowest bues per lakh

Total buses in Kolkata: 4,256 (2007),



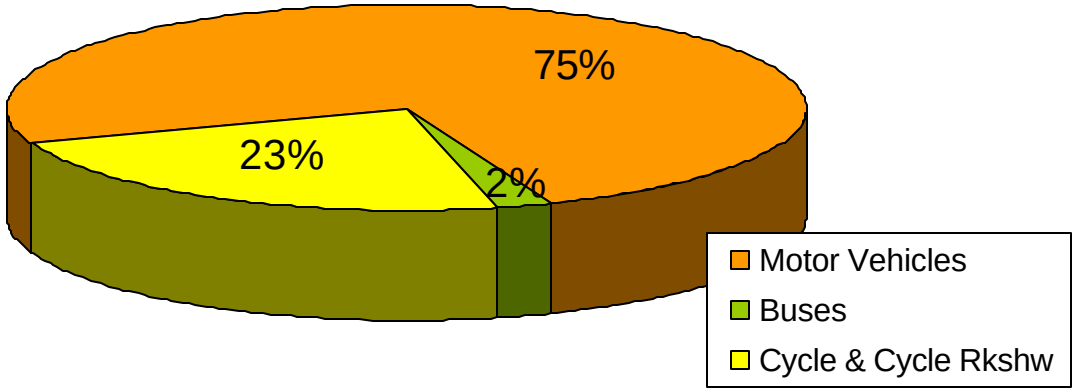

***Note:*** Delhi include private buses also as they constitute over 70 per cent
***Source:*** Computed on the basis of Anon 2005, 'A quick review of STUs (2004-05)', *Indian Journal of Transport Management*, Vol 29, No 2, April-June, p 229-256; population figures are taken from census of India, urban agglomerations data

