

“Apples Vs. Oranges”:

Comparing Safety Performance of Different Modes

Dr. Rongfang (Rachel) Liu

Watchung Transportation LLC

New Jersey Institute of Technology

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2012 RAIL CONFERENCE



OVERVIEW

- Background
- Comparison Context
- Definitions
- Data Sources
- Safety Performance Measures
- Industry Feedback
- Adequate Comparisons



RESEARCH BACKGROUND

- Definitions by Different Modes
- Data Sources for Different Modes
- Operating Environments
- Risk Exposures
- Aggregating Levels
- Data Availability



DEFINITIONS

Scope	Aviation	Highway	Railroad	Transit
Fatality	Within 7 days of accident	30 days	365 days 4 occupational illness	30 days
Injury	Physical, sickness, disease, disability, shock, mental anguish, mental injury	Medical Treatment away from the scene	Medical Treatment/Chronicle illness,	Medical attention away from the scene
Property Damage	Total or partial destruction, impairment	Vary by states	>\$9200	>\$25, 000 (Reportable)

DATA SOURCES

- **Aviation**

- Aviation Accident Database (AAD) - NTSB
- Accident/Incident Data System (AIDS) – FAA
- Aviation Safety Reporting Systems (ASRS) – FAA/NASA

- **Highway**

- Fatality Analysis Report (FARS) - NHTSA
- National Automotive Sampling System (NASS)
 - General Estimates Systems (GES)
 - Crashworthiness Data System (CDS)
- Motor Carrier Management Information Systems (MCMIS) – FMCSA



DATA SOURCES

- **Railroad**
 - Rail Equipment Accident/Incident Report Database
 - FRA
 - Highway-Rail Grade Crossing Incident Report Database – FRA
- **Transit:**
 - Safety Management Information Statistics Database (SMISD)
 - State Safety Oversight Program



EXPOSURE DATA

- Enplanement
- Passenger Miles Travelled (PMT)
- Vehicle Miles Travelled (VMT)
- Vehicle Hours Travelled (VHT)
- Unlinked Passenger Trips (UPT)



INTERNAL FACTORS

- Movement Types (H, R, T)
- Collision Types (H, R, T)
- Speed (H, R, T)
- Type of Vehicles (H, R, T)
- Locomotive Control Types (R)



Environmental Factors

- Weather Conditions
- Visibility
- Temperature
- Land Use Types: Urban vs. Rural
- Roadway/Territory Types (H, R)



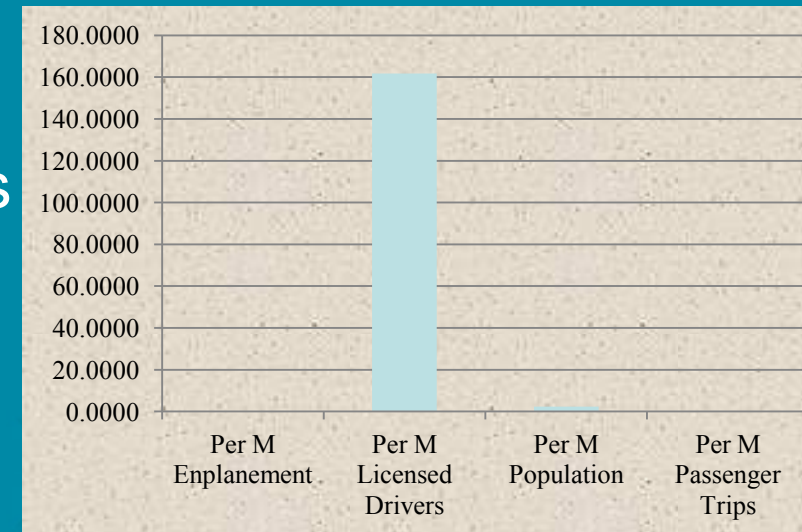
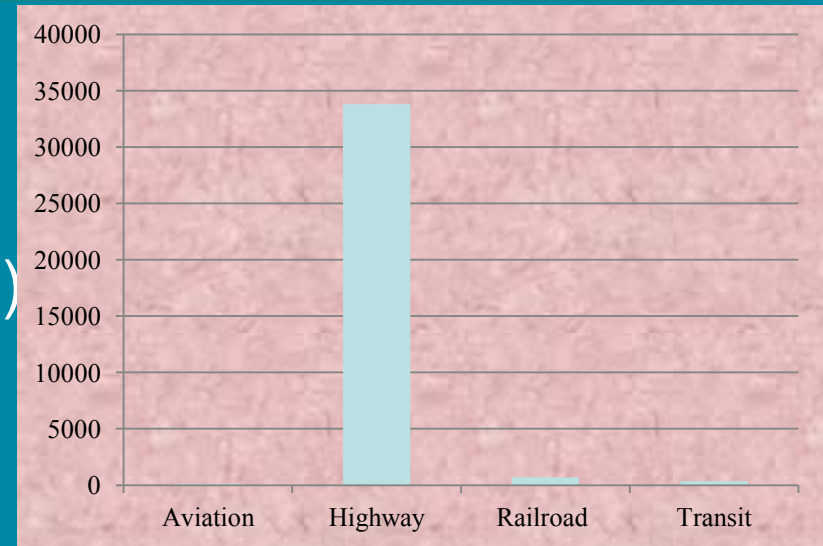
Aggregate Factors

