

# Epidemiology of road traffic accidents in Al-Ahssaa Governorate, Saudi Arabia

M.H. Qayed<sup>1</sup>

وبائيات حوادث المرور على الطرق في محافظة الأحساء بالمملكة العربية السعودية

محمد حسن قايد

خلاصة: أجريت دراسة لحوادث المرور على الطرق في محافظة الأحساء بالمملكة العربية السعودية، في سنة 1414 هجرية (من تموز/ يوليو 1994 إلى حزيران/ يونيو 1995). وكان هدف الدراسة تحديد حجم المشكلة ودراسة محدثاتها وعواقبها. وفي دراسة استرجاعية تمت مراجعة السجلات ذات الصلة بالموضوع لدى إدارة المرور والمستشفيات الرئيسية الأربعة في المحافظة. ووجد أن مجموع الحوادث التي وقعت بلغ 6117 حادثة، نجم عنها إصابة 2551 شخصاً ووفاة 151 مصاباً، وذلك بناء على بيانات السجلات الطبية. وفي هذه المقالة مقارنة بين بيانات هذه الدراسة وبيانات المناطق الأخرى، وتوصيات تهدف إلى خفض مشكلة حوادث المرور على الطرق إلى أدنى حد ممكن.

**ABSTRACT** A study of road traffic accidents was conducted in Al-Ahssaa Governorate, Saudi Arabia, 1414 AH (July 1994 to June 1995). The objective was to determine the magnitude of the problem and to study its determinants and consequences. Relevant records of both the traffic agency and the four main hospitals in the Governorate were reviewed in a retrospective study. A total of 6117 accidents occurred, which resulted in the injury of 2551 people and the deaths of 151, according to the medical records. The data are compared with those from other regions and recommendations given to help minimize the problem of road traffic accidents.

## Epidémiologie des accidents de la circulation routière dans le Gouvernorat d'Al-Ahssaa en Arabie saoudite

**RESUME** Une étude a été réalisée dans le Gouvernorat d'Al-Ahssaa (Arabie saoudite) sur les accidents de la circulation routière de juillet 1994 à juin 1995 (an 1414 de l'Hégire). Elle avait pour objet de déterminer l'ampleur du problème et d'examiner ses déterminants et ses conséquences. Les registres de la Direction du Trafic et de quatre hôpitaux principaux du Gouvernorat ont été passés en revue dans le cadre d'une étude rétrospective. Au total, 6117 accidents se sont produits, faisant 2551 blessés et 151 morts selon les dossiers médicaux. Ces données sont comparées avec celles d'autres régions et des recommandations sont formulées pour permettre de minimiser le problème des accidents de la circulation.

<sup>1</sup>Department of Community Medicine, Assiut University, Assiut, Egypt.

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## Introduction

Statistics show that the Arab population constitutes 3.6% of the world's population, that it owns 1% of the world's vehicles and its human losses as a result of road traffic accidents (RTA) account for 4.8% of the world's losses [1]. There is no doubt that RTA, whether fatal or not, cause a socio-economic burden to the victims themselves, their families and their country.

It is difficult to estimate the actual economic cost of RTA, which includes the expense of hospitals and rehabilitation centres dealing with victims and the loss of productivity as a result of absenteeism and disabilities. Deaths due to RTA deplete the pool of human resources, especially as the majority of victims are working males.

Saudi Arabia is a country with a good network of roads throughout its vast area. In addition, it has a relatively large number of modern vehicles which allow people to drive at very high speeds. Such circumstances can lead to critical situations where drivers lose control of the vehicle which results in accidents.

The objectives of the present study were:

- to determine the magnitude of the road traffic accident problem in Al-Ahssaa Governorate, Saudi Arabia
- to highlight the determinant factors behind these accidents
- to formulate a set of recommendations that may help in the development of a control programme.

## Materials and methods

A retrospective study was conducted in which the relevant data were collected by reviewing the records on RTA for the year

1414 AH (July 1994 – June 1995). This required reviewing the relevant records of the casualty departments of the four main hospitals serving the catchment area. The records included information about the victims of RTA, such as name, age, sex, nationality, organs affected and outcome of the accident. At the same time, the monthly reports of Al-Ahssaa Traffic Directorate for the same year were reviewed. These monthly reports included relevant information such as number of accidents, type and cause of accidents, time of accidents (day or night), site of accidents (in or out of town), distribution of accidents by days of the week, information about the drivers, and outcome of the accidents.

