

An Examination of Contributory Factors to Road Traffic Accidents

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Abstract— Road traffic accidents continue to be a major public problem worldwide, incurring significant loss of human and economic resources. In this investigation, the contributing factors affecting road traffic accidents in the province of Hail, Saudi Arabia, are examined. A comprehensive survey-questionnaire was designed and distributed to the local community in Hail to collect data needed for analysis. The results obtained in this study show that a very high percentage (74 percent) of participants had experienced road traffic accidents in the past. 67 percent of these accidents result from human errors, 29 percent from road conditions and only 4 percent from vehicle defects. The data indicate that excessive speeding is the main cause of road traffic accidents. Moreover, the results show that 24 percent of the survey participants do not possess a driving license, although they drive almost on a daily basis. The findings of this study highlight the need for developing effective enforcement of traffic of legislation in parallel with promoting public awareness and education in terms of road safety issues.

Keywords—road traffic accidents (RTA); human errors; road conditions

I. INTRODUCTION

Road traffic accidents (RTAs) and related injuries continue to be a growing threat, incurring heavy loss of human resources, along with severe socioeconomic costs across the world. Every day, thousands of people are killed and injured on roads across the world. The World Health Organization (WHO) has estimated that over 1.2 million people die each year on road traffic accidents and nearly 50 million suffer non-fatal injuries, the 6th cause of death [1]. WHO anticipates road accidents to be the third cause of death among the fifteen causes of death by 2020. Road traffic deaths accounted for 23% of all injury deaths worldwide. However, studies performed worldwide have shown that about 70 percent of these deaths occur in developing countries.

In fact, road traffic injuries alone ranked as the number one cause of disease burden among children between 5 and 14 years, and as the number three cause among those in the age group 15 to 29 years [1]. In Saudi Arabia, roads remain the primary means for transporting goods and people within the country due to the lack of a railway networks. With the increasing number of private vehicles and the limitation of public transportation, road traffic accidents are becoming a major problem in Saudi Arabia. More than 6,500 people die and 36,000 people get injured every year, and the economic losses exceed 6 US billion Dollars annually [2]. An average of

17 Saudi Arabian residents die on roads each day; which represents the country's principal cause of death in adult males aged 16 to 36. The World Health Organization has ranked Saudi Arabia at third place in the Arabian Gulf Cooperation Council (GCC) states and 53 worldwide as far as the occurrence of traffic accidents and resulting injuries and fatalities are concerned [1]. Previous studies have shown that casualty and fatality rates in Saudi Arabia and in other Gulf countries are much higher than in developing countries with comparable vehicle ownership levels [3][4]. Therefore, the magnitude of the problem requires the need for more research into road accidents and associated risk factors [5].

The causes of road accidents are complex and involve the interaction of a multitude of factors that include people, vehicles and the roadway environment [6][7]. Previous research studies [8][9][10] have shown that the majority of traffic accidents could be related to drivers' attitudes. A study conducted by Ansari et al. [4] have shown that an estimated 80% of traffic accidents in Saudi Arabia are due to human errors, while road safety and vehicle's condition contributed to only 20% of the accidents. Despite the fact that Saudi Arabia has a high rate of traffic accidents, relatively little literature about this problem has been produced.

The principle aim of this research is to identify the contributing factors affecting road traffic accidents in the province of Hail, Saudi Arabia. It is expected that the findings of the study will contribute to raising public awareness and designing policies for road safety planning in the Kingdom of Saudi Arabia and other countries with similar situation.

II. RESEARCH METHODOLOGY

To meet the objectives of this study, a comprehensive and structured survey-questionnaire is designed and distributed to the local community in Hail to collect comprehensive data needed for analysis. The survey contains 39 items of different type such as, Likert-scale type, multiple answers, single answer, and open questions and includes detailed information related to the vehicles, road environment, road-users and the interactions of these factors.

