A STUDY OF ROAD TRAFFIC ACCIDENTS IN SAUDI ARABIA

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ABSTRACT

Saudi Arabia, with its rapid expansion of road construction and increase in the number of vehicles, road traffic accidents are becoming a serious public health problem. The object of this paper is to discuss the magnitude of this problem and to compare the results with those of other rich, developing countries which have also had rapid expansion of road construction and increase in the number of vehicles. It appears that Saudi Arabia has lower accident rates but higher casuality and fatality rates than Kuwait.

1. INTRODUCTION

There has been a rapid economic growth in the Kingdom of Saudi Arabia since 1973 and this has resulted in an enormous increase in the number of vehicles. Many roads have been constructed in different parts of the Kingdom to cope with this increase. As a result, road traffic accident (RTA) has become a serious public health problem in the Kingdom. RTA is in fact, the second major health problem in the Kingdom of Saudi Arabia, after infections diseases (Mufti, 1983). Although a detailed study of road traffic accidents has been done for some other countries (see for example, Jacobs and Sayer (1977), Said and Jadaan (1985), Mekky (1985) and Lamm et al. (1985)), this has not been done for the Kingdom of Saudi Arabia. Moreover, the results obtained from other countries may not be applicable to Saudi Arabia because of its unique nature. This uniqueness can be attributed to several factors.

First is the enormous growth in the number of registered vehicles. This increased from 242974 in 1973 to 4144248 in 1985, an overall increase of 1605.6%. Second is the presence of expatriates from all over the world. These people come from different cultures with different habits and attitudes. The wide differences in their backgrounds can create safety-related problems on the road. Third, the fast pace of motorization has not been paralled by developments in driver education, law enforcement and other safety related areas.

The object of this paper is to discuss the magnitude of road traffic accidents in Saudi Arabia during the period 1973-1985, and to compare some of the results with those of other rich, developing countries such as Kuwait and Nigeria. These two countries, like Saudi Arabia, have had rapid expansion of road construction and increase in the number of registered vehicles. The three countries also have some similar cultural factors. For example, the sale and consumption of alcohol is prohibited by the Islamic Law in the three countries. These factors make our comparison reasonable.

The data used for this paper were taken from the Ministry of Interior's Yearly Statistical Report, Kingdom of Saudi Arabia, 1973-1985. The report contains information such as population, number of registered vehicles, number and nature of accidents, times of accidents according to days of the week, number of casualties and fatalities, causes and nature of accidents, ages of drivers and frequency of accidents. Additional sources of data were Tanner (1974), Jinadu (1984), Berner and El-Sayyad (1985), Mekky (1985), Said and Jadaan (1985) and Cochrane et al. (1986).

2. POPULATION AND VEHICLE STATISTICS

Table 1 gives the population and vehicle statistics for Riyadh and Jeddah, the two largest cities in the Kingdom of Saudi Arabia. It can be seen that there has been an enormous increase in the number of registered vehicles during the period 1973 to 1985.

During the 13-year period 1973 to 1985, the population of Riyadh increased by 179.7% and the overall increase in the number of registered vehicles was 1133.5%, averaging 31.6% between 1973 and 1977 and 12.8% between 1978 and 1985. The average annual growth rate in the number of registered vehicles in Riyadh during the 13 years was 21.3%.

(TABLE 1 HERE)

In Jeddah, the population increased by 43.7% during the 13-year period 1973 to 1985. The overall increase in the number of registered vehicles during the period was 3492% the average annual growth rate being 31.7% . Like Riyadh, the major growth in the number of registered vehicles occurred between 1973 and 1977 when an average annual growth rate of 45.2% was recorded.

Considering the Kingdom as a whole, the number of registered vehicles increased by 1605.6% in the 13 years, averaging 24.4% per annum, but notably the major growth occuring between 1973 and 1977 when an average growth rate of about 35% per annum was recorded.

Table 2 gives vehicles per capita for Saudi Arabia, Riyadh, Jeddah, Kuwait, Libya, Great Britain and Singapore during the period 1973-1985. The following points can be observed.

(a) During the period 1973-1982, Kuwait had more vehicles per capita than Saudi Arabia.

(b) Between 1973 and 1977 Riyadh had more vehicles per capita than Jeddah, but during the period 1978-1985, Jeddah had more vehicles per capita than Riyadh.

(c) Great Britain had more vehicles per capita than Saudi Arabia during the period 1973-1980, but less vehicles per capita during the period 1981-1985.

(d) Singapore had more vehicles per capita than Great Britain, Libya, Kuwait and Saudi Arabia during the period 1973-1982.

