



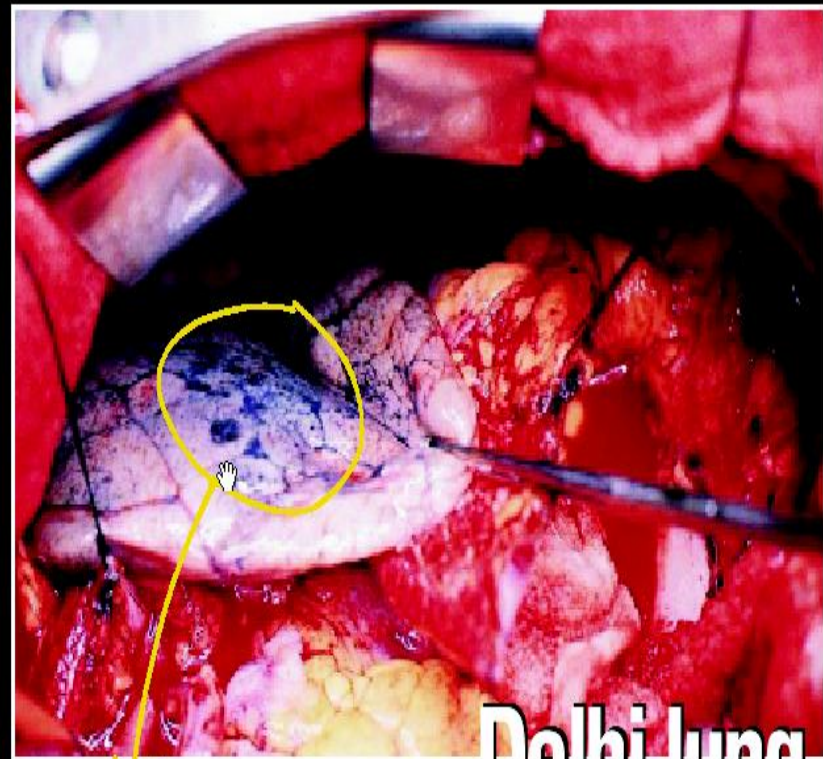
**Anumita Roychowdhury**

**-- Centre for Science and Environment**

***Smart Mobility Solutions for NCR***

**Gurgaon First**

**Gurgaon, November 30, 2016**

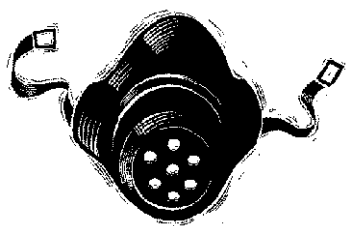


Look at these black spots on the lung. The unfortunate owner lives in Delhi and has been breathing polluted air. Air full of carbon particles which accumulate in the lungs (black spots). What you can't see is a cocktail of gases and tiny particles, even smaller than carbon that get into our bodies. Actually,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

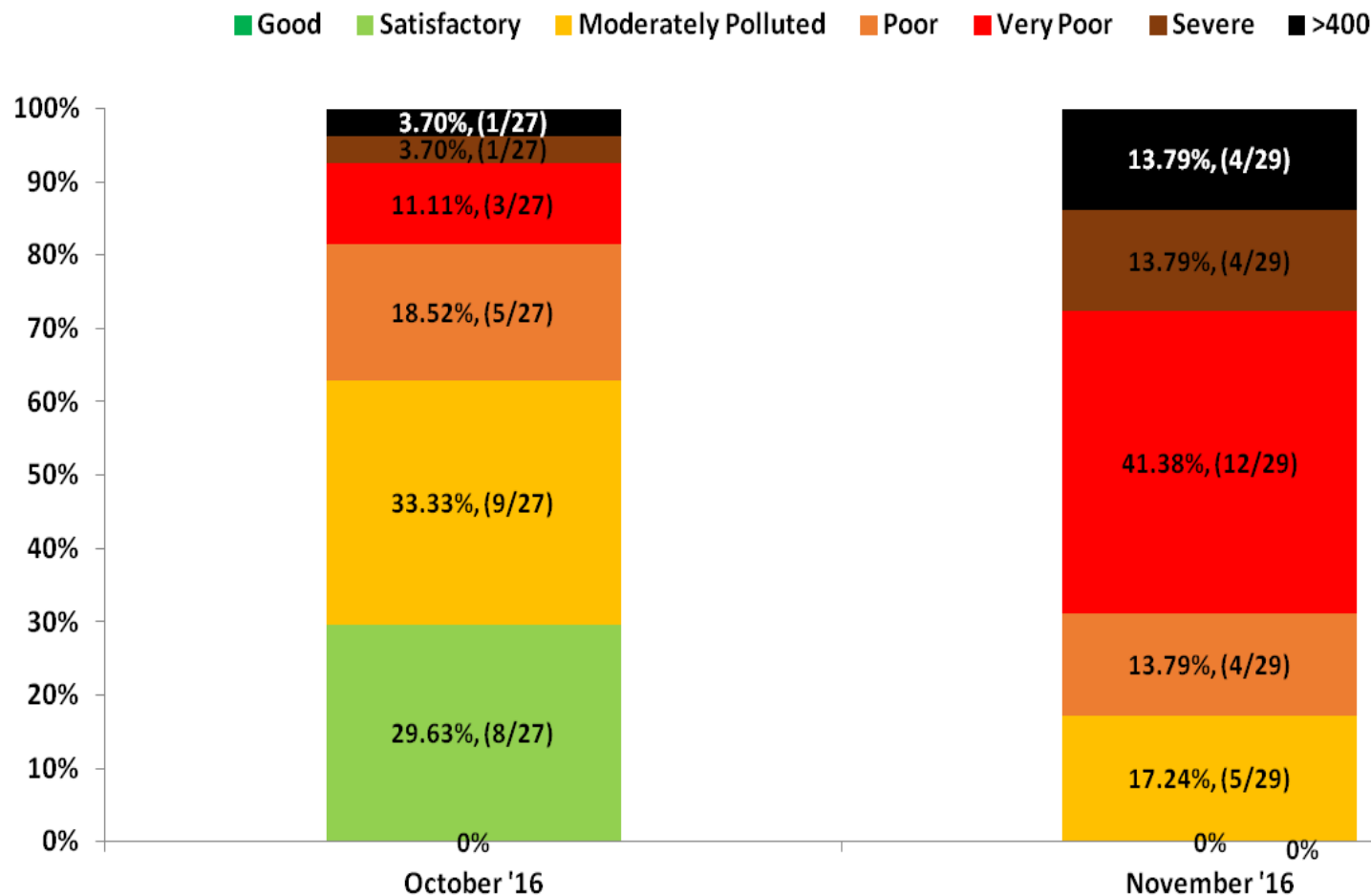
**Delhi lung**  
Capital punishment

Scary? But these cars are everywhere!  
**CSE POSTER**





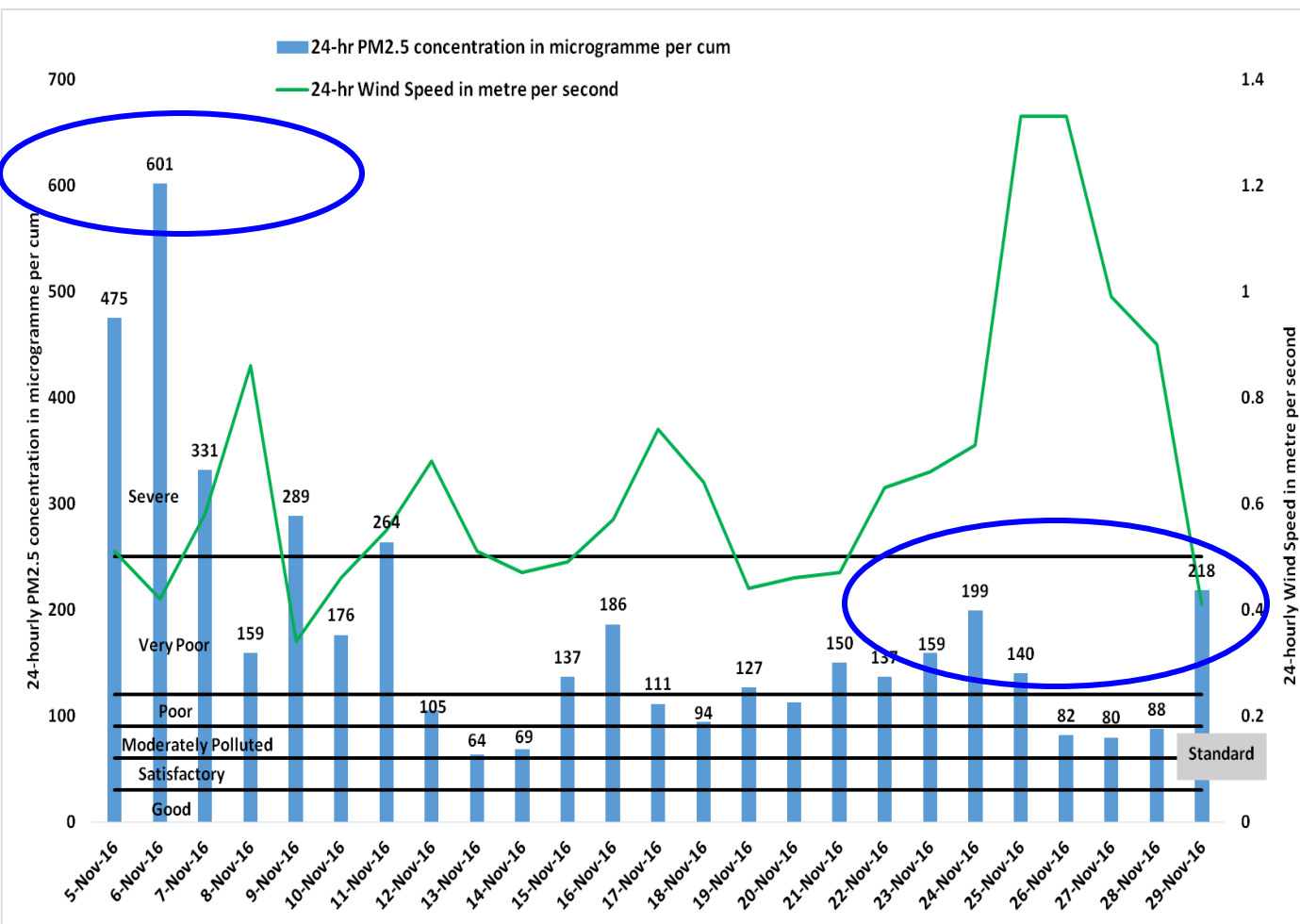
# Number of days in “very poor” and “severe” categories increase significantly



Percentage, (no. of days in that category/ total no. of days data available for the respective month)

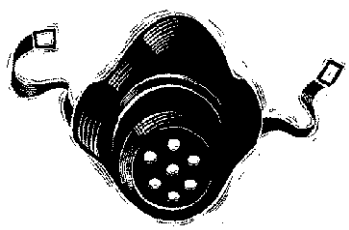


# Gurgaon: Smogged



Levels ten times higher than the standards

Wind improves – yet poor to very poor



# Limited monitoring....







# Exposure matters

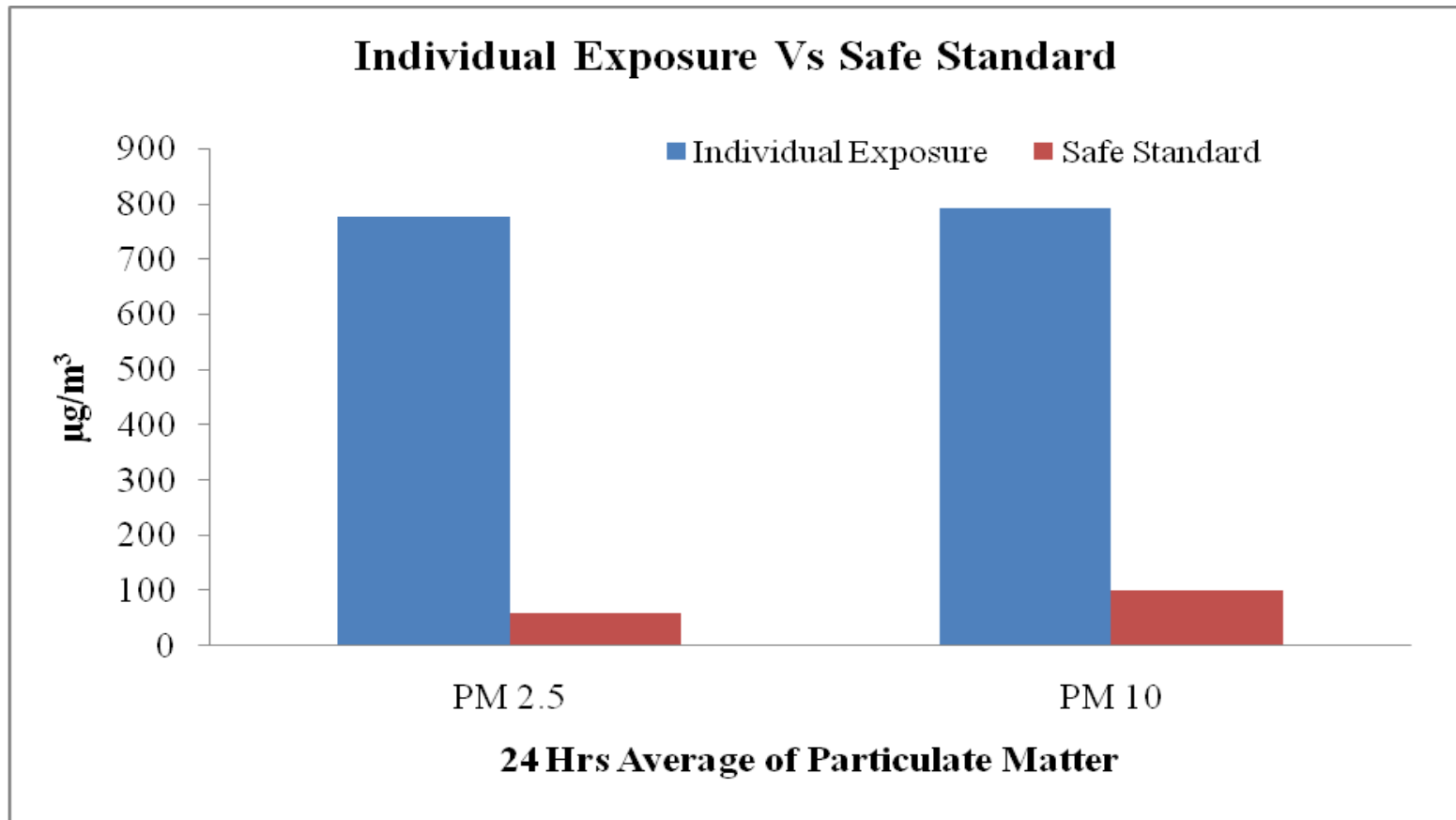


- Union Ministry of Health and Family Welfare: Report of *Steering committee on air pollution and health related Issues*,
- How close we are to the pollution source, what are we inhaling, how much time we spend close to the pollution source?
- Shift from concentration management to exposure management
- Ambient concentrations do not always well represent human exposures,





# How much pollution we breathe in Gurgaon: CSE exposure monitoring.....





## Deadly exposure



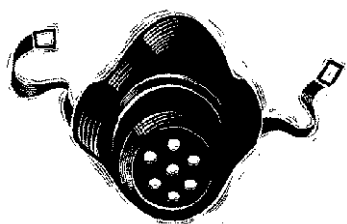
**High exposure during night:** Night time pollution inside homes close to Sohna Road elevated at 850 microgramme per cubic metre.

