Road traffic accidents trends in Sharjah, United Arab Emirates during 2001–2014

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Abstract: This paper quantitatively describes the extent of the road traffic accidents problem in the Emirate of Sharjah, the third largest emirate in UAE, for the period 2001–2014. Several interesting findings were revealed. While Sharjah’s population almost doubled during this period, the number of injury/fatality causing accidents decreased by more than half during the same period. The annual number of road accidents and injuries increased until the 2008 when the numbers sharply declined then stabilised in recent years, which could be attributed to the introduction of the new traffic law of UAE. Though both accidents and injuries per 100,000 population considerably decreased annually, the fatalities per 100,000 population only marginally decreased, indicating that the severity of accident may have increased. Overall, Sharjah enjoyed a better rate of fatalities per 100,000 population than that for the whole UAE. This paper’s results should be useful to identify directions to undertake in future research, policies, and programs on highway safety in Sharjah, UAE.

Keywords: road traffic accident; highway safety; accident trend analysis; Sharjah; United Arab Emirates.


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1 Introduction

Unfortunately, road traffic accidents continue to be one of the major mortality reasons in the world. According to the World Health Organization’s Global Status Report on Road Safety 2013, about 1.24 million road traffic deaths occur annually (equivalent to nearly
3400 deaths every day) on the world’s roads, in addition to tens of millions of people injured or disabled every year (WHO, 2013). The Report also shows that almost 127,260 persons died on the Eastern Mediterranean Region’s roads in 2010, which is about 10% of the world’s total deaths in the same year. This put the region’s fatality rate at about 21.3 per 100,000 population, as compared to the global rate of 18.03 per 100,000 population; thus making this region the second highest road traffic fatality rate in the world (only after the African Region which has a rate of 24.1 per 100,000 population).

Even more alarming is that some countries in the Eastern Mediterranean Region have the highest road traffic fatality rates in the world. For example, some of the region’s high-income countries are unusual in having the highest rates of road traffic fatalities, at 21.7 per 100,000 population, which is more than double the global rate of 8.7 per 100,000 population for high-income countries (WHO, 2013). Nevertheless, many of these countries have shown significant progress in making their roads safer in the recent years. For instance, the United Arab Emirates (UAE) rate has substantially reduced its estimated accident rate from almost 37.1 per 100,000 population in 2009 (WHO, 2009) to only 12.7 per 100,000 population in 2013 (WHO, 2013).

The problem of highway safety in UAE has increasingly attracted the interest of both researchers and professionals in the past. El-Sadig et al. (2002) analysed road traffic accidents trends in the UAE during the period from 1977 until 1998. The study described quantitatively the morbidity and mortality from accidents in the UAE and compared the results with those of developed countries. Data were obtained from UAE’s police and health sources. Overall and cause-specific fatality and injury rates were estimated using linear regression. The results revealed that during the period 1977–1998, the accident rates per 100,000 population and per 100,000 motor vehicles declined. Accident fatality and injury rates based on the same denominators also declined, except for a short period (1977–1985) when a steady increase in the risk of injury and death in each accident accompanied these declines. Between 1985 and 1998 the severity rate (the ratio of fatalities and injuries per 1000 accident) more than tripled in the UAE. The study concluded that UAE’s fatalities rate were five times above the mean rate of a number of selected group of countries. The study identified three major factors that could be related to such large rates of fatalities: low-level of seat-belt usage, vehicle mix whereas older, heavier vehicles had been replaced by smaller, more lightweight vehicles, and the low-level of first-aid knowledge to deal with the injuries in the accident place before the arrival of medical emergency services.

Bener and Alwash (2002) assessed the effects of speeding on traffic safety in the United Arab Emirates. The paper found that about 90% of road accidents could be attributed to road user characteristics. The speed rates decreased dramatically after the introduction of the radar systems and speed cameras in 1994. This caused a significant decrease in causalities and fatalities. However, the numbers were still higher than in USA and the UK. The traffic fatalities in the UAE were still the second most common cause of death after cardiovascular diseases. This study concluded that while the numbers of speeding vehicles has decreased, the fatalities rate had essentially remained the same. The authors attributed this to the behaviour of UAE drivers.

