

Road traffic accidents in the United Arab Emirates compared to Western countries

A. Bener¹ D. Crundall²

¹*Advisor WHO & Dept. of Medical Statistics Epidemiology,
Hamad General Hospital & Hamad Medical Corporation, Doha, Qatar*

²*Accident Research Unit, School of Psychology, The University of Nottingham, Nottingham, United Kingdom
e-mail: abener@hmc.org.qa*

subm. 15th April 2005

approv. after rev. 9th May 2005

Abstract

Road traffic accidents (RTAs) are increasingly being recognized as a growing public health problem in Bedouin Arabian Gulf countries. The discovery of oil around the middle of the last century has led to changes in many aspects of life in the United Arab Emirates (UAE), not least in regard to the amount of vehicles on the roads. Whilst affluence may advance a country in terms of technology, infrastructure and economic stability, it is not necessarily the case that general patterns of behaviour will adapt at the same speed. This is one of the reasons suggested for the high number of incidents involving aggressive driving behaviour and driving offenses. The study of such incidents, and their relation to traffic accidents, has become a major concern of researchers over several years. This current investigation presents recent data concerning RTAs and road user behaviour in UAE during 2000. Careless driving is identified as the most important factor in RTAs over the period of study, accounting for over 35% of all incidents, while excessive speed was the second most common cause. The findings are discussed in regard to the necessity of changing behaviour of drivers through media campaigns and health education. It is hoped that the findings of this study may assist decision makers and international consultants in the formulation of policies and the development of alternative plans to improve urban transportation system in the UAE.

Keywords – Road traffic accidents, psychological factors, driver, intelligence, personality, carelessness, violations, social maturity, arousal, death rates, UAE

1. Introduction

Road traffic accidents (RTAs) are increasingly being recognized as a growing public health problem in Bedouin Arabian Gulf countries. The discovery of oil around the middle of the last century has changed many aspects of life in the United Arab Emirates (UAE) [1]. There was an explosion in immigration and population, with a corresponding increase in vehicle numbers accompanied by rapidly expanding road construction programmes. Unfortunately patterns of behaviour did not change so rapidly, with behaviours rooted in traditional cultures mixed together with the Western culture [2]. The result has been a large increase in the number of road traffic accidents with casualties and fatalities creating a serious public health problem. This problem drastically needs targeted research in order to identify methods of reducing accidents and fatalities.

Previous research has addressed the problems of aggressive behaviour and driving offences, and their relation to traffic accidents [1,3-8], though the majority of such analyses have been concerned with Western countries. Although most researchers today agree that it is not appropriate to attempt to isolate a single main cause of an accident, early accident studies demonstrated that 90% of all accidents could be attributed to road user behaviour characteristics [1,3,5,6,8,9].

Previous studies have shown that casualty and fatality rates in UAE and in other Gulf countries, are much higher than in the developing countries with comparable vehicle ownership levels [2,10-12]. The magnitude of the problem therefore dictates the need for more research into road accidents and associated risk factors. Overall, the behaviour of the road user clearly constitutes an important risk factor. However, age, sex, marital status, education, training, experience, way of life, emotional status, fatigue, reaction time, vision, vigilance and driving speed, also play significant roles and need to be considered associated risk factors in road traffic accidents [13].

In UAE, with its rapid expansion of road construction and increase in number of vehicles, road traffic accidents are becoming an increasingly serious public health problem. The magnitude of the problems could be greatly reduced if appropriate measures were taken concerning road user behaviour.

The objective of our study is to evaluate the trend of RTA problems in the United Arab Emirates. And to compare these trends with other western countries like USA and UK and also a neighboring country like Qatar.

2. Materials and methods

The motor vehicle accidents statistics used in this study were taken from the Ministry of Interior's Yearly Statistical Report and the Annual Reports of the Directorate of Traffic (Directorate of Traffic Annual Reports 1990 to 2000) [14] and in collaboration with the Traffic Department, UAE. The study was based on the collection of data about all fatal motor vehicle accidents that occurred in United Arab Emirates during the period 1 January 1990 to 31 December 2000. The annual statistical report contains information such as the number of registered vehicles, number and nature of accidents, causes of road accidents, number of fatalities and casualties, age and gender of victims. Additional data were obtained from various sources, including the Ministry of Health, Health Statistics Annual Report for the period 1990 to 2000 (Ministry of Health Annual Reports 1990 and 2000) [15], World Health Statistics Annual Report, World Health Organization, Annual Statistical Reports, and Accident Facts National Safety Council [16] 2000 edition. Multiple linear regression analysis was performed to determine predictor for fatalities per 10,000 vehicles.

