

# Strategy For Identifying and Mitigating Accidents in UPSRTC and Meerut City Transport Service Ltd. with Special Reference to Meerut: A Case Study



**MCTSL**

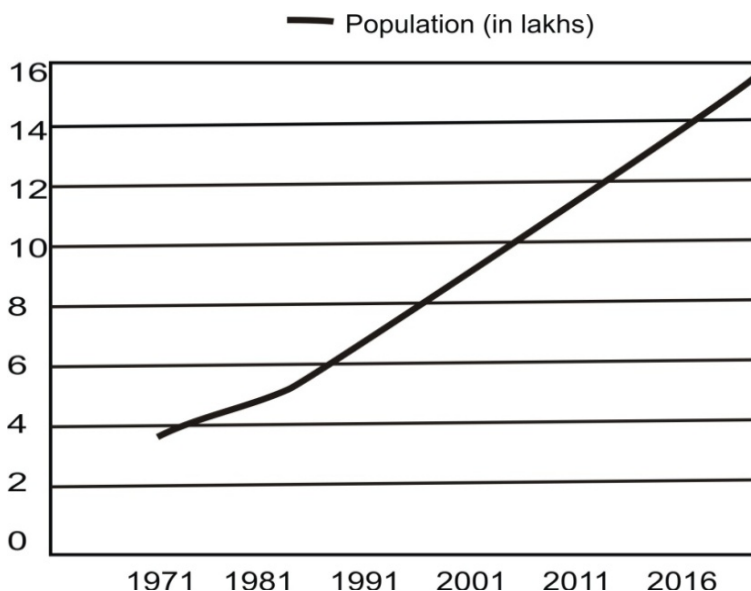


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# Meerut:

- Meerut is the 16<sup>th</sup> Largest Metropolitan area in India.
- Urban Population was approx 13.5 lacs in 2011 and Projected compounded annual growth rate is about 3%.
- Meerut is an Important city of NCR and lies at a distance about 70 km northeast of capital, New Delhi.
- Vehicular Population of Meerut has increased from 309704 in 2011 to 560374 in 2016 (+80%).
- Two Wheelers and Three Wheelers constitute 85 % of the total vehicles.



Source: RTO & Census-2011

Rise of Vehicle Population in Meerut

Year	Two/Three Wheelers	Cars	Jeeps	Taxis	Buses
2011	266499	40901	441	451	1412
2012	305034	49333	471	564	1430
2013	336039	55645	482	753	1450
2014	382219	62840	500	920	1475
2015	429393	70506	591	1210	1487
2016	478034	78578	741	1500	1521

# Present Transport System in Meerut

Operator	Total Vehicles	Operated Routes	Route length kms	Route Network Length	Peak period Headway Mnts.	Passengers Carried Per Day
MCTSL	120	20	92	59	12-18	30203
Pvt. Operator.	481	6	87	62	15-18	51190
UPSRTC	367	5	105	20	5-10	42270

Source: UPSRTC, MCTSL and RTO

## Public Transport Issues

- Cut throat competition
  - Overlap of IPT & city bus (UPSRTC, MCTSL and PO) routes
- Poor accessibility to PT– Inadequate route network
- Long wait periods for PT services
- Potential Safety hazards: Lack of Bus Queue Shelters/ stops - Haphazard stopping of Vehicles
- Excessive congestion due to:
  - heavy through traffic
  - Absence of bypass roads
  - Lack of footpath and cycle track.
- **Auto-rickshaws/ E- rickshaws together account for about 25% of all peak hour trips.**
- NMT (cycle and walk) account for almost 52% of overall trips within the city.

- Poor availability of city PT system : **12%**
- Private Vehicles : **54%.**
- High share of IPTs (auto rickshaws / E-rickshaws) : **34%**
- Excessively high volume of NMTs – cycle rickshaws / bi-cycles.