(TABLE 2 HERE)

3. ACCIDENT RATES

Table 3 gives accident rates per 1000 vehicles in Kingdom of Saudi Arabia and the two largest cities in the Kingdom, Riyadh and Jeddah, from 1973 to 1985. The following observations can be noticed.

(a) Despite of enormous increase in the number of registered vehicles during the period, there is a decline in the rate of accidents in Riyadh, Jeddah and in the Kingdom as a whole.

(b) The overall decrease in accident rate in the Kingdom during the period (1973-1985) is 82.9%, the average annual decrease being 14.6%. In Riyadh, the overall decrease during the period is 83.1%, the average annual decrease being 14.7%. The corresponding rates for Jeddah are 88.2% and 17.9%, respectively. Thus, it appears that the decline in accident rates is greater in Jeddah than in Riyadh.

(c) Accident rates in Riyadh are at least 100% greater than in Jeddah even though Jeddah has higher rates of vehicles per capita (after 1978) than Riyadh.

(d) Accident rates in Riyadh are at least 20% greater than the average in the Kingdom.

(TABLE 3 HERE)

Table 3 also gives accident rates in Kuwait from 1973 to 1982. It can be seen that accident rates in Kuwait during this period are greater than the corresponding rates in Saudi Arabia, Riyadh and Jeddah. The mean accident rate in Kuwait from 1973 to 1982 is 250% greater than the corresponding rate in the Kingdom of Saudi Arabia, and is 100% greater than the corresponding rate in Riyadh.

Table 4 gives the distribution of road traffic accidents in Saudi Arabia according to days of the week during the period 1973 to 1985. It can be observed that the highest proportion of accidents occurred on Thursdays, followed by Fridays, these days being weekends in the Kingdom. Jinadu (1984) obtained similar results for Nigeria.

(TABLE 4 HERE)

4. CASUALTY RATES

In the last section we found that accident rates (per licensed vehicle) in Kuwait between 1973 and 1982 were higher than the corresponding rates in Riyadh, Jeddah and in Saudi Arabia as a whole. In this section we compare casualty rates (per traffic accident) in Saudi Arabia with rates in Kuwait and Nigeria. As we have already pointed out in Section 2, Saudi Arabia, Kuwait and Nigeria have some cultural and developmental factors which make such a comparison reasonable. The relevant data is given in Table 5, from which the following can be observed:

(TABLE 5 HERE)

(a) Casualty rates (per traffic accident) in Saudi Arabia are more than three times greater than in Kuwait. Thus, it can be seen that between 1973 and 1982, Saudi Arabia had lower accident rates but higher casualty rates than Kuwait.

(b) Even though accident rates in Jeddah are about 50% lower than in Riyadh, casualty rates in Jeddah are at least 100% greater than in Riyadh.

(c) Casualty rates in Nigeria (Oyo State) between 1978 and 1982 are at least 50% greater than in Saudi Arabia.

5. FATALITY RATES

In the last section we compared casualty rates in Saudi Arabia with the corresponding rates in Kuwait and Nigeria. In this section we consider fatality rates (per traffic accident) using the data given in Table 6. It can be observed that:

(a) Fatality rates in Jeddah are at least 130% greater than in Riyadh. It can therefore be seen from sections 4 and 5 that between 1973 and 1985, Riyadh had higher accident rates but lower casualty and fatality rates than Jeddah.

(b) Riyadh and Jeddah have lower fatality rates than the average rates in the Kingdom.

(c) Fatality rates in Saudi Arabia are at least 300% greater than in Kuwait. The average fatality rate in Saudi Arabia between 1973 and 1982 is at least 600% greater than the corresponding rate in Kuwait.

It appears from Sections 3, 4 and 5 that Kuwait has higher accident rates but lower casualty and fatality rates than Saudi Arabia.

(d) Fatality rates in Nigeria (Oyo State) are at least 120% greater than in Saudi Arabia, and at least twenty times greater than in Kuwait.

(TABLE 6 HERE)

6. CAUSES OF ROAD TRAFFIC ACCIDENTS

In this section we consider the main causes of road traffic accidents in the Kingdom of Saudi Arabia. Table 7 gives the distribution of road traffic accidents in the Kingdom from 1974 to 1985, and the causes of these accidents. It can be seen from Table 7 that in Riyadh, Jeddah and in the Kingdom as a whole, excessive speed is the main cause of road traffic accidents, and failure to obey traffic lights is the next contributor to road traffic accidents. It can also be seen from Table 7 that drugs and alcohol have an insignificant effect on road traffic accidents. The fact that drugs and alcohol have an insignificant effect on road traffic accidents in Saudi Arabia is not surprising to us, since under the Islamic Law, the sale and consumption of alcohol is prohibited in the Kingdom. The penalty for this offense is very severe.