3. Results

Figure 1 shows all the registered vehicles, crashes, injuries and fatalities from 1977 to 2000. Table 1 provides a brief overview of certain key statistics of UAE for the period of year 2000. The picture is one of a relatively wealthy country with a small (but expanding) population dominated by expatriates. Despite the relatively low ratio of licensed vehicles to the number of inhabitants, this figure has grown dramatically over the last ten years. Compared to the UK and the USA, the extent of the problem becomes apparent (Table 2). Whereas the UK and USA recorded 0.72 and 1.51 RTA fatalities per hundred million vehicle kilometers, UAE recorded a disproportionate 3.33 fatalities per hundred million vehicle kilometers.

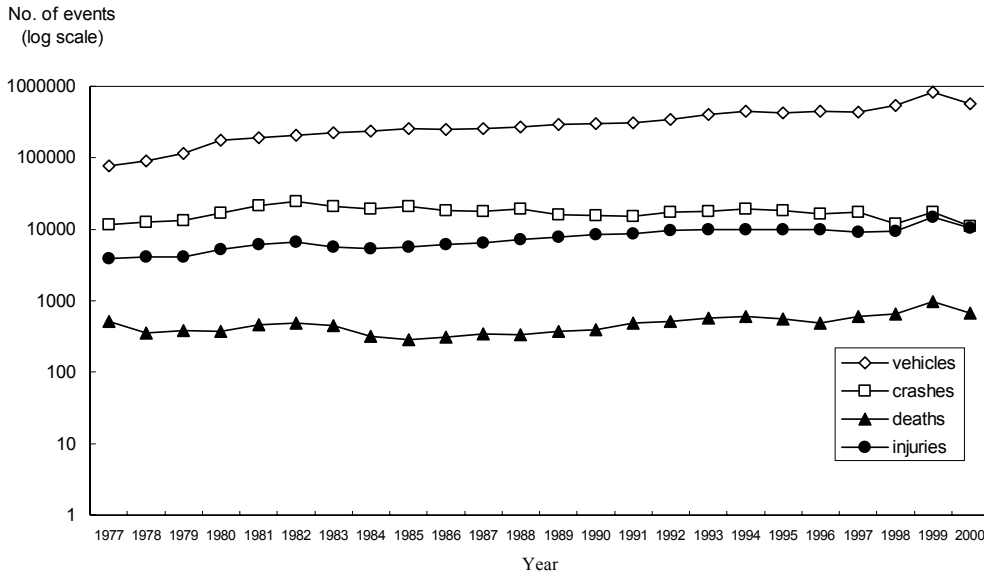


Fig. 1 – Total number of registered vehicles, crashes, deaths and injuries in the UAE (1977-2000)

Tab. 1 – Summary statistics for United Arab Emirates (2000)

| | |
|------------------------------------|----------------------------|
| <i>Population</i> | 3,108,000 (70% Expatriate) |
| <i>Registered vehicles</i> | 575,929 |
| <i>Passenger Cars</i> | 540,446 |
| <i>Vehicle travel (Million Km)</i> | 1,935 |
| <i>Population per Car</i> | 5.75 |
| <i>Population per Vehicle</i> | 5.39 |
| <i>Annual Income per capita</i> | 22,000 US Dollars |
| <i>Mean family size</i> | 5.8 |
| <i>Mean family Income</i> | USD 2,853/month |
| <i>Mean vehicle-trip (Km)</i> | 10.5 |
| <i>Mean vehicle-km per day</i> | 53 |
| <i>Population per doctor</i> | 1279 |
| <i>Population per bed</i> | 621 |

Even though the ratio of vehicles to population is greatest in the UAE (5.4 people per vehicle, compared to 2.1 people and 1.3 people per vehicle in the UK and US respectively), the number of fatalities per hundred thousand vehicles is nearly six times greater than that in the USA, and more than ten times greater than in the UK.

The major causes of RTAs during 2000 are detailed in Table 3. The largest single cause of an accident was classed as careless driving, contributing more than 36.5% of all casualties and fatalities in RTAs. Excessive speed took the second rank in all incidents accounting for 16.% of casualties and 27% of fatalities. Together these two causes accounted for over 62% of all road traffic fatalities in UAE in 2000.