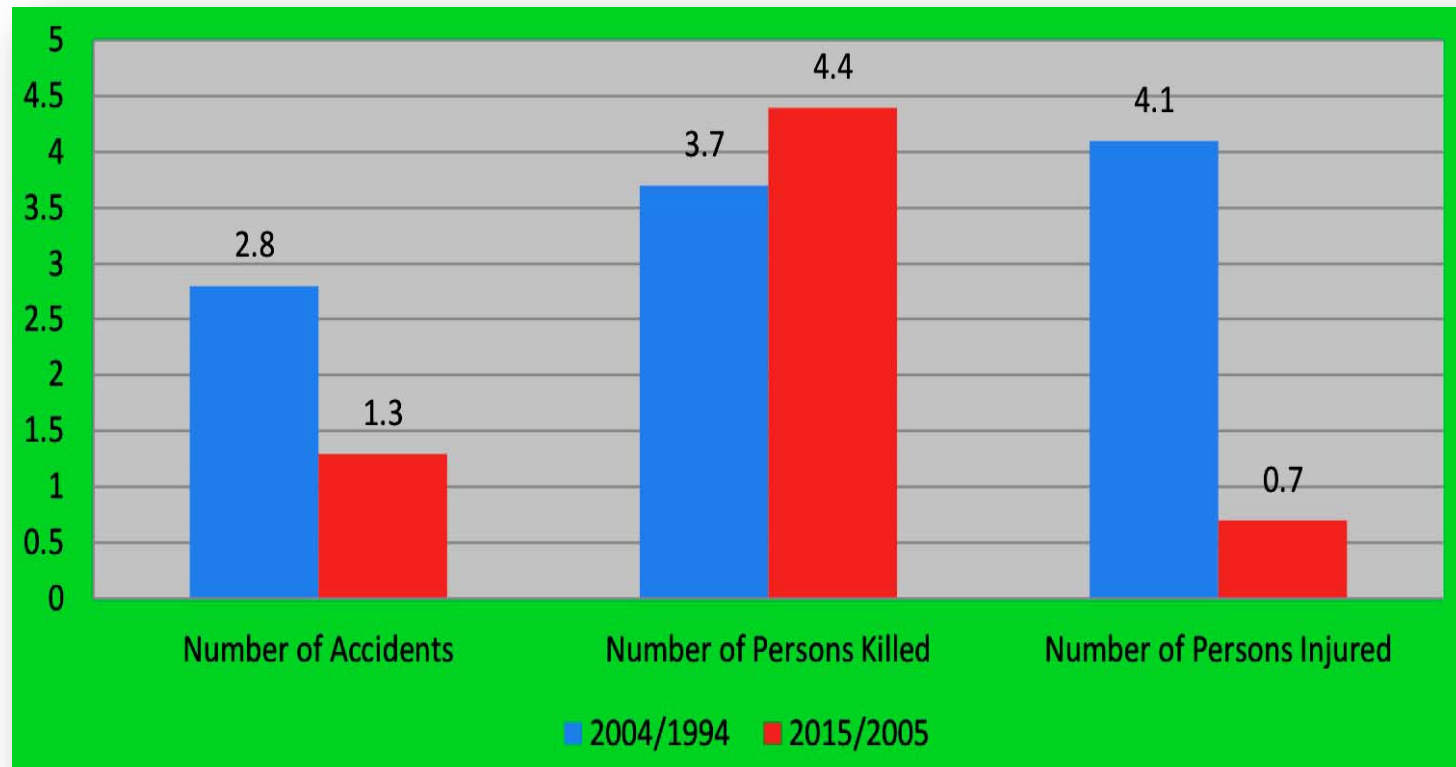


Congested City Area-Begum Bridge

## Objectives of the Study:

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- To Assess accidents scenario of UPSRTC/MCTSL and their causes.
- To assess spatial distribution of road accidents and black spots.
- To formulate strategy for mitigation of accidents in Meerut.



*Compound Annual Growth Rate of Accident **during** 1994-2004 and 2005-2015*

## Accidents in INDIA

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- The total number of road accidents increased by 2.5 percent from 4,89,400 in 2014 to 5,01,423 in 2015.
- The total number of persons killed in road accidents increased by 4.6 percent from 1,39,671 in 2014 to 1,46,133 in 2015.
- The total number of persons injured in road accidents increased by 1.4 percent from 4,93,474 in 2014 to 5,00,279 in 2015

Road Accident Parameters: 2014 and 2015			
Parameter	2014	2015	% increase over pervious year
Total Accidents in the country	4,89,400	5,01,423	2.5
Total number of Persons Killed in the Country	1,39,671	1,46,133	4.6
Total number of Persons Injured in the country	4,93,474	5,00,279	1.4
Accident Severity*	28.5	29.1	2.1
*No. of persons killed / 100 accidents.			

