



IRF WORLD ROAD MEETING 2017

/ 14-17 NOVEMBER / DELHI / INDIA /

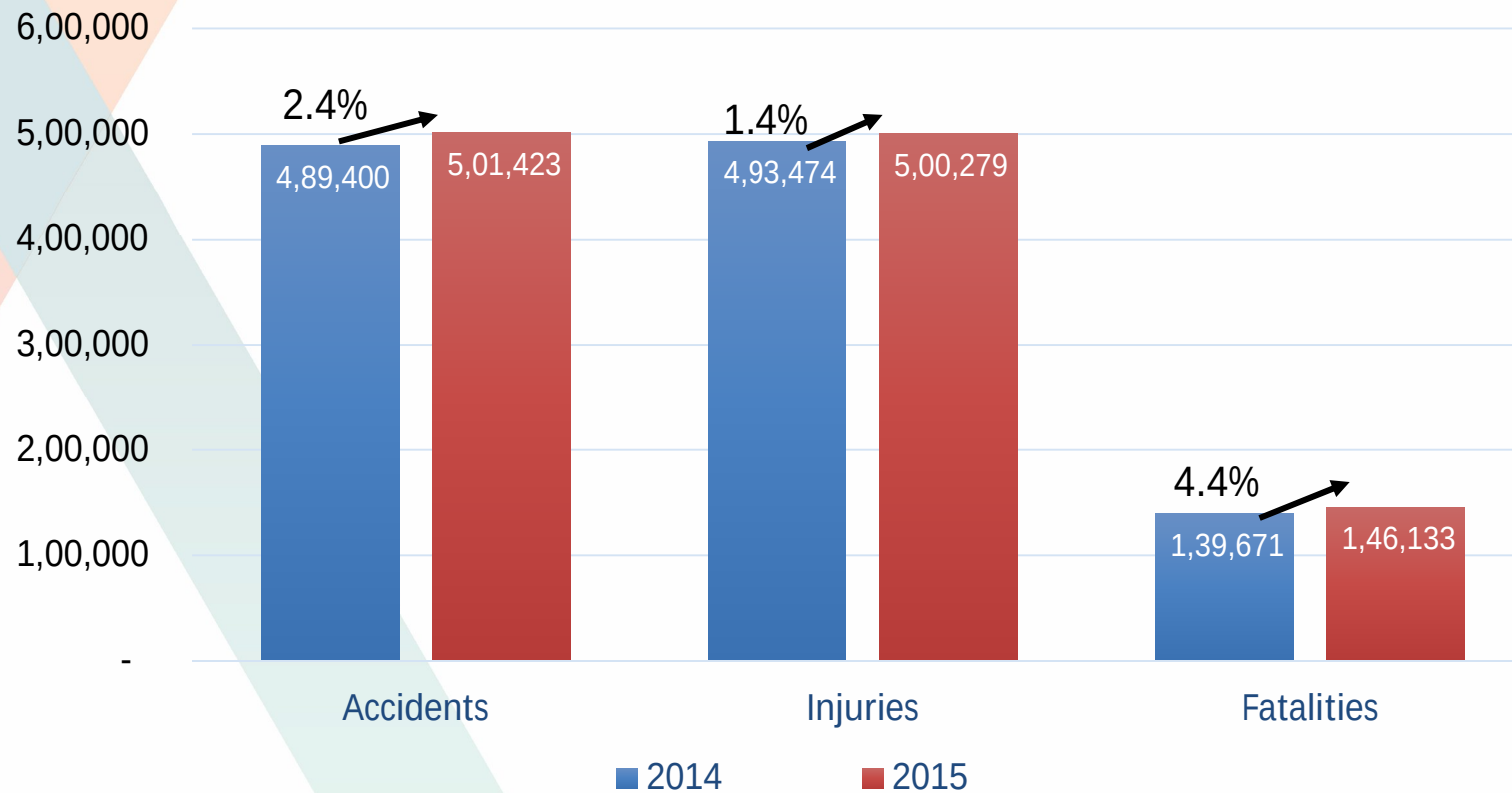
Generating Insights from Correlating Driving Behavior of Drivers with the Changing Driving Context

