

CITIES, HEALTH AND WELL-BEING

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Road Traffic Accidents in Indian Cities



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Road Traffic Crashes in Indian Cities: *Design and Planning of cities*

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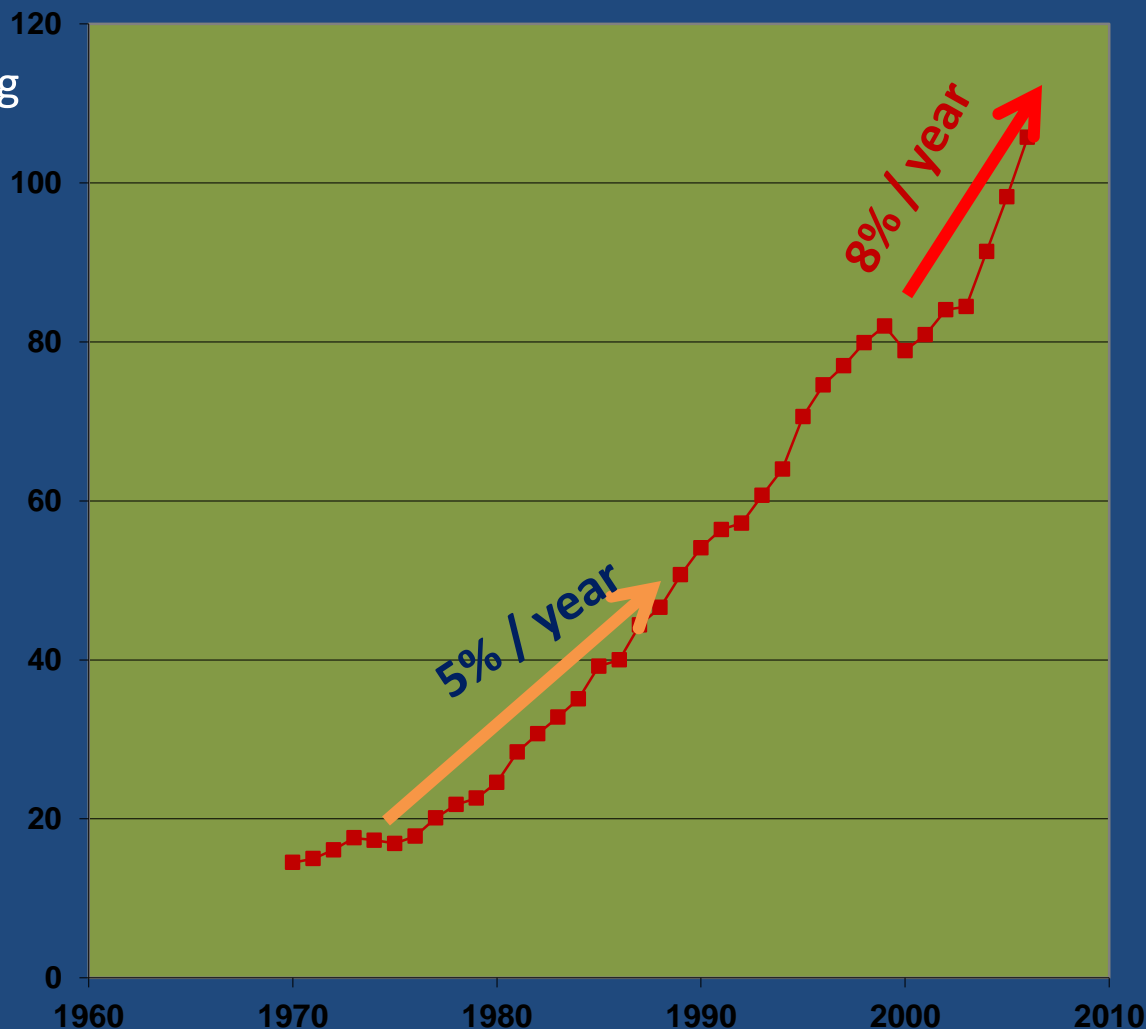
Urban Age Conference, Hong Kong, 16-17 November, 2011

126,896 persons killed in road traffic crashes, 2009

Among the three leading cause of death for people in the age group of 15-44 years

110 persons are killed per million population

8-10 % of casualty registration, 3.5% of admissions, 7-8% of deaths in the hospital are due to RTI in Bangalore (Bangalore Road safety and Injury prevention programme, 2011)