## Road Accidents in U.P. Vs. INDIA

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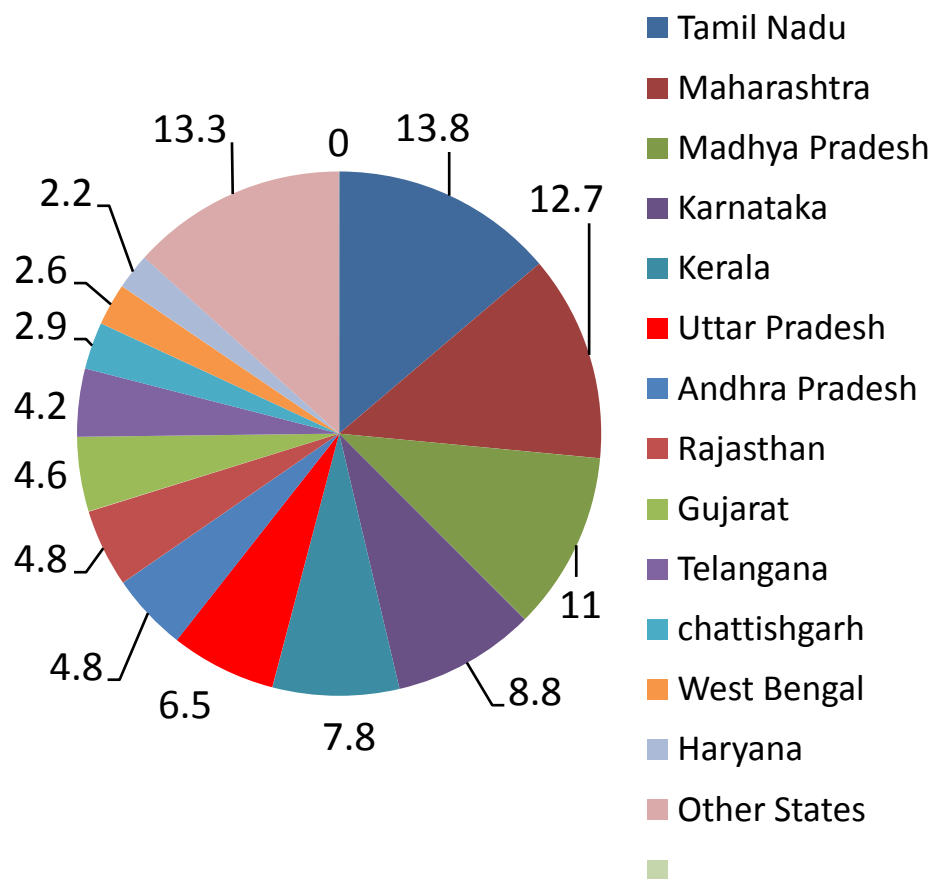
Percentage share of U.P. Road Accidents in 2015 in comparison to INDIA		
Parameter	Total No	Percentage Share
Total No of Accidents in U.P.	32,253	6.5%
Total number of Persons Killed in U.P.	<b>17,666</b>	<b>12.1%</b>
Total number of Persons Injured in U.P.	23,205	5.4%

- During 2015, 32253 accidents occurred in Uttar Pradesh.
- The burden of road traffic accidents in Uttar Pradesh is relatively high in it's Metropolitan Cities.
- The seriousness of the road accidents problem can be gauged from the fact that more than 40 people get killed every week in metropolitan cities of Uttar Pradesh due to traffic accidents.
- Vehicle accidents are a major concern in rapidly growing urban agglomerations.
- Buses are Involved in 12-20 percent of fatal accidents in Indian Cities.

# Fatal Accidents in U.P. Vs. INDIA

Cont.

