

Identification assessment and the enhancement of accident data collection and analysis in KSA

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Abstract

Tabuk city in the Kingdom of Saudi Arabia suffers from significantly high accident rates and severities, which are both continuously increasing. Higher dependence on car, violation of traffic regulation and laws, higher speeds on the roads as well as weather conditions and other environmental factors related to roads, traffic and drivers are responsible for the rise in accident rates and worsening severities. In this paper a typical accident reduction framework and methodology of Tabuk city is presented which include risk identification, assessment and enhancement of accident data collection and analysis in KSA. This framework is designed to reduce the accident risk when implemented at a city level and also to provide a policy framework for other cities in Saudi Arabia.

Keywords: accident, risk assessment framework, Tabuk, Saudi Arabia.

1 Introduction

Even though Saudi Arabia has an oil-based economy, it possesses about 17% of the world's proven petroleum reserves, ranks as the largest exporter of petroleum; it still has some crisis in traffic such as traffic congestion, safety and negative environmental impacts. Such crisis contributes to increasing the risk of health problem in the Saudi including increase the percentage of car accidents and air contamination. The main root for this crisis goes back to the lifestyle in Saudi Arabia. Due to the very high ownership and use of the private cars; some families own 4–6 cars, there is a huge lack of public transport in the country. Statistics show that the population of Saudi Arabia in 2012 was 19,838,448 and car ownership is estimated to be about 50% of that number. Furthermore, women in Saudi Arabia are not allowed to drive, so they heavily rely on employing



foreign private drivers. Because of large number of foreign drivers from different location, there are a large number of problems occurring as a result. The drivers ignore the regulation of traffic concerning speed limits; they do not obey traffic regulations while using the highways, turning etc. In Riyadh, a recent study showed that 90% of drivers were violating traffic regulations and traffic laws. Results also show that there is a lack of information available to such drivers. In addition, from 1993 to 1989 weather conditions such as increased relative humidity and amount of precipitation of rain play paraded to the negative behaviour of drivers in Riyadh particularly between 12 noon and 3 pm which give rise to step up stress and implode the ability to follow the rules and regulation of traffic. Consequently the number of the deaths and injury between 1970 to 2004 has climbed considerable over 5000 people by the car accident. The statistics in Ministry of Health hospitals showed 81% of death in Saudi hospital due to traffic accidents. Furthermore, 79% people who injury have spinal injury a result of car accidents. In the South of the Saudi Arabia, the total number of patients of car accidents included 356 male and 157 female. Majority were in the younger age group, drivers and front seat passengers. In May 2012 an accident of a private car and a truck on the road link Jeddah and Tabuk led to seven deaths, five of them from one family. The cause of that accident was that the driver of the truck was not able to control the speed of the truck thus the truck collided with the back of the family car which led to explosion and overturning of the car.

Despite government initiatives to save lives and reduce traffic congestion, roads in Saudi Arabia remain among the most dangerous in the world, with an average of 19 road fatalities occurring daily. The numbers of fatalities on the country's roads have grown by 10% so far in 2012, accounting for billions of dollars of remedial government costs. Saudi Arabia spends US\$6 billion per year on the management of car accidents, and US\$250 million per year on medical care for those injured on Saudi roads, while an average of 19.1 deaths a day makes the country among the most dangerous in the world for drivers [1]. "Motorists can be seen running red lights, speeding, racing, or driving in a reckless and aggressive fashion, while most car accidents are mainly caused by young male drivers, due to their lack of responsibility and careless attitudes [2].

Saudi Arabia, like many of the Gulf States, is experiencing significant growth and development. From the transportation perspective, maintaining adequate mobility for such cities in a sustainable manner is perceived as the dominant planning challenge and is characterised by significant investment in roads and infrastructure. Unfortunately, road safety has not kept pace with the increased traffic and Saudi has seen a phenomenal growth in the incidence and severity of traffic accidents. A study by the King Abdulaziz City for Science and Technology (KACST) warns that if the current rise in road accident rates is not addressed, Saudi Arabia will have over four million traffic accidents a year by 2030. The World Health Organisation reports that in 2007 Saudi had an estimated rate of 29 road traffic deaths per 100,000 populations, making it far more dangerous on the roads than, say, the UK with only 5.4 road traffic deaths per 100,000 populations. According to the World Health Organization (WHO),

Gulf residents are seven times more likely to die in a car accident than UK residents. The main causes of road accidents in the region are related to recklessness and the careless behaviours of young drivers who dominate the roads of the region, with an unusual aggressiveness and a perceived need for speed. An overwhelming absence of driver lane discipline and failure to properly use turn signals and obey traffic lights, amplifies the frequent stress and danger of driving in the Gulf States [1].