Estimated 1,650,000 hospitalised in 2006

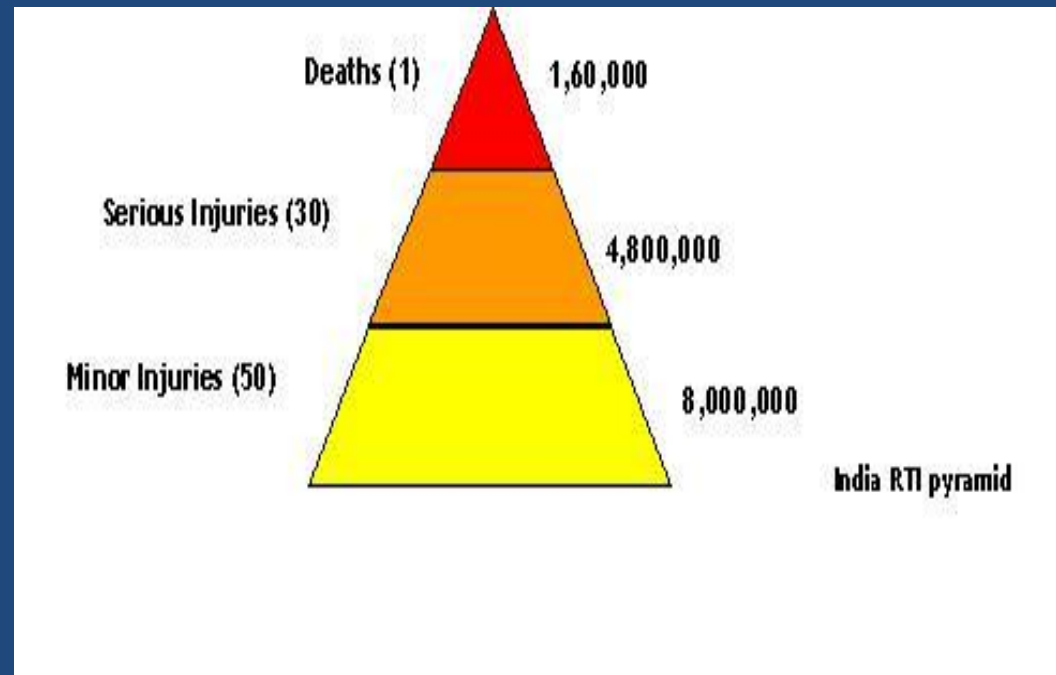
Estimated fatalities and Injuries due to Road Traffic Crashes

Fatalities are ~ 5% under reported

Injuries are 4-5 times under reported

For every death nearly 30-40 persons are injured and hospitalized for varying durations.

160000 persons would have died in road crashes during 2010 with hospitalisations of about 6 million and minor injuries among 16 million people.



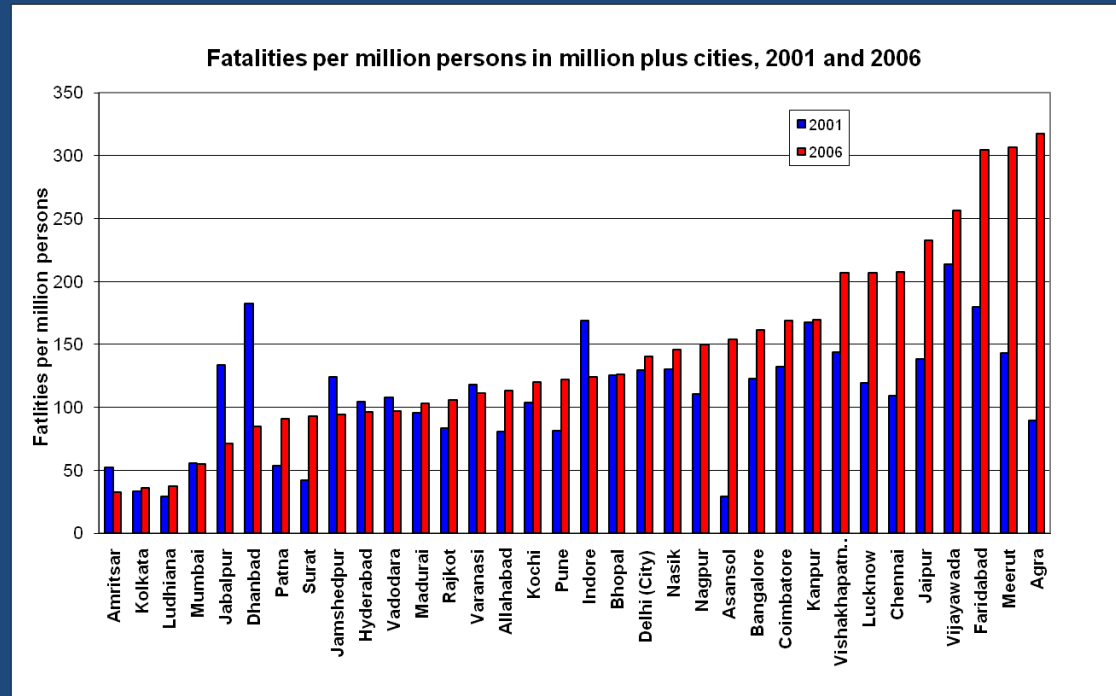
Estimated economic losses ~3% of GDP per year
(MORTH, 2009)