Tab. 2 – Statistical comparison of motor-vehicle traffic fatalities in United Kingdom, United States, United Arab Emirates and Qatar

| Country and year | UK 2000 | USA 2000 | UAE 2000 | Qatar 2000 |
|--------------------------------------|------------|-------------|-------------|---------------|
| Description | | | | |
| Motor vehicle deaths | 3,409 | 41,471 | 673 | 85 |
| Vehicle travel (million km) | 467,700 | 2,750,000 | 19,970 | 7,278 |
| Registered Vehicle | 28,890,000 | 217,028,000 | 575,929 | 303,245 |
| Passenger cars | 23,196,000 | 205,102,000 | 537,918 | 286,883 |
| Registered Population | 60,000,000 | 274,634,000 | 3,108,000 | 578,470 |
| Death Rates | | | | |
| Fatality per 100 million vehicle km | 0.72 | 1.51 | 3.37 | 1.2 |
| Fatality rate per 100,000 population | 5.7 | 15.1 | 21.6 | 14.7 |
| Fatality rate per 100,000 vehicles | 11.8 | 19.1 | 116.8 | 28.0 |
| Population per vehicle | 2.1 | 1.3 | 5.4 | 1.9 |
| Population per car | 2.6 | 1.3 | 5.8 | 2.0 |

Tab. 3 – Percentage distribution of RTAs, casualties and fatalities in UAE by causal factors (2000)

| DRIVER'S ERRORS & VIOLATIONS | ACCIDENTS | | CASUALTIES | | FATALITIES | |
|------------------------------------|-----------|------|------------|------|------------|------|
| | Frequency | % | Frequency | % | Frequency | % |
| 1) Carelessness | 4224 | 38.0 | 3703 | 35.0 | 240 | 35.6 |
| 2) Excessive speed | 1456 | 13.1 | 2063 | 19.5 | 181 | 26.9 |
| 3) Tail gating | 711 | 6.4 | 582 | 5.5 | 11 | 1.7 |
| 4) Driving Opposite Direction | 545 | 4.9 | 614 | 5.8 | 17 | 2.5 |
| 5) Incorrect over taking | 522 | 4.7 | 614 | 5.8 | 38 | 5.7 |
| 6) Disregarding traffic red light | 467 | 4.2 | 307 | 2.9 | 15 | 2.2 |
| 7) Drug and Alcohol | 445 | 4.0 | 317 | 3.0 | 11 | 1.7 |
| 8) Disallowing priority pedestrian | 389 | 3.5 | 497 | 4.7 | 34 | 5.0 |
| 9) Incorrect Reversing | 233 | 2.1 | 254 | 2.4 | 15 | 2.3 |
| 10) Vehicle Condition | 211 | 1.9 | 307 | 2.9 | 34 | 5.1 |
| 11) Animals | 156 | 1.4 | 42 | 0.4 | 4 | 0.6 |
| 12) Incorrect cornering | 145 | 1.3 | 159 | 1.5 | 3 | 0.5 |
| 13) Using incorrect lane | 67 | 0.6 | 95 | 0.9 | 13 | 2.0 |
| 14) Others | 1545 | 13.9 | 1026 | 9.7 | 55 | 8.2 |
| TOTAL | 11116 | 100 | 10581 | 100 | 673 | 100 |

Tab. 4 – Result of regression analysis (dependent variable – Log fatalities per 10,000 vehicles)

| Parameter | A | B | R | Statistical significance at 95% level |
|---|-------|---------|-------|---------------------------------------|
| 1) (Log) vehicles per person | 0.861 | 0.573 | 0.814 | Significant |
| 2) (Log) Gross national Product per capita | 2.782 | 0.369 | 0.625 | Not significant |
| 3) Population per physician | 1.115 | 0.00023 | 0.428 | Not significant |
| 4) Population per hospital bed | 0.795 | 0.00034 | 0.865 | Significant |
| 5) Percentage of school age population attending school | 1.797 | 0.01 | 0.813 | Significant |