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Road Accidents in India

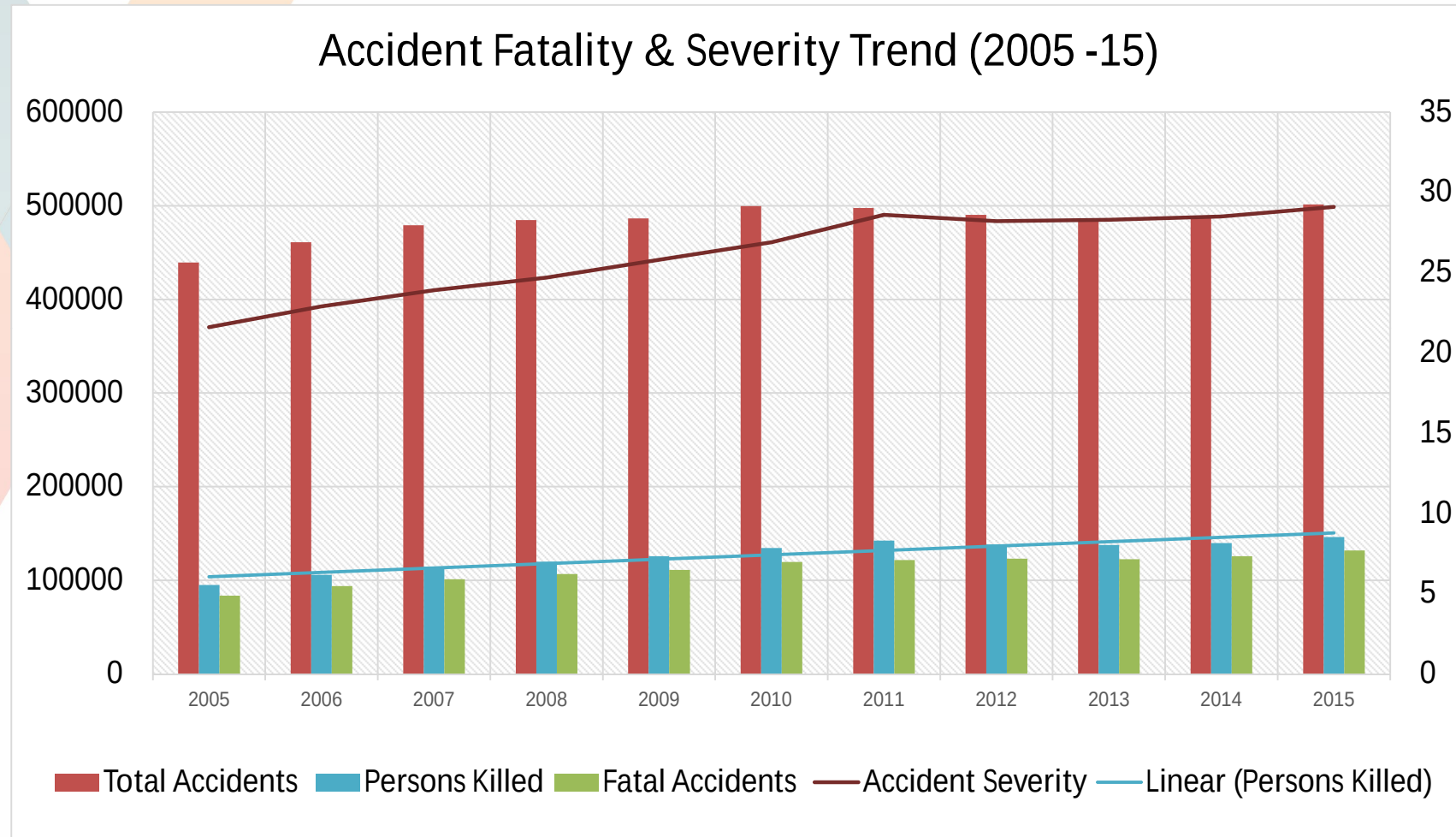
- India has one of the highest rates of road accidents in the world
- Fatality Growth Rate is significantly higher than Accident Growth Rate

Road Accidents in India (2014-15)