RTI in Urban areas

15% of RTI deaths in the country occurred in cities with a population of more than a million

~ transport infrastructure investment accompanied with increase in fatalities rate

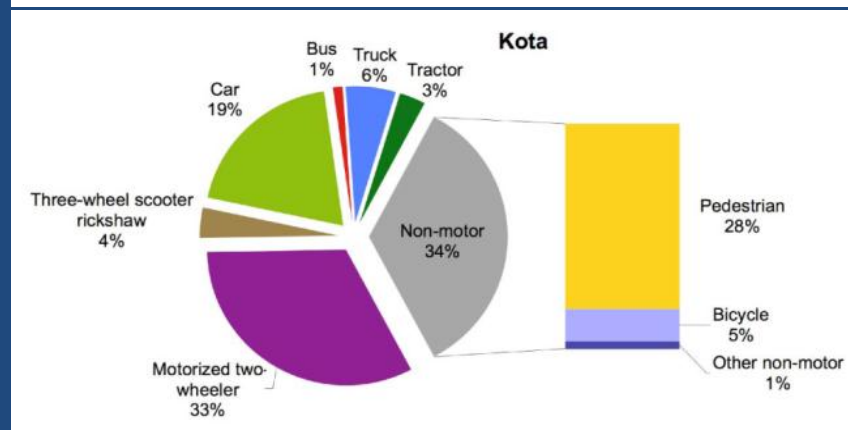
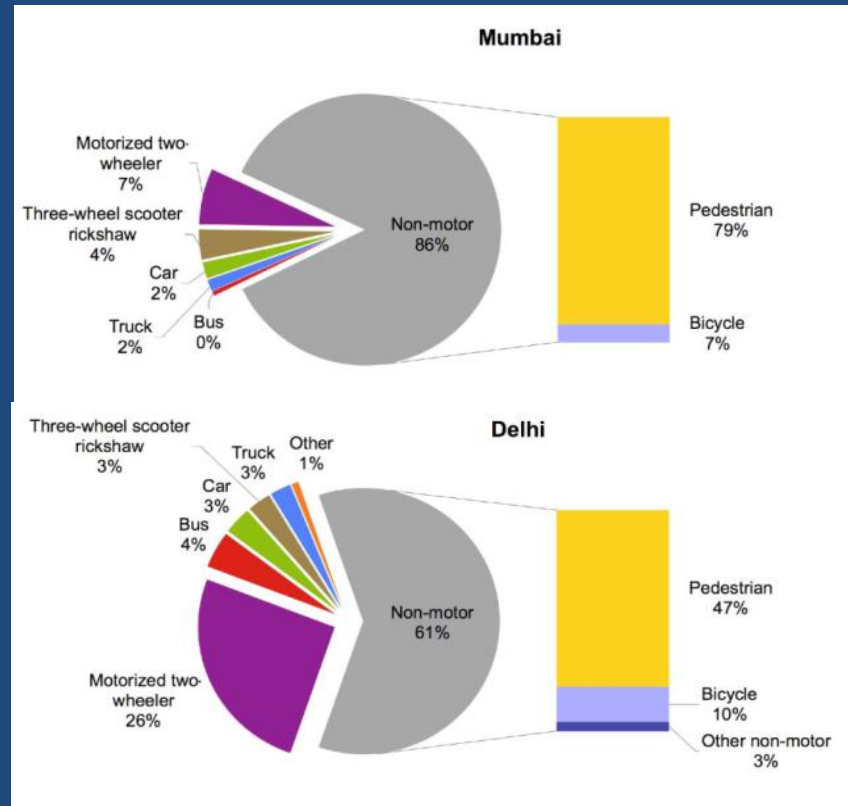
Highest increase in cities close to the National highways