Bener and Crundall (2005) evaluated trends of road traffic accidents problems in the UAE and compared these trends with other western countries like USA and UK, as well as a neighbouring country, namely Qatar. The authors used data obtained from the UAE
Ministry of Interior’s Directorate of Traffic in 2000. Whereas the UK and USA recorded 5.7 and 15.1 fatalities per 100,000 population, UAE recorded a disparate 21.6 fatalities per 100,000 population. UAE rate was nearly one-and-a-half times greater than that in the USA, and nearly four times greater than in the UK. The number of fatalities per 100,000 vehicles showed almost a similar trend. Two causes, which together accounted for over 62% of all road traffic fatalities in UAE in 2000, were found to be careless driving and excessive speeding.

Hassana et al. (2012) proposed a holistic approach to investigate traffic safety in the UAE. The study reviewed UAE traffic accident and violation records for the period 2004–2009. Data did not follow a particular trend of increase or decrease in the number of accidents, injuries and fatalities and their rates. However, the number of accidents (that cause injury) and number of injuries decreased from 2005 to 2006 then started to increase until 2009. In 2009, the number of accidents, injuries and fatalities decreased relative to the previous year. The fatality trend also showed an increase from 2005 till 2009, but then decreased in 2009 relative to the previous year. Initially, 12 potential factors were investigated using data collected through official police reports, road-users surveys, and interview of traffic safety experts. Based on data analysis and interpretation, the main factors affecting traffic safety in the UAE are: driving behaviour, awareness, education and training, infrastructure, vehicle, law enforcement, coordination and quality of resources. Among these factors, a major deficiency was found in the “driving behaviour”. Based on the deficiency level of the factors recommendations were proposed to improve the status of traffic safety in the country.

El-Sadig et al. (2004) evaluated the effectiveness of safety seatbelt legislation after few years of implementation in the Eastern District of Abu Dhabi Emirate (UAE). The implementation of the seatbelt legislation was associated with statistically significant reduction in morbidity in those arriving alive at hospital following an accident, including reduced severity of injury, admission rate to hospital and the duration of hospital stay.

Bener et al. (2008) investigated the relationship between driving behaviour and accident involvement in UAE and Qatar. A widely-used instrument for measuring self-reported driving style, the Manchester Driver Behaviour Questionnaire, was utilised. The results showed that UAE drivers were more aggressive than their Qatari counterparts.

Abdalla (2002) examined crash and safety statistics from the Emirate of Dubai, UAE in an attempt to identify factors responsible for making population at greater risk of crashes compared to other countries. Influence and strength of the most common risk factors are quantified using relative risk, the Lorenz curve, and the Gini index. Traffic fatality risk was found to be higher in Dubai, compared to some developed countries, and to vary considerably between different classes of road users and groups of Dubai’s population.

While some effort has been made to study traffic safety in UAE in general, the purpose of this paper is to explore road traffic accidents trends in the Emirate of Sharjah, which is the third largest emirate in UAE. The Emirate covers 2600 km² (1003 square-miles) and had an official estimated population of over 800,000 in 2005 (UAE National Bureau of Statistics). It comprises the City of Sharjah (the seat of the emirate), and other minor towns and enclaves such as Kalba, Dibba Al-Hisn and Khor-Fakkan. City of Sharjah is one of the most densely-populated cities in the United Arab Emirates. This causes a high rate of accidents and results in many fatalities, injuries, and property damage in the Emirate.
This paper adds to previous studies of highway safety in UAE. The objective of this paper is to describe quantitatively the extent of the road traffic accidents in the Emirate of Sharjah, UAE. Specifically, the paper will identify trends in these accidents during the period 2001 to 2014, using data routinely collected by police. This effort will help to establish the baseline facts about the extent of the accident problem in Sharjah; and therefore, the most useful direction for future research, policies, and programs on highway safety in Sharjah.

2 Materials and methods

To conduct this analysis, the researchers utilised data obtained from the official police reports on annual statistics of road traffic accidents in the Emirate of Sharjah for the 2001–2014 period. The collected data include annual summaries of road traffic accidents tabulated by:

1. Accident severity (fatal, critical injury, moderate injury, or minor injury)
2. Gender of driver causing accident (Male or Female)
3. Age of driver causing accident (< 18, 18–30, 30–45, 45–60, and > 60 years)
4. Nationality of driver causing accident
5. Vehicle classification (motorcycle, car, light truck, heavy truck, etc.)
6. Collision type
7. Accident cause
8. Education level of driver (Read and write, Primary school, Middle school, Secondary school, and University or higher)
9. Geographic area (Sharjah City, Khorfakan, Diba, Al Hisn, Kalbaa, Eastern Area, and AL-Thaid)
10. Time of day (Morning, Afternoon, Evening, and Night).