**Percentage Share in Total Number of Road Accidents (in%) 2015**



**13 States : Share in Total Number of Persons Killed in Road Accidents (in%)**

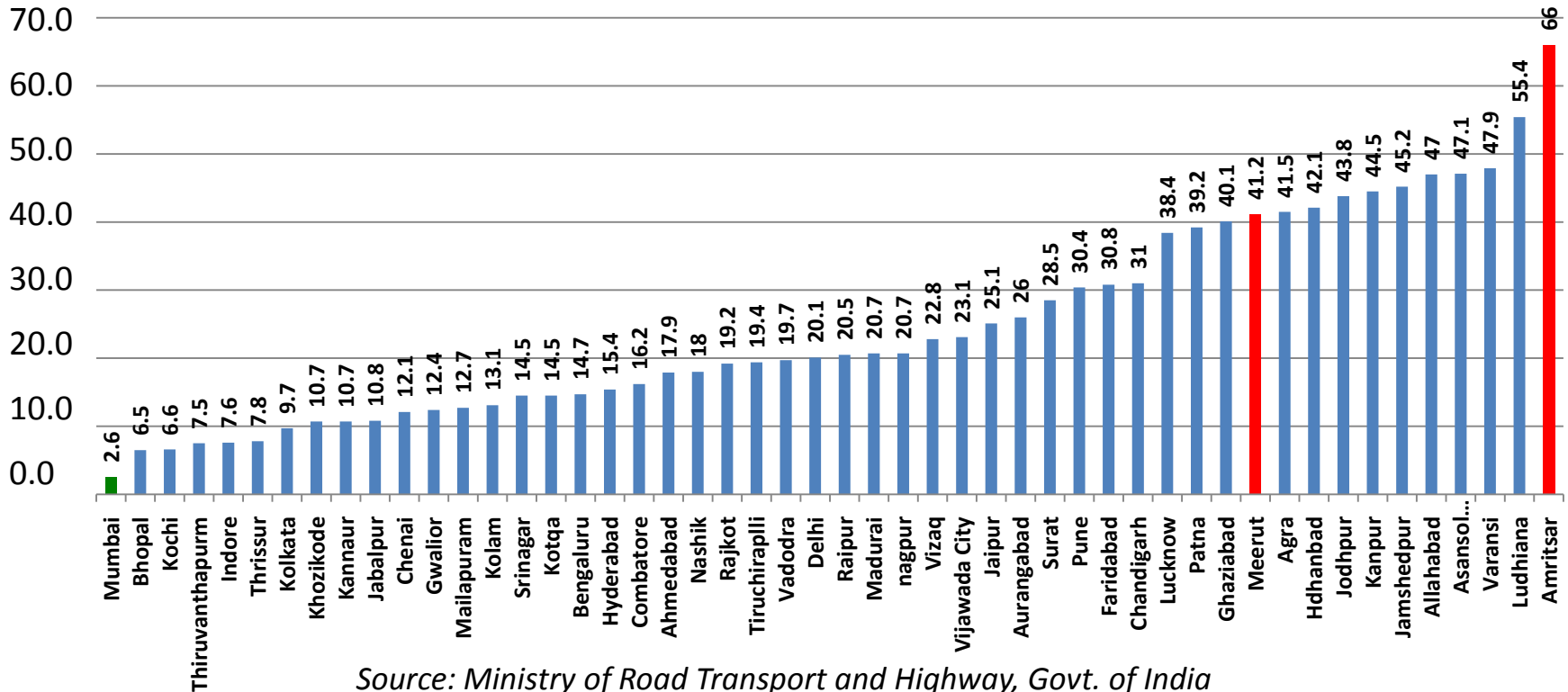
Share of States	83.6	1,22,153
1 Uttar Pradesh	12.1	17,666
2 Tamil Nadu	10.7	15,642
3 Maharashtra	9.0	13,212
4 Karnataka	7.4	10,856
5 Rajasthan	7.2	10,510
6 Madhya Pradesh	6.4	9,314
7 Andhra Pradesh	5.7	8,297
8 Gujarat	5.6	8,119
9 Telangana	4.9	7,110
10 West Bengal	4.3	6,234
11 Bihar	3.7	5,421
12 Punjab	3.3	4,893
13 Haryana	3.3	4,879

\*Top 13 according to their respective share in 2015



# Accident Severity in Million Plus Cities

Accident Severity No of fatalities per 100 accidents in Million Plus Cities in 2015



➤ 50 Million cities accounted for a share of 22.1% road accidents in the country during 2015, as against 22.7 in 2014.

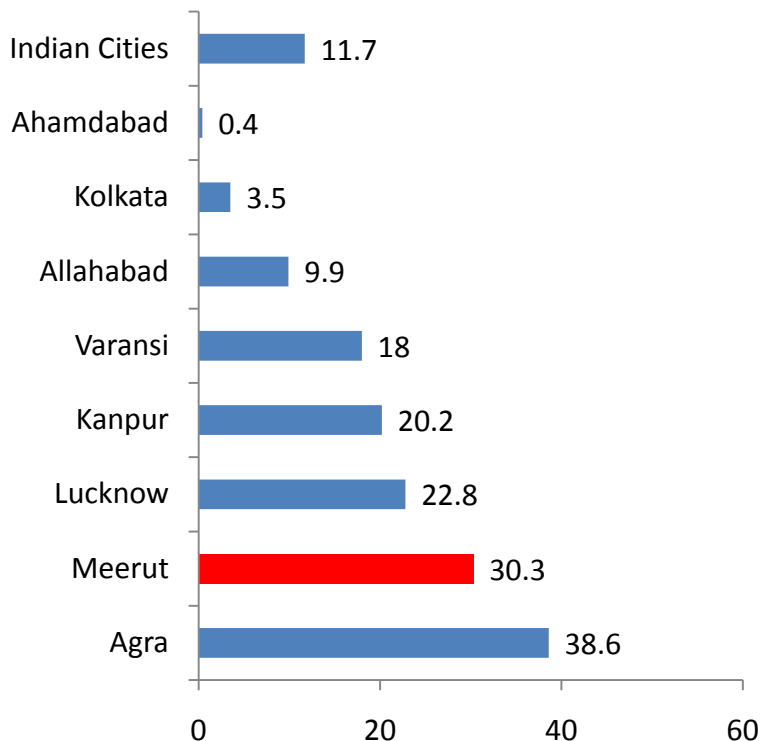
➤ Accident severity varies from low of 2.6 in Mumbai, to high of 66.0 in Amritsar.