**Early morning inversion condition worsens pollution impacts.** During morning hours the hourly levels near Artemis, Hospital, and mid morning near Amity International School the levels were more than 738 microgramme per cubic metre.

**High levels in busy market areas and public transport nodes with high footfalls:** The levels near Civil Hospital (Sadar Bazaar, old Gurgaon) was 580 microgramme per cubic metre around noon. In Udyog Vihar the levels in the afternoon was 550 microgramme per cubic metre.

**Late afternoon** near MGF Mall on MG Road was 675 microgramme per cubic metre. Green and clean part of Gurgaon showed exceptionally high values for particulate matter

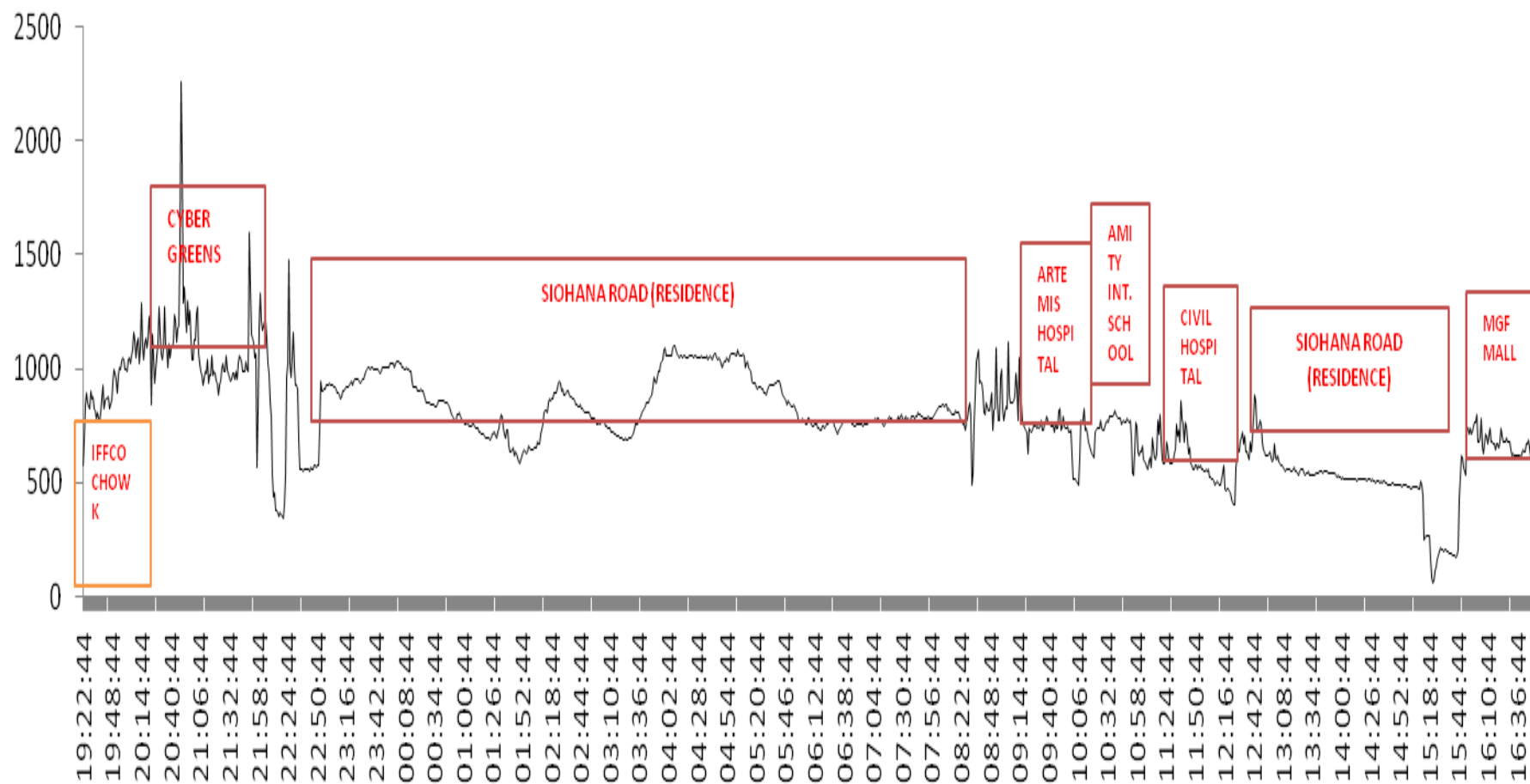




## Living and breathing in Gurgaon .....



PM2.5 (microgramme per cubic metre) 18-19 Dec (19:22-16:50)





# Health of children compromised.....



**2012 epidemiological study on children in Delhi (CPCB and Chittaranjan National Cancer Institute of Kolkata):**

- Covered **11,628 school-going children** from 36 schools.
- **Every third child has reduced lung function. Sputum of Delhi's children contains four times more iron-laden macrophages** than those from cleaner environs, **indicating pulmonary hemorrhage.**



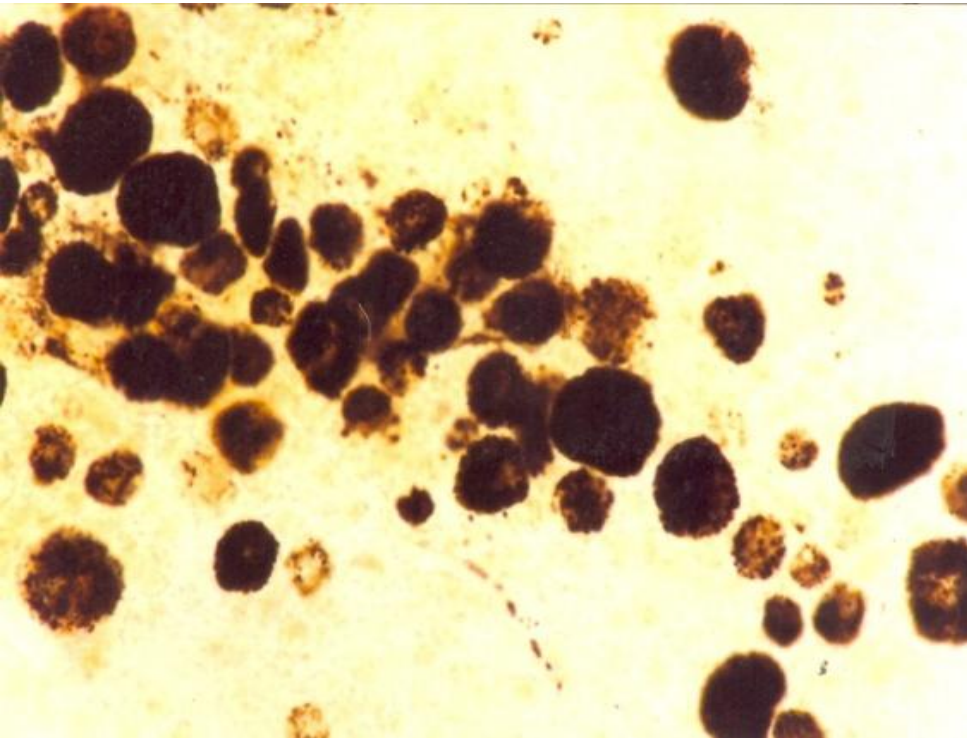


# Deadly evidences.....



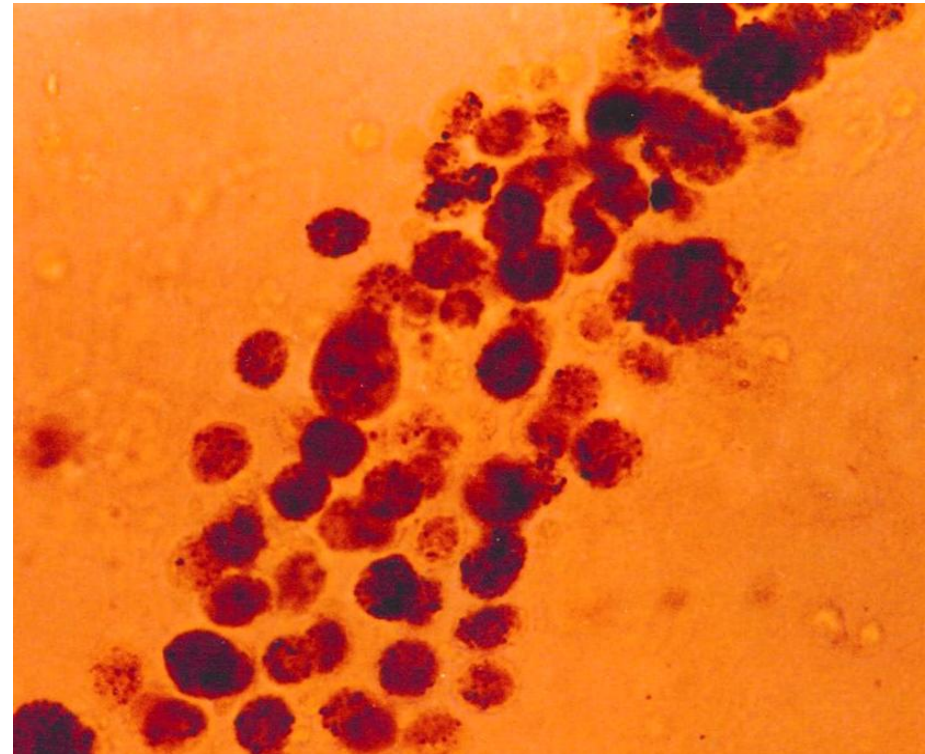
**Kolkata taxi driver**

**Increase in AM number**



**Delhi: 14 year old child**

**AM number**







## Vehicular pollution: High exposure

Vehicular emissions -- significant human exposure.

**Pollution concentration in our breathe is 3-4 times higher** than the ambient air concentration.

In densely-populated cities more than **50 – 60% of the population lives or works near roadside** where levels are much higher.

**The WHO:** Epidemiological evidences show adverse health effects of exposure to transport related air pollution is increasing.

**Some of the deadliest air toxics, also carcinogens,** are related to vehicular emissions. Diverse health outcome. Blamed even for killing foetus.



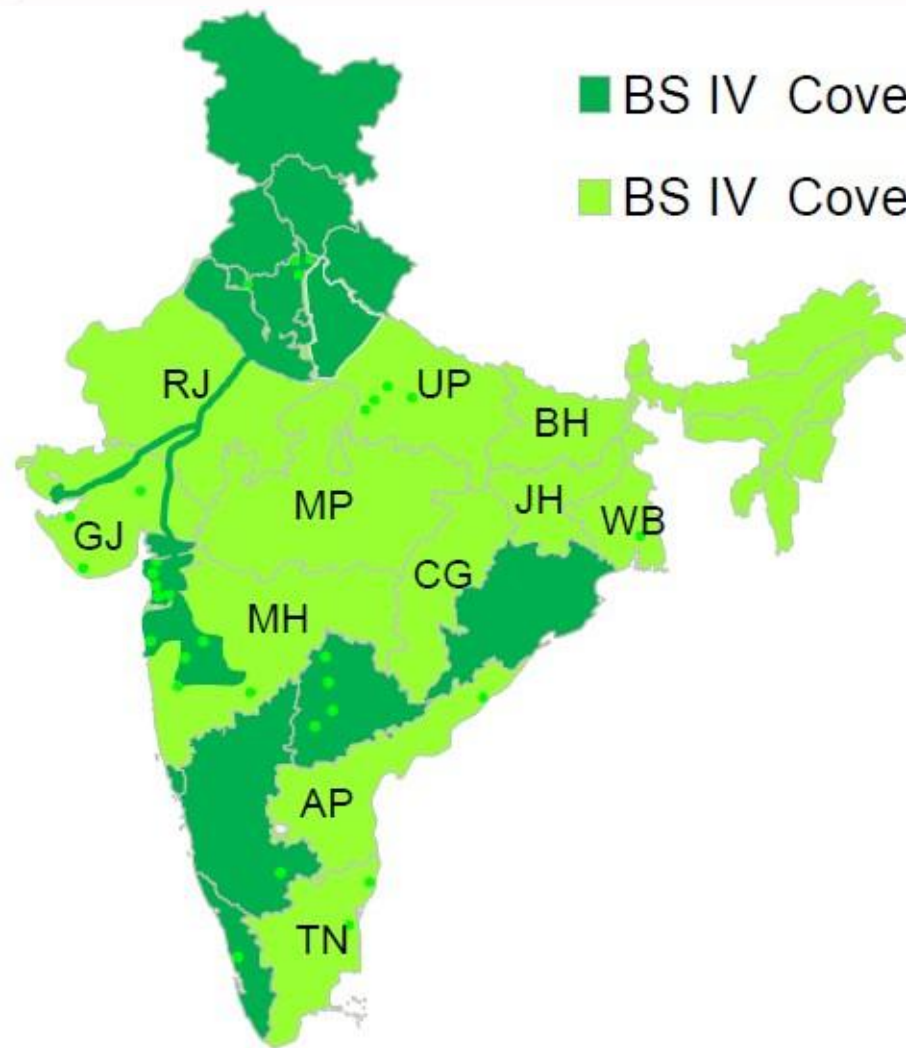
# Guru'jam'

## Losing battle of car-bulge





# Addressing Emissions from New and Old Vehicles



■ BS IV Coverage - 01.04.16

■ BS IV Coverage - 01.04.17

## New Vehicles

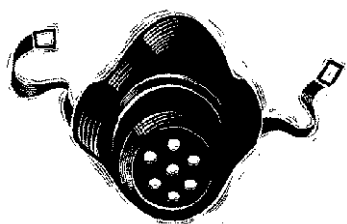
April 2017: BSIV nation-wide  
April 2020: Leapfrog to BS VI  
to address diesel emissions

