

## 20<sup>th</sup> SAFETY CONVENTION



Organized by Safety and Quality Forum; The Institution of Engineers (India)

# Tractor-trailers a mode of rural transport: Associated injuries and preventive measures



Presented by

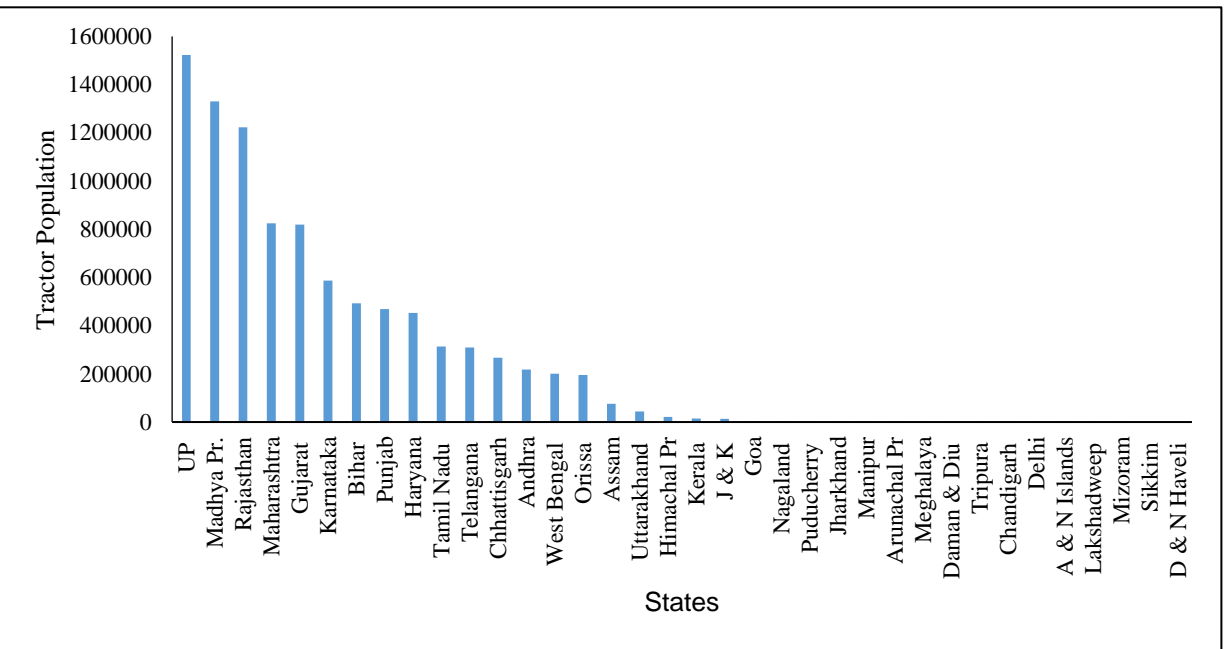
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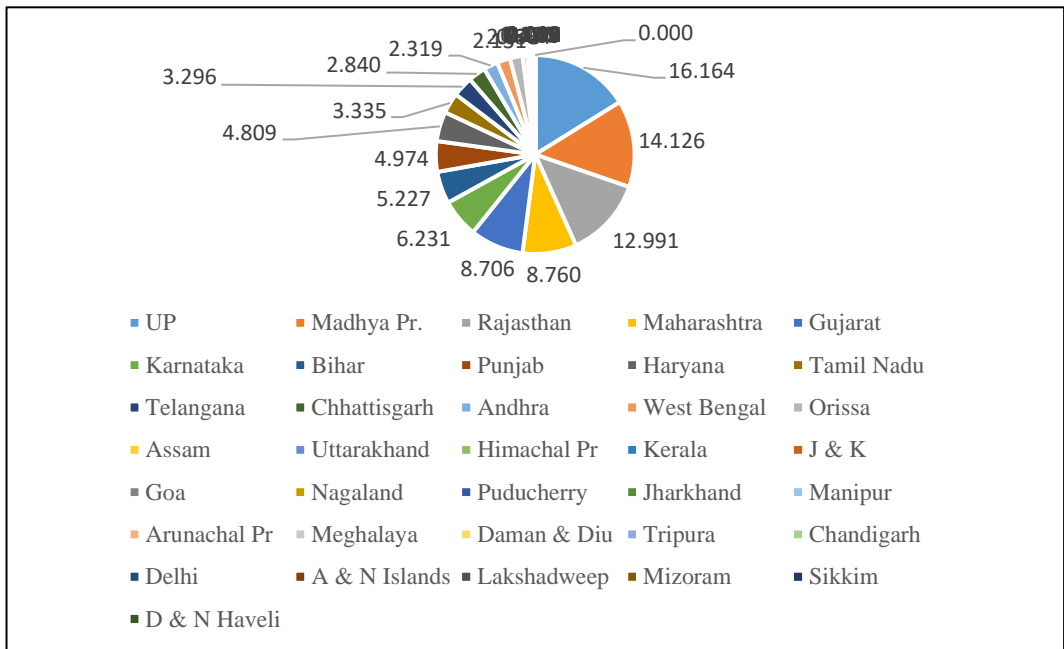
# Introduction