Accident severity in Meerut is 41.2.



# Fatal Accidents In Meerut VS. Indian Metropolitan Cities

**Road Accident Fatality Risk in Indian Metropolitan Cities**



Source: GOVERNMENT OF INDIA, MINISTRY OF ROAD TRANSPORT & HIGHWAYS TRANSPORT RESEARCH WING, NEW DELHI-2015.

**Fatality Risk in U.P.'s Metropolitan Cities 2015**

	Population (in Million)	Number of Fatalities	Fatality Risk (No of Fatalities Per 1,00,000 People)
Agra	1.32	510	38.6
Allahabad	1.05	104	9.9
Kanpur	2.69	544	20.2
Lucknow	2.27	517	22.8
<b>Meerut</b>	<b>1.17</b>	<b>271</b>	<b>30.3</b>
Varanasi	1.21	218	18.0
Metropolitan cities of UP	9.71	2,247	23.1
Metropolitan cities of India	107.88	12,664	11.7
Metropolitan Cities of rest of India	98.17	10,417	10.6
Uttar Pradesh	188.54	12,555	6.67
India	1,136.55	1,14,590	10.1

- The fatality risk in cities of Uttar Pradesh is much higher than cities located in other parts of the country ranging from 0.4 fatalities per 1,00,000 people for Ahmadabad to 30.3 fatalities per 1,00,000 people for Meerut, which is second highest in India.

# Accident Cases in Meerut For Last 5 Years

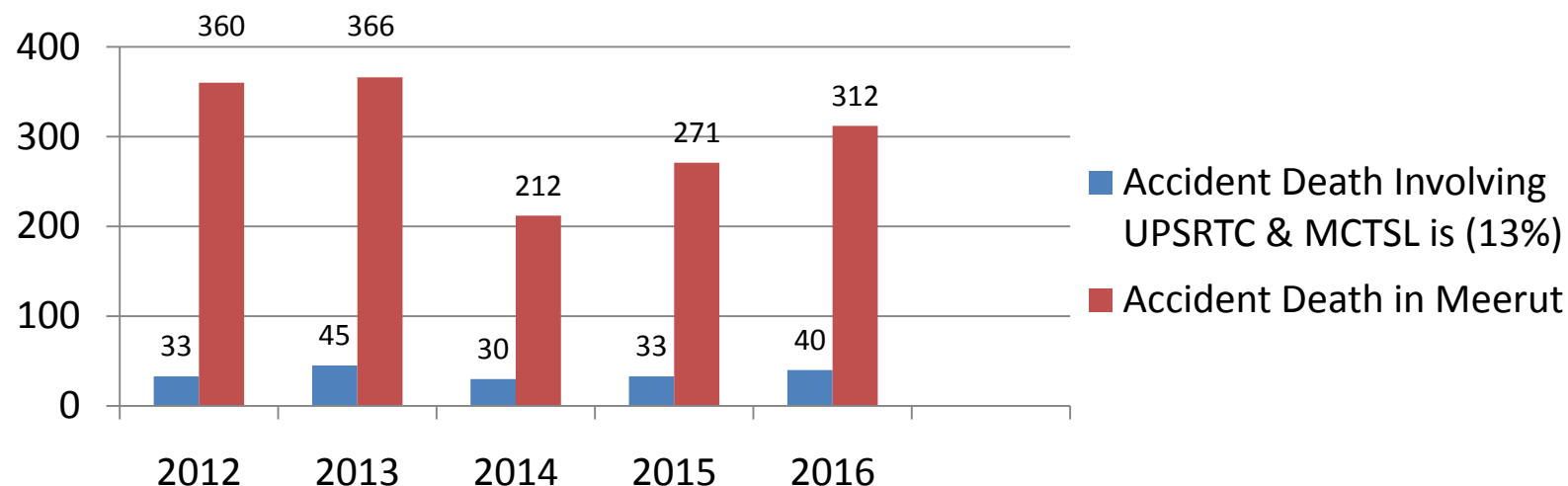
Accident Cases in Meerut City (Up to 31 September-2017)					
Details	2013	2014	2015	2016	2017
Total Accidents	651	771	691	748	784
Deaths	366	292	271	312	317
Injured	647	642	679	623	635

Source: SP Traffic, Meerut

Yearly Depot wise accident death						
Year	UPSRTC DEPOT				MCTSL DEPOT	GRAND TOTAL
	BHAISALI	MEERUT	SOHRAB GATE	TOTAL		
2012	6	10	14	30	3	33
2013	4	14	15	31	14	45
2014	6	11	10	27	3	30
2015	6	10	11	27	6	33
2016	5	16	19	35	5	40

- In Meerut, the total no of fatal accident deaths in 2016 is 312 out of which 40 involved buses of UPSRTC and MCTSL, which is 15%.