Who are the victims in Road Crashes (Delhi (2001-2005), Mumbai (1996-1997), and Kota (2007))

Pedestrians are the largest no. of victims followed by motorised two wheeler riders

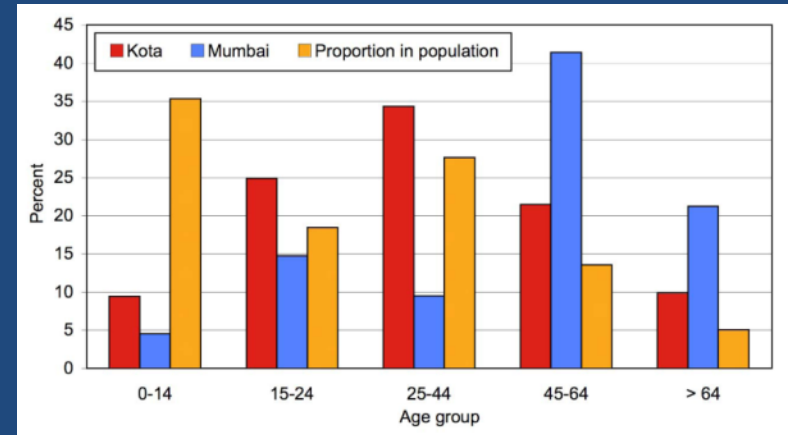
NMV victims are more than 60% in large cities



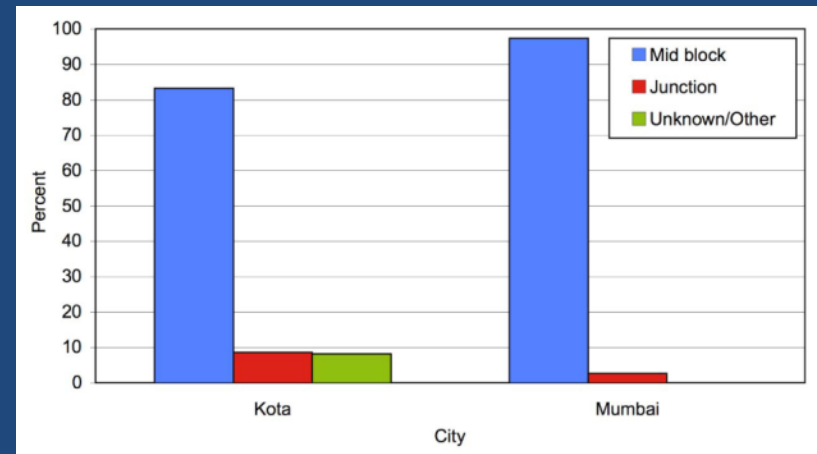
Victim age and location of fatal crashes

- Children are under represented in fatal crashes
- Old people(>64 years) are overrepresented
- Most crashes are away from the junction

Traffic fatalities by age group in Kota and Mumbai



Locations of fatal crashes in Kota (2007) and Mumbai (1996-1997)



Transport Infrastructure interventions & impact on fatalities

- 3 case studies
- 1. Planned/relocated low income settlements
- 2. Pedestrian risk at signal free junction
- 3. Safety on the bus corridor

Urban poor in Delhi

→ Symbiosis between formal

~90% people are employed in unorganised sector(2002)