## Old vehicles

NGT directives

**Need new emissions  
inspection regime**





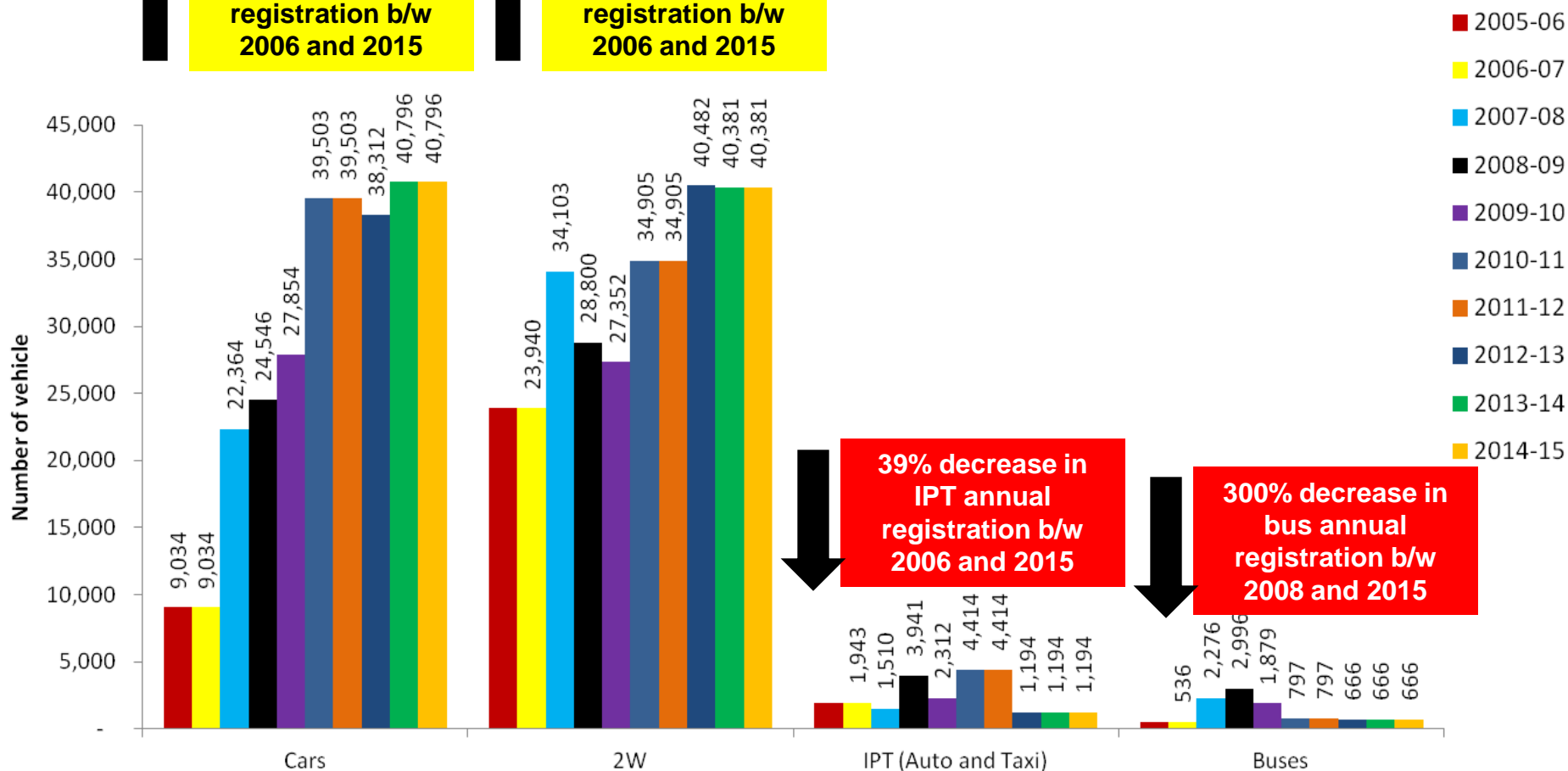
# Explosive numbers

## Annual registration of vehicles in Gurgaon: 2006 – 2015



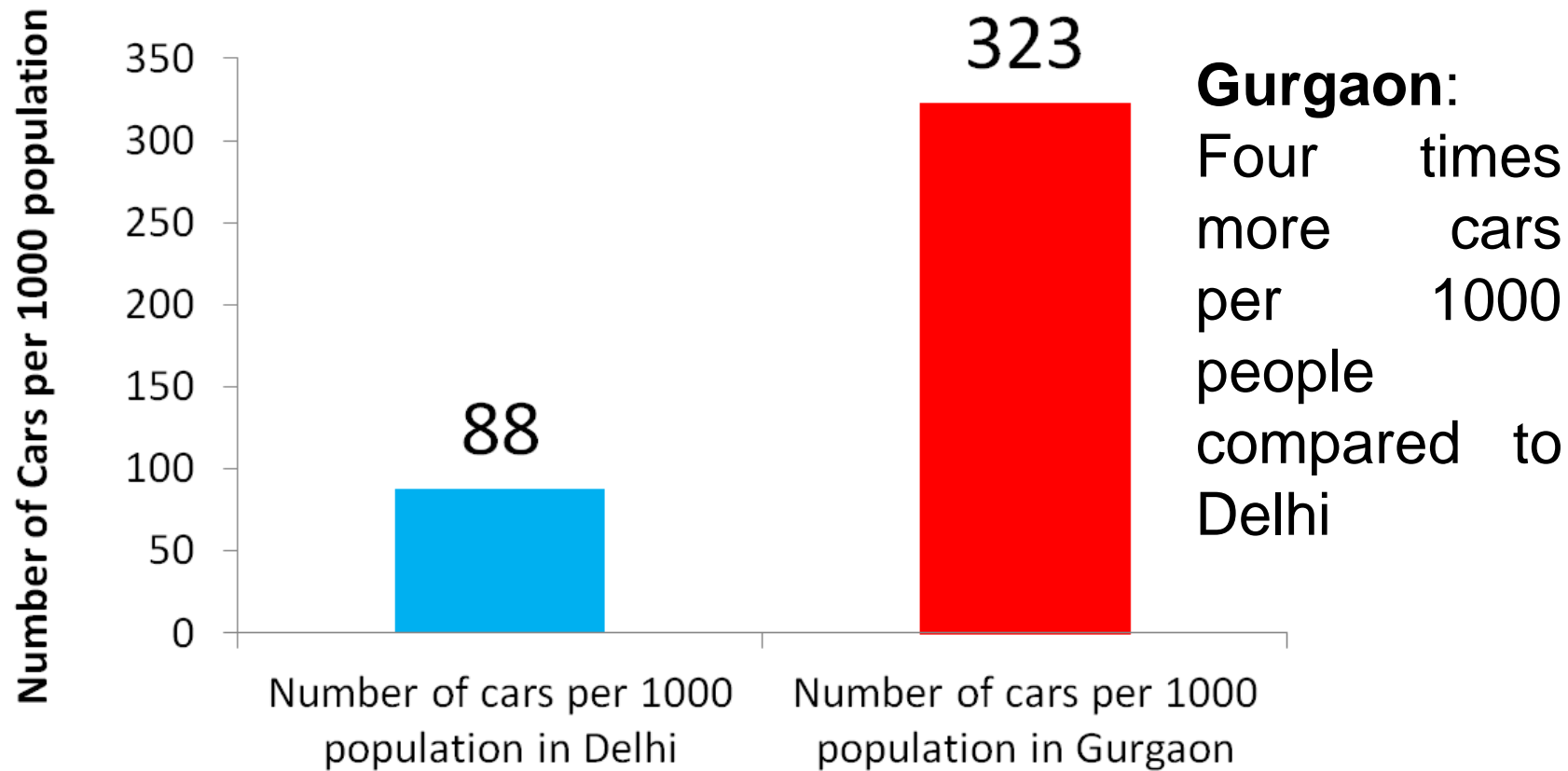
352% increase in  
cars annual  
registration b/w  
2006 and 2015

69% increase in 2  
wheeler annual  
registration b/w  
2006 and 2015

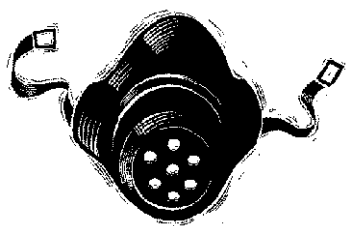




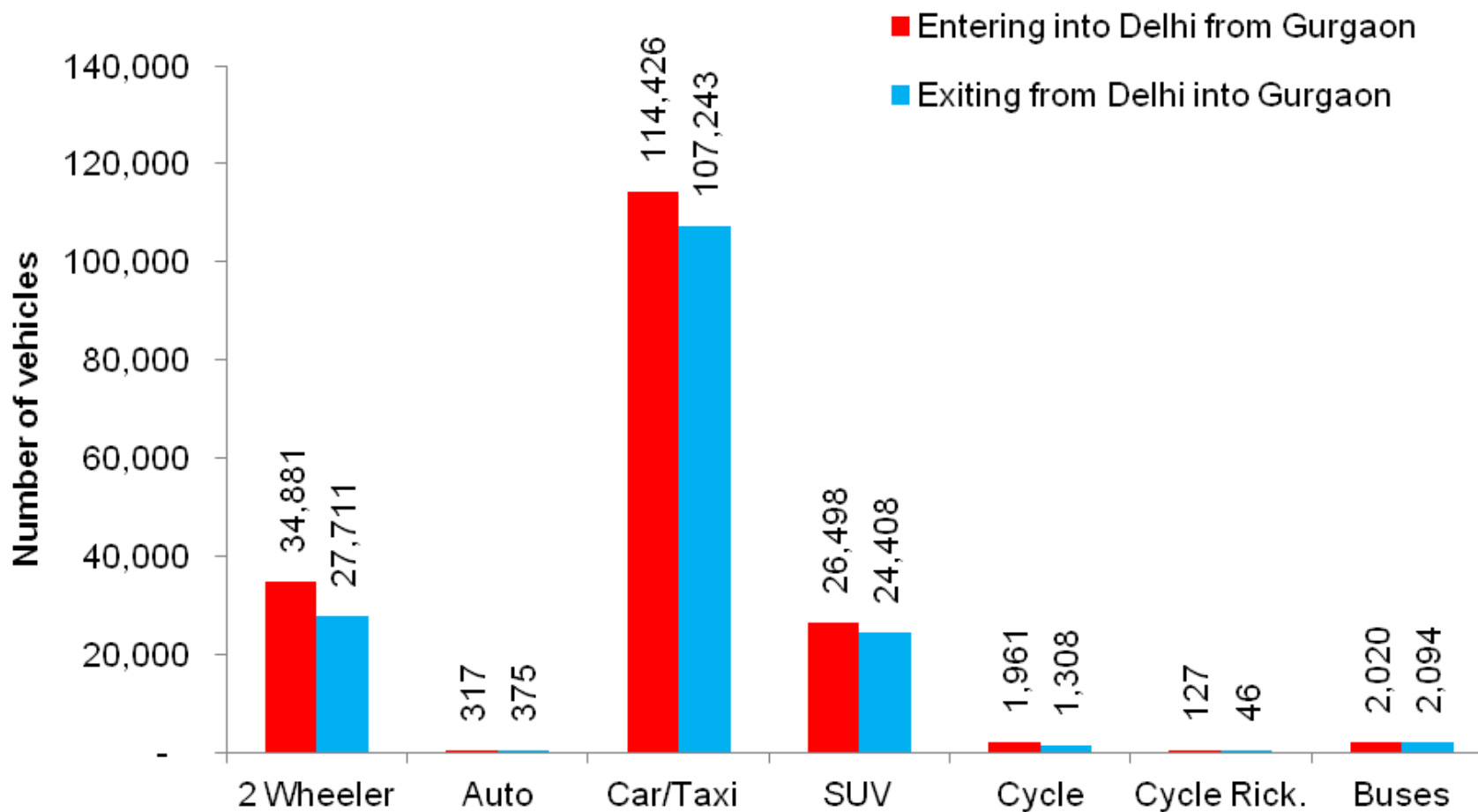
# Galloping car ownership....



Source: Economic survey of Delhi-2014-15, Statistical Abstract of Haryana- 2014-15 and Census of India- 2011

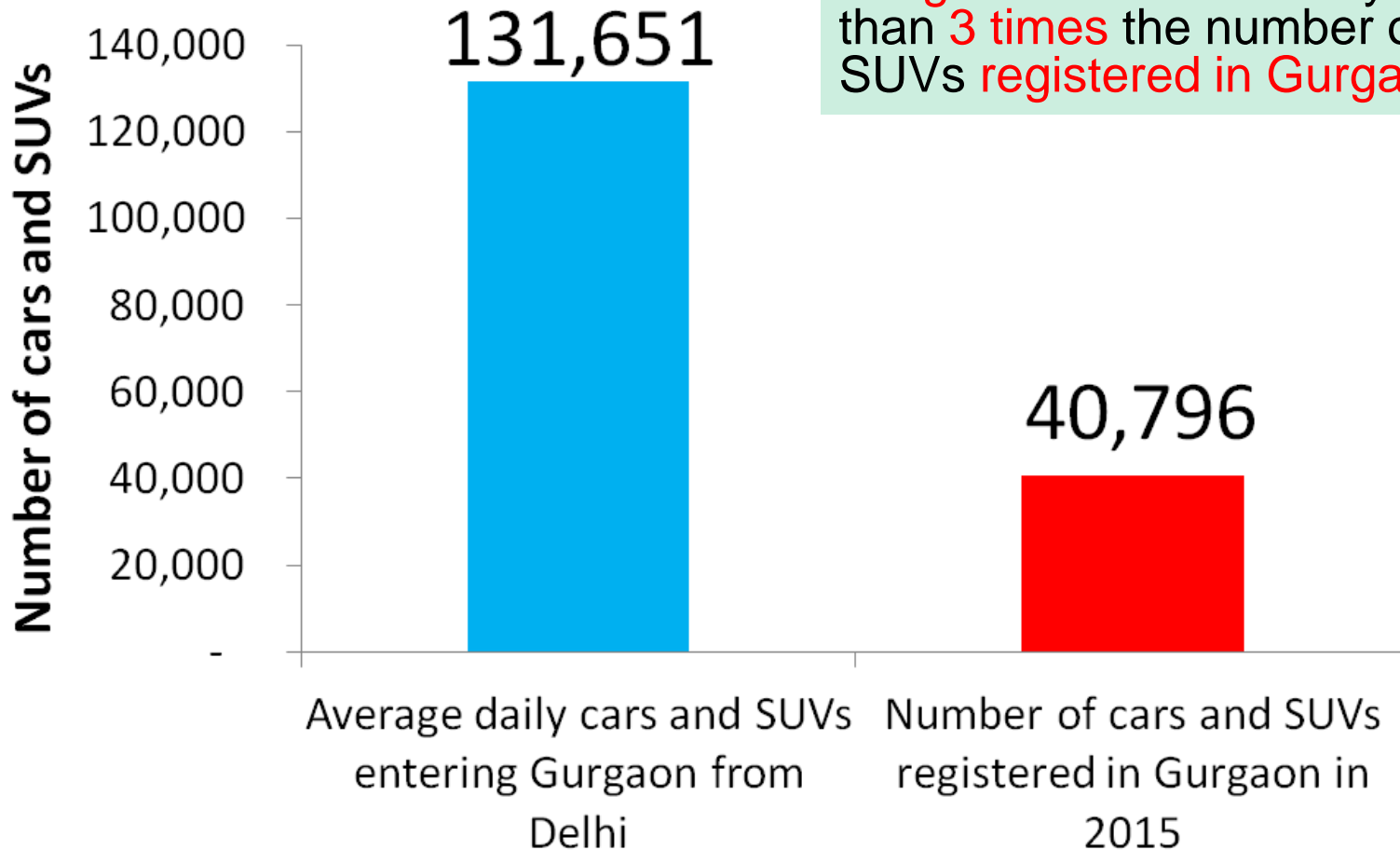


# Vehicles entering Gurgaon from Delhi through Rajokari on NH-8

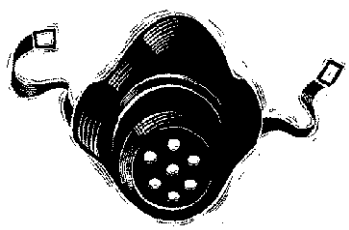




# Daily influx higher than the annual registration



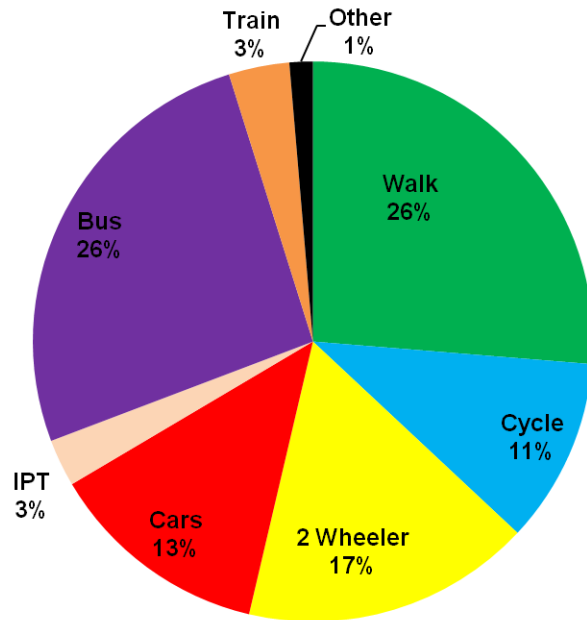
- Number of cars & SUVs entering Gurgaon from Delhi daily is more than 3 times the number of cars and SUVs registered in Gurgaon in 2015



