

Disaster Prevention and Management

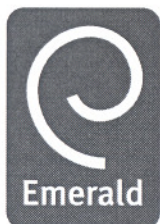
Insight into the nature of road accidents from data on injured and dead

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Insight into the nature of road accidents from data on injured and dead

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Keywords

Road accidents, Death, Injuries, India

Abstract

Analysis of data on road accidents collected from different sources brings forth important characteristics related to the nature of accidents. Based on this, the fatality index (FI) is defined as the ratio of fatalities to injuries in accidents. An increase in FI is indicative of fatalities in accidents. High FI is observed to correlate positively with difficult terrain, slow response and poor medical facilities. FI therefore represents an important indicator for planning initiatives to reduce fatalities related to road accidents.

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Introduction

Despite causing loss of human life and property, together with the associated trauma and suffering, road accidents are often not placed under the category of disasters. The magnitude of the problem is often not realised, and these are looked upon as stray incidences. This leads to lack of organised support for efforts to mitigate road accidents, and tolls keeps mounting with increases in road length and vehicular traffic.

The Vienna Convention on Road Traffic (1968) defined injury in road crashes as being the result of the collision of a moving vehicle on a public road in which a road user (human or animal) is injured (IRTAD, 1992). A road death is deemed to have occurred when a person injured dies within 30 days of the crash (and as a result of the crash), but not all countries adhere to this definition. For the purposes of this study, people injured or killed in an accident are taken to be the number of persons reported to be injured or killed by local police records as a result of road accidents. The police department in India has a procedure of reporting all accidents by lodging a First Information Report (FIR) of the same in the reporting station under whose jurisdiction the accident has taken place. Death or damage caused by the accident is also reported in the FIR, which is produced in court during any judicial enquiry into the case. Statistics of accidents for the state of Uttaranchal are based on the FIRs of the police department for the previous two years (2002 and 2003), and these are expected to cover the majority of accidents occurring in the state. However, some accidents may have gone unreported, and therefore the statistics give the minimum status.

Road accidents: the scenario

There is growing concern worldwide over increasing incidences of road accidents and consequent loss of human life, together with the loss in workforce due to disabilities caused by road accidents and the economic losses that they inflict on society. Two major studies (World Health Organisation, 1996, 1999) assessing causes of death placed road accidents ninth in 1990 on a comprehensive list of more than one hundred separate causes of death. Forecasts made from analysis of data and trends suggest that by the year 2020, road accidents as a cause of death will have

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moved up to sixth place. It has been predicted that "years of life lost" and "disability-adjusted life years" due to road accidents will reach second and third place, respectively, by 2020. Attempts to highlight the worsening road accident scenario have also been made (Ghee *et al.*, 1997), and the World Health Organisation (WHO) has estimated the death toll in road accidents in 1998 to be 1.17 million worldwide.

Data on road accidents for the previous 30 years (1970-2001) for India indicate that they have gradually increased from 114,100 to 394,800 in this period, 3.5-fold increase (Road Safety Cell, Ministry of Road Transport and Highways, n.d.). In this period, annual road fatalities have increased from 14,500 to a staggering 80,000, and the number of people injured in accidents has risen from 70,100 to 382,700.

State data on road accidents show that fatalities related to road accidents are highest in the state of Maharashtra, followed by Andhra Pradesh, Tamil Nadu and Uttar Pradesh. Not surprisingly, these are the states that have the greatest number of vehicles, with the exception of Gujarat, which despite having more vehicles, has a smaller number of fatalities related to road accidents. Fatalities per 100 kilometers of road length are highest in Haryana (ten), Chandigarh, Delhi, Daman and Diu (seven each) and lowest in the hilly northeastern states of Nagaland, Arunachal Pradesh and Mizoram.

Data on the number of people injured is generally expected to correlate positively with the fatality data, but when analysed for different states these show some marked divergences that are suggestive of some underlying clue regarding the nature of accidents in different states. To understand this divergence and to analyse the causes underlying it, the ratio of fatalities in road accidents and people injured in accidents in different states was studied in detail. Defined here as the fatality index (FI) of road accidents, this ratio gives important clues on the nature of road accidents. The FI increases as more and more road accidents become fatal (i.e. more people are killed in relation to those injured):

$$FI = \frac{\text{Number of fatalities}}{\text{Number of people injured}}$$

Analysis of road accident data for three years (1999, 2000 and 2001) shows marked differences in the nature of accidents in different states. FI is observed to be higher for Punjab, Uttar Pradesh, Uttaranchal, and Mizoram (Figure 1) despite these states recording a relatively smaller number of fatalities. This reflects the fatal nature of road accidents in these states. The reasons for this

might be different for different states, and may include:

- bad road conditions;
- topography;
- delays in post-accident medical care; and
- non-compliance with traffic rules, etc.

FI is only suggestive of the relative fatal nature of accidents, and the causes of accidents have to be investigated individually.