The questionnaire is composed of four main sections: the first section includes general information about the participant, the second section evaluates the driving behaviour and practices of participants, the third section assesses knowledge and awareness of participants about traffic regulations and safety rules, and the fourth section assesses traffic safety of the state of Hail roads. The questionnaire allows identifying

the most thoughtful difficulties and trafficking safety problems that road users face in Hail. It also provides an evaluation of the traffic experience, awareness, attitude, traffic safety and road conditions and allows identifying the level of understanding and compliance with traffic regulations of the participants.

The collected data is analysed through the statistical package SPSS, which is extensively used to produce different statistical figures and tables of relevant significance. The adequate data presentation is followed by a discussion about the importance of the results, particularly with respect to discrepancies that exist in accident-casualty data from different sources.

III. DATA PROCESSING AND ANALYSIS

More than 500 questionnaires were distributed randomly to a sample of people living in Hail. The total number of completed and returned questionnaires was 208 giving a rate of 41.6%. The respondents are mainly students falling within the age group of 19 to 29 years as shown in Fig. 1 and 2. The data indicates that 76% of the respondents have insurance, either full or third party coverage, while 24% of the respondents are uninsured as shown in Fig. 3.

The results show that 76% of the survey respondents possess a driving license (Fig. 4 and 5), while a relatively high percentage (24%) do not have a driving license. It should be noted that the majority of the unlicensed respondents report that they drive on a daily basis and the survey shows that about 94% of them are high school students having less than 18 years old. This result highlights the need for a strict driving license policy to enhance current measures against unlicensed driving, particularly in the area of enforcement practices. Unlicensed drivers represent a serious danger within the drivers' community due to the fact they have not undergone appropriate training and testing and may, therefore, be deficient in some aspect of the knowledge, awareness and skills required to drive safely. Furthermore, drivers who are unauthorised may have less incentive to comply with road traffic regulations and laws due to the fact that they are not influenced by penalties set up under the licensing system. Driving without a valid license remains a serious problem in many countries despite ongoing improvement in traffic law enforcement practices.