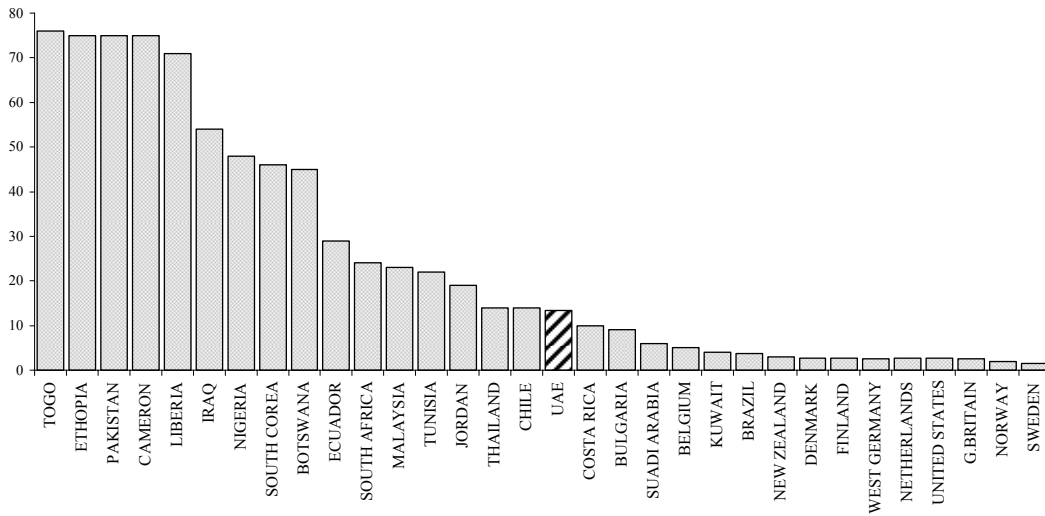


Fig. 2 – Road Accident Fatalities (deaths per 10,000 vehicles) in selected countries, 1988-1998

An attempt was made to test the relationship between fatality rate and other parameters that are believed to have some impact on fatalities in the United Arab Emirates. The parameters used were as follows.

1. Vehicle per-person.
2. Gross National Product (GNP) per-capita;
3. Population per – physician;
4. Population per hospital bed; and
5. Percentage of school age population attending school.

The reason for choosing parameters is that they are believed to reflect some social, economic and health characteristics of United Arab Emirates with sufficient variable data. Simple regression

analysis was carried out to quantify separately the dependence of the fatality (per-licensed vehicle) for 1990-2000 was related to above parameters. The results of the analysis are given in Table 4. The results of the regression analysis showed that the fatality rates were found to fall with an increase in vehicle ownership (possibly due to a shift to more vehicle/vehicle incidents than vehicle/pedestrian incidents, where the latter carries a greater chance of fatality). Similarly decreases in fatalities were noted with increases in GNP per-capita, and increases in the percentage of the school-age population attending school. Additionally fatalities were found to increase along with increases in population per physician, and increases in population per hospital bed.

4. Discussion

The UAE is a young nation which during its thirty-two year existence has undergone enormous rapid growth in road construction, number of vehicles and the emergence of high risk road user behaviour [1,2,12]. These factors have converged to produce a dramatic number of road traffic accidents, presently constituting the second cause of death in the nation. Auto-accident rates are considerably higher in the UAE and other Gulf countries with comparable vehicular ownership levels. Though accident rates are higher in UAE than the UK USA and Qatar, the pattern of accident causation is not dissimilar. It is possible that RTA causes in UAE are the same as causes of RTAs in many other countries. The problem is the extent of these accidents, rather than the nature of their causes. If causes do overlap between UAE and other countries, then it is feasible that policies introduced to tackle specific accident factors in the developed countries could be adapted for use in young nations struggling to come to terms with the extent of road traffic accidents. However it should be borne in mind that successful policies and media campaigns are culturally specific and the psychological factors of individuals based within a specific cultural setting must be understood, before planners can hope to influence driver behaviour. In fig. 2 the fatalities due to road accidents per 10,000 vehicles of different countries is shown from 1988-1998. The average fatalities per 10,000 vehicles of UAE was 13.3 during this period. This figure was twice as much compared to neighboring oil rich countries like Kuwait and Saudi Arabia.

The present study shows that road traffic fatalities are second only to cardiovascular disease in the list of major causes of death. Similar results have been found in other studies [1,17,18]. Road traffic accidents generally cause more serious trauma than other accidents, which is reflected in high number of fatal and serious injuries [1,11,12,17-20].

According to a previous report²¹, Driver Behaviour of UAE was compared with other countries UK, Finland and Australia and there was a significant differences noted with respect to driver behavior. Mean scores of lapses, errors and violations were higher among the UAE population. This finally implies that cultural and lifestyle characteristics are strongly associated with higher risk in UAE.

Investigations into some aspects of driver behaviour in some affluent developing countries [12] indicate that drivers acquire many dangerous and harmful driving habits and that driver compliance with traffic regulations is poor¹¹. A recent study showed that in most Gulf Countries Sultanate Oman, Kuwait, Saudi Arabia and United Arab Emirates, the seat belt law is ignored [1,2,11,12,17].