Therefore the main aim of this paper is to present a brief assessment and enhance accident data collection and analysis methodology in the KSA. In order to carry out this study, a case study city, with particularly high accident rates, Tabuk will be selected for the investigation keeping view of impacts of other environmental road factors such as presence of signs, speed cameras, etc. on accident rates and severities will also investigated in future to develop a risk assessment framework for road and traffic accidents in Saudi Arabia.

2 Study area description on Tabuk

Tabuk region lies in the far north west of the Kingdom situated on the Red Sea. The region is bound by Jordan to the north, Al Jawf and Hail to the east, Al Madinah Al Munawwarah to the south and the Red Sea to the west. The region has a geographical area of some 146,072 km² with a population of 791,535. The region is typically arid, with desert continental weather, having hot summers and mild winters. Temperatures in the summer reach between 27° and 46°C while in winter they reach between 4° and 18°C.

However, during the more severe winter's frosts is common with temperatures reaching as low as -6°C. Rainfall in the region falls in the winter months from November to March, with some snow every 3–4 years. Tabuk City is the principal city of the region; it has 512,629 inhabitants and is situated approximately 670 m above sea level. The city serves as an active commercial centre especially as it lies along the route of pilgrims coming from Turkey, Jordan, Palestine and Lebanon. Other main cities in the region are: Al Ula, Al-Wajh, Haql, UmmLujj and Duba. Haql is situated on the border of Jordan, giving road access to Egypt, and Africa, it serves as a transit point for pilgrims heading to the holy cities of Makkah and Madinah. Umm Lujj and Duba are both located on the coast of the Red Sea.

2.1 Accident data in Tabuk

There were 22,166 traffic accidents in Tabuk in the year 2012 resulting in 386 deaths. The majority of the accidents involved men in the age group of 18–30 years, and that a majority of the accidents were due to excessive speed [3]. Snowfall in Tabuk causes traffic accidents. Four people died and 32 injured in traffic accidents caused by snowfall in the Tabuk region January 2012.



2.2 Road network in Tabuk

The inter-urban road network of the Tabuk region is currently experiencing a great expansion. The existing road network covers an overall road length of 2,981 km of which 599 km of the roads are expressways or dual roads. The main routes through the region are:

Road 15 heading north from Tabuk, connects Tabuk with Halat Ammar the border city to Jordan.

Road 15 heading south from Tabuk connects with Road 70 which gives access to Al Ula.

Road 15 later continues south providing road access to Madinah.

Road 70 east of Al Ula, connects Al Ula to Hail.

Road 5 a coastal road, connects Duba with Yanbu and continues north to Sharma. Further north it turns inland and continues north to the border town of Al Haql.

Road 15 heading east from Tabuk connects Tabuk with Qalibah. This then connects with Road 80 providing road access to Sakaka in Al Jawf.

The region is currently progressing a road dualing programme for many of the single inter-urban roads linking the cities and towns within the region.

3 Proposed methodology

Traffic Accidents continue to inflect severe health and economic repercussions worldwide. Despite major efforts to improve traffic safety, traffic accidents have increased steadily through the last three decades [4, 5]. Statistics for the year 2009 showed that traffic accident fatalities were 1.2 million worldwide and 6458 deaths in Saudi Arabia alone. As for injuries, there were 50 million worldwide and 36489 in Saudi Arabia. Further, it was found that around 18 deaths and 100 injuries occur daily in Saudi Arabia.

3.1 Problems in existing data collection procedure around the world

The most common process for data collection has until now been that road accident data are reported from the place of the accident, by the police or other law enforcement authorities. The data collected normally include important pieces of information such as type and number of vehicles involved, type of traffic environment and possibly also indications of the cause of accidents can contribute to the understanding of road accident occurrences. Lack of sharing and common strategy between police, hospital and traffic engineering perspective lead to missing or underreporting in data collection. Underreporting occurs as the police are not always alerted to all types of accidents. Misreporting occurs as the police are understandably unable to make a fully-fledged medical assessment of the severity of an injury.

- There is always a challenge to know more accurately the total number of people who are seriously injured in road accidents since there are different definitions available of how to define severity of injuries in

any country. It is always useful to use the police data with care by applying correction coefficients; report the number of injuries based on data from hospitals; or create a link between police and hospital data. So there is always opportunities to improve the data currently collected by the police to allow for the mis- and underreporting, thereby arriving at a truer estimate of the number of people seriously injured.