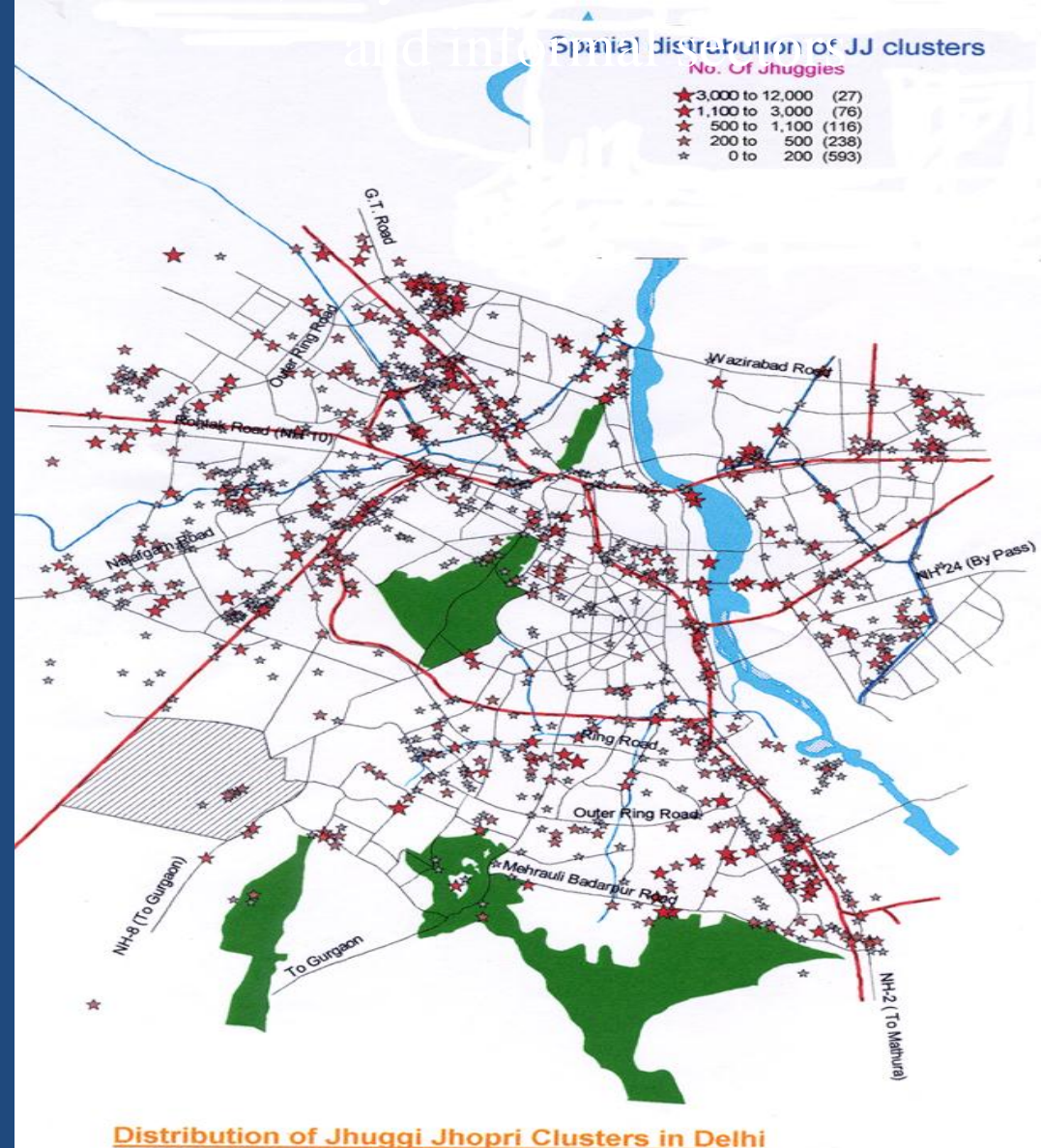
48% unorganised sector is dependent on “own business”- vendors etc.

50% women have daily wage jobs

Women are either domestic workers, self employed, or street vendors.