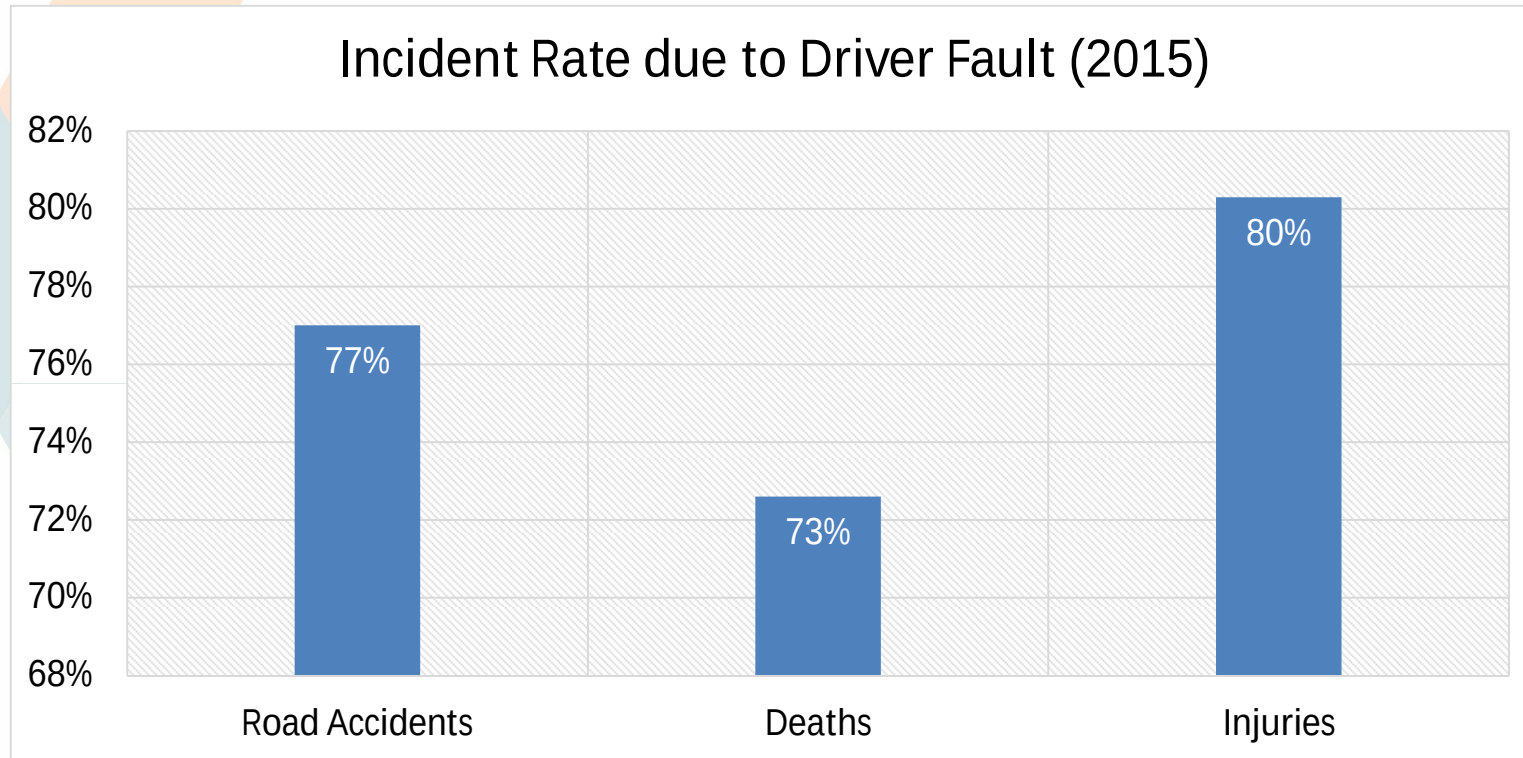
Road Accidents → Fatality & Severity (2005-2015)

Accidents increased by 14.2%, but fatalities increased by 53.9%



So, Who is Responsible? THE DRIVER?

- “Driver Faults” → ~70% of all accidents



But is this the CORRECT INTERPRETATION?

What about the DRIVING CONTEXT?

(Road Conditions, Geographical Terrain, Weather, Traffic Intensity)

DRIVING CONTEXT + DRIVER RESPONSE = DRIVING BEHAVIOUR

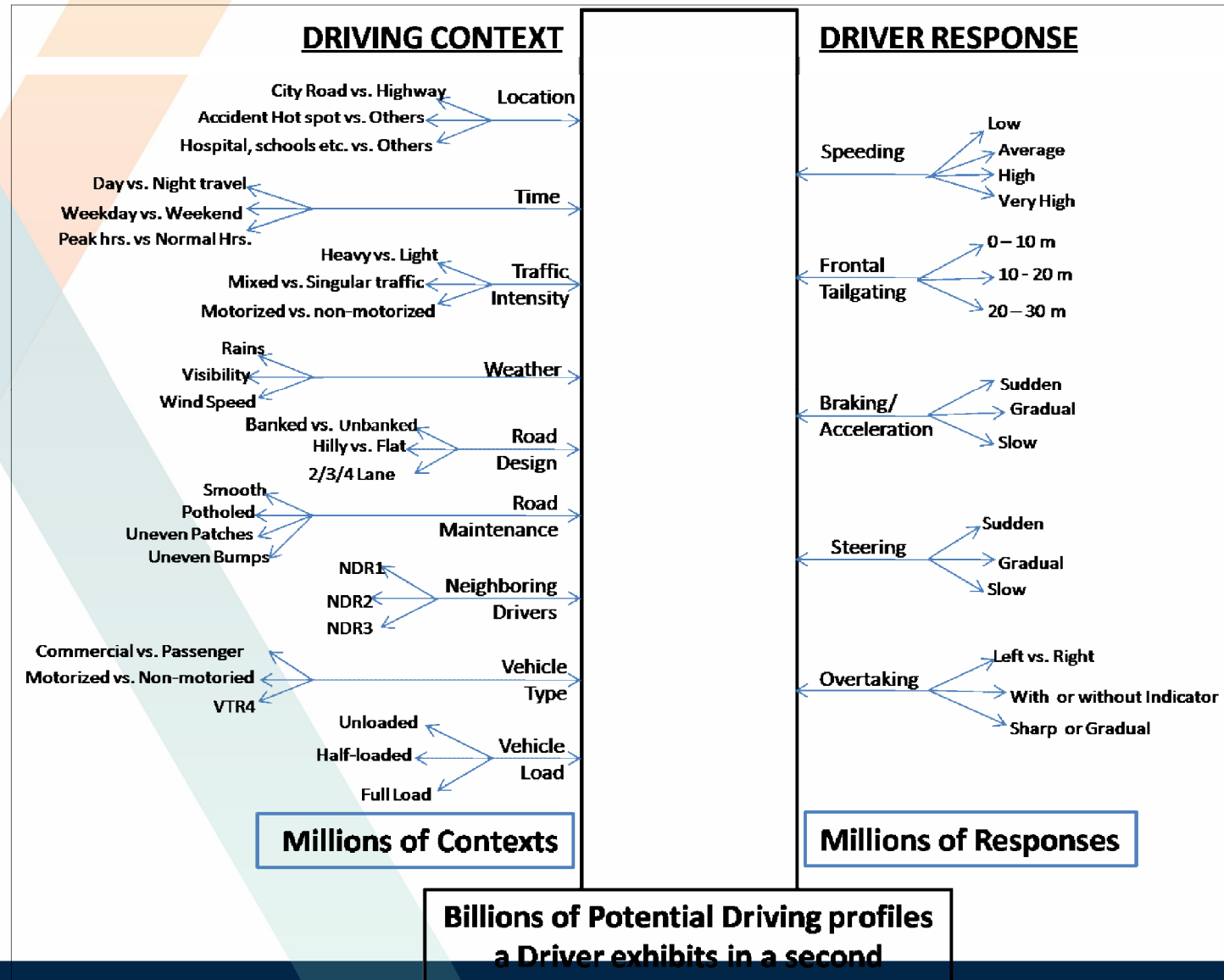
Driving Context → Road Terrains & Road Conditions, Weather Conditions, Traffic,