**Yet the majority is walking, cycling, and using public transport....**

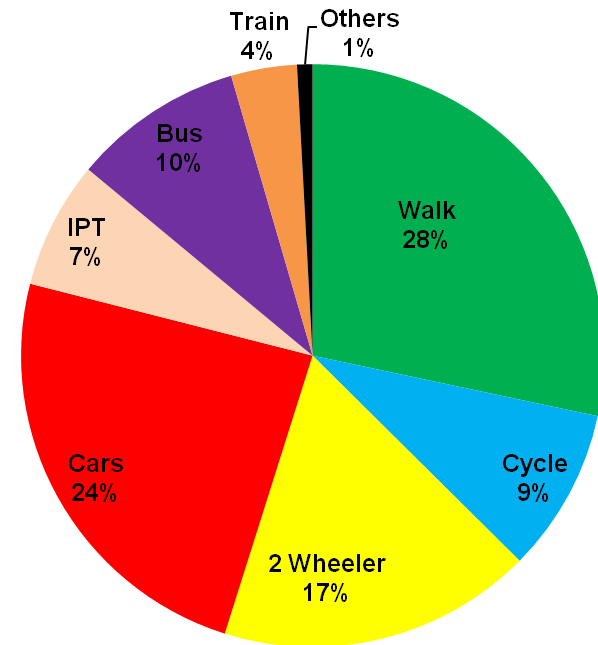


## Delhi

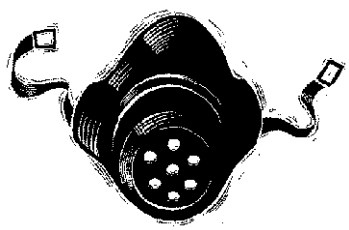


- 30% by cars & 2W in Delhi.
- 37% Walk and cycle
- 29% by Bus & train

## Gurgaon



- 41% by cars & 2W
- 37% walk and cycle
- 14% by Bus & train



# City Bus Service: Can be a game changer



## Efficient bus operations

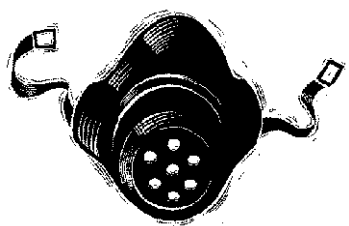
- Number of buses
- Route planning to serve the population with reliable service
- Fleet utilisation
- Kilometre Efficiency and load factor
- Distance travelled and trips /day
- Average age of bus
- Fuel Efficiency
- Staff per bus
- Reducing dead mileage
- Infrastructure optimisation

## Planning and policy – regulatory and fiscal – Innovations –

- Management strategies
- Service guarantee programme
- Public transport system



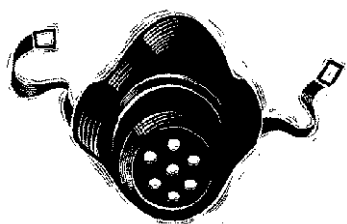




# Bus transport languishing



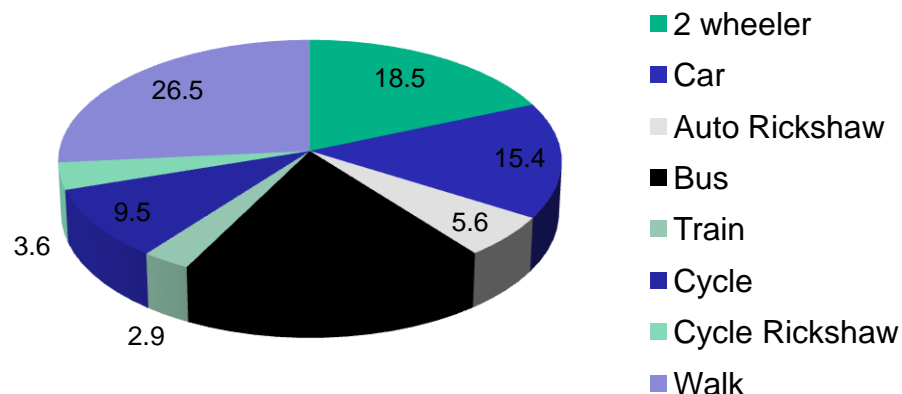
Indicator	2014-15	2013-14	Service Level Benchmark
Total fleet of buses	284	289	60 buses per lakh population): in Gurgaon the number is only 31 buses per lakh in 2014-15
Daily Passengers carried	31,030	27,753	
Daily distance travelled by a bus	197	197	Minimum of 225 kms a day/bus



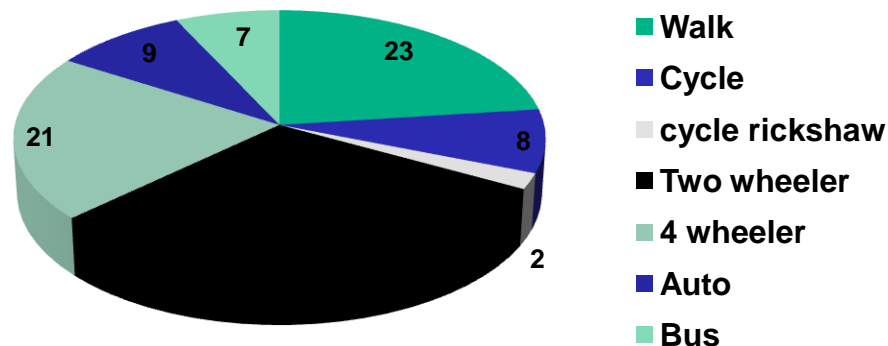
# Weakening of baseline Gurgaon: Massive drop in public transport ridership since 2004



**2004:** Share of total public transport and intermediate public transport -- 58%



**2010:** Nearly 60% of travel trips carried by personal transport –cars and two wheelers



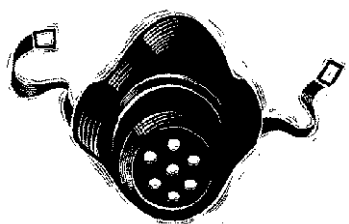


## Need NCR-wide public transport plan



### Implement seamless public transport system in the NCR

- Implement NCR wide seamless bus system and para transit system and remove tolls and tax barriers across borders for public transport within a year under **reciprocal agreement**
- Implement plan for improved rail network

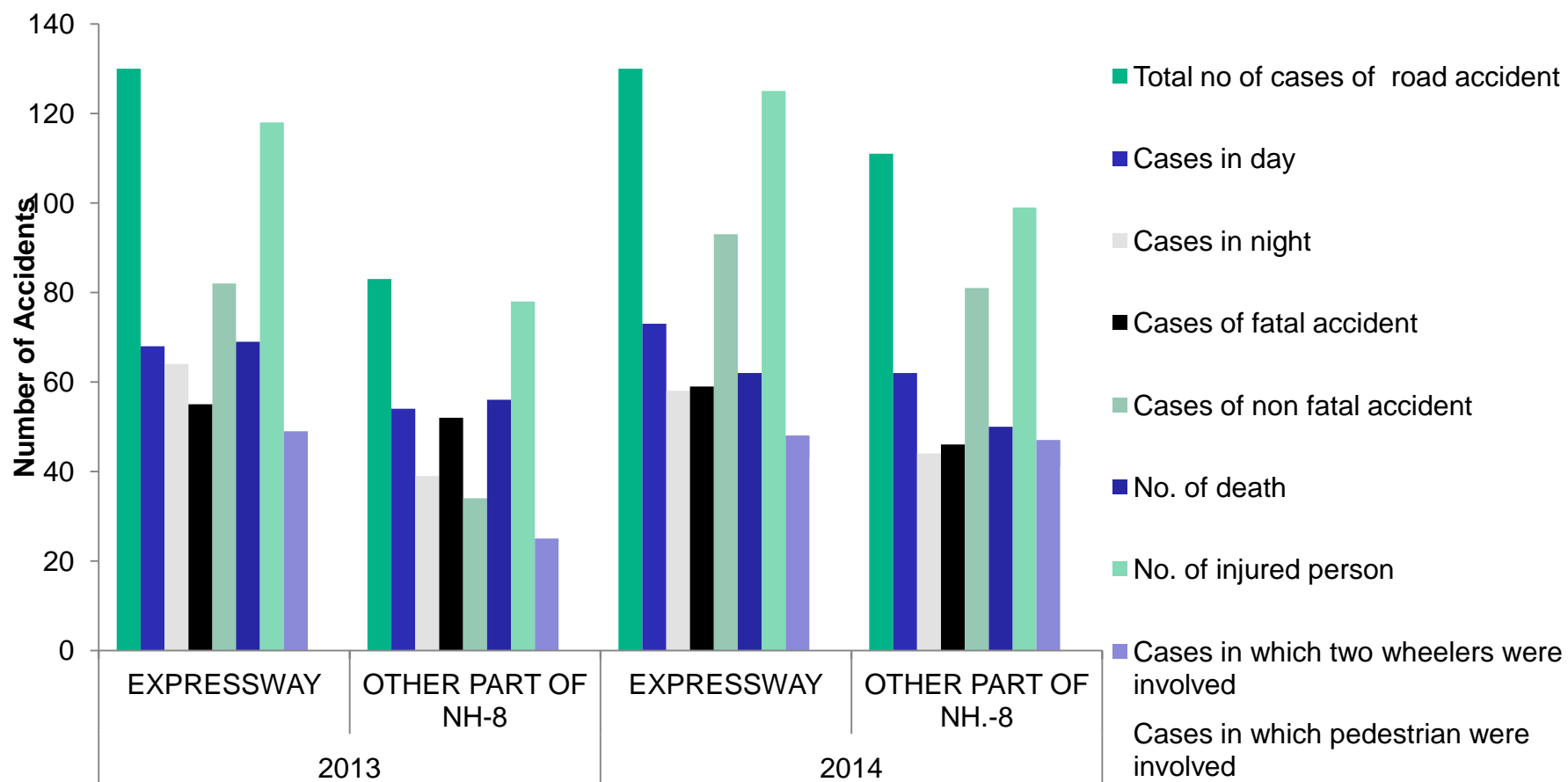


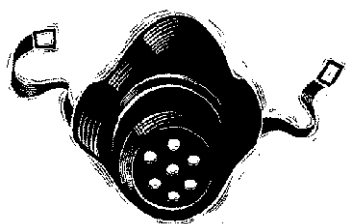
# Road injuries

## Deadly Highways and Expressways



60% of accidents on NH-8 expressway



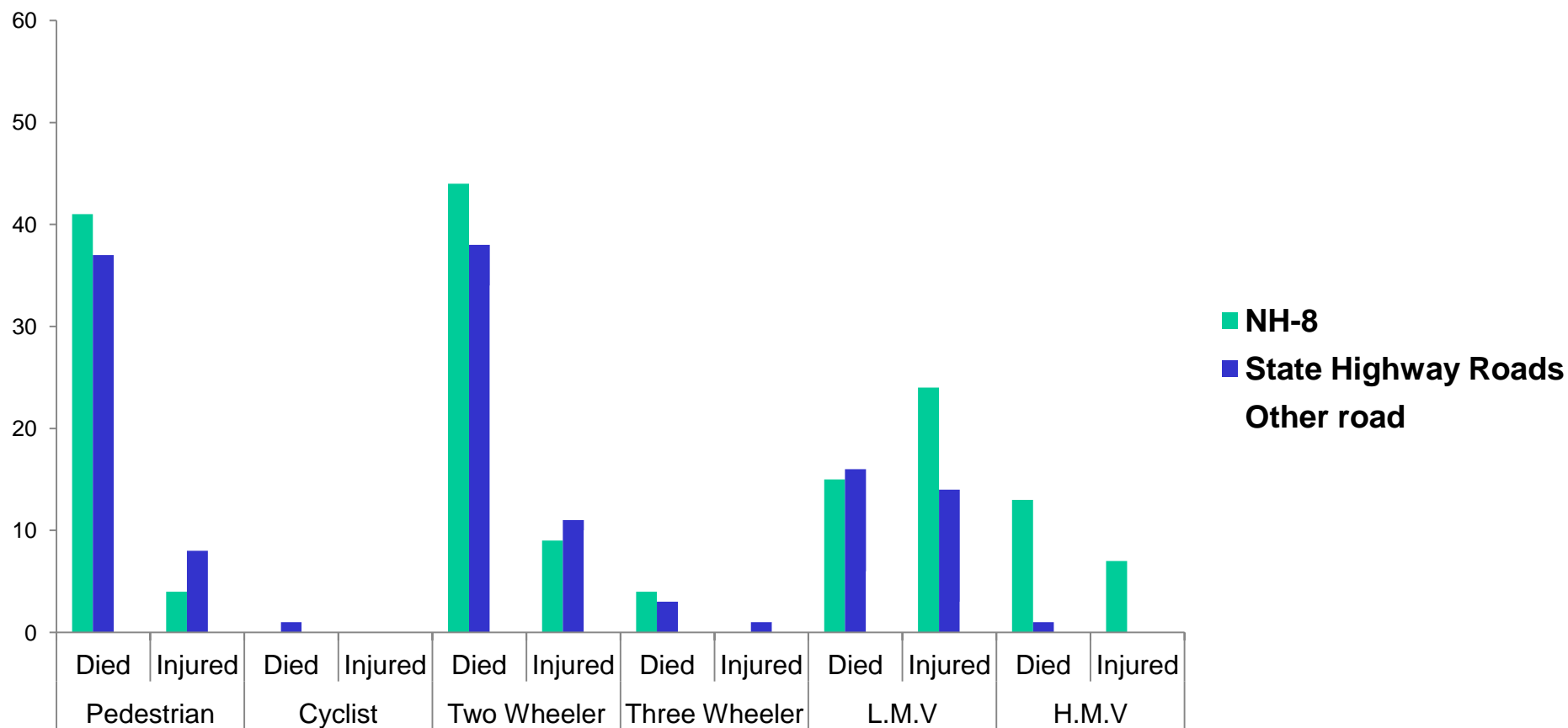


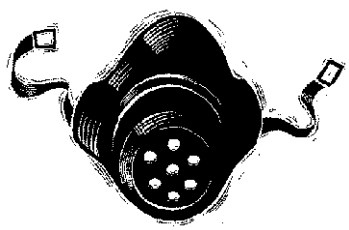
# Lack of safe access

## Pedestrians and two wheeler riders most vulnerable



Road wise Fatal Accident Analysis W.E.F. 1-1-2014 to 30-9-2014





## CSE Audit of streets and connectivity in Gurgaon



### The audit has assessed

- Interconnected street network that allows movement of, their engineering and design features for footpath and cycle track;
- Crossing- Intersection and mid section protection for pedestrians and public transport users;
- Modal interchange locations and parking for all mode users; location and quality of facilities outside station premises, way finding maps; Universal accessibility;
- Amenities and safety features ( Toilet, vendor space, trees, lighting, seating ), and building entry locations and public transport feeder services.
- Considered 500 meter radius from the Metro stations.
- The scoring was ascribed accordingly.