Data from the medical records of the four hospitals were recorded on a special form designed by the author. *The international classification of diseases and related health problems (ICD-10)* was used in coding morbidities and mortalities resulting from RTA [2]. The data were analysed using *SPSS* (version 6.0).

## Results

The records of Al-Ahssaa Traffic Directorate showed that 6117 accidents occurred throughout the year 1414 AH. These accidents involved 11 381 drivers and 10 799 vehicles, and resulted in the injury of 1604 people and the deaths of 159. In contrast, the medical reports relating to RTA showed that 2551 people had been injured and 151 had died.

Table 1 shows the monthly distribution of RTA in Al-Ahssaa Governorate during the period of study. The highest percentage of accidents (13.7%) occurred during Jumada II (December), while the lowest percentage (6.39%) occurred during Sha'ban (February).

**Table 1 Monthly distribution of road traffic accidents in Al-Ahssaa Governorate**

Month	No.	%	Rank
Muharram (July)	440	7.19	9
Safar (August)	473	7.73	7
Rabi' I (September)	421	6.88	10
Rabi' II (October)	415	6.78	11
Jumada I (November)	481	7.86	5
Jumada II (December)	838	13.70	1
Rajab (January)	480	7.85	6
Sha'ban (February)	391	6.39	12
Ramadan (March)	506	8.27	4
Shawwal (April)	632	10.33	2
Dhu Al-Qa'dah (May)	592	9.68	3
Dhu Al-Hijjah (June)	448	7.32	8
Total	6117	100.00	

Source: Statistical Department, Al-Ahssaa Traffic Directorate, Saudi Arabia

**Table 2 Daily distribution of road traffic accidents in Al-Ahssaa Governorate**

Day	No.	%	Rank
Saturday	723	11.82	7
Sunday	823	13.45	6
Monday	828	13.54	5
Tuesday	865	14.14	4
Wednesday	956	15.63	2
Thursday	995	16.27	1
Friday	927	15.15	3
Total	6117	100.00	

Source: Statistical Department, Al-Ahssaa Traffic Directorate, Saudi Arabia

Table 2 shows that the last three days of the week (Wednesday, Thursday and Friday) had the highest proportion of acci-

**Table 3 Distribution of road traffic accidents by type in Al-Ahssaa Governorate**

Type of accident	No.	%
Collision with another vehicle(s)	4150	67.84
Collision with a pedestrian	1322	21.61
Vehicle over-turning	270	4.41
Collision with a fixed object	242	3.96
Collision with animals	80	1.31
Vehicle leaving the road	27	0.44
Fire	3	0.05
Others	23	0.38
Total	6117	100.00

Source: Statistical Department, Al-Ahssaa Traffic Directorate, Saudi Arabia

dents (15.63%, 16.27% and 15.15% respectively). About two-thirds of accidents (61%) occurred during the day, while about 39% occurred at night. In addition, 72.18% occurred in town, while 27.82% occurred out of town.

Table 3 illustrates that Al-Ahssaa traffic authorities reported seven main types of RTA; they are in order of frequency: collision with another vehicle(s) (67.84%), collision with a pedestrian (21.61%), over-turning of the vehicle (4.41%), collision with a fixed object (3.96%), collision with animals (1.31%), leaving the road (0.44%) and fire in the vehicle (0.05%), in addition to other types (0.38%).

Table 4 illustrates the different causes of RTA as reported by the traffic authorities; they are in order of frequency: very high speed (70.48%), disobeying the traffic signals (12.28%), incorrect stopping of the vehicle (7.24%), other vehicles proceeding incorrectly (6.77%), incorrect turning of the vehicle (2.14%), driver under the influ-

**Table 4 Distribution of road traffic accidents by cause in Al-Ahssaa Governorate**

Cause of accident	No.	%
Very high speed	4311	70.48
Disobeying traffic signals	751	12.28
Incorrect stopping of vehicle	443	7.24
Incorrect proceeding of other vehicles	414	6.77
Incorrect turning of vehicle	131	2.14
Driver under the influence of drugs	11	0.18
Others	56	0.92
Total	6117	100.00