- Spatial Environment
 - Urban Vs. Rural
 - Geographical Information
 - Transportation locations
- Persons
 - Age
 - Gender
- Temporal Information
 - Day of the week
 - Time of the day



PERFORMANCE MEASURES

- **A Number:**
 - 121 (Aviation Fatality, 2009)
 - 33,808 (Highway Fatality, 2009)
 - 696 (Railroad Fatality, 2009)
 - 367 (Transit Fatality, 2009)
- **A Rate or Frequency**
 - 0.18 Per Million Enplanement
 - 162 Per Million Licensed Drivers
 - 2.26 Per Million Population
 - 0.04 Per Million passenger trips
- **A Ratio or Percentage**



SAMPLE SPM FOR HIGHWAY USERS

- Number of run-off-road fatalities
- Number of intersection-related fatalities
- Number of speeding-related fatalities
- Number of fatalities involving distracted drivers
- Number of fatalities in unlicensed-driver crashes
- Number of fatalities involving 16-19 year-old drivers
- Number of motorcyclist fatalities
- Number of fatalities involving heavy trucks

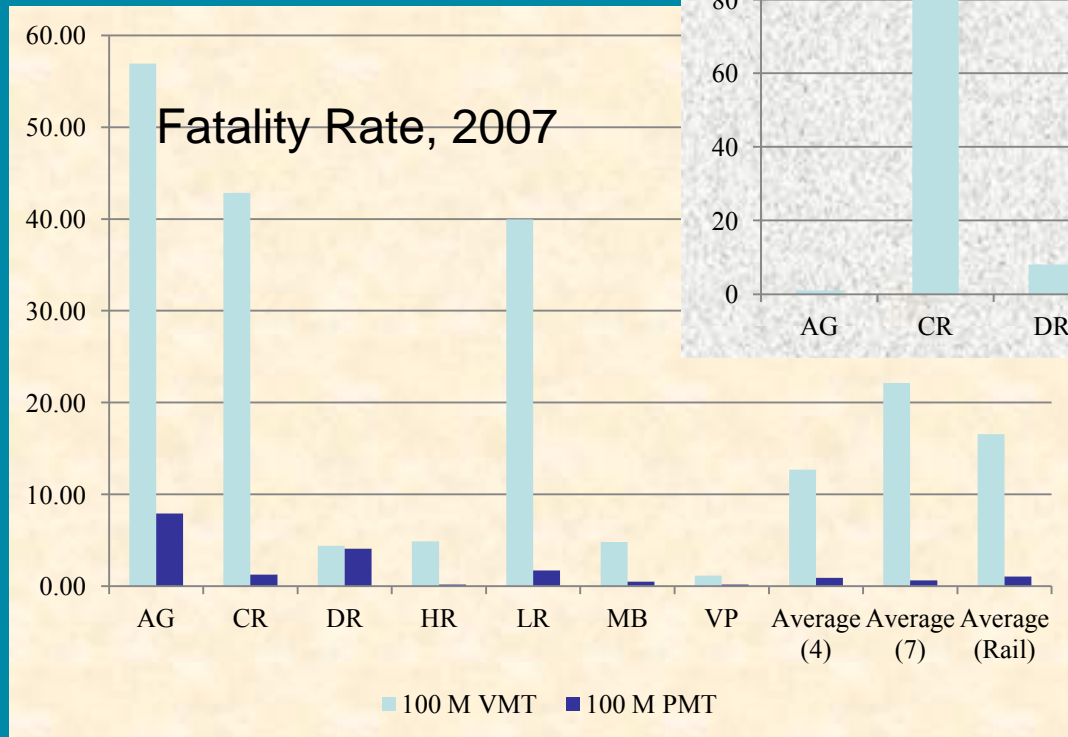


INTERPRETATION OF DIFFERENT PERFORMANCE MEASURES

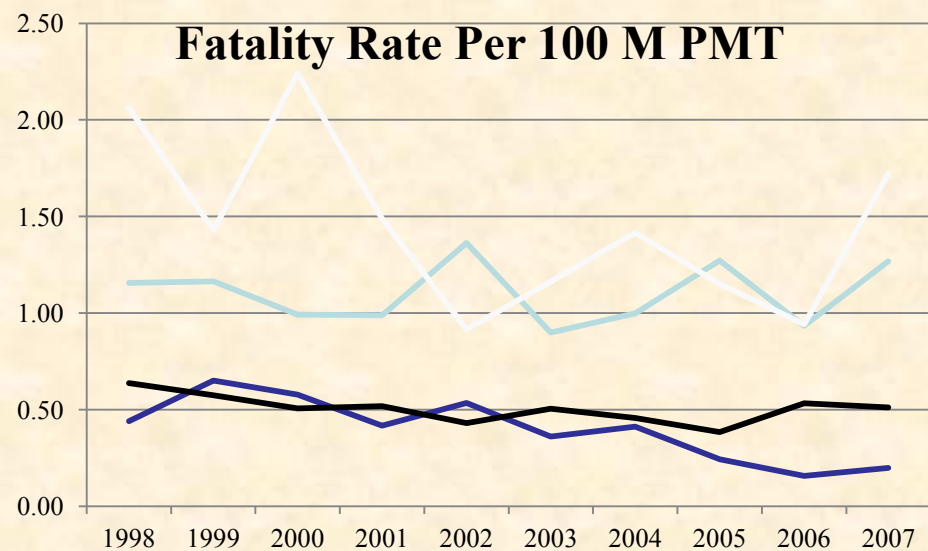
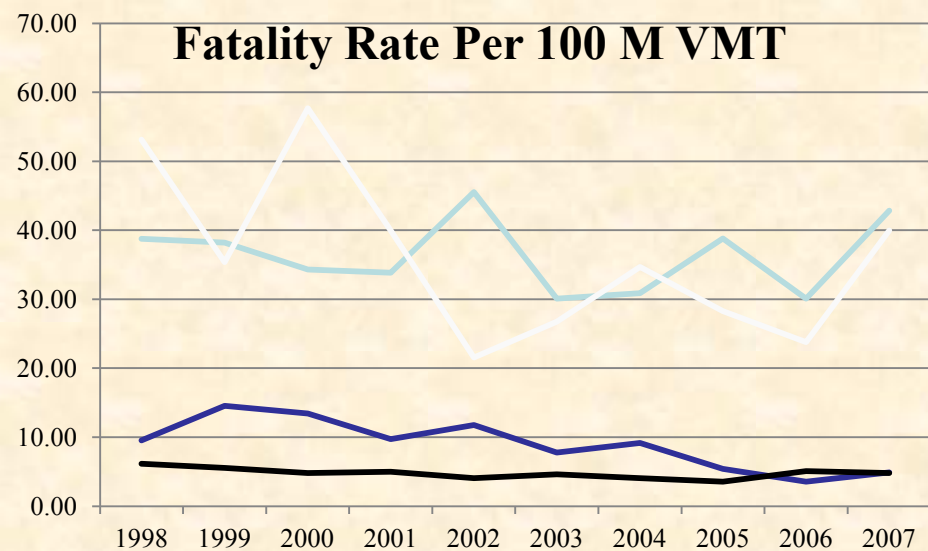
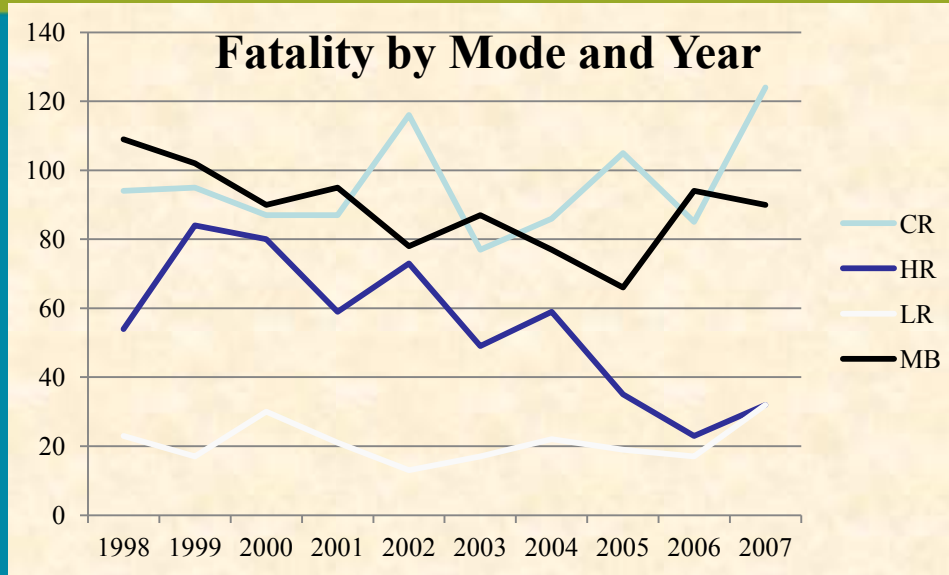
Table 4.3 Using Number and Rate of Fatalities to Describe Performance

Transit Agency	Number of Preventable fatalities	Passenger-miles traveled (millions)	Fatalities/ million passenger-miles traveled
A	5	10	0.50
B	5	100	0.05

SPM for Transit Modes



HISTORICAL TRENDS



ADEQUATE COMPARISON

- Apples to Apple and Oranges to Oranges
- Quality of the Data
- Aggregate Levels
- Environmental Factors
- Exposure Data
- Causal Relationship



QUALITY OF DATA

- Timeliness
- Accuracy
- Completeness
- Uniformity/Consistency
- Integration
- Accessibility
- Multimodality
- Geographic Scale
- Forecastability



STAKEHOLDER INPUT

- Federal Agencies
- State Safety Oversight Offices
- Transit Agencies
- Local Governments
- Police Officers



First Level Bins

- Urban Environment
 - Automobile
 - Bus
 - LRT
 - Subway
 - Commuter Rail
 - Ferry
- Intercity Travel
 - Aviation
 - Automobile/Motor Bus
 - Amtrak



CONTACT INFORMATION

Dr. Rachel Liu

Watchung Transportation LLC

rliu@watchunhgtrans.com

908-578-3500

Or

New Jersey Institute of Technology

rliu@njit.edu

973-596-5884