Driver Response → Instantaneous Manoeuvres (Speed, Steer, Brake)

Thus, Driver is as Guilty or Innocent as the Driving Context

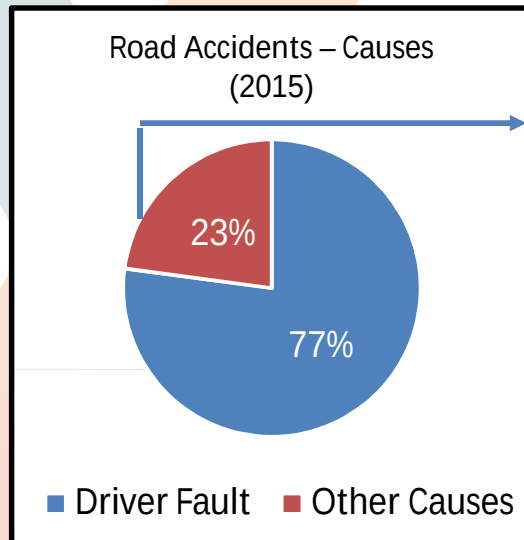
Driving Behavior → Response to Multiple Context

- A driving context, is a combination of multiple context
- Driving behavior elicits a response specific to the context.

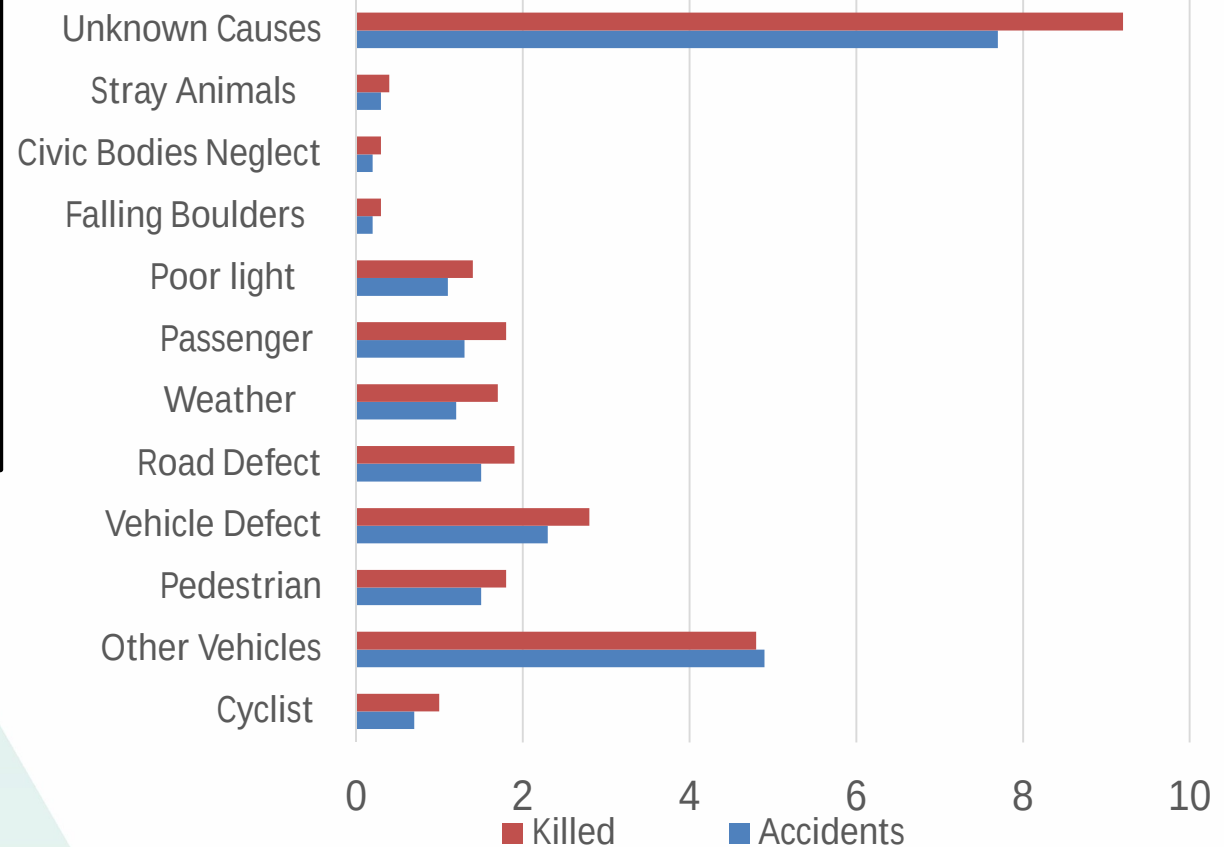


Rash Driving – A Contextual Driving Response?

An evaluation of “Other Principal Causes” of Road Accidents reveals the challenging driving contexts which generate a driver’s response to the context.

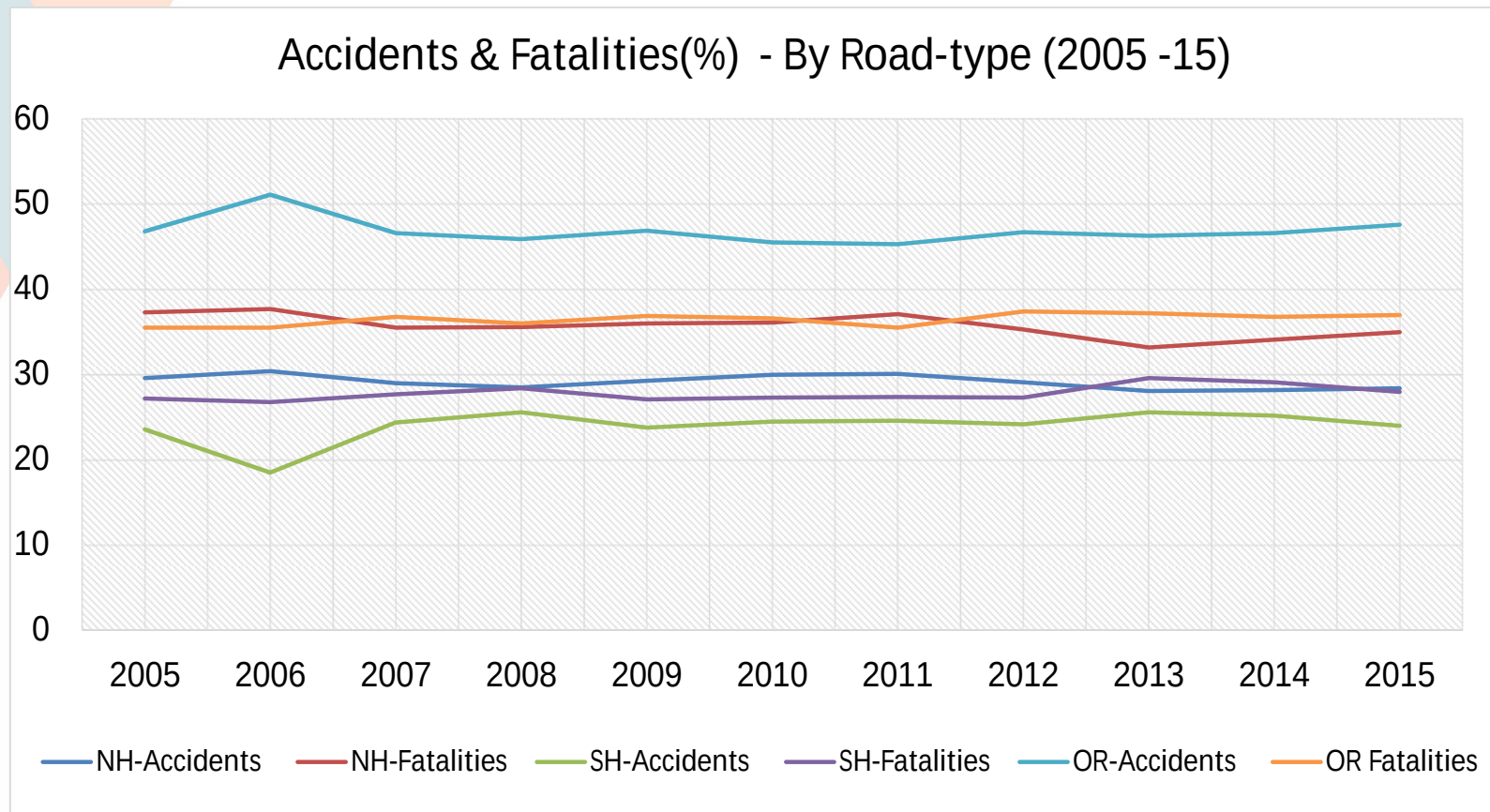


Accident Causes(%) - Others (2015)