- The power availability was increased from **0.28 kW/ha in 1960's to 2.761 kW/ha** in 2020-21
- The tractor is main power source for increasing the pace of farm mechanization
- The total registered number of tractors as of 31<sup>st</sup> March 2020 is 9.4 billions with a total registered % share of 2.89% among all vehicles
- The top five states in tractor population are U.P, M.P, Rajasthan, Maharastra and Gujarat, with a share of 16.16, 14.12, 12.99, 8.76 and 8.70, respectively
- The tractor use not only restricted to farming activities can also be better utilized for non farming activity (transportation, haulage)
- Using tractors in transport accounted for about 60 percent of the average annual hours
- The total number of registered tractor-trailers as on 2020 was 22,74,803 with a % share of total registered vehicles in a total of 0.70%
- The top five states in tractor population are Maharastra, Gujarat, Karnataka, Bihar, and Telangana U.P, M.P, Rajasthan, Maharastra and Gujarat, with a share of 18.71, 17.48, 14.13, 10.41 and 9.29, respectively

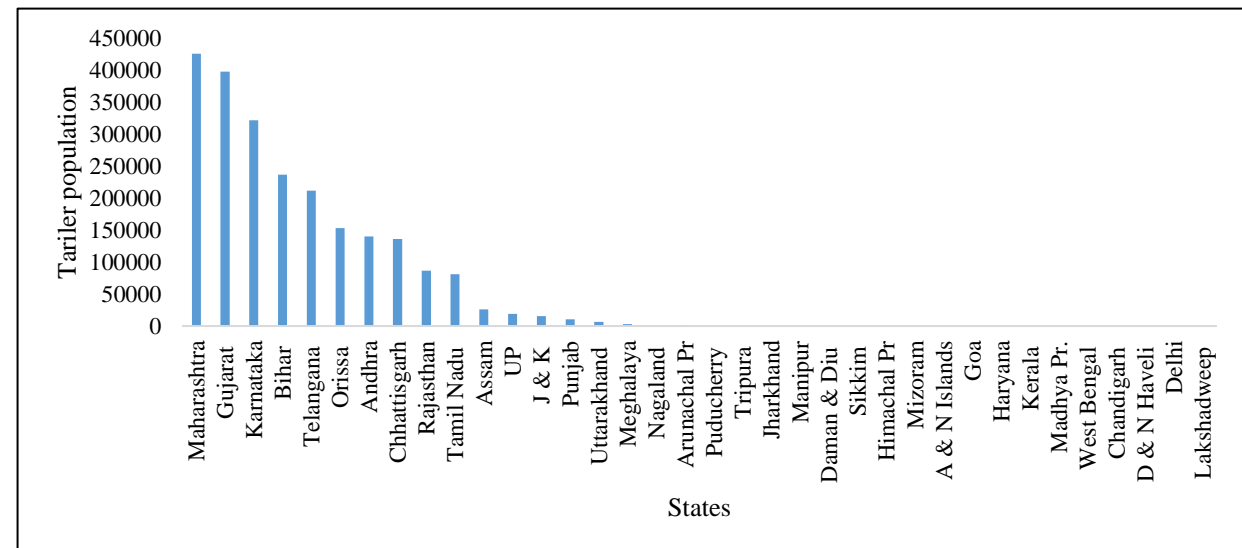




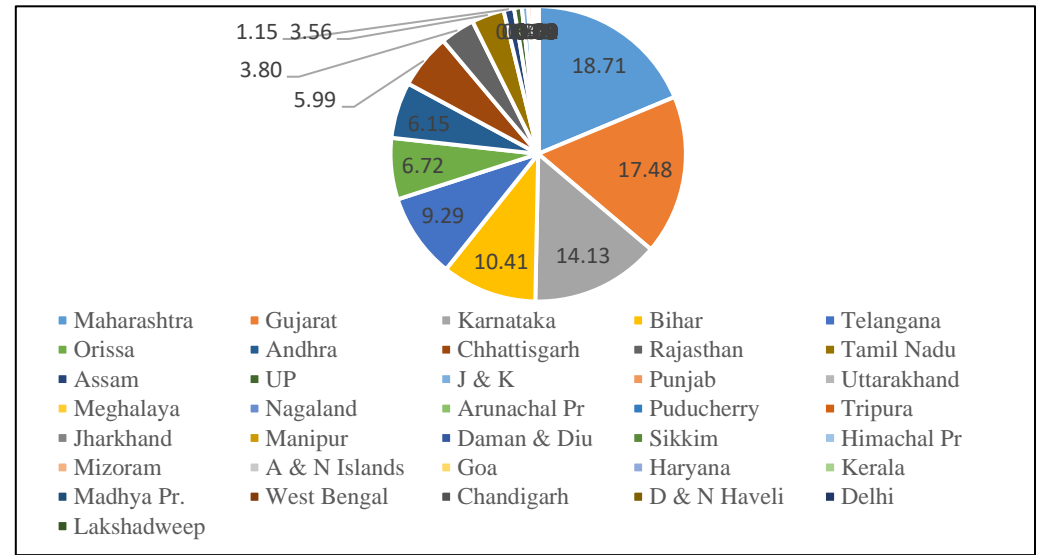
Tractor population in different states of the country 2020



Percentage share of tractors in different states of the country



Trailer population in different states of the country up to 2020



Percentage share of trailers in different states of India

## Limitation of tractor-trailers

Majorly, tractors are hitched with single-axle (unbalanced) and double-axle (balanced) trailers for haulage carriage and transportation in rural areas.

The load capacity of the single-axle trailers shall not be more than 5 tonnes (BIS)

- No brakes
- Lacks suspension system
- No sitting system for passengers; can cause exposure to higher vibrations, noise and dust.
- Does not have rear visibility; or side indicators
- Less conspicuous: lack of rear indicators, SMVE
- Trailer is towed by a tractor; improper hitching causes side turning and overturning.
- During haulage transportation, it covers a wide area of roads, causing difficulty for other vehicles in visibility and movement.
- Towing two trailers in
- No safety devices

# Overloaded tractor trailer during road and haulage transportation

**Suryapet | Nov 13, 2022 | 12:39**



Five people, including a child, died while 20 others sustained injuries after a lorry collided with a tractor

**Bareilly | April 12, 2021 | 06:48 IST**



ओवरटेक करते समय दो ट्रैक्टर की टक्कर में तीन की मौत, सड़के हादसे में 18 लोग घायल भी हुए हैं

