Statistical modelling of the frequency and severity of road accidents

Under-reporting of traffic accidents is a well-discussed subject in traffic safety and it is well-known that the degree of under-reporting of traffic accidents is quite high in many countries. Nevertheless, very little literature has been made to investigate what causes the high degree of under-reporting. The problem of under-reporting is not unique for traffic accidents as severe under-reporting is a challenge in many other fields of incident reporting. In other incidents fields with intended or unintended harm, research has investigated the behavioural reasons for why people choose to report an incident to the authorities. These kinds of studies have never been conducted within the field of transport. Furthermore, in other fields of incident reporting literature has documented that distrust to the police or to other authorities has an influence on the reporting rate. Even though a few studies have focused on the service quality within the police none have looked at the service quality specific for the handling of traffic accidents. The objective of this Ph.D. thesis is to investigate the extent of under-reporting of traffic accidents in Denmark and trace the under-reporting systematically. As something new and innovative this project also explores the behavioural reasons for under-reporting by investigating the barriers associated with the intention to report a bicycle incident in Denmark. Furthermore, the service quality within the police for the handling of traffic accident reporting is investigated by an expert management tool. Initially models were built by using existing traffic accident data collected by the police and emergency rooms in Denmark. The data registered by the police was collected on traffic accidents occurred on Danish roads in the period between 2002 and 2008. The emergency room data were collected at three hospitals located at Funen in the period between 2002 and 2009. Furthermore, two large-scale questionnaires were developed and administered. The first questionnaire was administered among bicyclist in Denmark and investigates the behavioural reasons for reporting traffic accidents. The second questionnaire was administered to stakeholders in the transportation field and was made to detect strengths, threats and opportunities for reporting traffic accidents within the police. This Ph.D. study contributes significantly to the literature about under-reporting. The following innovative findings are presented:

1) New estimates of the under-reporting in the police registered data at Funen in Denmark have been found and these numbers were found to be larger than numbers found in other Countries (Paper 1).
2) As something new the heterogeneity in the reporting rate has been shown and by that recognition of the reasons for heterogeneity has been made, which in the end may lead to devising policy measures (Paper 1).
3) A connection between the occurrence probability of trauma type and crash, vehicle and person characteristics exists (Paper 2).
4) The attitudes that accident reporting is useless are found to be the most relevant factor related to the lack of intention to report future cycling accidents. Secondly, the factors: concerns about family distress and social image and preference to allocate time to other activities are both associated with non-reporting intentions (Paper 3).
5) New information about the barriers for the intention to report a bicycle incident can help in designing policy measures for improving the reporting rate for bicycle incidents and in that connection also the traffic safety for bicyclist (Paper 3).
6) A new and innovative method is found to evaluate the service quality and is tested on the handling of traffic crash reporting within the police (Paper 4).
7) Improvements can be made within the police to improve the handling of traffic crash reporting and these improvements will benefit the reporting rate the most if they are made in the dimension responsiveness (Paper 4).

The thesis extends the literature about under-reporting and gives new and innovative knowledge which can contribute to new policy measures for improving the reporting rate. For that reason this study should be used as an important tool whenever addressing the under-reporting challenge.

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