The last three types of data have been only reported starting 2008; and therefore, they were excluded from our analysis. Furthermore, investigation of fatalities and injuries by severity, gender, nationality, age, and road user type will be conducted and results will be presented in a forthcoming paper.

In Sharjah and UAE in general, officially-reported road traffic accidents include only accidents resulting in injury or fatality to road users (drivers, motorcyclists, passengers, pedestrians, and cyclists). That is, property-damage-only accidents though recorded by police, their numbers are generally not readily available to the public. Road traffic accident injuries include all traffic-related non-fatal injuries, and generally classified as critical, moderate, or minor injury. Further, it is widely believed that only a very small number of accidents goes unreported in UAE. According to El-Sadiq et al. (2002), this could be attributed to strict police enforcement of a law requiring all parties involved to report any accident.
Using the annual crude numbers of road traffic accidents and population estimates for Sharjah, the following rates were calculated: road traffic accident per 100,000 population, deaths per 100,000 population, and injuries per 100,000 population. These rates will make it easier to compare trends in Sharjah to other parts of the country, region, as well as other parts of the globe.

To quantify the risk of injury and fatality in road traffic accidents, the ratio of injuries and fatalities to accidents (i.e., severity rates of injury and death per 1000 accidents) was also calculated. The number of road traffic accidents, injuries, and fatalities were obtained from Sharjah Police annual statistical reports from 2001 to 2014. UAE population data were generally obtained from the UAE National Bureau of Statistics. Official population estimates for Sharjah could not be found, except for year 2005 in which Sharjah’s population was about 19.33% of UAE’s total population (UAE Census 2005). Therefore, Sharjah population for the other years were simply estimated assuming the same percentage. For the nationality of driver responsible for causing the accident as well as the nationalities of those killed or injured, the police reports listed over a hundred nationalities. For the sake of this paper, the author grouped statistics from some nationalities together to simplify the presentation of the results. The data for comparison with other areas were obtained from the published literature.

Trends of road traffic accidents and their related deaths and injuries for 2001–2014 were estimated using linear regression analysis. The age and gender of road users injured or killed during 2001–2014 were also analysed. After 2008, the police started to publish summary reports containing some details of accident causal factors, from the police viewpoint, that contribute to traffic accidents in Sharjah. Therefore, this paper also describes some of these specific causal factors, including speeding, careless driving, personal factors (e.g. fatigue, driving under the effect of drugs, alcohol, etc.), environmental and vehicle conditions. Hence, the data for 2001–2014 were analysed to describe the possible factors. All data variables were processed, graphed, and analysed using Microsoft Excel.

3 Results and discussion

3.1 Frequency of accidents, fatalities, and injuries

Figure 1 shows the crude numbers of accidents, fatalities, injuries, as well as population in Sharjah for the period 2001 to 2014. Whereas the population increased by almost 200% during this period, the number of injury/fatality causing accidents decreased by about 57%. Ironically, these declines were accompanied by an overall increase in the number of fatalities by almost 24%. The number of injuries decreased by more than 30% during the same period. As can be seen, while the number of causalities was almost stable the annual number of road accidents and injuries increased until the 2008 when the numbers suddenly declined then stabilised in recent years. This significant decrease can be attributed mainly to the introduction of the new unified traffic law of UAE, which tightened regulations and took some measures such as increasing fines, introducing black point system, and authorising the installation of mobile radar cameras. The noticeable reduction can also be partially attributed to the economic crisis and the consequent changes in traffic and driver behaviour.
The trend analysis of these data using linear regression revealed the following: accidents decreased annually by 130.37 ($R^2 = 0.6509$), injuries decreased annually by 56.31 ($R^2 = 0.6028$), whereas fatalities annual decrease was insignificant (0.1912 with $R^2 = 0.0009$). The almost-zero R-squared value indicates that the fatalities numbers are not following a linear trend but more of a random one. While the decreasing trends for accidents and injuries are definitely encouraging, the increasing fatalities rate is an alarming result since the number of fatalities did not fall in parallel.