**Kanpur | October 02, 2022 | 11:03**

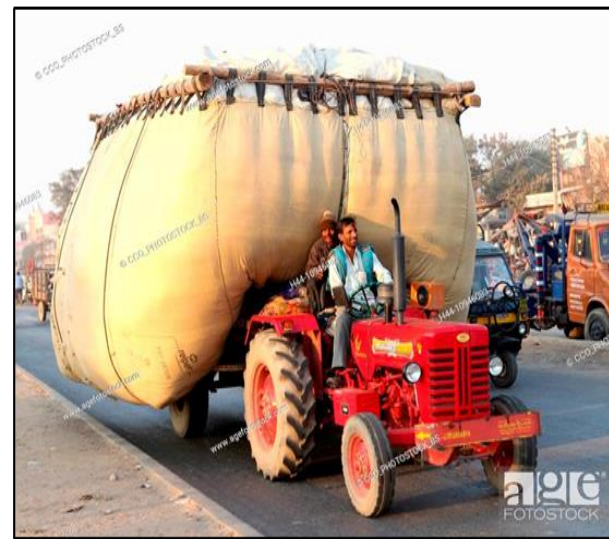


Trailer was carrying around 50 people, 26 killed and 16 seriously injured

**Damoh | Oct 31, 2020 | 05:38 IST**



देवी विसर्जन करने जा रही ट्रैक्टर-ट्रॉली पलटी, दो की मौत व दर्जन से अधिक घायल



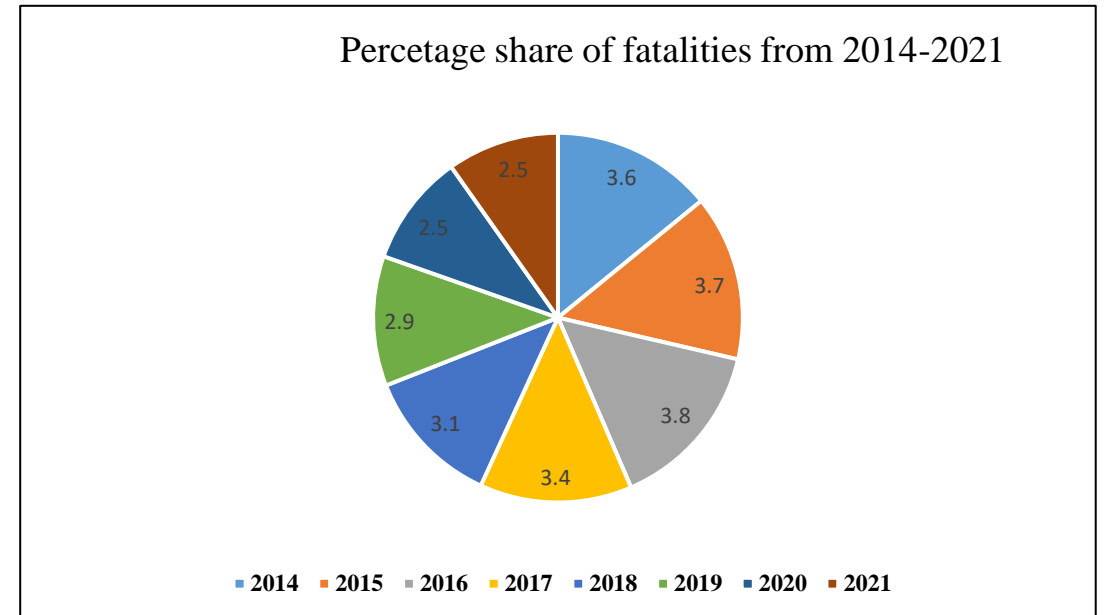
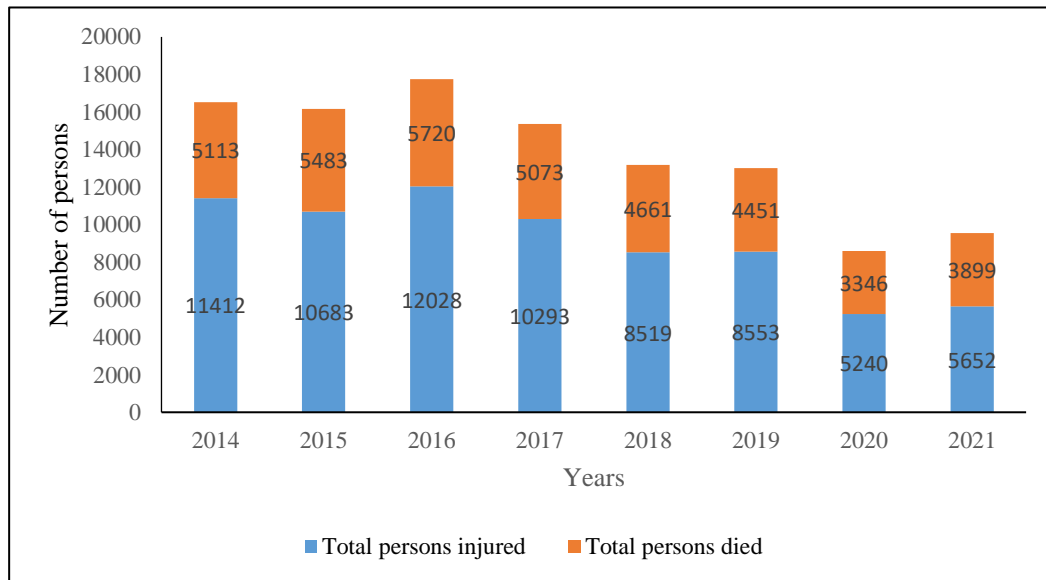
Tractor-trailer accidents glimpse during transportation