# Engineering features: People unfriendly



**No safe crossings outside metro stations**



**Height of the footpath, making it inaccessible for users**



**Pedestrian entry to HUDA city centre metro station is blocked**





# Poor crossing and inadequate feeder services



People waiting on road to board buses as bus stand is in the service and obstructed by median



Only one bus stop was existing near HUDA city center and there were no bus stops around other metro stations





# Unorganised feeders outside metro stations



**Feeder services are poorly designed with no designated parking for autos and cycle rickshaws**





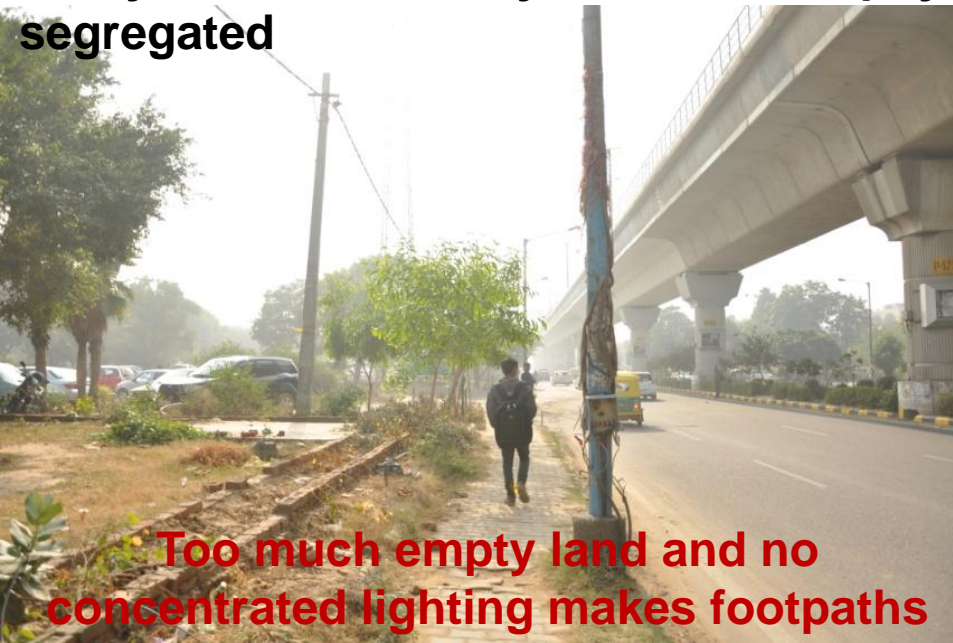


# Aesthetics and Safety

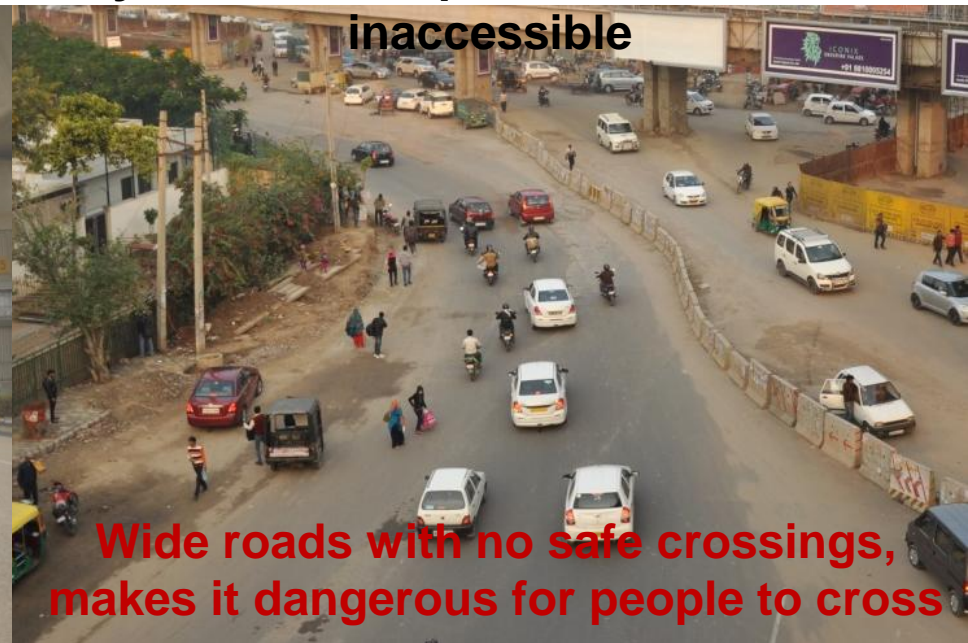


**Cycle track near HUDA city centre but not accessible easily as it's a one way road and not physically segregated**

**Lot of obstruction on footpath makes it inaccessible**

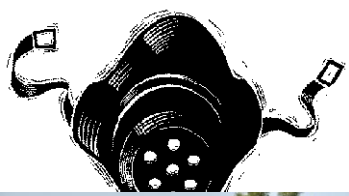


**Too much empty land and no concentrated lighting makes footpaths**



**Wide roads with no safe crossings, makes it dangerous for people to cross**





# Universal accessibility: Poor



The signage shows parking for disabled with no provision of ramps

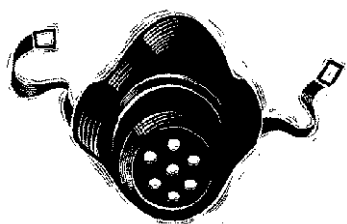


The height of the footpath, makes it difficult for differently able to use them

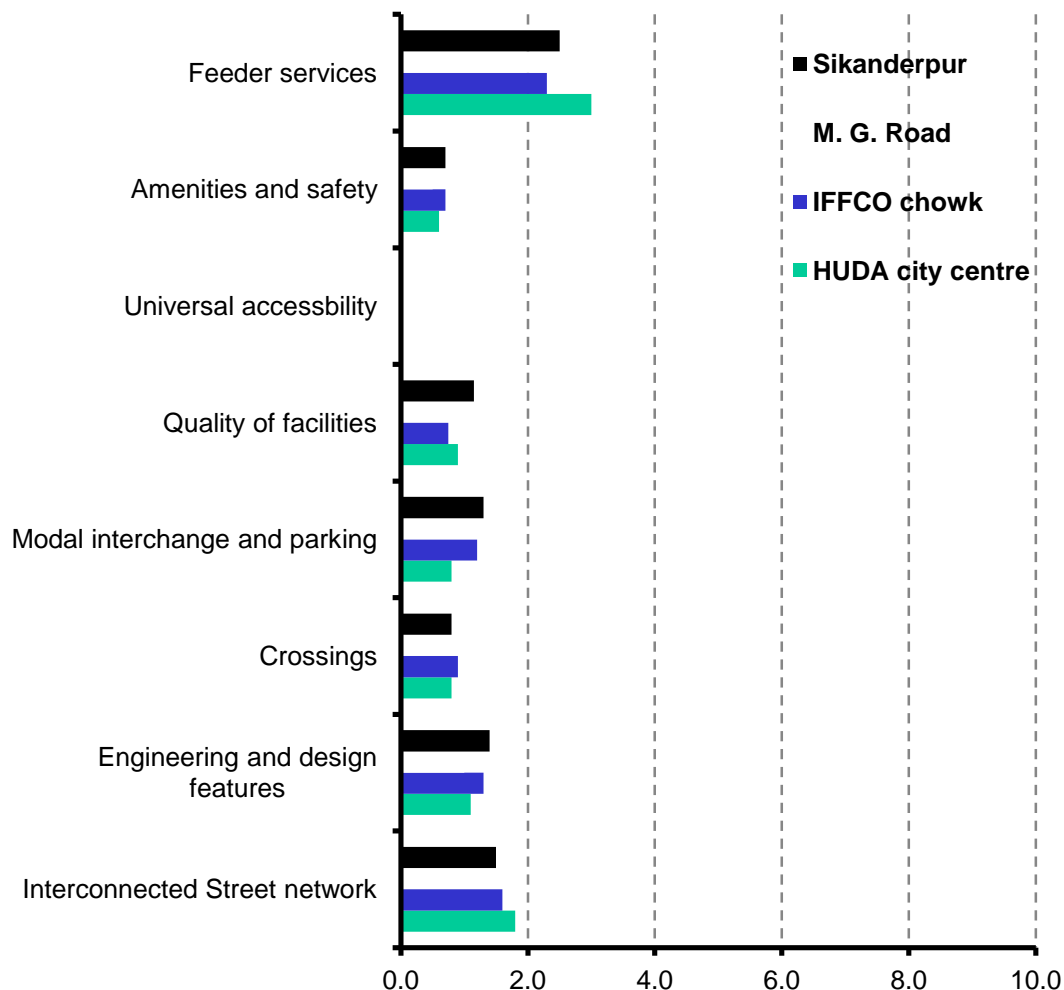


Uneven surface, blocking access for differently abled.





# Poor access to metro stations



**All metro stations score very poor on all parameters**

Access to metro stations is not designed keeping pedestrians and cyclists.

**No safe crossings around any metro stations for walkers and cyclists.**

Footpaths are available mainly all around the metro stations but their height and quality make them inaccessible. Cycle tracks only near HUDA city centre.

**Autos, Cycle rickshaws are the major feeder services along the metro stations. But not organized.**

**There are hardly any bus stops outside metro stations.**

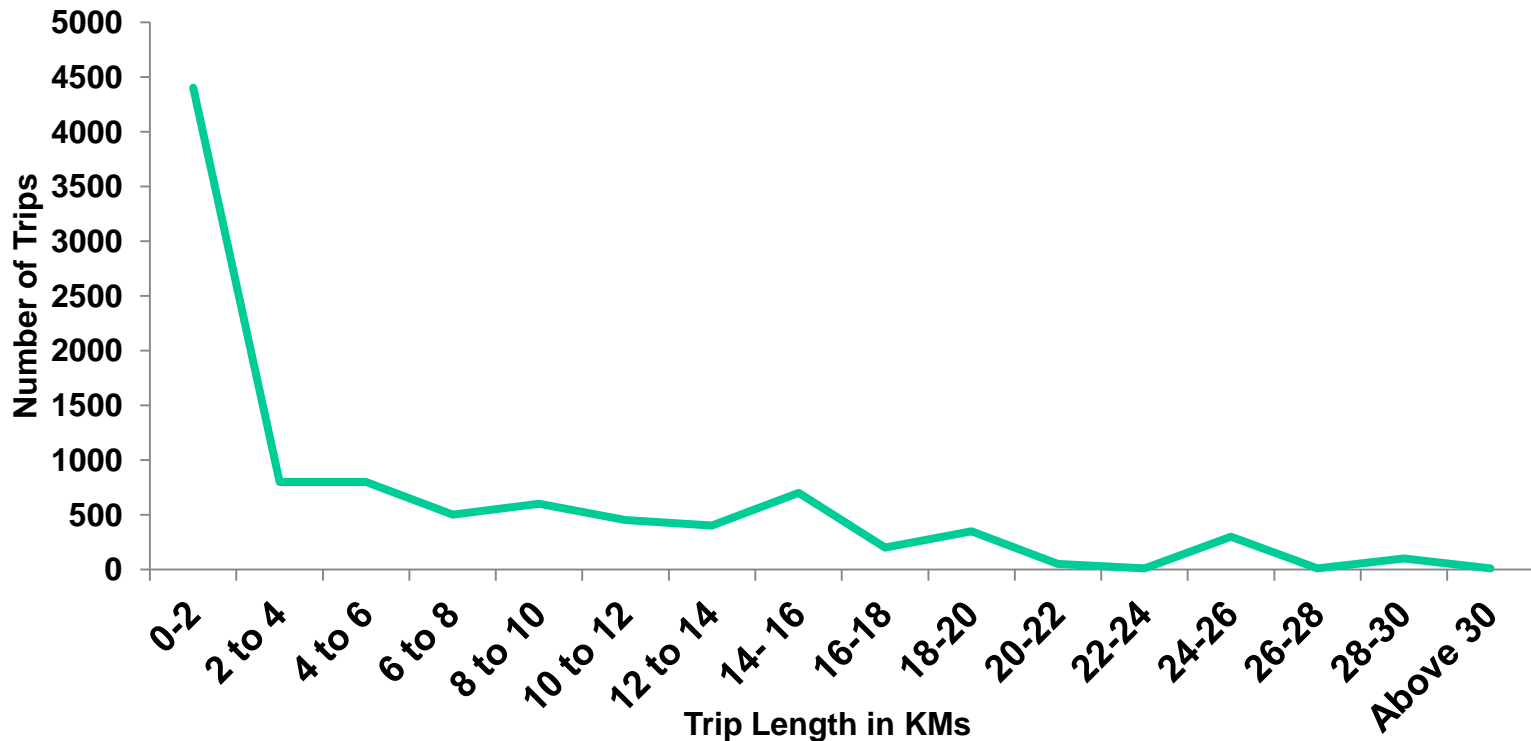
Parking is provided mainly for private vehicles.