# Think people not vehicles

**50 cars** / **60 bicycles** / **1 Bus**

# You get different answers depending on your priorities – moving vehicles vs. moving people

**Distribution of Vehicles - By Mode**




**Chirag Delhi Junction**

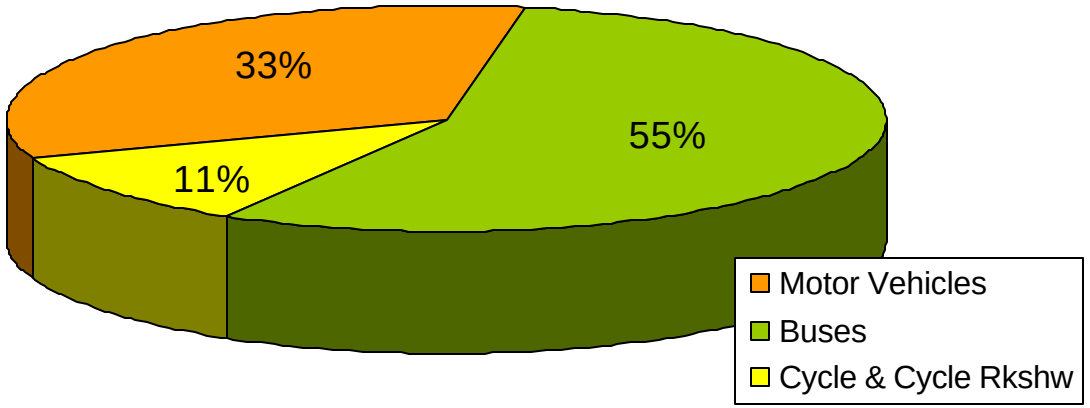
**Morning Peak Hour**

**AK to MC**

**4,916 Vehicles**

**11,480 People**

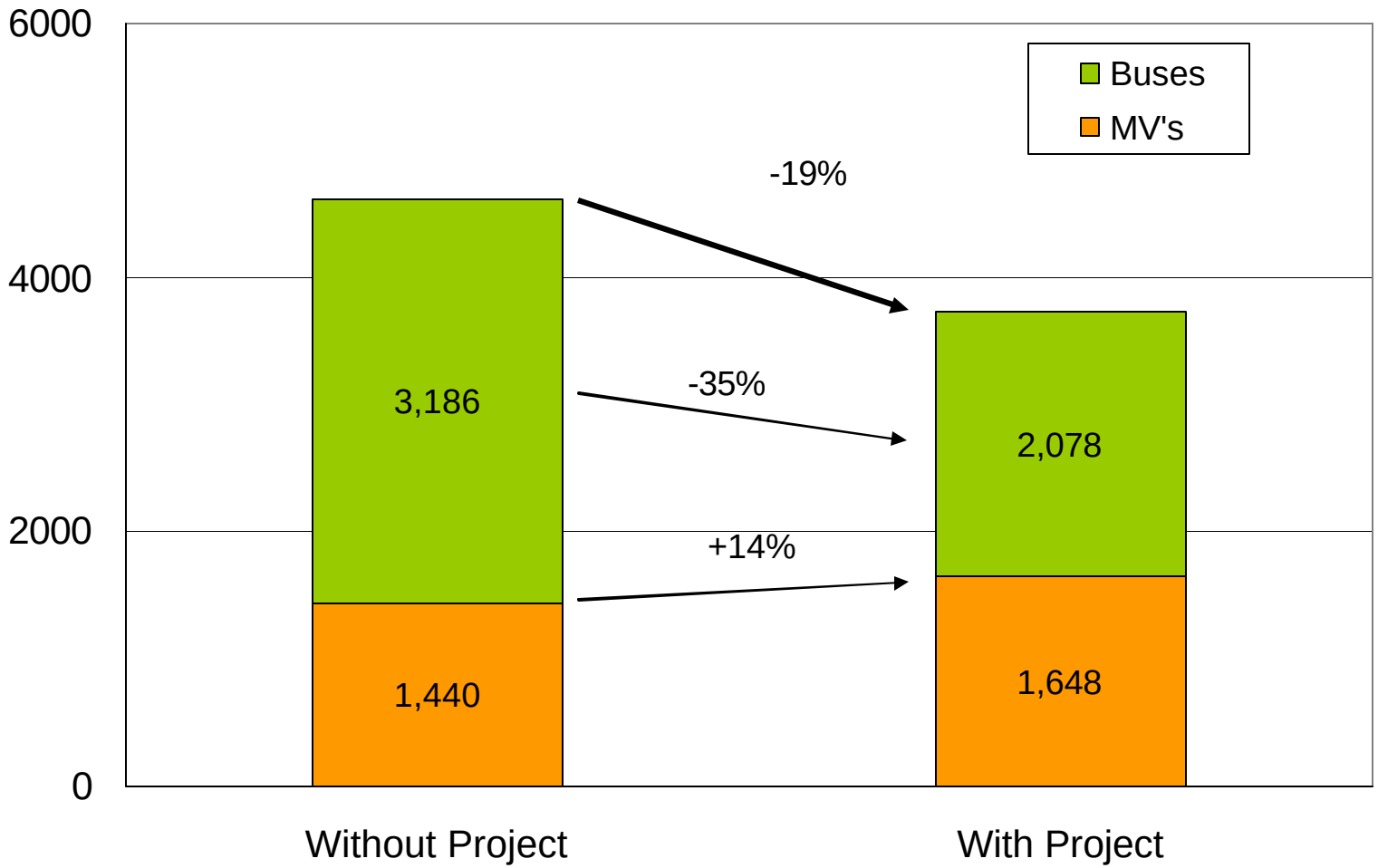
**Distribution of People - By Mode**




Source: Dario Hidalgo study for CSE, 2008 Mimeo

Delhi bus corridor has reduced the average travel time

## People Delay - Morning Peak Hour - In Hours

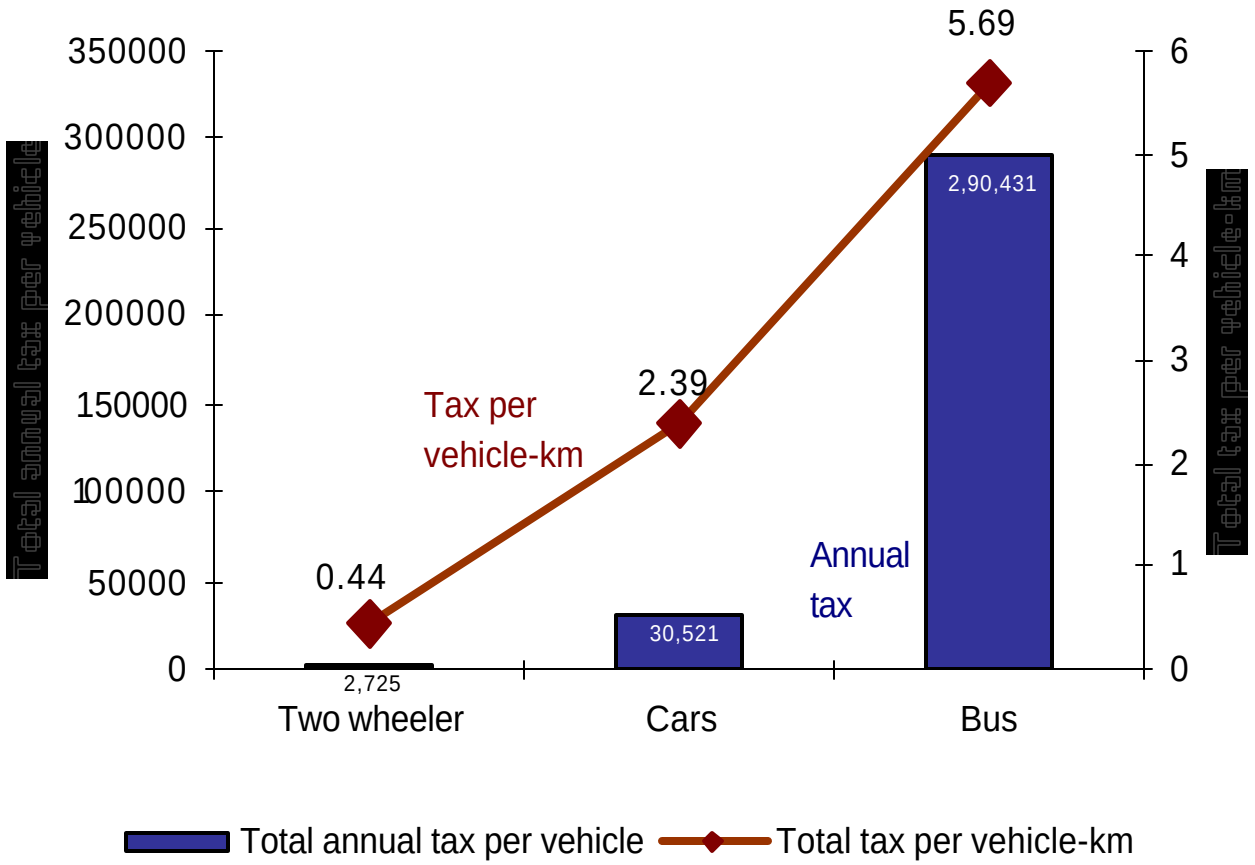



Dario Hidalgo study for CSE, 2008
Mimeo

# Indian style socialism

Buses bear significantly higher tax burden in India

Tax correction can push a large number of two wheeler users to buses



# Kolkata-style socialism

**Stage carriage bus:** Rs 31.25 per seat per month passenger tax

**Two wheelers:** For engine size 80cc to above 250cc the one time tax range from Rs 1560 to Rs 6250

**Cars:** For engine size from 900cc to above2000cc tax for every five years range from Rs 8550 to Rs 20,000.

**Bus: A standard bus pays Rs 23,250 annually**

**Car: 900cc engine car pays a life tax of Rs 25,650**

Source: Road transport year book (2004-05), MOSRTH