52% women walk to work

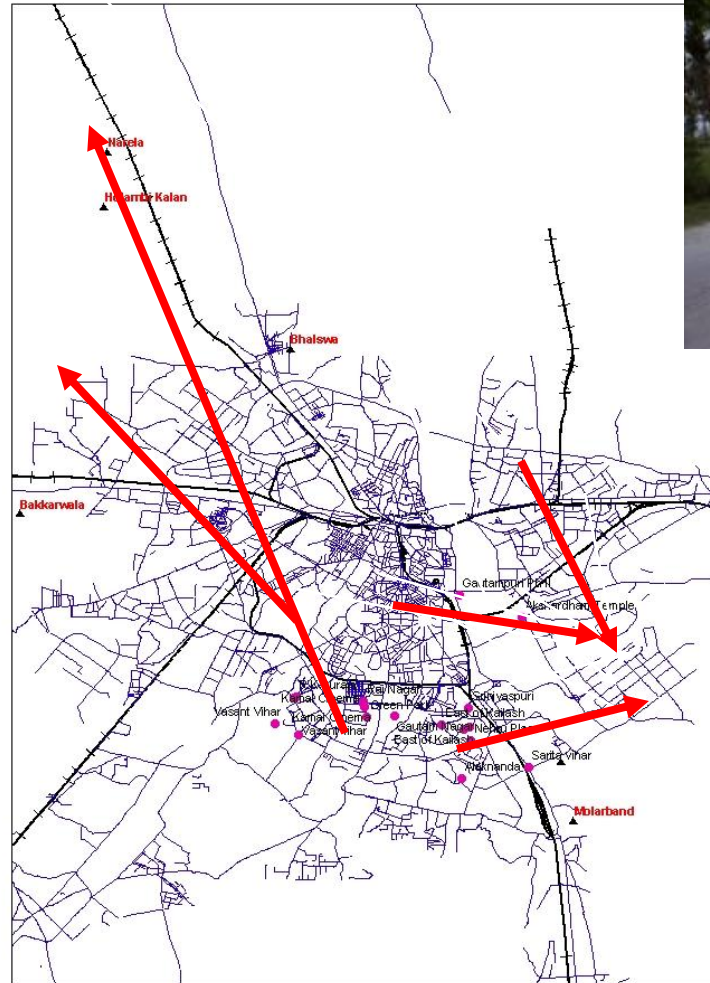
Women have longer work days than men



Large number of people relocated for metro and other development projects

Converting walking trips to motorised trips- buses, RTVs, LCVs

Long cycling trips



Time poverty of women increases

Opportunity for
“self employed”
business reduces

Self planned vs Expert planned

There is significant impact on Accessibility, Mobility and SEWB

The land-use accessibility has deteriorated as distance to education, health services and other urban services has increased for 52%, 63% and 52% of the households respectively.

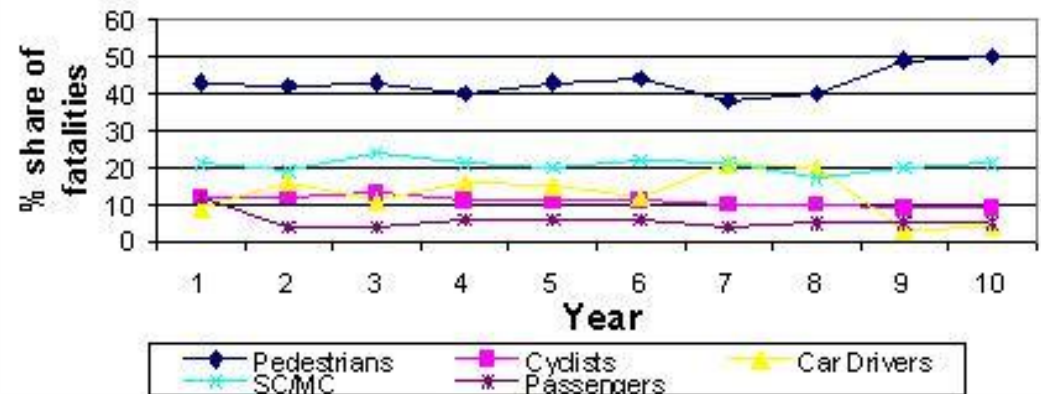
The transport accessibility has deteriorated even more as distance to bus stop has increased for 72% of the households and the bus frequency has seen an average decrease from 5 min to 63 min (almost 13 times)

52% traffic fatalities involve pedestrians

- Pedestrian facilities are given low priority
- Signalized intersections are designed to improve flow of motorized traffic
- Pedestrians fatalities have increased over the years

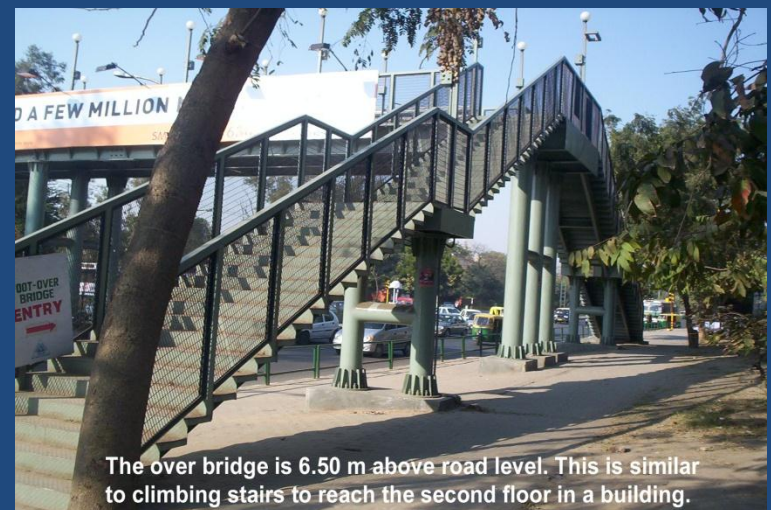


Figure 2: Road traffic Fatalities in Delhi, 1990-1999



Pedestrians on grade separated junctions

- to estimate the risk faced by unprotected pedestrians while crossing the road at a signalized junction.
- estimate change in risk faced by pedestrians after the reconstruction of the site into a signalfree interchange.