**All residential neighbourhoods along the metro line are poorly connected with the transit lines.**





## Short distance travel trips dominate: Enormous potential to promote zero emissions walking and cycling



- Trips between 0-2 kms -- more than 45%
- Trips between 2-6 kms -- 8%
- 6-10 kms -- 8% trips



## **Need infrastructure and regulations for safe walk and cycling**



**Non-motorized network plan and policy for time bound implementation**

**Mandate people and cycling friendly street design guidelines and standards for all roads**

**Protect walkways and cycle tracks from encroachment and ensure safe crossing:** Implement the provision of Motor Vehicle Act 1988 that bars vehicles from being parked on pavements.



# Gurgaon's Car Free Day

## Proactive move...





# Case Study – Gurgaon Sector 28

## Accessing Metro from ITC Laburnam Apts

400M

Emerald Court 1

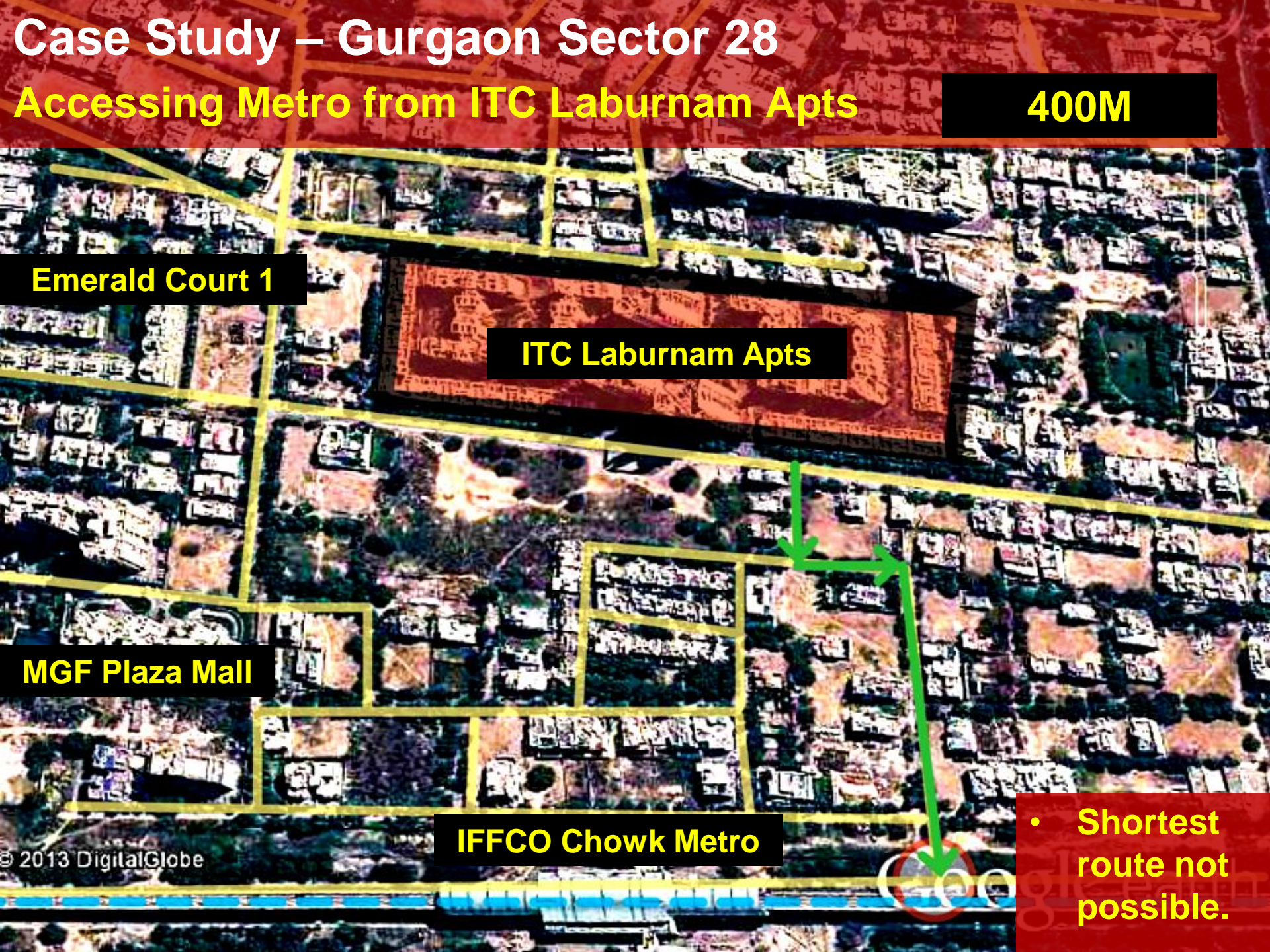
ITC Laburnam Apts

MGF Plaza Mall

IFFCO Chowk Metro

© 2013 DigitalGlobe

- Shortest route not possible.

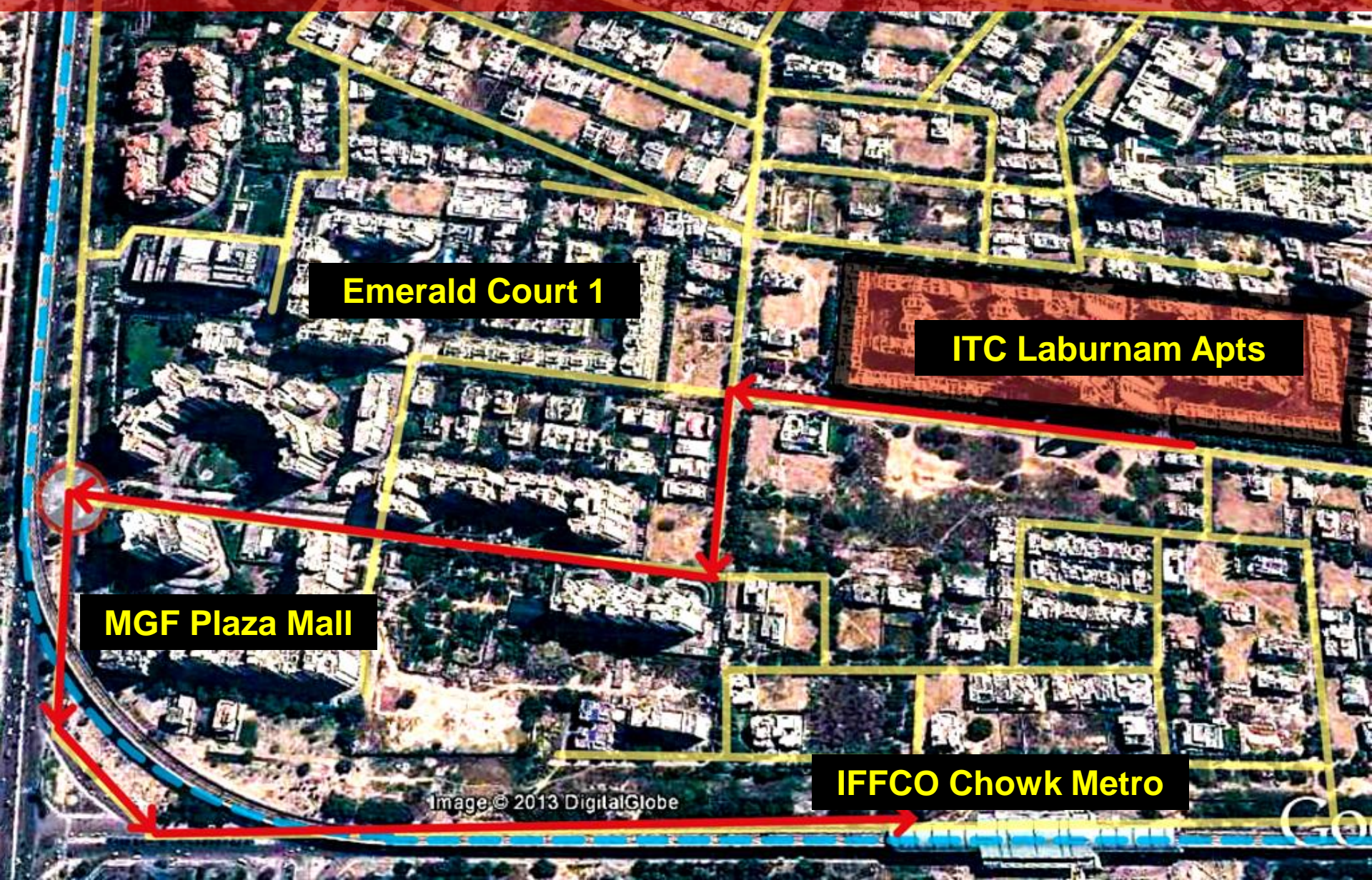




# Case Study – Gurgaon Sector 28

Accessing Metro from ITC Laburnam Apts

1800M



Emerald Court 1

ITC Laburnam Apts

MGF Plaza Mall

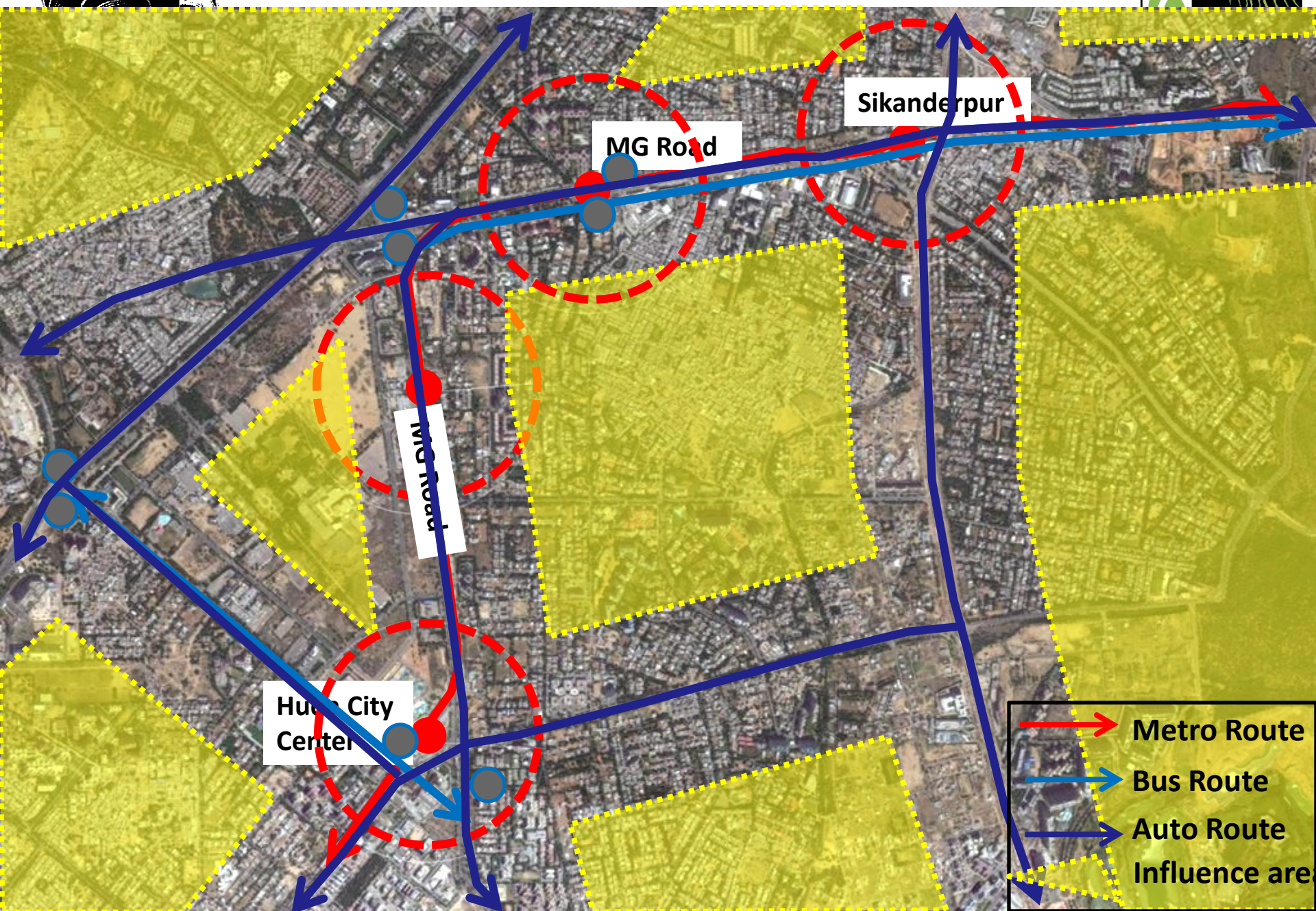
IFFCO Chowk Metro

Image © 2013 DigitalGlobe

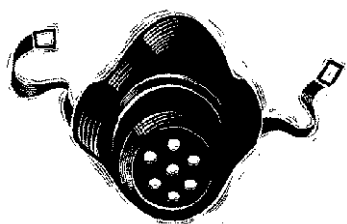




# Metro Catchment: Unconnected neighbourhoods







## Build compact city .....Devil is in detail



### ***National Habitat Standard Mission of the Ministry of Urban Development***

#### ***Guidelines for compact mixed land use***

- **95% of residences should have daily needs** retail, parks, primary schools and recreational areas accessible **within 400m walking distance.**
- **95% residences should have access to employment and public and institutional services by public transport or bicycle or walk or combination of two or more.**
- **At least 85% of all streets to have mixed use development.**
- **Need small block size with high density permeable streets etc**

#### **UTTIPEC guidelines**

<b>Hierarchy of Facilities</b>	<b>Accessibility Standard from each home/ work place.*</b>
MRTS Station	Approx. 800 m or 10 min walk
Metro feeder/ HOV feeder Stop	Approx. 400 m or 5 min walk
Bus Stop	Approx. 400 m or 5 min walk
IPT/ auto-rickshaw Stand	Approx. 250 m or 3 min walk
Cycle Rickshaw Stand	Approx. 250 m or 3 min walk
Cycle Rental Stand	Approx. 250 m or 3 min walk
Shared private parking garage	Approx. 500 m or 6 min walk



# How can public transport, walk and cycle work here?



Engineering changes once made cannot be reversed easily... It permanently decides our travel choices and locks up pollution.....Traffic and pollution impact of infrastructure is never carried out.....