Tractor-trailer during of overloaded haulage transportation

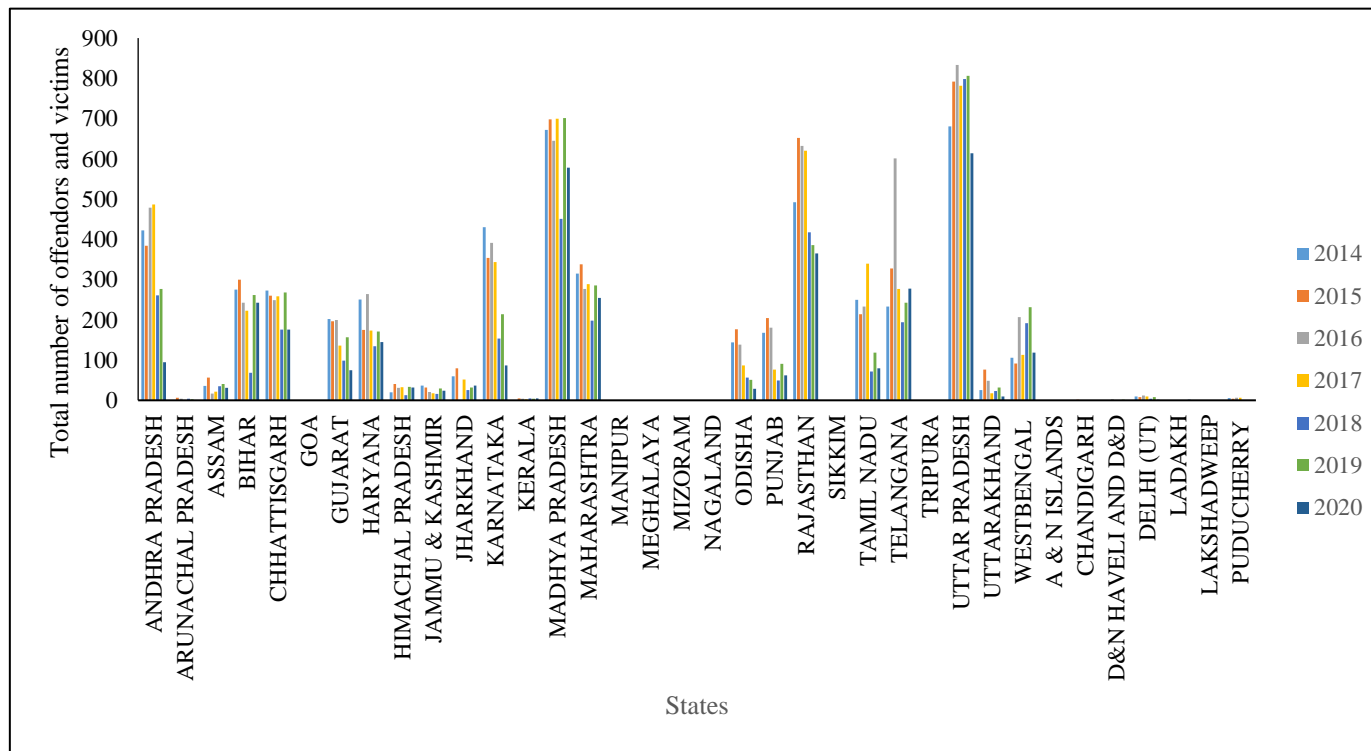


## Tractor-Trailers associated injuries and fatalities

- Mainly the tractor-trailer combinations used for transporting farm inputs, produce, construction materials and people in low-income countries
- Uttar Pradesh had the highest number of offenders and victims throughout this period, followed by Madhya Pradesh, Rajasthan, Andhra Pradesh and Maharastra
- Interestingly, there are higher accidents (offenders and victims) in the states with the higher number of tractors and trailer populations.