(TABLE 7 HERE)

7. TYPE OF ROAD TRAFFIC ACCIDENT

Table 8 gives the type of road traffic accident in Riyadh, Jeddah and in Saudi Arabia as a whole. It can be seen that Riyadh has a very high percentage (81.5%) of vehicles crashing and a low percentage (10.1%) of pedestrian accidents. In Jeddah, about 48% of road traffic accidents involve crashing and 32.4% involve pedestrians. In the Kingdom as a whole, crashing constitutes the highest percentage of road traffic accidents, about 64.6%; this is followed by pedestrian accidents (17.5%) and overturning (15.2%). Unfortunately, the report used for this paper does not contain a finer breakdown of traffic accident classifications.

(TABLE 8 HERE)

It should be pointed out that the type of accident taking place in an area will have some effect on the casualty and fatality rates in that area. For instance, since the pedestrian

is the most vulnerable of all road-users, wherever pedestrian accidents are high, casualty and fatality rates are also likely to be high. Table 8 shows that Riyadh has a lower percentage of pedestrian accidents than Jeddah and this probably explains why casualty and fatality rates are lower in Riyadh than in Jeddah, even though Riyadh has higher accident rates than Jeddah.

8. DISCUSSION

Police reports are, in most countries, the main source of information about road traffic accidents. In the Kingdom of Saudi Arabia, it is an offense, under the Road Traffic Regulations, for a driver whose vehicle gets involved in an accident to refuse to report this accident to the Police. The penalty for this offense is very severe. Indeed, no damaged vehicle can be repaired in a workshop in the Kingdom unless a police report about the accident is produced. This, to some extent, reduces underreporting bias of property damage accidents in the Kingdom.

This study has shown that despite the enormous increase in the number of registered vehicles in the Kingdom of Saudi Arabia, there appears to be a decline in accident rates (per licensed vehicle). Recently, several roads with high standard safety measures have been constructed in the Kingdom and there has been strict enforcement of road traffic regulations. Furthermore, driver education has been intensified under the auspices of the National Road Traffic Safety Committee. These measures have probably contributed to the decline in accident rates in the Kingdom.

During the period 1973-1985, about 35% of road traffic accidents in Saudi Arabia occurred in Riyadh, the capital of the Kingdom and about 11% occurred in Jeddah, the second largest city in the Kingdom. Accident rates (per licenced vehicle) in Riyadh were higher than in Jeddah, and also higher than the average in the whole Kingdom. However, casualty and fatality rates (per accident) in Riyadh were lower than in Jeddah and also lower than the average rates in the whole Kingdom.

An analysis of road traffic accidents according to days of the week showed that the highest proportion of accidents in the Kingdom occurred on Thursdays, followed by Fridays, these days being weekends in the Kingdom (see Table 4).

The main cause of road traffic accidents in the Kingdom appears to be excessive speed (see Table 7). In Riyadh, about 60% of road traffic accidents are caused by excessive speed and in Jeddah excessive speed is responsible for about 63% of road traffic accidents. Strict enforcement of speed limits and electronic speed checks are likely to reduce road traffic accidents in the Kingdom.

An analysis of the type of accident taking place in Saudi Arabia showed that Riyadh has a very high percentage of vehicle crashing and a low percentage of pedestrian accidents (see Table 8). It was also found that the percentage of pedestrian casualities in Jeddah was greater than in Riyadh. Since the pedestrian is among the most vulnerable of all road-users this explains why casualty and fatality rates are lower in Riyadh than in Jeddah, even though Riyadh has higher accident rates than Jeddah.

A comarison of the numbers of casualities and fatalities during the period 1973-1985 showed that Riyadh had a lower fatality index (i.e. the proportion of all personal-injury accidents that are fatal) than Jeddah. The fatality index for Jeddah was also found to be lower than the average index in the Kingdom. It should be pointed out that the fatality index for an area is related to medical facilities available in that area. Riyadh has two University Teaching Hospitals, an Armed Forces Hospital, a Specialist Hospital, several other well-equipped hospitals and a medical rehabilitation center for victims of road traffic accidents. Riyadh therefore has better medical facilities than Jeddah and other parts of the Kingdom. Thus when a serious accident occurs, the chance of the injured person dying is less in Riyadh than in Jeddah. It is therefore not surprising that Riyadh has a lower fatality index than Jeddah.