### 3.2 Rates per 100,000 population and per 1000 accident

To put Sharjah’s accident safety record in perspective and to make a fair comparison between Sharjah and other areas, the author computed the following road accident rates: deaths per 100,000 population, deaths per 1000 accident, fatality-to-injury ratio, injury per 100,000 population, injury per 1000 accident, and finally accident per 100,000 population. Figures 2 and 3 summarise these basic indicators for the period 2001–2014.

Figure 2 shows the rates for deaths, injuries, and accidents per 100,000 population. Overall, the figure shows decreasing trends over the years, though it is less clear in case of deaths. The trend analysis of these data using linear regression revealed the following:
accidents per 100,000 population decreased annually by 25.27 ($R^2 = 0.8205$), injuries per 100,000 population decreased annually by 16.051 ($R^2 = 0.835$), whereas fatalities per 100,000 population decreased annually by a mere 1.141 ($R^2 = 0.7903$). Therefore, though the crude number of fatalities did not decrease, the trend of fatalities per 100,000 population did decrease over the years. This could be explained by the fact that while fatalities did not significantly decrease, the population still increased which resulted in an overall decrease in the fatalities per 100,000 population rate. Both injuries and accidents per 100,000 population showed the sudden, sharp drop occurred in 2008.

Figure 2  Sharjah fatalities, injuries, and accidents per 100,000 population during 2001–2014
(see online version for colours)

Figure 3 shows the rates for deaths and injuries per 1000 accidents. Overall, the figure shows a surprisingly increasing trend for both deaths and injuries per 1000 accidents. The trend analysis of these data using linear regression revealed the following: deaths per 1000 accident increased annually by 11.507 ($R^2 = 0.6944$) and injuries 1000 accident increased annually by 52.173 ($R^2 = 0.7433$). Unfortunately, these numbers indicate that the severity of accidents in Sharjah has been on the rise. The fatality-to-injury ratio, which is the number of fatalities to the number of injuries, showed an overall increasing trend growing from 8% in 2001 to reaching 14% in 2014. Interestingly, these trends are similar to these reported by El-Sadig et al. (2002), who also reported decreasing trends for accidents, fatalities, and injuries per 100,000 population in UAE for the period 1977 to 1998; and at the same time there was an overall increase in the rates of fatalities and accidents per 1000 accidents. In general, Sharjah enjoyed a better rate of fatalities per 100,000 population than that for the whole UAE: 9.59 vs. 37.1 in 2009 as well as 7.51 vs. 12.7 in 2013, in Sharjah and whole UAE, respectively.
3.3 Variation by gender of accident-causing driver

In addition to the aforementioned highway safety rates, the author investigated the gender, age, and nationality of the driver responsible for causing the accident.

Figure 4 shows the distribution of accidents by gender of the accident-causing driver. The vast majority (an average of 89.66%) of accidents were caused by male drivers. This is unsurprising given that the UAE population is predominantly male, which according to UAE official statistics had only 25.4% female population in 2010. Nevertheless, the figure also reveals an interesting result: while female drivers caused only 5.27% of the accidents in 2001, they caused more than double of that (exactly 11.63%) in 2014 (after reaching about 23% in 2013). As can be clearly seen in Figure 4, the gap between male and female drivers causing accidents has narrowed significantly in 2008 and became more stable since then.

3.4 Variation by age of accident-causing driver

Figure 5 shows the distribution of accidents by age group of the accident-causing driver. Two age groups, 18–30 and 30–45 year-old, comprise together an average of about 85% of the accidents. This is in line with the fact that UAE’s population is mostly young since the vast majority of non-citizens (expatriates) in the country are young labourers and technicians. According to UAE Census 2005 data, about 68% of UAE total population were in the age of 19–44 year-old (UAE Census 2005). As can be seen in Figure 5, these two groups witnessed the foremost reductions in number of accidents in 2008, but stabilised since then. The third age group, 45–60 year-old, had seen also a noticeable reduction in the number of accidents in 2008. The last two age groups, the very young
(less than 18 year-old) and the very old (older than 60 year-old), account together for about 2% of the accidents. Before 2008, less than 18-year-old drivers caused more accidents than those caused by drivers older than 60 year-old. This corresponds to the new traffic regulation which severely penalising driving without a proper driving licence, common among teenagers in the region.