Results Summary

- two bus stands are the source of all pedestrian traffic to the two medical institutions then
 - Increased vehicle speeds increased risks to pedestrians
 - *Twenty two percent pedestrians accepted a risk despite the presence of a nearby pedestrian underpass*



Results Summary

- The speeds increased 21.6%, 22.6%, 15%, 31.6 % for the heavy vehicle, car, motorized three-wheeler, and motorized two wheeler groups, respectively.
- The probability of pedestrian fatality with a specific vehicle group increased 67 percent, 100 percent, 100 percent, and 200 percent, respectively.

BUS Corridor Delhi – (2008)



BRTS Corridor Delhi – Safety Features

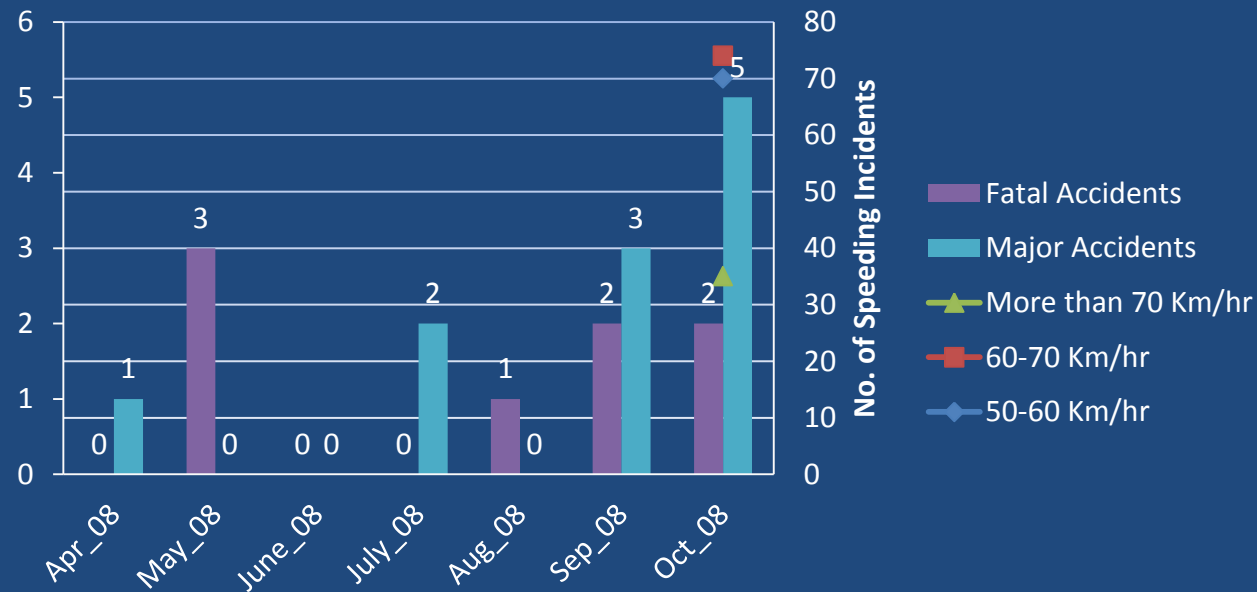


BRTS Corridor Delhi – Safety Features

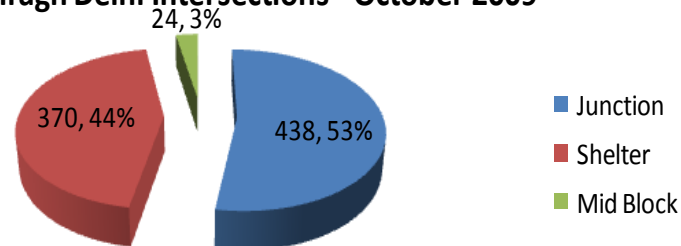


Post Operational Monitoring

Comparison Between Accidents and Bus Speeding
on BRTS Corridor, Delhi



Pedestrian Crossing Between Sheikh Sari and
Chiragh Delhi Intersections - October 2009



- Cyclist and motorist fatalities become zero while those for pedestrians increased
- Buses overspeed in the corridor
- 24% pedestrians cross at midblocks