Driving Behavior: By Road-type

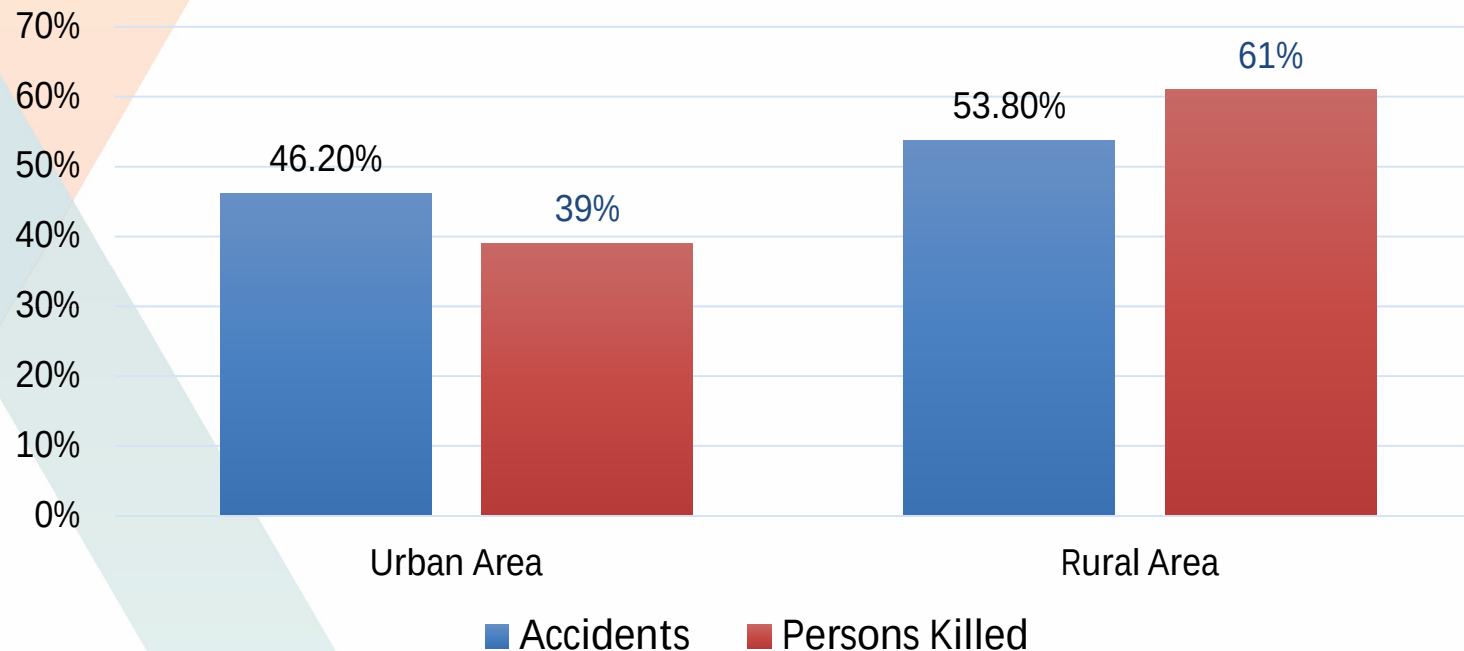
- National Highways(NH), State Highways (SH), Other Roads (OR) (urban/rural roads)
- **OR** → higher accident rate compared to **NH or SH**
- **NH and SH** → better maintained + low traffic congestion



Driving Behavior – By Road Infrastructure-type (Rural / Urban)

- % Road Accidents: Rural Area > Urban Area
- % Road Fatalities : Rural Roads >> Urban Roads

Accidents & Fatalities (%) - Urban vs Rural (2015)



Conclusion:

- Rural Road Infrastructure → Poor Design Quality + Low Maintenance
- Road Infrastructure Quality $\propto$ Driving Behavior of Drivers