Source: Statistical Department, Al-Ahssaa Traffic Directorate, Saudi Arabia

**Table 5 Distribution of road traffic accidents according to the condition of cars involved in the accident in Al-Ahssaa Governorate**

Condition of car	No.*	%
Faulty lights	181	1.68
Faulty brakes	70	0.65
Faulty steering devices	384	3.56
Sudden defect	485	4.50
Good condition	9 679	89.60
Total	10 799	100.0

Source: Statistical Department, Al-Ahssaa Traffic Directorate, Saudi Arabia

\*No. of drivers > No. of cars means that some drivers could have caused more than one accident with the same car or more than one driver could have used the same car during the study period.

ence of drugs (0.18%), in addition to other causes (0.91%).

As regards the age distribution of drivers involved, 22% were less than 18 years old, 71% were 18–49 years old, while 7%

**Table 6 Distribution of people involved in road traffic accidents in Al-Ahssaa Governorate according to medical reports by age, sex and nationality**

Variable	No.	%
<i>Age (years)</i>		
<5	194	7.6
5–14	474	18.0
15–24	714	28.0
25–44	920	36.1
45–64	184	7.2
65+	52	2.0
Unknown	13	0.5
<i>Sex</i>		
Male	2170	85.1
Female	381	14.9
<i>Nationality</i>		
Saudi	1818	71.3
Non-Saudi	733	28.7
Total	2551	100.0

were 50 years and above. As regards nationality, about two-thirds of drivers were Saudi nationals (63.77%), while non-Saudis constituted one-third (36.23%). Finally, 71.6% of drivers were literate.

Table 5 shows that the great majority of cars involved in accidents (89.30%) were in good condition, while the minority (10.37%) had some sort of defect. These defects were in the form of faulty lights, faulty brakes, faulty steering devices and sudden unpredictable defects.

Table 6 presents some characteristics of the people involved in RTA. About two-thirds of the people (64.1%) were aged 15–44 years, 9.2% were aged 45 years and above and 26.2% were <15 years. The vast majority of those involved (85.1%) were males, and more than two-thirds (71.3%) were Saudi nationals.

**Table 7 Outcome of road traffic accidents in Al-Ahssaa Governorate according to hospital and traffic records**

Statistic	Hospital records	Traffic records
No. of accidents	—	6117
No. of people injured	2291	1604
No. of people killed	151	159
Injury/100 accidents	—	26.2
Death/100 accidents	—	2.6
Accident:injury ratio	—	7:2
Fatality:injury ratio	1:15	1:10

Source: Statistics departments of health and traffic directorates, Al-Ahssaa Governorate, Saudi Arabia

**Table 8 Distribution of road traffic accidents by part of body affected in Al-Ahssaa Governorate according to medical records (ICD-10)**

Affected part	No.	%
Head and neck	1612	63.19
Lower limbs	711	27.87
Upper limbs	475	18.62
Trunk	360	14.11
Internal viscera	41	1.61

More than one organ per injured person could be affected.

Total number of people involved in RTA = 2551

Table 7 shows the outcome of the RTA. The records of the traffic authority show that 13 324 people were involved in these accidents. The vast majority of them (86.77%) were not hurt, 12.04% were injured and 1.19% were killed. In contrast, the hospital records showed 2551 victims of RTA, the vast majority of whom (89.8%) were injured, 4.3% were injury-free, while

5.9% died. According to traffic reports, the accident-injury rate per 100 accidents was 26.2 while the accident-death rate per 100 accidents was 2.6. The accident:injury ratio was about 7:2 and the fatality:injury ratio was about 1:10, while it was 1:15 according to the hospital records.

Table 8 illustrates the organs and systems affected by accidents. The head and neck were affected in about two-thirds of victims (63.19%), the lower limbs in 27.87%, the upper limbs in 18.62%, the trunk in 14.11% and the internal viscera in 1.61%.