**Figure 4** Sharjah accidents by gender of driver responsible for accident during 2001–2014 (see online version for colours)

**Figure 5** Sharjah accidents by age of driver responsible for accident during 2001–2014 (see online version for colours)
3.5 Variation by nationality of accident-causing driver

Figure 6 shows the distribution of accidents by nationality group of the accident-causing driver. While the police reports listed number of accidents caused by drivers from over 100 nationalities, the author grouped the accidents by 11 groups, as listed in Figure 6. Three nationality groups topped the list, causing together an average of about 84% of all accidents in Sharjah. These groups are: UAE citizens causing about 27%, Indian subcontinent (India, Pakistan, and Bangladesh) nationals causing about 37%, and other Arab countries (excluding GCC countries) nationals causing about 20% of Sharjah’s accidents. According to UAE Census 2005 data, UAE citizens made up about 17.4% of Sharjah’s population (UAE Census 2005); however, they caused an alarming 27% of the accidents.

Figure 6  Sharjah accidents by nationality of driver responsible for accident during 2001–2014 (see online version for colours)

Even though the UAE National Bureau of Statistics does not publish demographic data by nationality, unofficial estimates put the population from the three east-southern countries to about 47% of the population (UAE Census 2005); nevertheless, this population group caused only 37% of the accidents. The third largest group (other Arab countries excluding GCC countries nationals) unofficially make up about 12% of the population but still caused about 20% of the accidents. The decrease of accidents in 2008 is noticeable across almost all population groups.
3.6 Variation by classification of accident-causing vehicle

Figure 7 shows the distribution of accidents by classification of vehicle responsible for accident. This does not include the class of any other vehicle(s) affected in the accident other than that driven by the driver responsible for the accident at the time he/she caused the accident. Cars (including taxis) caused about 85% of all accidents. This is expected given that cars make up most of the registered cars in Sharjah. Heavy trucks, light trucks, and motorcycles made up each about 3% of Sharjah’s accidents. Overall, the numbers of car-caused accidents have dropped by about 59% between 2001 and 2014. The significant reduction of accidents in 2008 can be easily noticed in cars and to less extent in light and heavy trucks. Numbers of accidents caused by motorcycles, minibuses (used heavily by companies and schools), and buses have seen more of a randomly fluctuating trend rather than following any linear, decreasing trend. Numbers of accidents caused by trucks (especially heavy trucks) have been noticeably decreasing since 2008. Interestingly, the number of accidents with unclassified vehicle reported has been rising. Therefore, more effort should be exerted to ensure that the vehicle type is reported.

Figure 7  Sharjah accidents by classification of vehicle responsible for accident during 2001–2014 (see online version for colours)

3.7 Variation by collision type

Figure 8 shows the distribution of accidents by collision type. While one can notice the dramatic reduction in many collision types since 2008, the number of run-over collisions has not seen any noticeable decrease. On average, run-over collisions are about 25% of
all accidents, and remain the number one leading collision type. Knowing that this type of accidents is mostly a vehicle-pedestrian collision, this means that many pedestrians are still at high risk in Sharjah. Sideswipe collisions and collisions with fixed object that used to be on top of the list have abruptly decreased in 2008. These three collision types make up combined an average of about 61% of all accidents. Figure 8 also shows that head-on collisions, often a fatal type of collision, have shown unfortunately a slight increase over the years.

Figure 8  Sharjah accidents by collision type during 2001–2014 (see online version for colours)

3.8 Variation by causal factor

Figure 9 shows the distribution of accidents by cause of accident as reported by police officer on site. The number one cause of accidents in Sharjah remains the failure of driver to give way (priority) for oncoming vehicles. Turning/cornering/merging is number two cause of accident, which unfortunately is in the rise. Another driver-behaviour cause of accident which witnessed a consistent increase is driver’s carelessness. An interesting observation confirmed by Figure 9 is that the number of accidents caused by running red-light has significantly decreased over the years. This could be attributed to the city-wide installation of red-light-running cameras in Sharjah. On the other hand, accidents caused by drivers while under the influence of drugs or alcohol have been rising since 2008, the year at which this data has started to be reported. This may prompt officials to take a more rigorous action against driving under the influence of alcohol or drugs.
Figure 9  Sharjah accidents by causal factor during 2001–2014 (see online version for colours)

4 Conclusion

This paper explored road traffic accidents trends in the Emirate of Sharjah, the third largest emirate in United Arab Emirates, for the period 2001–2014. While other researchers tackled highway safety issues in UAE in general, this paper is the first to focus its analysis on Sharjah and to describe quantitatively the extent of the roadway traffic accidents in the Emirate.