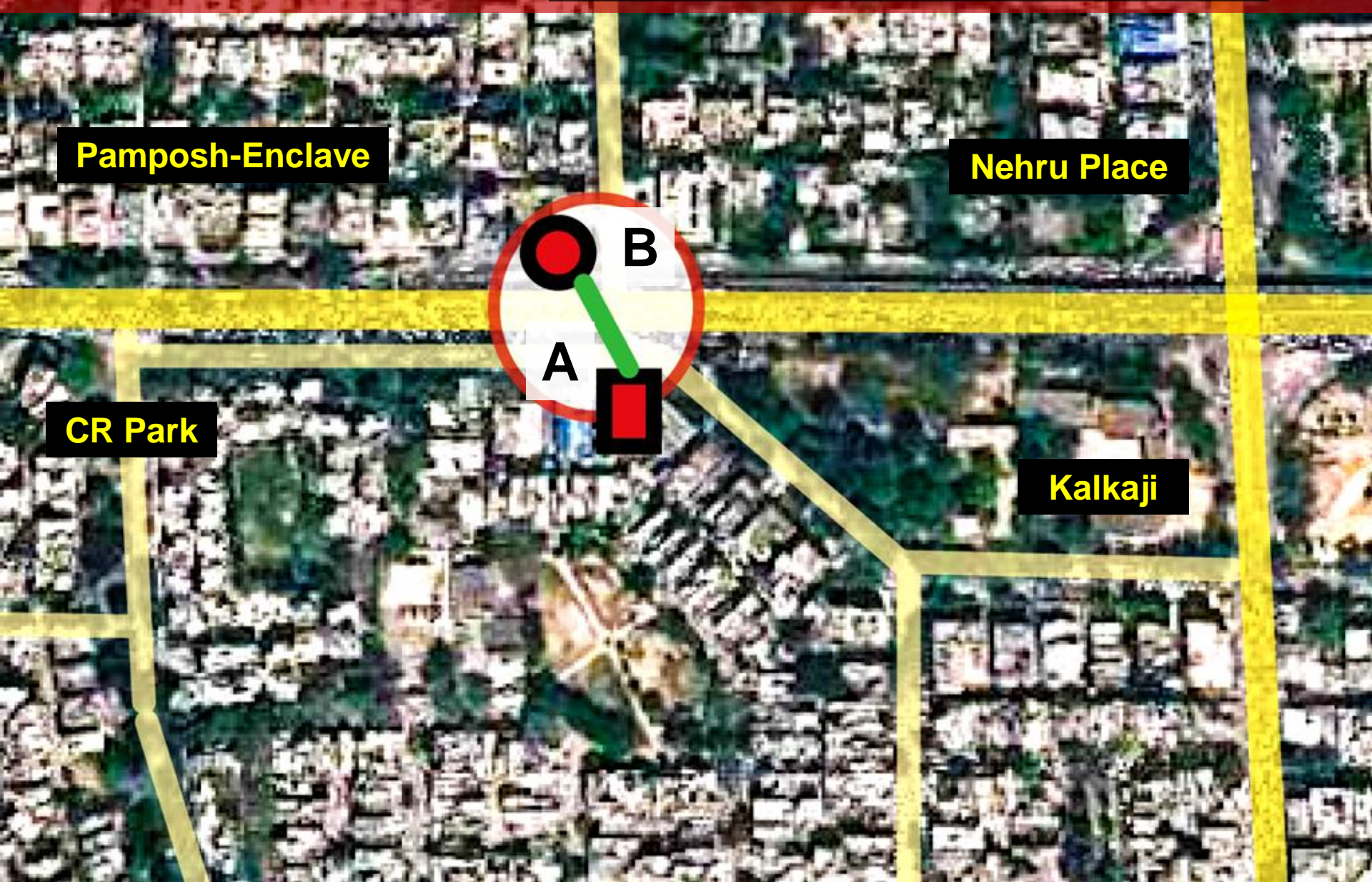




# Case Study – Outer Ring Road (Nehru Place Flyover)

Travelling from A to B

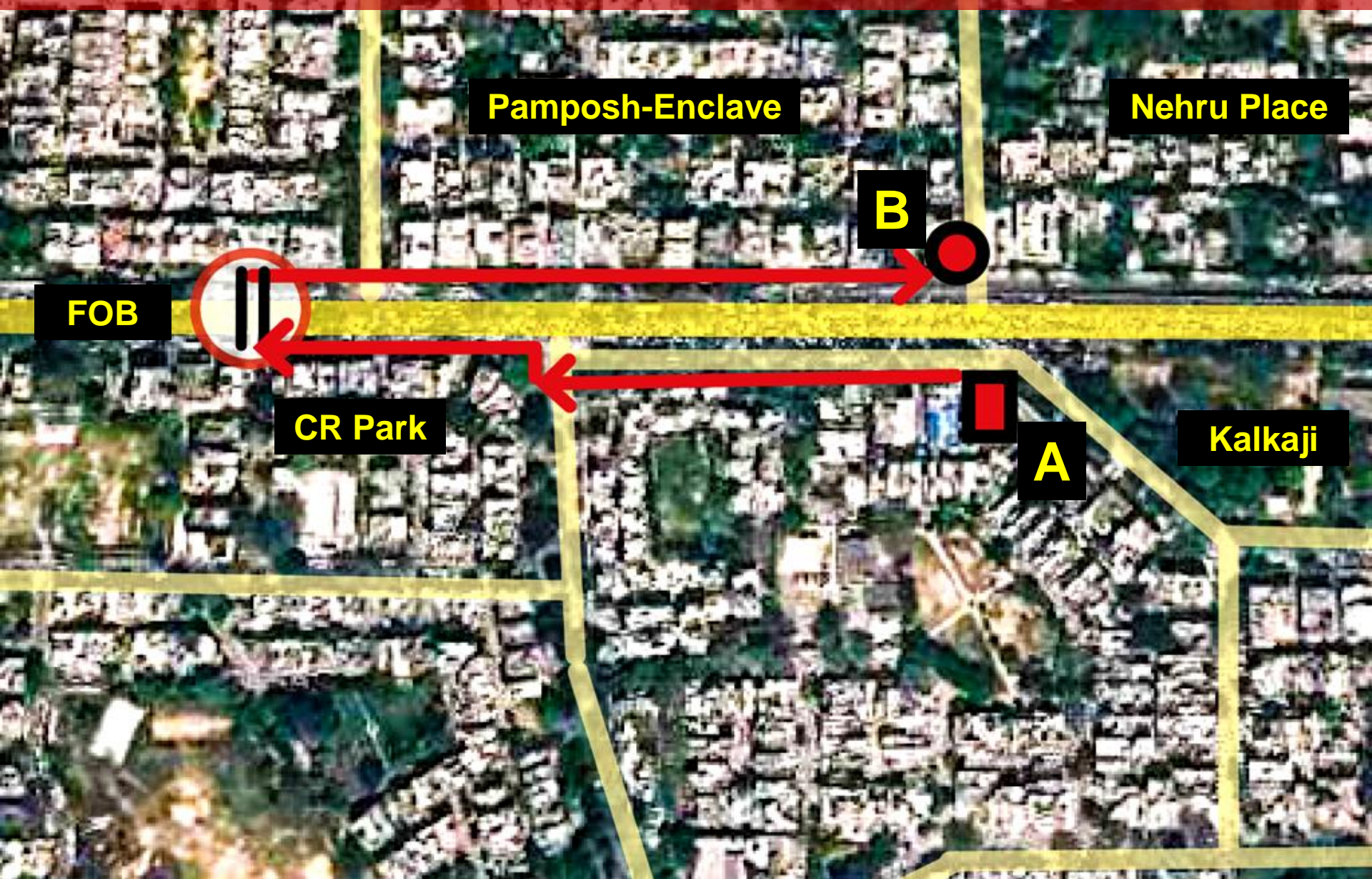
Originally 30M across the road





# Case Study – Outer Ring Road (Nehru Place Flyover)

Travelling from A to B – Pedestrian Route 1 1000M via FOB







## Car restraint strategy

How can we use parking policy as restraint measure?



- **Parking: most wasteful uses of cars:** Out of 8760 hours/ year total steering time of an average car is 400 hours. For about 90 to 95 per cent of the time a car is parked.
- **Insatiable demand for land:**
- **Inequitous use of land:** A car is allotted 23 sq m for parking. A poor family 18 sqm under low cost housing scheme.

**Land is limited. Where will cities find more land to park cars?**

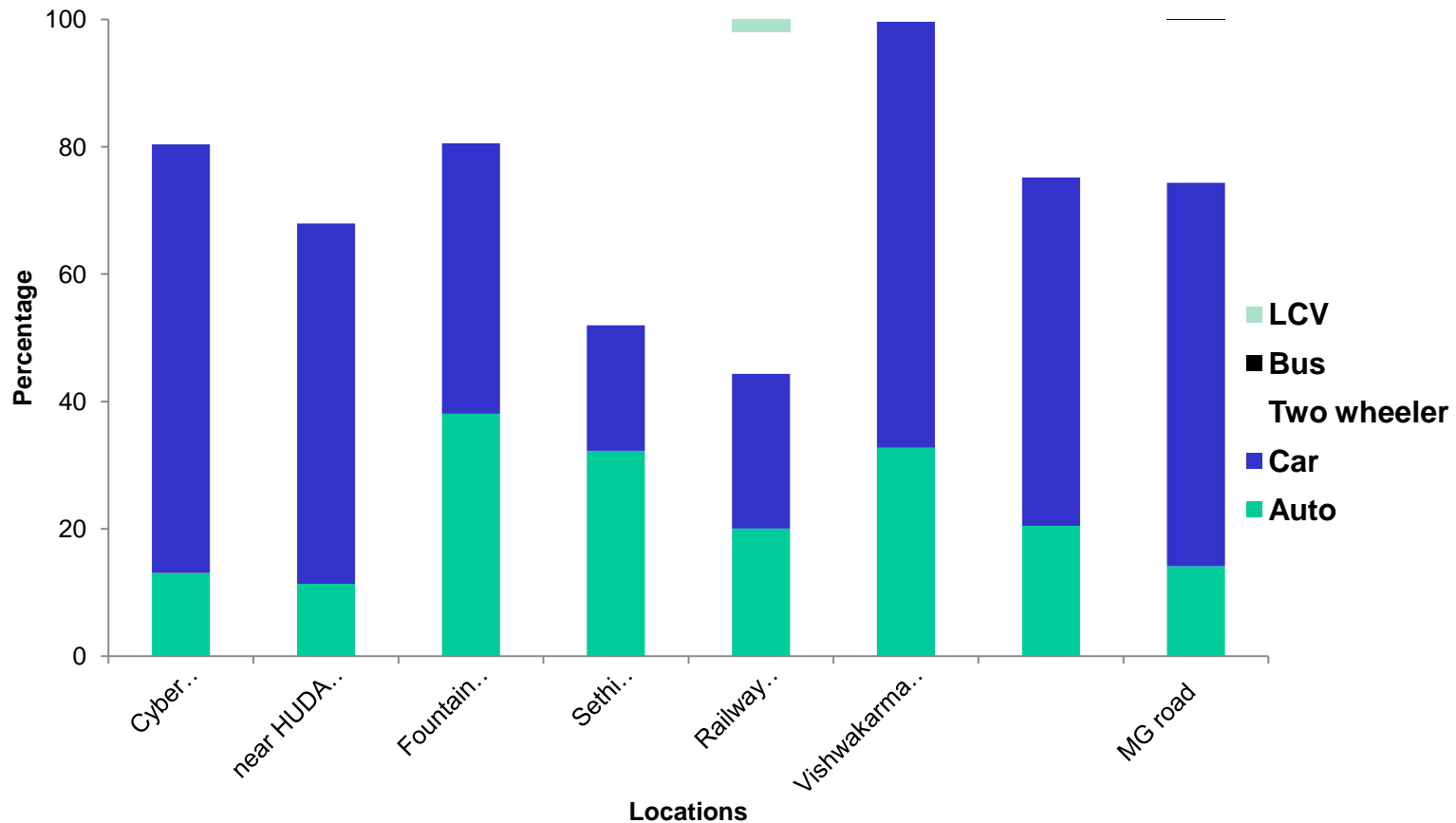


- Gurgaon needs additional land equal to **175 football fields to meet parking demand from new cars every year.**





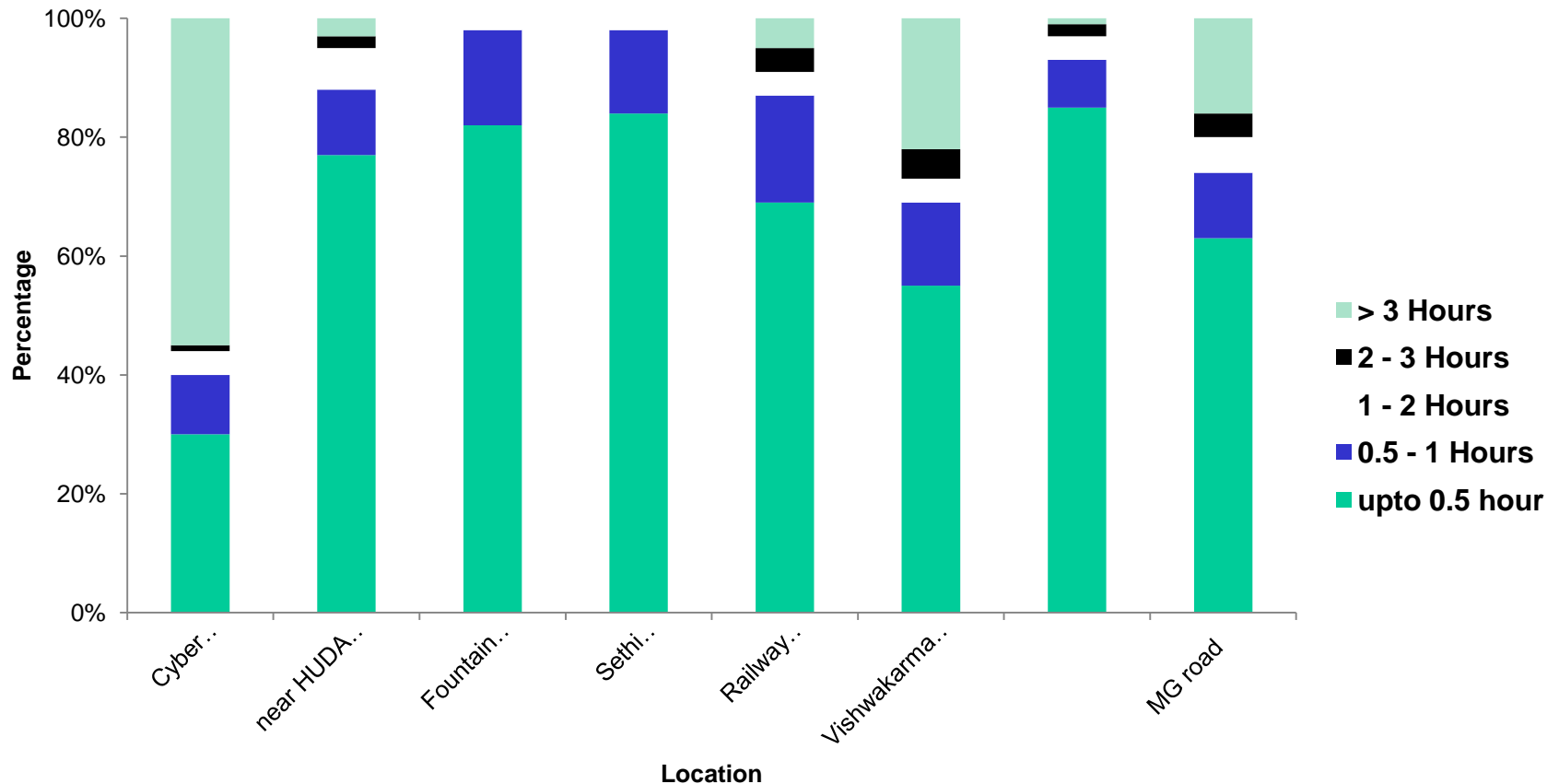
# Personal vehicles dominate parking demand in Gurgaon



•Cars and two wheelers take majority of the space out of total vehicles parked.