## Discussion

The data for this study were collected from the statistics departments of both the traffic and health authorities. The statistics of both sources showed some differences, especially in the number of people involved in RTA. For example, according to traffic reports, the total number of people involved in RTA was 13 324; in contrast, medical reports recorded only 2551. This large difference could be due to the fact that the traffic authority makes its investigations at the scene of the accident when all the people involved in the accident are still at the accident site, whereas the majority of uninjured people or those with minor injuries or trauma refrain from going to health facilities. This is quite obvious from the numbers of uninjured people recorded by both the traffic and health authorities which were 11 561 and 109 respectively.

As regards the number of deaths due to RTA, the traffic authorities recorded 159 deaths, while medical reports showed 151. The difference may be because the relatives of some victims may bury them without notifying the health authority.

The results of this study show that the average daily number of accidents was 14–18, while it was 141–180 in Riyadh city [3]. This difference could be attributed to the difference in the number of vehicles and people in both cities (Al-Ahssaa and Riyadh); the latter is the capital of Saudi Arabia and the centre of many activities.

The findings of this study illustrate that the accident-injury rate per 100 accidents, accident-death rate per 100 accidents and accident-injury ratio and fatality-injury ratio were 26.2, 2.6, 7:2 and 1:10 respectively according to traffic reports. The study of Badawi et al in Asir Region reported that the accident-injury rate per 100 accidents was 179, while it was 68 at the national level [4]. In addition, they found that the accident-death rate and fatality-injury ratio were 33.1 and 1:5 respectively in Asir, while the national figures were 8.77 and 1:10 respectively, and the accident-injury ratios were 3:5 and 3:2 in Asir and overall in the country respectively.

The results of this study show that the last three days of the week (Wednesday, Thursday and Friday) had the highest rates of RTA in Al-Ahssaa Governorate. This could be attributed to the fact that some adolescents and young people participate in unofficial car races with their peers at the week-ends as a leisure-time activity. These young people may lack a sense of responsibility towards themselves, others and property, which thus leads to drastic outcomes. In addition, people who have to visit their relatives and friends living away from their locality, and those who seek recreation and shopping find the weekend a good opportunity to fulfil these needs and demands. They therefore have to drive long distances on the motorways, thus exposing themselves and their companions to the risk of RTA.

In Al-Ahssaa Governorate, 22% of drivers involved in RTA were under 18 years, compared with 8% in Asir Region. Such a high proportion of young drivers, lacking in driving skills and experience, may increase both the risk and severity of accidents.

Very high speed was responsible for about 70% of accidents in the Governorate compared with 67% as a national figure as found by a national study on RTA in 1980 [5], and with 51% in Asir Region during the period 1975–1977 [6].

The head and neck was the part of the body which suffered the highest percentage of trauma (63%), compared with 46% in the Asir study and 54% at the national level. Next were the lower limbs (28%).

As regards the cause of death among victims of RTA in Al-Ahssaa Governorate, medical reports revealed that 88% of the people killed suffered from head trauma resulting in fracture at the base of the skull. This finding concurs with that of the Asir study (1975–77) [6] and the Taif study (1978–82) [7] where head trauma was responsible for 82% and 85% of deaths respectively.

## Conclusion and recommendations

Road traffic accidents are still a major public health problem, both in industrialized and developing communities. Such accidents lead to a depletion of valuable resources, especially human resources. Studies of RTA have shown that the vast majority of victims are males of working age, so such losses have adverse consequences on families, communities and states. Every effort should be made to minimize the problem of RTA and reduce its negative effects.

The following recommendations would help to minimize the magnitude of the RTA problem in Saudi Arabia and its consequences.

1. Traffic awareness in the community should be raised through the mass media.
2. Traffic awareness among students should be raised through integration of the subject into the teaching curricula at different educational levels.
3. Traffic laws should be strictly enforced, especially regarding the age of drivers.
4. The penalties on the parents of children and adolescents who drive cars before being eligible to hold a driving licence should be strengthened.
5. Immediate medical care at the scene of the accident is urgently needed; this will minimize deaths and the more serious consequences of RTA.
6. Training in first-aid measures should be given to the police. This will enable them to deal with the situation correctly before the arrival of medical and rescue teams.
7. Speed limits should be strictly monitored using sensitive modern equipment.
8. A centre for RTA studies should be established, sponsored by the General Directorate of Traffic, to support training, studies and research in the area of RTA.

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