BRTS Corridor Delhi - Interventions

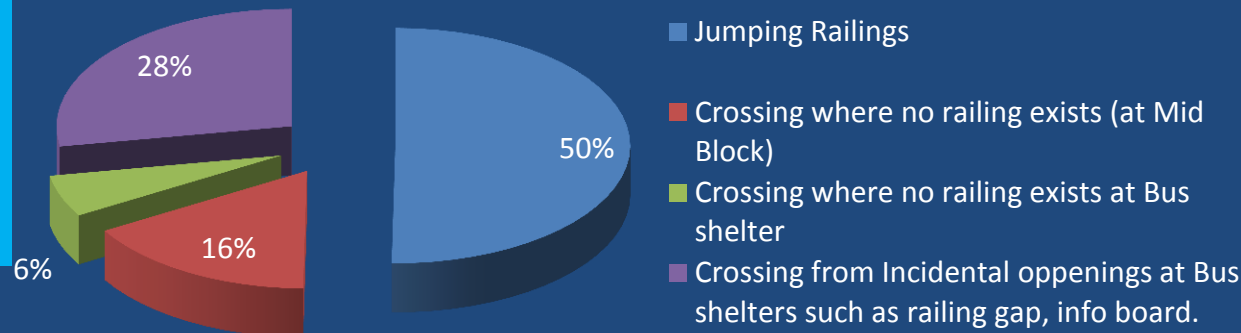
- Rumble Bars at station approaches in bus lane
- Rumble Bars Repaired
- Signal cycle improved at one junction to reduce pedestrian delays
- Railing extended in some Mid Block segments.
- Rumble Bars added at mid block segments (bus lane)
- Rumble Bars at Mid Block segments repaired



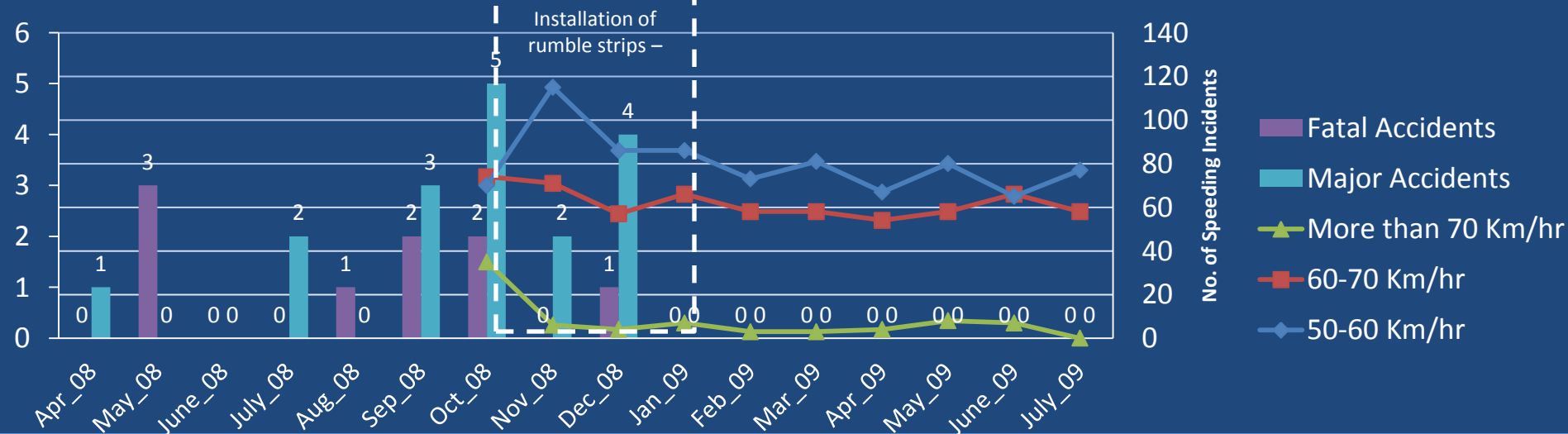
BRTS Corridor Delhi - Results

Pedestrian Crossing Behaviour - Oct 09

- Railing had little impact
- Rumble Strips had maximum impact in reducing fatalities



Comparison Between Accidents and Bus Speeding on BRTS Corridor, Delhi



No. of Accidents post installation of rumble strips in bus lane – “ZERO”

Conclusion

- Investments in transport infrastructure has resulted in increase in fatal crashes, and increase in risk to pedestrians
- Regardless of city size and density, fatality rate has increased in the last decade in most cities
- Appropriate infrastructure design (pedestrian, and bicycle facilities and speed control measures) can reduce fatal crashes