Road accident scenario in the Himalayan state of Uttaranchal

Uttaranchal is mainly rugged mountainous terrain, with ten of its 13 districts falling totally within the Himalayas, while Haridwar, Udham Singh Nagar are totally plains and Dehradun is partially plains. FI analysis shows that road accidents in the state of Uttaranchal are highly fatal (FI ~ 0.5) and that the causes of accidents are rooted in its rugged topography, remoteness, inadequate response structure and medical facilities.

Having defined FI as reflecting the nature of road accidents, it is imperative to study FI individually for different districts, so that the reasons for peculiar patterns can be investigated at a local level and measures to reduce accident frequency and fatality can be planned. Data on accidents was collected from the Police Department for all 13 districts of the state of Uttaranchal for the years 2002 and 2003. This data was used to study accident patterns in various districts together with the type of vehicle involved and the timing of accidents.

On average, around 700 people are killed every year due to accidents in the state, and the three districts described earlier as being totally or partially plains (i.e. Dehradun, Udham Singh Nagar and Haridwar) account for the maximum number of road fatalities (50 per cent of total fatalities; Figure 2). Of the hill districts, the maximum number of accident-related casualties are recorded in Chamoli, Tehri, Uttarkashi, Pauri Garhwal, Pithoragarh and Nainital.

Speeding is considered to be the main cause of accidents. However, in the hills there are fewer collision-related accidents, and major damage is caused by vehicles falling off the road. Trucks (goods carriers) are most frequently involved in road accidents, but in the hills the jeep (a popular mode of public transport) is the major culprit for most accidents. Most accidents are observed to take place during the night (between 18.00 and 06.00 hours).

Despite having fewer fatalities, FI is considerably higher in the hills (Figure 3), with

Figure 1 Fatality index in different states of India for 1999, 2000 and 2001

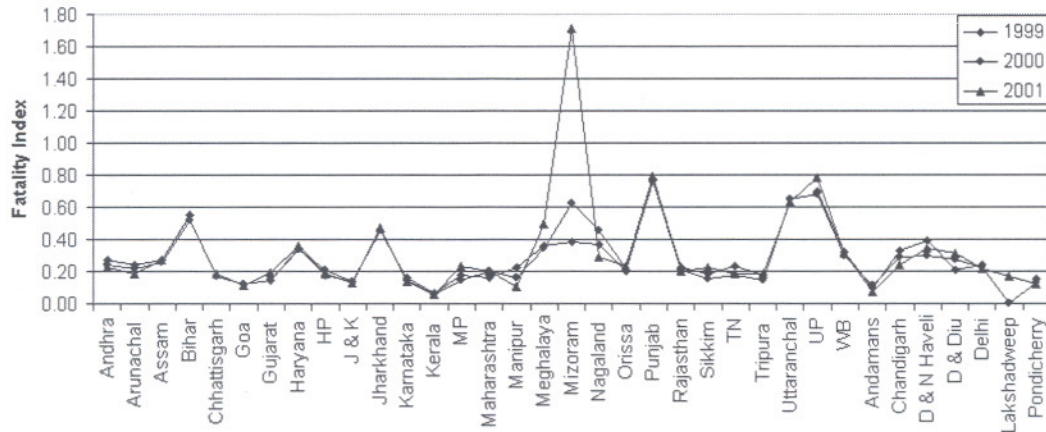


Figure 2 Data showing accidents causing fatalities and road accident scenario in Uttaranchal

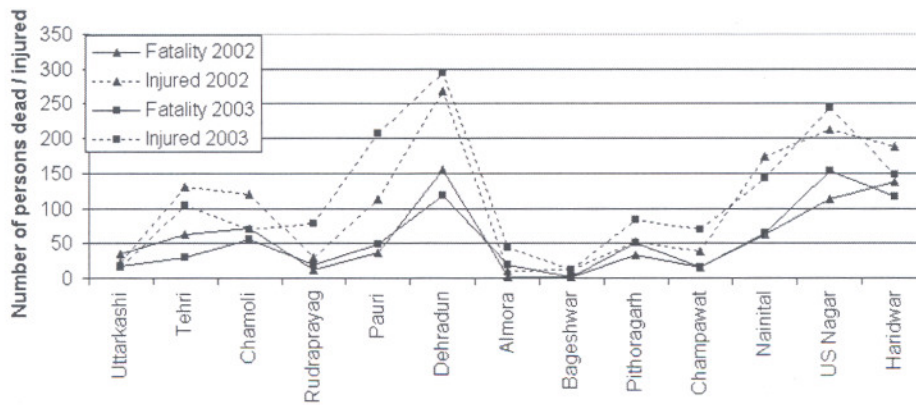
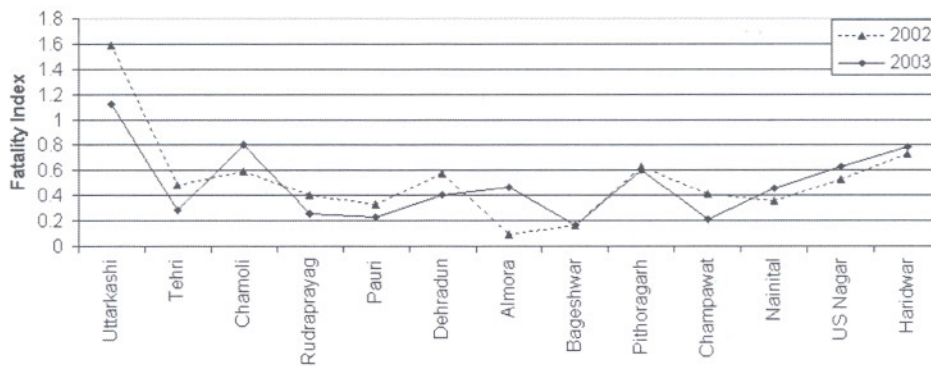