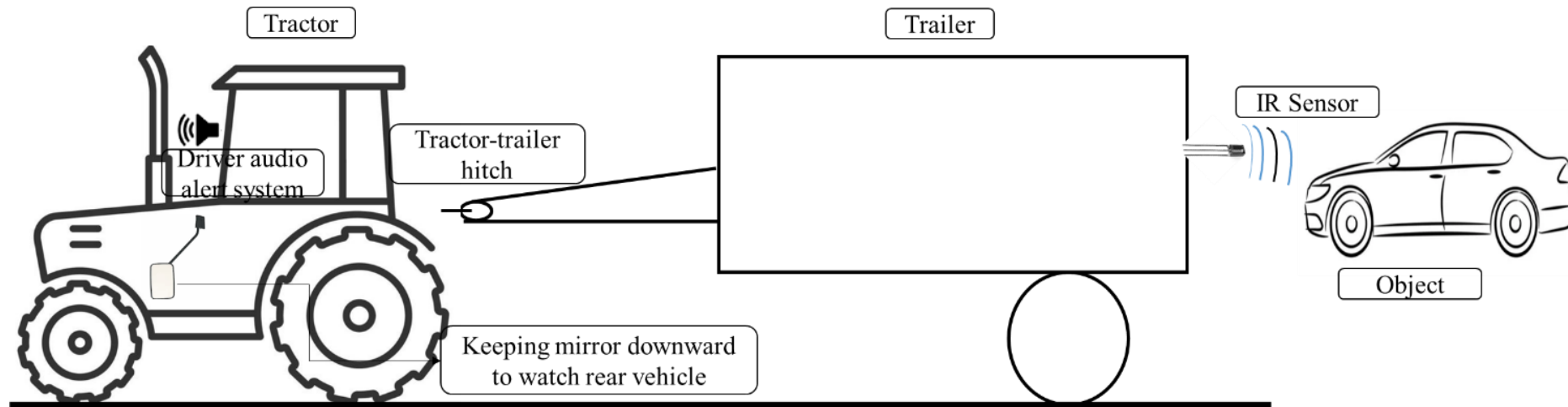


Number of persons injured and died in road accidents due to tractor Percentage share of death rates due to tractors among all accidents



Total victims and offenders in different states of the country from 2014-2020

## Preventive measures to mitigate tractor-trailer accidents during transportation



Conceptual drawing for IR sensor-based audio signal alerting system and downward mirror technique

### ▪ Sensor based

- The visibility hindrance, especially during turns and maneuvers, has been a leading cause of accidents
- An infrared (IR) sensor-based system emerges as a practical and cost-effective solution
- This innovative approach not only enhances safety but also proves economically viable
- Upon detection, the sensor promptly alerts the tractor-trailer operator with an audible signal

### ▪ Rear View Mirror (downward)

- By angling the mirrors downward, the tractor-trailer combination can observe the vehicle's rearward view, utilizing the ground clearance as a strategic vantage point.
- This practical adjustment enhances the overall safety of the haulage operation by compensating for reduced visibility caused by the heavy load.



## Other Interventions

- Enhancing the visibility of tractor-trailers: "SMVE at Rear marking plate a triangular shaped with truncated corners
- Placing of low-cost rear camera and display system at the operator
- Provision of Rear (tail lights), blinkers and side Indicators
- Tarpaulin cover with fluorescent stripes/LED strips to make the covered trailer visible
- Compressing the low-density fodder into blocks for lower volume
- Careful during driving at sharp slopes, uneven, soft or slippery ground, alongside ditches or banks, and during turning or reversing.
- When traveling on public roads, keep on the correct side of the road. Use light signals to turn, stop or slow down.
- No overloading of the trailer to prevent tipping backward
- Removable guards for trailer when passengers are travelling



Slow moving vehicle emblem at the rear of tractor and trailer