# Short term parkers dominate



More than 80% of the vehicles are parked less than one hour.  
Effective pricing can make a difference





## Organise parking... Method in madness



**Off street car and auto rickshaw parking area along the road**

Source: I Trans, Anvita Arora

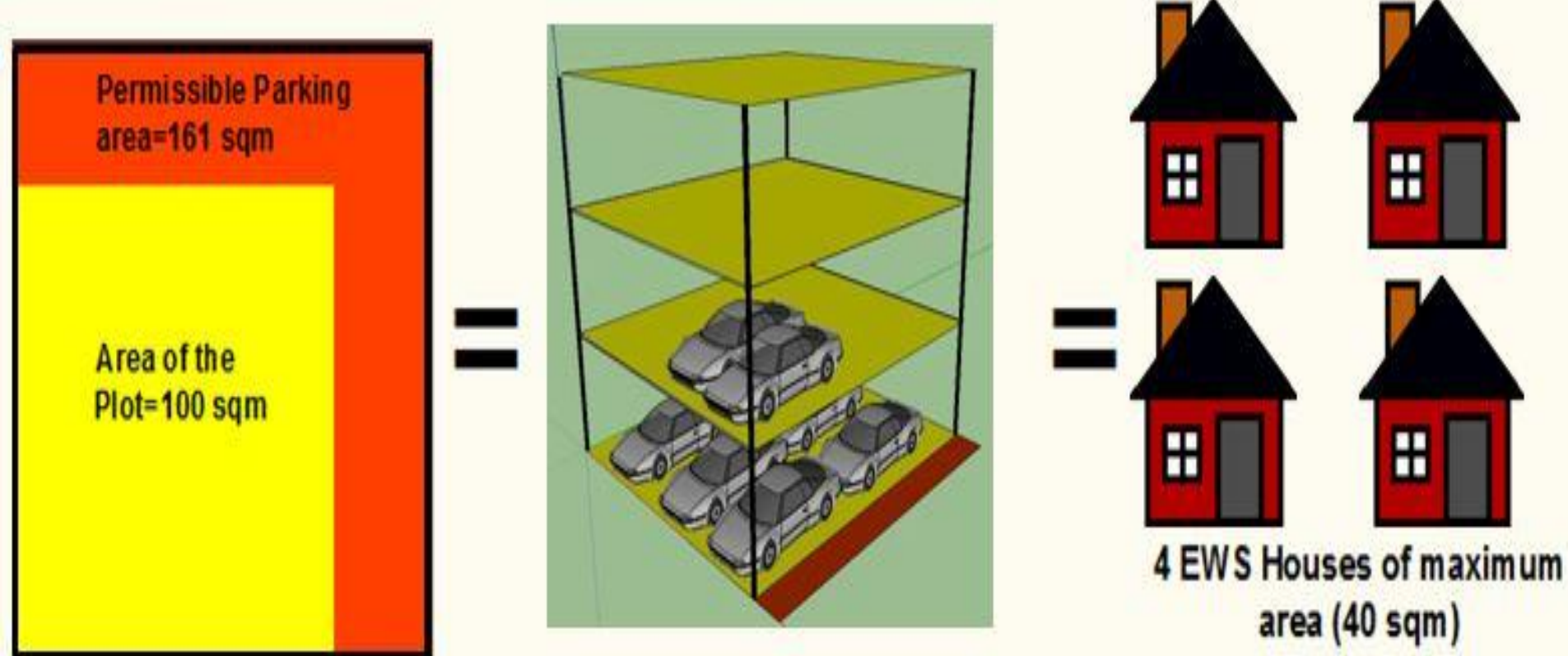




# Why are we wasting so much valuable space for parking?

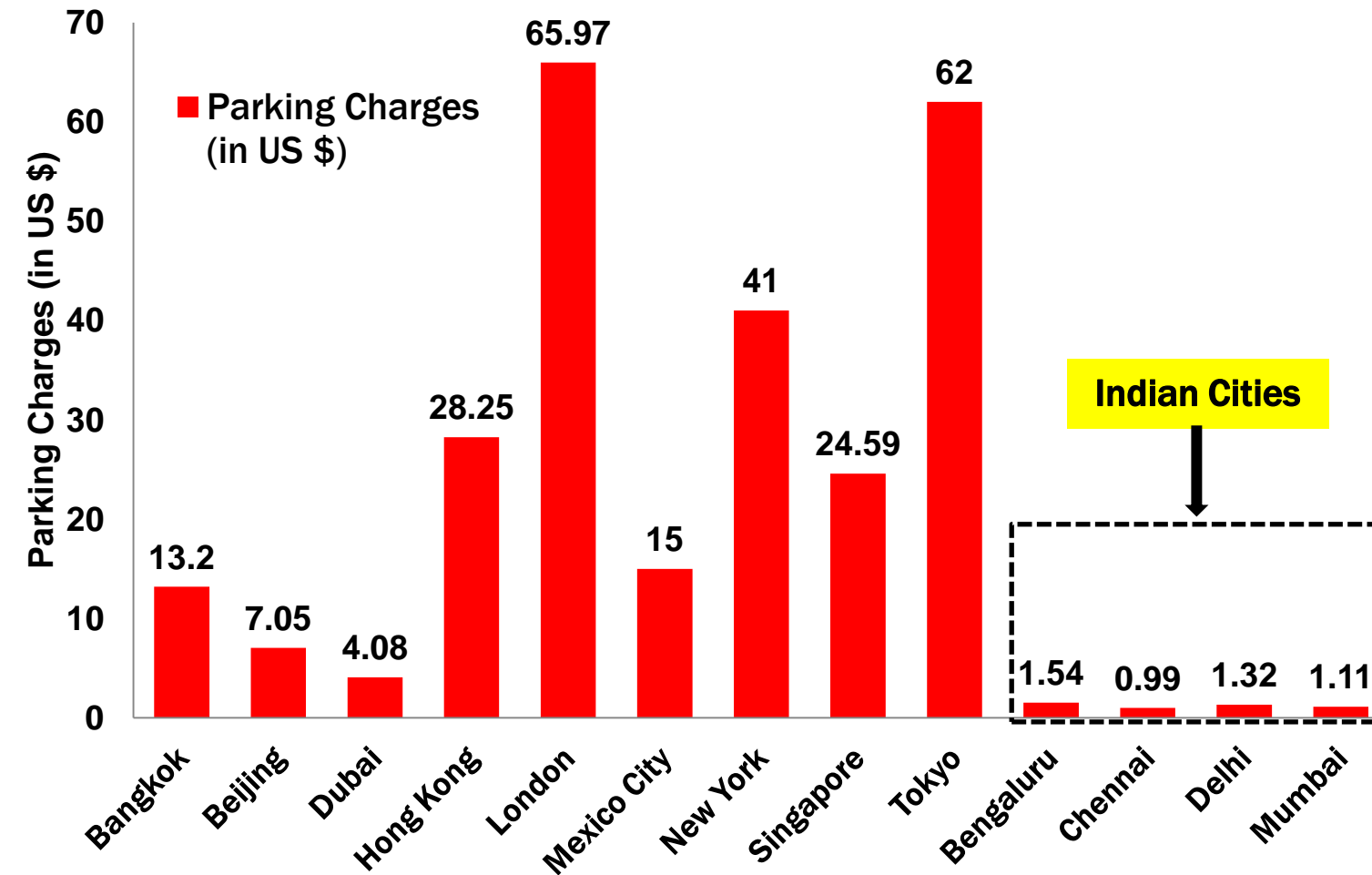


A 100 sqm plot built to the full allowable FAR (315 sq m) needs 161 sq m of parking space by Law - more than half. This is equal to one and half storey or space of 4 EWS dwellings....





# Parking is cheapest in Indian cities



Parking charges in Indian cities are some of the **lowest** in the **world**.



## On-street parking pricing has major impact on vehicualr use.....



**No meters**



**Meters**



**Prices quadrupled**

Grosvenor square, London



## Parking and clean air



**It is still not clear to many how parking management and restraints can reduce air pollution and give public health benefits**

**Boston** froze their parking requirements at a level that is only 10 per cent higher than the 1973 level to meet the Federal clean air standards.

**New York:** very high parking fees and limited parking supply have lowered car ownership far below the average rates in other US cities.

**Amsterdam** -parking fees expanded to meet EU directives regarding NO<sub>2</sub> and PM<sub>10</sub> emissions. Car plate numbers are registered with emissions information. Trucks are allowed to unload for a maximum of 15 minutes in spots where they are not allowed to park

**Zurich** considers total NO<sub>2</sub> emissions when determining the amount of parking to be allowed.

**Aizawl, Sikkim have made proof of parking mandatory for purchase of cars; High Court of Jodhpur** has given similar direction





# Gurgaon has begun to chart a roadmap.....



## Example -- Gurgaon Manesar Mobility Plan charts the way:

### Scale up and modernise public transport

- Provision of high capacity mass transport corridors and integration with other modes of transport
- Medium level mass transport system -- BRT beyond the Metro network
- Rationalisation of local bus system and its augmentation.
- Improvement in traffic management through TSM measures.
- Special facilities for pedestrians within the entire network specially in the core areas
- Pedestrian subways, footpaths and road furniture along the roads
- Diverting through traffic on bypasses, providing transport hubs at the periphery
- Improving primary, arterial and other important roads (particularly radial and ring roads) by providing grade separation in the form of underpasses, junction

### Inform and accelerate this process ....



## Judiciary steps in....



### **Supreme Court -- NCR wide control on different sources:**

CNG initiative

Waste burning

Dust control in construction

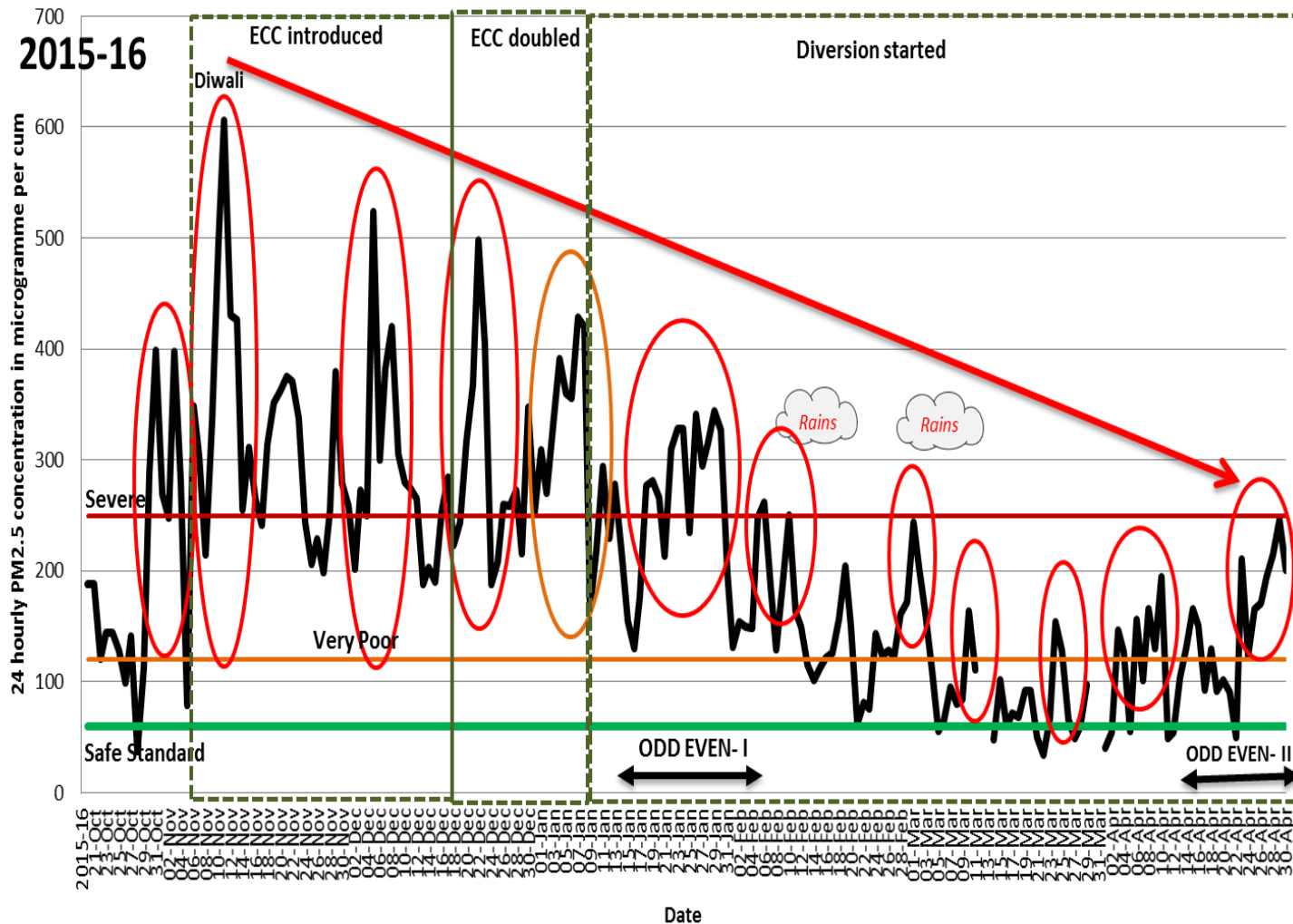
Framing of graded action according to pollution level – to include transport

Air Pollution Monitoring plan for the NCR

**NGT directives on old vehicles.....**



# Action makes a difference



Winter of 2015-16.....

Action on trucks, waste, construction, odd and even etc

This slowed down peaking of pollution ....





# **Our cities need upscaled transition to cut pollution and health costs**



## **Opportunity to provide scaled up alternatives**

Scale up integrated public transport systems

Infrastructure for walking and cycling and protection of pedestrian rights

## **Reduce demand for travel and vehicle usage**

Integrate land-use and transport planning

Parking policy as a restraint measure

Road pricing and other fiscal instruments

## **Leapfrog technology and fuel quality**

Leapfrog to Euro VI Emissions standards

Control dieselisation of cars and autos

Accelerate CNG transition

**Tax measures and resource mobilisation** to create dedicated fund for pollution control in cities

**This needs support. Must not be allowed to fail...Otherwise what??**

## Dutch Minister visits the queen





Thank You