Figure 3 Fatality index in Uttaranchal



Uttarkashi exhibiting a FI of more than unity (more people killed in accidents than those injured). Pithoragarh and Chamoli are two other hill districts with a high FI. It is worth noting that all three hill districts showing high FI are remote frontier districts of the state, and the terrain conditions in these districts are rough with high

relief. Moreover, a major portion of the *Yatra* (pilgrimage) route (Gangotri and Badrinath) passes through Chamoli and Uttarkashi districts. These districts therefore experience a large number of tourists who are not accustomed to hill driving. This is highlighted in the monthly distribution of road fatalities in these districts,

which registers a steep rise during the summer (the *Yatra* season). Post-accident medical facilities are also not particularly good in these remote hill districts, and this aggravates the accident death toll. The relatively low FI in low-lying districts, despite them having more accidents and fatalities, is attributed to terrain conditions, which reduce rescue time, and access to better medical facilities in these districts.

The state government needs to direct more resources into making accidents in these three hill districts less fatal, and for this both structural and non-structural measures should be employed.

Mitigation strategy for reducing FI

The Himalayan terrain of Uttaranchal is highly fragile and prone to natural disasters. Through generations of experience, observation, experimentation and accumulated knowledge, the people living in this rugged terrain have devised innovative ways of mitigating the effects of earthquakes, landslides, flash floods and drought.

With the introduction of modern means of transportation and construction of roads in the region in the last century, people witnessed the fury of road accidents and the untimely death of a large number of people because of them. The people were observant of this phenomenon, and it was observed early that the frequency of fatal road accidents was particularly high on certain stretches of road. People attributed this to the curse of some local deity and resorted to the construction of small roadside temples at these points. The practice of slowing down and stopping at these temples in respect to these deities and to pray for a secure journey thus became common practice, and it has helped in reducing the frequency of accidents on these stretches of road. The recognition of these temples can be estimated from the fact that almost all new vehicles are first taken to these temples to get the blessings of the deity, and this practice is invariably followed by people of all beliefs and sects.

The hilly terrain of Uttaranchal houses a number of famous tourist, adventure sports, and pilgrimage centers that attract large number of people from across the country and abroad. The region thus experiences a large number of drivers who are not conversant with the terrain, the principles of hill driving and the significance of these small roadside temples, and thus very often are involved in accidents. It is for the safety of these people, and also to promote tourism (one of the main sources of revenue) that road safety needs to be given more attention.

Some suggestions for reducing the frequency of road accidents in the hills include:

- *Awareness generation* – In the hills, certain stretches of the road are known to be prone to accidents. A massive awareness drive to make drivers conscious of this fact should be launched. Apart from this, drivers should be made aware of the various precautions that can be taken to avoid road accidents in the hills.
- *Licensing* – Licensing procedures have been relaxed in previous years, and this has led to the granting of licenses to some who are not well trained in driving. The issuing of new driving licenses needs to be made more stringent, and procedures should be laid down for the cancellation of the driving licenses of those drivers involved in reckless driving.
- *Surveillance* – In the hills a large number of accidents are caused by overloading and the use of vehicles which are not roadworthy. To combat this, stringent surveillance should be employed, and strict and immediate action should be taken against defaulters.
- *Rescue teams* – In the rugged Himalayan terrain of Uttaranchal even a small amount of negligence on the part of the driver has the potential to cause fatal accidents, and this is reflected in the large number of accidents that result from vehicles falling off the road into deep gorges, cliffs and fast flowing and deep water. Even if the police force reaches the site of the accident, it is ill equipped and badly trained at rescuing the victims. The delay in response thus leads to soaring fatality rates in such cases. To reduce fatality rates on mountain roads it is essential to train and equip those in charge of search and rescue in the aftermath of any accident. The option of raising a trained cadre of rescue volunteers could also be useful for this purpose. Trained rescue personnel should be stationed at crucial sites and must be provided with better communication and mobility.
- *Night driving* – A large number of accidents in the hilly region take place at night. Night driving should be forbidden in the hills.
- *Barricading* – Zones in which accidents occur frequently should be marked and special structural measures should be employed in these zones to avoid fatal accidents.
- *Not leaving everything to the government* – It is necessary that organisations involved in insurance, tourism, hospitality and the like become partners in making hill roads safer. These organisations need to be motivated into making investments in the field of accident mitigation, as this would lead to a reduction in

accident claims for insurance companies, while the business of the others would increase. This would amount to a win-win situation for all players.

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