No of Fatal accidents caused by Buses of UPSRTC & MCTSL from (2012-2016)							
S.No.	Depot	Year	No. Of Accident s	Total No Of Buses Held	Fatal Accident Per 100 Buses	Vehicle K.M. Travelled (Million KM)	Fatalities Per Million Bus KM
1	UPSRTC	2016	35	367	9.53	40186500	0.87
2	MCTSL	2016	5	120	4.16	7482416	0.67



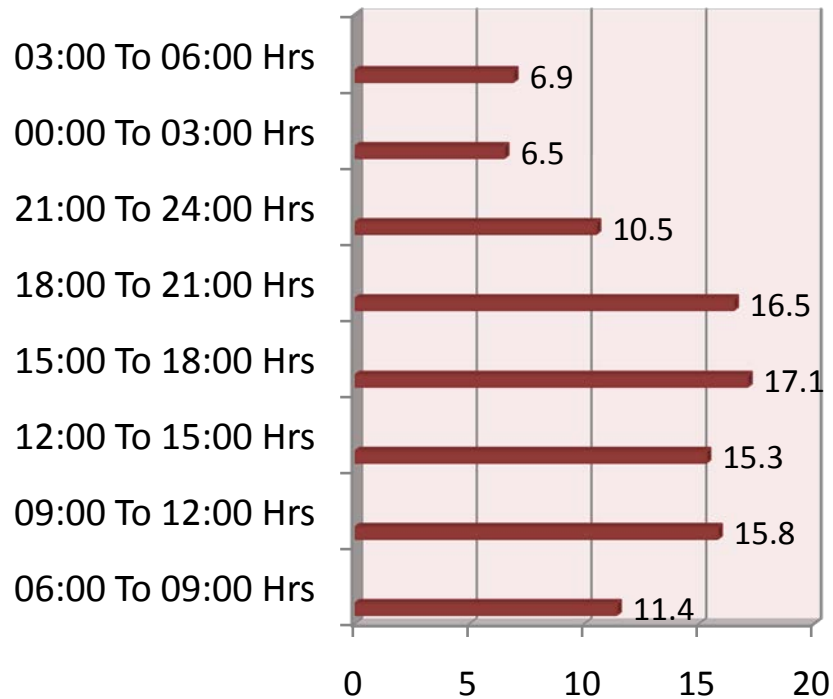
## Fatal accidents caused by City Buses Operated by STU's

S.No.	STU		Fleet Held	Fatal Accidents Per 100 Buses	Vehicle K.M. Travelled (Million KM)	Fatalities Per Million Bus KM
1	Best (Mumbai)	35	3391	1.03	240	0.15
2	AMTS (Ahmadabad)	11	521	2.11	45	0.24
3	BMTCL (Bengaluru)	77	3468	2.22	329	0.23
4	CSTC (Kolkata)	1	741	0.13	26	0.04
5	DTC (Delhi)	63	2578	2.44	181	0.35
6	PMT (Pune)	15	845	1.77	61	0.25
7	MTC (Chennai)	121	2773	4.36	219	0.55
8	UPSRTC (Meerut)	40	367	9.53	40.1	0.87
9	MCTSL (Meerut)	5	120	4.16	7.48	0.67

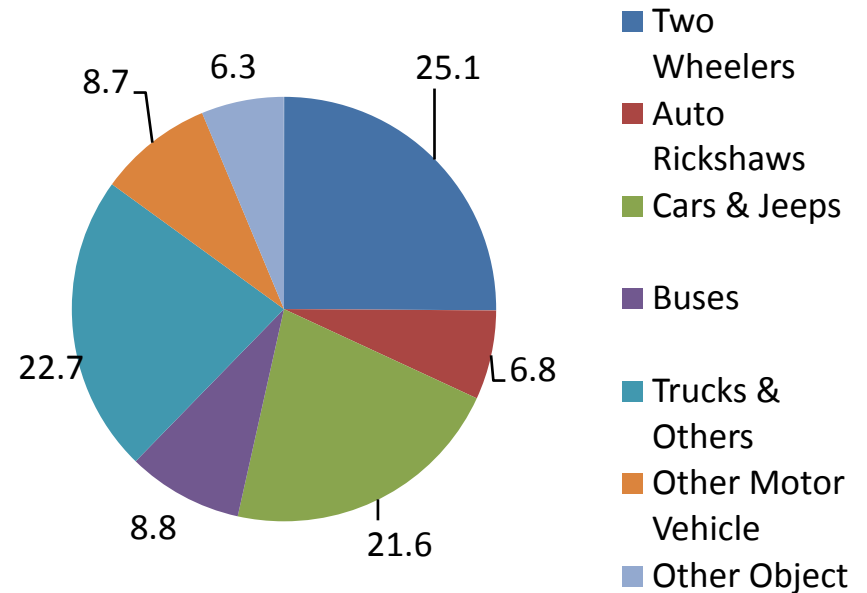
- City rates are higher than the average for India as a whole (80 fatalities per million person).
- Most of the cities have similar rates (100+/20 fatalities/million persons).
- Among all STU's operating in City service, fatalities per million buses km, the percentage of UPSRTC is 0.87, MCTSL, Meerut is 0.67, CSTC is 0.04, BEST Mumbai is 0.15 and DTC is 0.35.
- A study of "Transportation Policies and Strategies in Urban Areas" (Wilbur Smith Associates 2008) concluded that cities with higher slow moving vehicle in the traffic stream such as Meerut, Guwahati, Varanasi, Agra, Raipur and Amritsar etc. (Populations of less than 3 Million) have a worse safety index and are unsafe.
- In Meerut due to the absence of separate lanes for slow-moving vehicles, lack of footpaths, cycle track, the right-of-way is shared by all, leading to increase the risk and severity of accidents.