- There is no updating of any such correction and review to give as accurate an estimate possible of the road traffic injury situation.
- There is always an incompatibility issue to gather these data which exist in hospital and traffic engineer.
- Manual or automatic systems may be considered to complement the on the-spot reports by the police with hospital verification regarding injury severity.
- While linking of data between police and hospital, the principles of integrity and data protection must be kept in mind. The relevant data from hospital records would need to be processed into road traffic databases in anonymised form to prevent sensitive or private health-related data from being improperly handled. Safeguards against abuse of such system.
- In order not to risk losing data, consideration could be given to continuing the present data collection method and allowing the old and the new reporting systems to run in parallel for a transitional period [6].

There is need of improvement safety frame work in taking above point.

4 Risk assessment framework

A risk assessment framework (RAF) is a strategy for prioritizing and sharing information about the risks associated with road users and that are related to traffic. A good RAF organizes and presents information in a way that both technical and non-technical personnel can understand. It has two main important components: Consistent assessment methods and a reliable and clear reporting system. A properly organised risk assessment process involves a wide range of areas to be assessed: pedestrians, vehicles, accidents at signals, tunnels, highways, city roads, workplaces, commercial and residential complex, specific (dangerous) works and construction related activity on roads. As a result of an incomplete risk assessment, there is the possibility that the risk reduction measures are not well-focused and high risk areas are neglected which in its turn can lead to incompliance with legislation and higher probability of accidents. The common view an RAF provides help to cities, local authorities and transport planners to determine the low risk and high risk components of the transport system including locations, users, vehicles as well as other environmental (or surrounding conditions). The developed RAF should provide a useful tool for determining the threats, opportunities, strength and weaknesses of the data system used to report, analyse and document road and traffic accidents in the city.

There are several risk assessment frameworks available which have been developed for various problems and context. However, a framework which is developed specifically for a particular problem should be the most suitable and appropriate to meet the targets and objectives of the problem in hands.

1. Any risk assessment framework for road and traffic accidents should have: Inventory and categorisation of accidents
2. Identify threats: these may include factors that represent high risk in terms of accidents
3. Identify most vulnerable road users: Data about vulnerabilities can be obtained from the available database
4. Prioritize locations in the transport system.
5. Document risks and determine action.

This will have to be an on-going process, with a pre-determined schedule for issuing reports. The report should document the risk levels for all components of the transport system in question. In the report, it should be noted what level of risk any city is willing to tolerate and accept and identify procedures at each risk level for implementing and maintaining security controls. An overview of the activities is depicted in Figure 1.

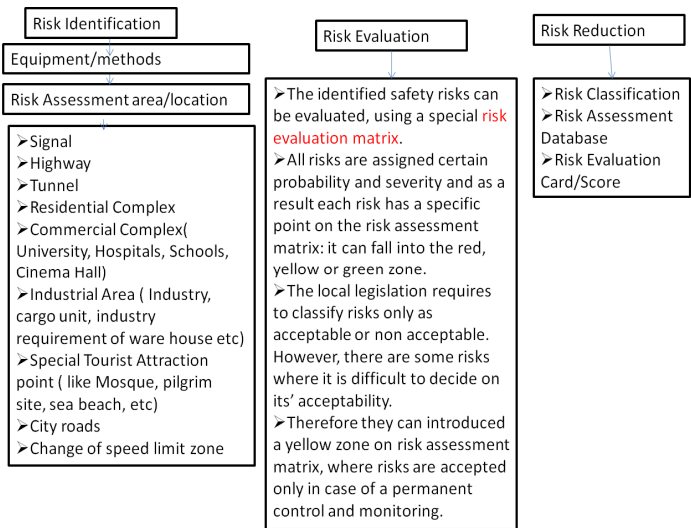


Figure 1: Activity chart for RAF for Kingdom of Saudi Arabia.

5 Conclusions

There are many methodologies have been developed in the area of risk assessment framework in different countries and different conditions. Though they provide useful handy information for road safety, each country has specific

driver, vehicle, and environmental conditions that need to be properly taken care of while developing the Risk Assessment Frame. In this paper a typical accident characteristic of Tabuk city is presented and city specific risk assessment methodology is proposed which include risk Identification, Assessment and Enhancement of accident data collection and analysis in KSA. This frame work will reduce the accident risk when it is implemented at the city level.

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