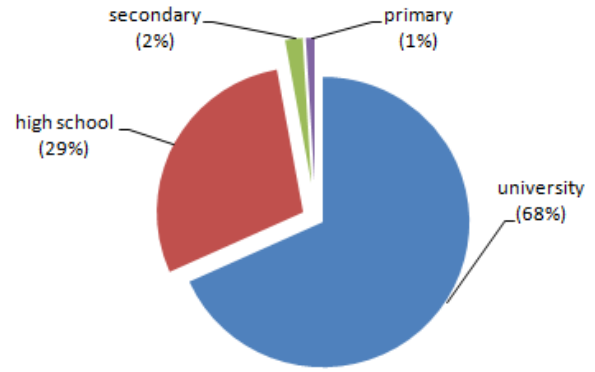


Fig. 2. Distribution of the participants by education level

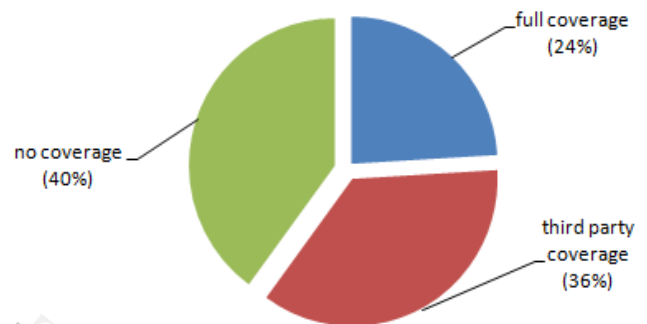


Fig. 3. Insurance coverage of the participants

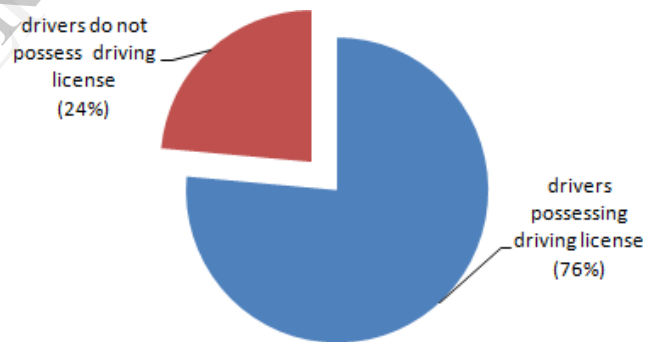


Fig. 4. Possession of driving license

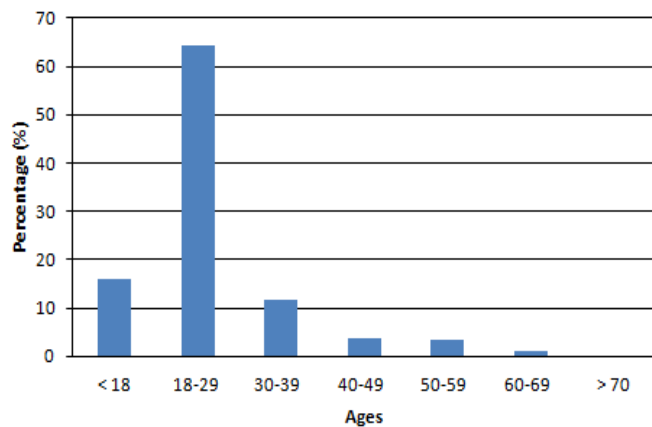


Fig. 1. Age breakdown of respondents

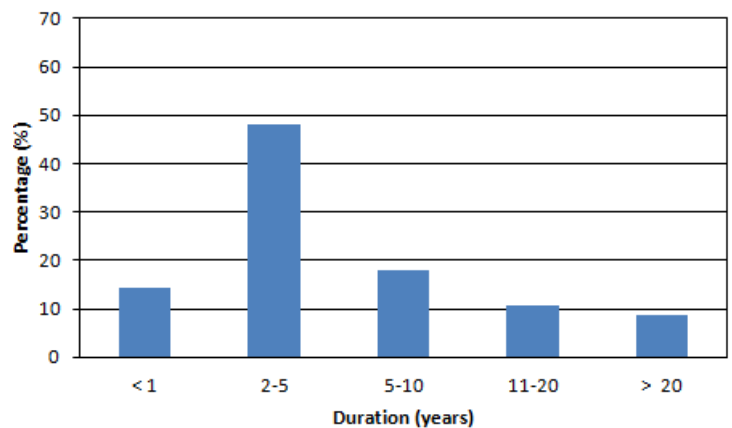


Fig. 5. Driving licence duration

A survey in the USA has shown that approximately 20% of fatal crashes involve at least one driver who does not possess a valid license at the time of the crash [11][12]. In 2000, it was estimated that there were around 7,000 crashes (11,000 casualties) in UK involving drivers subsequently prosecuted for unlicensed driving [13]. In Australia, unlicensed drivers represent over 5% of the drivers involved in fatal crashes [14]. In the case of Saudi Arabia, although the current data shows an alarmingly high proportion of unlicensed driving, there is a lack of data on the contribution of this part to traffic accidents.

A further examination of the data indicates that a high percentage of participants (74%) had experienced a road traffic accident in the past as shown in Fig. 6. With regard to the causes of these accidents and as illustrated in Fig. 7, the results show that 67% of the accidents result from human errors, 29% from road defects and 4% from vehicle defects, which is lower than one could expect. Human factors are supposed to be the leading contributing factor in any road traffic accidents study including this case study. The survey results indicate that excessive speeding is the main cause of road traffic accidents among the human causes of accidents. This result is consistent with previous research findings [4][8][15]. It is important to note that about one third of the accidents are related to road condition. Although there are many variables that can lead to traffic accidents, the most common one may be considered to be road environmental factors. Indeed, roadway's conditions like quality of pavements, shoulders, visibility, lane marking, traffic control devices and intersections, can be considered as major potential factor in road traffic accidents. As a matter of fact, this should be the object of further investigation and in-depth analysis.