# Analysis of Fatal Accidents (MCTSL and UPSRTC, Meerut) Cont.

Percentage of Accidents as per time of occurrence



Accidents in terms of involvement by vehicle type



- Data shows substantial fluctuations in the number of fatal accidents recorded per hour during different times of the day.
- Highest and Lowest accidents were between 15:00 to 18:00 Hrs and 00:00 To 03:00 Hrs respectively.
- Fatal accidents rate between 09:00 To 12:00 Hrs is highest in the morning, which is also the traffic peak period.
- While evening fatal accidents rates peaks between 15:00 To 18:00 Hrs, which is also traffic peak period.
- Accidents is also very high between 18:00 To 21:00 Hrs, Indicates over speeding of vehicles due to empty peripheral routes, resulting in accidents.

- Accidents occur due to Human, Infrastructural and Natural Errors

➤ **Human Errors are:**

- **Driver Fault Identified:**

- Rash & Negligent Driving and Excess Passengers
- Overtaking Continuous Center Line
- Dangerous Lane Changing and Drunken Driving
- Wrong Side Driving and Cell Phone Usage
- Chasing Target Time and Destination
- Excess Passengers

- **Pedestrians/Passengers Fault Identified:**

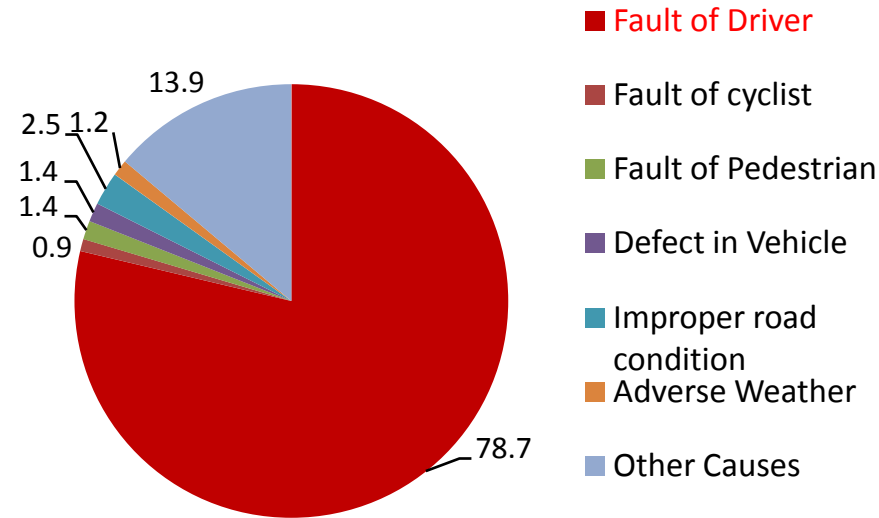
- Instigate the Driver to go fast
- Boarding and Alighting a Running Vehicle.
- Don't care about other traffic and become innocent victims.

➤ **Infrastructural Errors Identified:**

- Unsafe Road Geometry and Maintenance
- Improper Junctions & Uneven Road Width
- Lack of Co-Ordination Between Road Related Agencies
- Lack of Road Traffic Signage, Street Lights, Road Marking, Signals, Etc.

➤ **Nature Errors:**

- Falling of Trees, Hot Summer and Foggy Winter.