# Kolkata-style socialism

**Stage carriage bus:** Rs 31.25 per seat per month passenger tax

**Two wheelers:** For engine size 80cc to above 250cc the one time tax range from Rs 1560 to Rs 6250

**Cars:** For engine size from 900cc to above 2000cc tax for every five years range from Rs 8,550 to Rs 20,000.

**Bus: A standard bus pays Rs 23,250 annually**

**Car: 900cc engine car pays a life-tax of Rs 25,650**

**A car pays in its lifetime what a bus pays every year**

# What are other governments doing?

Other governments are enforcing tax and road pricing measures and caps on car sales to reduce congestion and pollution…

Congestion charges:

-- London: This has reduced traffic delays by 30 per cent.

-- Seven European cities are adopting congestion charges.

-- Trondheim, Norway: peak hour traffic dropped by 10% after the introduction of congestion charges.

-- Singapore's road pricing measures: This reduced percentage of commuters entering central areas from 56% to 23%.

Caps on cars in Singapore and Shanghai:

-- Shanghai has adopted a system of auctioning a limited number of car licenses per month. This has helped the city to cap car registration at not more than 7,500 cars per month -- or 250 cars per day.

Such measures require good public transport system…..

# The future road-map

- 1. Phase out two-stroke; transition to LPG-four stroke;
- 2. Reduce diesel -- move to LPG or reduce numbers on road
- 3. Make transition to public transport -- bus; tram; cycle
- 4. Think of Kolkata as the future city -- leapfrog from public-public

Put Kolkata on the future-map -- not pollution-map of world

Do you think
we are not seeing
the point?
AUTO
INDUSTRY
GOVERNMENT