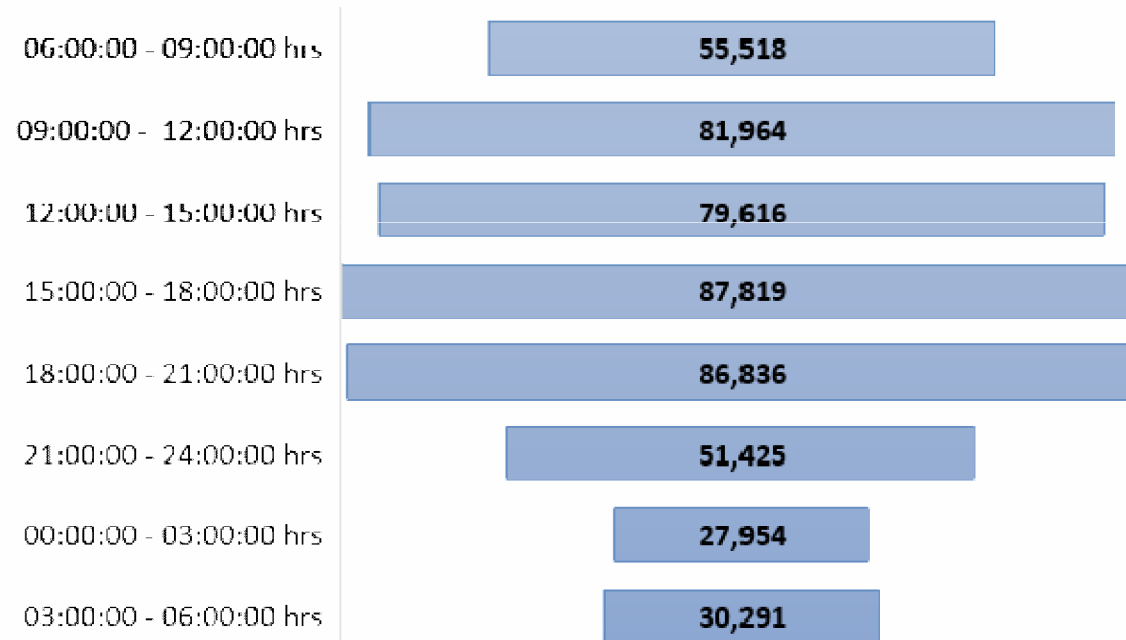
Driving behavior: By Time of Driving

- Do accidents occur during late night / early morning?
- Analysis of Accident data for 2015 :
 - Highest in late afternoon (3:00 pm - 6:00 pm) & early evening (6:00 pm -9:00 pm)
 - Significantly lower during late night, early morning hours

Potential Reasons:

- High Traffic Intensity?
- Inexperienced drivers on road?

Accidents - By Time of Day (2015)



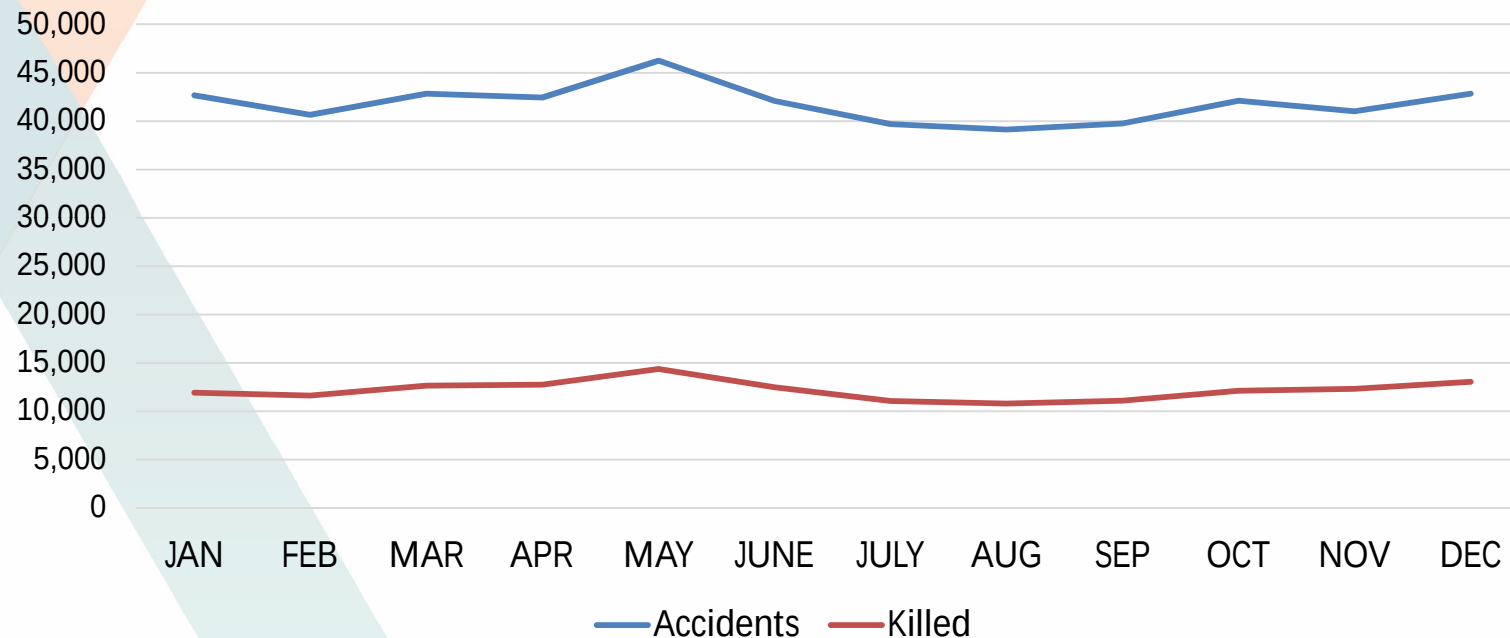
Conclusion:

- Context such as traffic congestion and rash driving influence the driving behavior