**Causes of Accident**



## Analysis of Causes of Fatal Accidents (Infrastructural Errors) Cont.

- In Meerut as many as 198 deaths took place on the 11 black spots, accident prone roads or areas – in the city, have been identified collectively by us and traffic police.
- While 10 of them are situated on NH 58, remaining one is situated on NH 19.
- The eleven spots include Sakauti, Nangli Gate, Ruhasa cut, Sivaya, Daurala Bhadala cut – all in Daurala area, Mussorie in Inchauli area, Partapur crossing, Ghat turn, Moiuddinpur (opposite sugar mill) and Bhoorbaraal in Partapur area.

Black Spots	Number of Accidents		Number of Persons	
	Fatal	Grievous	Injured	Deaths
Sakauti	22	31	19	22
Nangli Gate	21	29	28	21
Ruhasa cut	21	28	13	21
Sivaya	23	26	18	23
Daurala Bhadala cut	19	23	20	19
Mussorie	12	26	16	12
Partapur crossing	14	19	28	14
Ghat turn	15	14	15	15
Moiuddinpur (opposite sugar mill)	19	9	14	19
Bhoorbaraal	13	12	17	13
Total	198	224	199	198



## Strategies Formation for Mitigation of Road Accidents

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- As per analysis, pedestrians are most vulnerable group on Indian roads, closely followed by cyclists and two-wheelers in fatal accidents involving buses.
- Almost all fatal accidents take place on straight stretches of roads and also when the bus and victim are travelling in the same direction .
- **Separation of buses from non-motorized road** users and provision for safe pedestrian and bicycling facilities on arterial urban roads will help not only in reducing the number of fatal accidents but also improving access to the public transport system.
- **BRT Corridor in Ahmadabad** has reduced road accidents.
- There are large number of cases where the victim is run over by the bus or falling while entering or leaving the bus. Such accidents could be prevented through **better design of bus** like low floor, pneumatic doors etc.
- Formulation of Better **Personnel Policies for Recruitment** of good drivers, their training and provision for rewards.
- Bus Operation should have their own **internal regulatory mechanisms for monitoring** the behaviour of their crews and their compliance with safety rules.
- Good Mechanisms for **Speed Control and checking of driver under the influence of alcohol** should be introduced.

# Golden Rules







































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## Golden Rules for Road Safety

- **STOP OR SLOW DOWN :** Allow pedestrians to cross first at uncontrolled zebra crossing.
- **OBEY TRAFFIC RULES AND SIGNS:** To prevent road accidents.
- **OBEY SPEED LIMITS:** For your own safety and that of others. In residential areas and market places, ideal speed should be 20 kmph and maximum speed limit is 30 kmph.
- **KEEP VEHICLE FIT:** To Prevent breakdown and accidents on road.
- **NEVER USE MOBILE WHILE DRIVING:** To avoid distractions that largely lead to accidents.
- **NEVER DRIVE DANGEROUSLY:** To ensure your own safety and that of other road users.
- **BE COURTEOUS:** Share the road with all and be considerate. Never rage on the road.
- **NEVER MIX DRINKING AND DRIVING:** Be Responsible....Don't drink while driving.

# Road Safety Signs

## Mandatory/ Regulatory Signs for Road safety

			
<b>Straight Prohibited or No Entry</b>	<b>One Way Sign</b>	<b>One Way Sign</b>	<b>Vehicle Prohibited in Both Directions</b>
			
<b>All Motor Vehicles Prohibited</b>	<b>Truck Prohibited</b>	<b>Bullock Cart Prohibited</b>	<b>Tonga Prohibited</b>
			
<b>Hand Cart Prohibited</b>	<b>Cycle Prohibited</b>	<b>Pedestrians Prohibited</b>	<b>Right turn Prohibited</b>
			
<b>Left Turn Prohibited</b>	<b>U-Turn Prohibited</b>	<b>Overtaking Prohibited</b>	<b>Horn Prohibited</b>
			
<b>Bullock Cart &amp; Cart Prohibited</b>	<b>Length Limit</b>	<b>Speed Limit</b>	<b>Load Limit</b>
			
<b>Height Limit</b>	<b>Width Limit</b>	<b>Axle Load Limit</b>	<b>Restriction Ends Sign</b>
			
<b>No Parking</b>	<b>No Stopping or Standing</b>	<b>Compulsory Ahead Only</b>	<b>Compulsory Keep Left</b>
			
<b>Compulsory Turn Left</b>	<b>Compulsory Turn Right</b>	<b>Compulsory Turn Right Ahead</b>	<b>Compulsory Turn Left Ahead</b>
			
<b>Compulsory Ahead or Turn Left</b>	<b>Compulsory Ahead or Turn Right</b>	<b>Compulsory Cycle Track</b>	<b>Compulsory Sound Horn</b>
			
<b>Stop</b>		<b>Give Way</b>	

*Every Life is Precious...*

*Let us save at least one today...*

**Thank You**