These results throw some light on how social and economic parameter might affect the road safety situation in a particular country. The results also suggest that fatality rates due to road accidents could reasonably reduced by improving medical services and education. Although road

and vehicle engineering measures proved to be effective in reducing accidents, engineers must recognize that road safety is multidisciplinary and ensure that their work is integrated with that of others [2,12]. They must take into account erroneous road user behaviour and accordingly design the system to reduce the consequences. It is, therefore, recommended that, to provide better understanding, a comprehensive in depth study of accident causation with a focus on the human factor be carried out.

5. Conclusions

Road traffic injuries besides being a major health hazard leading to a high mortality rate of morbidity, disability and death, have a great socio-economic impact on the victim, his family and the nation as a whole. The problem is not intractable and the toll could be greatly reduced if appropriate measures were taken.

Acknowledgments

We would like to thank Prof. Leonard Evans (USA), Dr. Abdul Ghaffar (WHO), and Ms. Sarah Groombridge (TRL, UK), for their valuable advice and information, which have improved the presentation of this paper.

References

1. Bener A, Breger E, Al-Falasi A. Risk-taking behaviour in road traffic accidents. *J Traffic Med* 1994; 23: 65 - 70.
2. Bener A. Road Traffic Injuries in developing countries: Motor Vehicle Accidents in the United Arab Emirates: Strategies for prevention. *Global Forum for Health Research, the 10/90 Gap in Health Research, Forum 5, Geneva, 9-12 October 2001*, pp 221-222.
3. Parker D, Reason JT, Manstead ASR, Stradling SG. Driving errors, driving violations and accident involvement. *Ergonomics*; 1995; 38: 1036-1048
4. Sumala H. Accident risk and driver behaviour. *Safety Science* ; 1996; 22: 103-117
5. Lawton R, Parker D, Stradling SG. Predicting road traffic accidents: the role of social deviance and violations. *Br J Psychology* , 1997; 88: 249-262.
6. Kontogiannis T, Kossiavelou Z, Marmaras N. Self- reports of aberrant behaviour on the roads: errors and violations in a sample of Greek drivers. *Accid Anal Prev*;2002; 34: 381-399.
7. Dobson A, Brown W, Ball J, Powers J, McFadden M. Women drivers' behaviour, socio-demographic characteristics and accidents. *Accid Anal Prev* ,1999; 31:525-35.
8. Mesken J, Lajunen T, Summala H. Interpersonal violations, speeding violations and their relation to accident involvement in Finland. *Ergonomics*, 2002;45 : 469-483.
9. Jonah BA. Accident risk and risk-taking behaviour among young drivers. *Accid Anal Prev*; 1986; 18:255-271.
10. Bener A, Jadaan KS. A perspective on road fatalities in Saudi Arabia. *Acc Anal Prev* 1992; 24: 143-148.
11. Jadaan KS, Bener A, Al-Zahrani A. Some aspects of road user behaviour in selected Gulf countries. *J Traffic Med* 1992;20(3):129-135.
12. Bener A, Abu-Zidan FM, Bensiali AK, Al-Mulla AAK, Jadaan KS. Strategy to improve road safety in developing countries. *Saudi Med J*; 2003; 24: 603-608.
13. Gregersen, N. P., Bjurulf, P. Young novice drivers: Toward a model of their accident involvement. *Accid Anal Prev* ,1996, 28: 229-241.
14. Ministry of Interior's Directorate of Traffic, Road Traffic Accident Statistical Annual Report 2000, Abu Dhabi, United Arab Emirates
15. Annual Report 2000, Ministry of Health, Department of Preventive Medicine, Abu Dhabi Emirate, United Arab Emirates, 2000.

16. Accident Facts. National Safety Council, National Highway, Traffic Safety Administration. 2000. Edition USA.
17. Klenk G, Kovacks A. Etiology and patterns of facial fractures in the United Arab Emirates. *J Craniofac Surg*; 2003; 14: 78-84.
18. Ansari S, Akhdar F, Madoorah M, Mutaery K. Causes and effects of road traffic accidents in Saudi Arabia. *Public Health*, 2000; 114: 37-39.
19. Krug E. Ed. *Injury: a leading cause of the global burden of disease*. Geneva, World Health Organization, 1999,
20. www.who.int/violence_injury_prevention/index.html (accessed 1 August 2003)
21. Bener A and Alwash R. A perspective on motor vehicle crash injuries and speeding in the United Arab Emirates. *Traffic Injury Prevention*; 2002; 3: 61-64.
22. Bener A, Crundall D, Haigney Di, Benisiali AK, Al-Falasi AS. Driver Behavior, Stress, Error and Violations on the Road: A cross-cultural comparison study. A. 3rd International Conference on Traffic & Transport Psychology, 5-9 September 2004, Nottingham, UK.