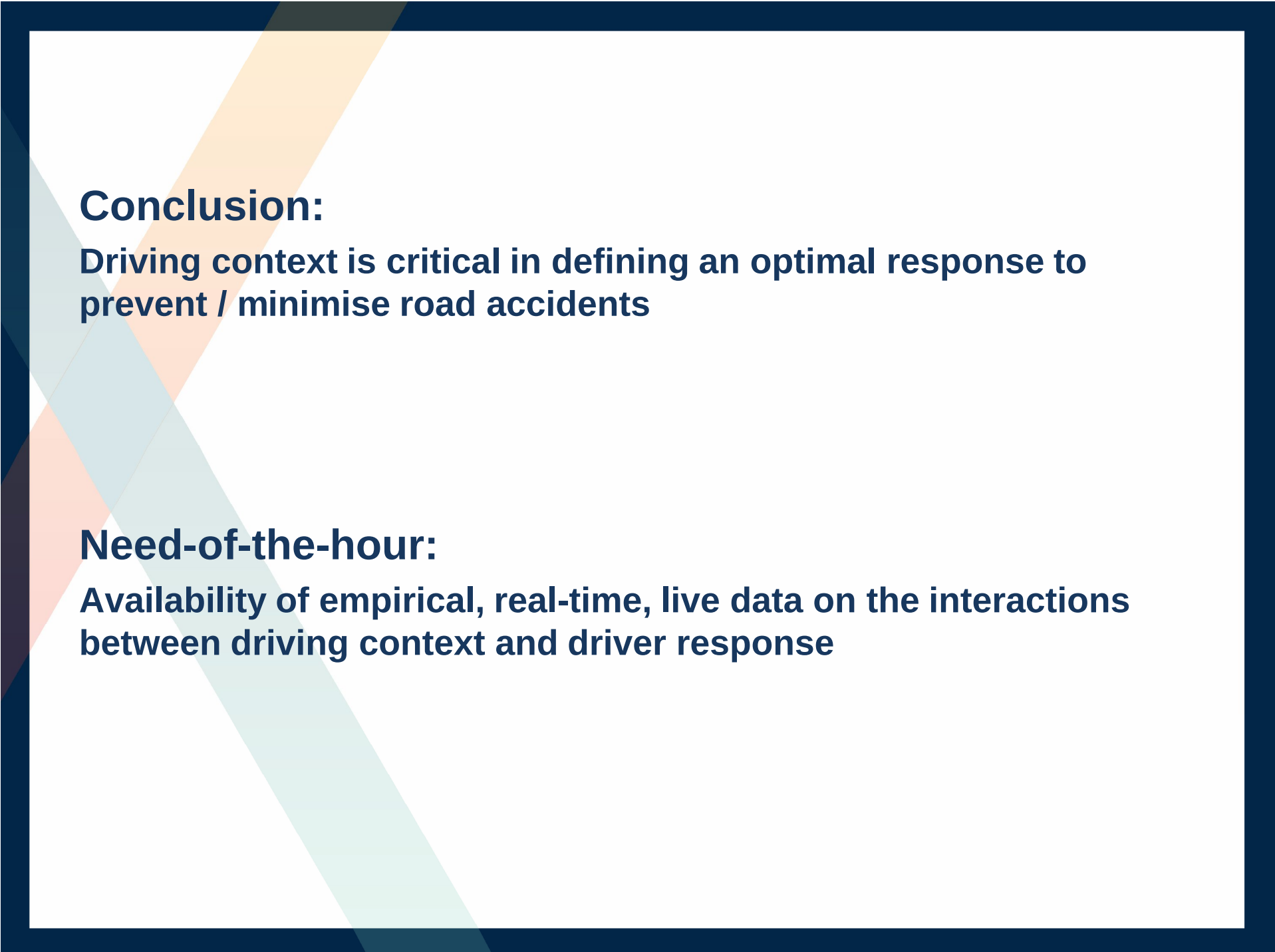
Driving Behavior: By Weather

- Common Perception → Accident rate highest during Monsoons
- Analysis → Lowest during Monsoons
 - Better Driving Behavior during adverse weather conditions

Accidents & Fatalities - By Month (2015)



Direct correlation between risk perception of a driving context and driver's response, commensurate to the adverse driving conditions



Conclusion:

Driving context is critical in defining an optimal response to prevent / minimise road accidents

Need-of-the-hour:

Availability of empirical, real-time, live data on the interactions between driving context and driver response

Instance of an Empirical Data-Point:

- Driver A, an HCV truck driver
 - carrying full truckload
 - 40+ kmph for 10 minutes, on 17 Oct 2017, 22:00 - 23:00
 - 3 instances of aggressive braking
 - 15 minutes of tailgating @ less than 0.5 sec reaction time
 - Mumbai-Pune NH with gradient = 1 / 18
- **Such Reporting provides detailed insights on**
 - “**Driver’s driving response**” for the “**specific part of the trip**” where he exhibits rash driving behavior
 - “**Driving context**” for the trip

A combination of these two data sets can be used to **assess the exact driving risk profile of Driver** for the trip
- **Driving Risk Score Card** for the trip quantifies the risk profile of the driver, which can
 - Act as a serious deterrent for the driver from exhibiting similar response in a high risk driving context, in the future,
 - Provide a specific insights on the impact of the overall driving context on the driving response of Driver

References/ Data Source:

1. ROAD ACCIDENTS IN INDIA 2015

<http://pibphoto.nic.in/documents/rlink/2016/jun/p20166905.pdf>