Towards this, the researcher utilised official police reports on annual statistics of road traffic accidents in the Emirate of Sharjah for the 2001–2014 period. Accidents publicly reported include only accidents resulting in injury or fatality to road users (drivers, motorcyclists, passengers, pedestrians, and cyclists).

The paper explored trends using the following variables: (1) crude numbers of accidents, fatalities, and injuries; (2) rates per 100,000 population and per 1000 accidents; (3) gender of accident-causing driver; (4) age of accident-causing driver; (5) nationality of accident-causing driver; (6) classification of accident-causing vehicle; (7) collision type; and (8) accident causal factor.

Several interesting findings were revealed by this analysis. While Sharjah’s population almost doubled during 2001–2014 period, the number of injury/fatality causing accidents decreased by more than half during the same period. Interestingly, these declines were accompanied by an overall increase in the number of fatalities. The annual number of road accidents and injuries increased until the 2008 when the numbers
Road traffic accidents trends in Sharjah

Road traffic accidents trends in Sharjah sharply declined then stabilised in recent years. This significant decrease could be attributed mainly to the introduction of the new unified traffic law of UAE, which tightened regulations and applied tougher fines for violators.

To fairly compare Sharjah’s accident safety record to other areas, road accident rates per 100,000 population and per 1000 accidents were calculated. These rates showed that while both accidents and injuries per 100,000 population considerably decreased annually, the fatalities per 100,000 population only marginally decreased. Therefore, though the crude number of fatalities did not decrease, the trend of fatalities per 100,000 population did decrease over the years. This could be explained by the fact that while fatalities did not significantly decrease, the population still increased which resulted in an overall decrease in the fatalities per 100,000 population rate. Both injuries and accidents per 100,000 population showed the sudden, sharp drop occurred in 2008. Surprisingly, deaths and injuries per 1,000 accidents showed increasing trends for both. Unfortunately, these numbers indicate that the severity of accidents in Sharjah has been in the rise. Further, the fatality-to-injury ratio showed an overall increasing trend. In general, Sharjah enjoyed a better rate of fatalities per 100,000 population than that for the whole UAE.

As expected, the vast majority of accidents were caused by male drivers. However, the gap between male and female drivers causing accidents has narrowed significantly in since 2008. Drivers between age of 18 and 45 years caused the vast majority of the accidents. This is unsurprising given that UAE’s population is mostly young since the vast majority of non-citizens in the country are young labourers. The number of accidents made by less than 18-year-old drivers has decreased since 2008. Three nationality groups caused the vast majority of the accidents in Sharjah: UAE citizens, Indian subcontinent nationals, and other Arab countries (excluding GCC countries) nationals. This was not unexpected given that these three groups make up most of UAE’s population.

As expected, cars (including taxis) caused the vast majority of all accidents. The significant reduction in the number of accidents in 2008 can be easily noticed in cars and to less extent in trucks. Numbers of accidents caused by motorcycles, minibuses, and buses have not seen any decreasing trend. Numbers of accidents caused by trucks (especially heavy trucks) have been noticeably decreasing since 2008. Unfortunately, the leading collision type, run-over collisions which mostly involves a vehicle-pedestrian collision, has not seen any noticeable decrease. Another unfortunate finding was that the often-fatal head-on collisions, have shown a slight increase over the years. The three top causes of accidents that have shown consistent increase are all related to driver behaviour: the failure of driver to give way (priority) for oncoming vehicles, turning/cornering/merging, and driver’s carelessness. Interestingly, the number of accidents caused by running red-light has significantly decreased over the years. This could be attributed to the installation of red-light-running cameras. Further, accidents caused by drivers while under the influence of drugs or alcohol have been rising since 2008.

Finally, this paper established baseline facts about the extent of the accident problem in Sharjah; and therefore, its results could be useful to identify direction to undertake future research, policies, and programs on highway safety in Sharjah.
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