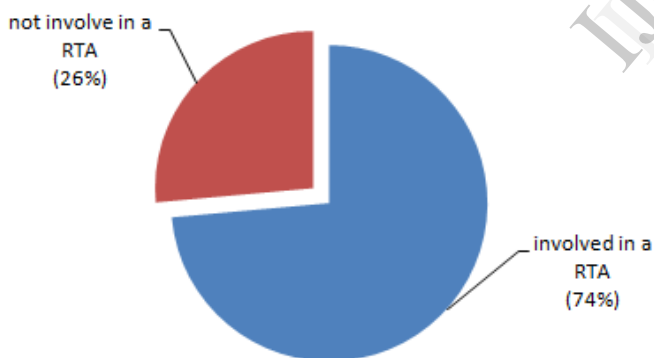


Fig. 6. Involvement in road traffic accidents

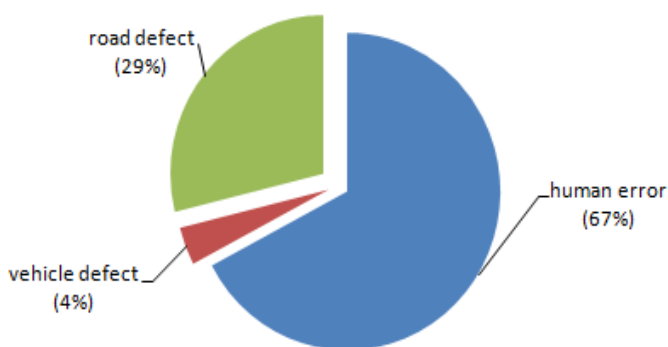


Fig. 7. Main causes of accidents

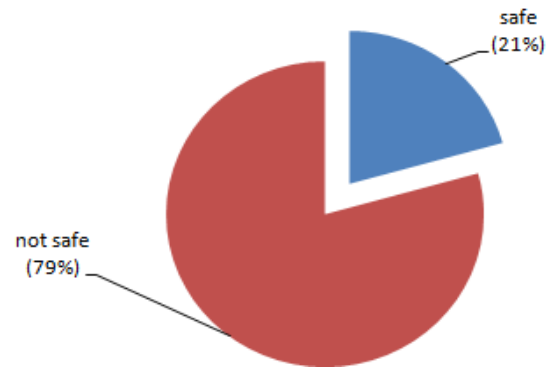


Fig. 8. Feeling of the respondents about Hail's road safety

Data from the safety section of the survey show that 79% of the respondents feel not safe when driving on Hail's roads as shown in Fig. 8. This high dissatisfaction percentage suggests the need for improvements in road design and maintenance in order to ensure safer roads in the province of Hail.

IV. CONCLUSION

Road traffic accidents are a major cause of death and injury and result in significant social and economic costs. The majority of these accidents are the direct result of "driver error", although there are many other variables that can lead to traffic accidents such as roadway's conditions. In the present investigation, the survey questionnaire used is designed in four main sections: participant general information, driving behaviour and practices, participants' traffic regulations and safety rules knowledge and awareness and finally, assessment of Hail roads in terms of traffic safety.

The results show that a very high percentage (74 percent) of participants has experienced a road traffic accident in the past. 67 percent of these accidents are caused by human errors, 29 percent by road conditions and only 4 percent by vehicle defects. The data indicates that excessive speeding is the main cause of road traffic accidents. The results also reveal that 24 percent of the survey participants drive almost on a daily basis without possessing a driving license. As a conclusion, it can be highlighted that further efforts should be undertaken for developing effective enforcement of traffic legislation measures alongside with promoting public awareness and education in terms of road safety issues. The issue of ameliorating road quality and all related traffic safety equipment is also of importance owing to the high rate of dissatisfaction in this regard (79%).

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