On comparison with values obtained for Saudi Arabia, Kuwait and Nigeria, we found that accident rates in Kuwait are, on average, at least 120% greater than in Saudi Arabia, but casualty and fatality rates in Saudi Arabia are at least three times greater in Kuwait. Casualty and fatality rates in Nigeria (Oyo State) were found to be greater than in Saudi Arabia.

The fatality index for Saudi Arabia during the period 1973-1982 was found to be about 1:6, the corresponding indexes for Kuwait and Nigeria during the same period being 1:11 and 1:4, respectively. These are very large ratios when compared with 1:50 for Great Britain.

Under the Islamic Law, the sale and consumption of alcohol is prohibited in the Kingdom of Saudi Arabia. The penalty for this offense is very severe, and it is therefore not surprising that drugs and alcohol have an insignificant effect on road traffic accidents in the Kingdom.

9. RECOMMENDATIONS

The estimated annual cost of road traffic accidents in Saudi Arabia is over ten billion Saudi Riyals (Tamimi et al., 1980). This cost is very high and it is therefore important that efforts are made to reduce road traffic accidents in the Kingdom. We make the following recommendations:

(a) There should be a more rigid enforcement of road traffic regulations. In particular, unlicensed drivers should be severely punished.

(b) Since excessive speed is the main cause of road traffic accidents in the Kingdom, speed limits should be introduced and must be rigidly enforced. We recommend a very severe penalty for excessive speed.

(c) Education in accident prevention should be intensified.

(d) The hazards of road traffic accidents should be publicized. The medical profession should take the initiative in this area.

(e) The use of safety belts by drivers should be made compulsory.

(f) Vehicles must have periodic inspection and those found not to be roadworthy should have their registration licenses withdrawn:

(g) There should be a better documentation of road traffic accidents. In particular, there is a need for finer and more specific definition of accident classifications. There is also a need to calssify drivers who get involved in accidents according to age, marital status, level of education and income. It will then be possible to examine the effects of driver characteristics on accident involvement in Saudi Arabia.

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Table 1
Population and Vehicle Statistics for Riyadh and Jeddah
(1973-1985)

Year	Riyadh		Jeddah	
	Population	No.of Registered Vehicles	Population	No. of Registered Vehicles
1973	543120	105144	543120	40950
1974	667000	139244	561000	72269
1975	718339	189343	579200	113224
1976	773626	270691	596086	185545
1977	833169	415232	613976	264266
1978	897293	494927	632643	383103
1979	966354	575080	651910	475425
1980	1040730	655495	671763	606639
1981	1120830	773795	692222	690093
1982	1207095	985378	713303	873461
1983	1309171	1160663	735026	1105552
1984	1431954	1270110	757410	1399312
1985	1458951	1297007	780475	1471129

Table 2
Vehicles per capita for Saudi Arabia, Riyadh, Jeddah, Kuwait, Libya, Great Britain and Singapore (1973-1985)

Year	Saudi Arabia	Riyadh	Jeddah	Kuwait	Libya	Great Britain	Singapore
1973	0.038	0.194	0.075	0.226	0.085	0.313	0.60
1974	0.060	0.209	0.124	0.242	0.094	0.317	0.65
1975	0.084	0.264	0.196	0.274	0.095	0.322	0.64
1976	0.124	0.350	0.311	0.301	0.099	0.328	0.60
1977	0.176	0.448	0.430	0.336	0.100	0.334	0.60
1978	0.222	0.552	0.606	0.367	0.105	0.327	0.61
1979	0.263	0.596	0.730	0.398	0.108	0.343	0.62
1980	0.310	0.630	0.903	0.430	0.105	0.353	0.64
1981	0.362	0.690	0.997	0.463	0.102	0.340	0.67
1982	0.437	0.816	1.182	0.495	0.105	0.346	0.72
1983	0.440	0.886	1.504	n.a	n.a	0.357	n.a
1984	0.443	0.887	1.847	n.a	n.a	0.365	n.a
1985	0.447	0.889	1.885	n.a	n.a	0.376	n.a

n.a. = Not available.

Table 3
Accident rates per 10,000 Vehicles in Saudi Arabia, Riyadh, Jeddah and Kuwait

Year	Traffic Regions			
	Average in Saudi Arabia	Riyadh	Jeddah	Kuwait
1973	403.7	520.1	260.0	642.5
1974	306.9	408.9	203.8	519.6
1975	262.0	405.1	190.8	516.5
1976	202.8	301.7	149.8	522.2
1977	141.8	209.4	88.6	507.4
1978	126.0	168.2	68.0	520.2
1979	103.0	136.5	59.1	515.1
1980	90.6	129.9	45.3	500.3
1981	72.5	102.1	36.7	495.6
1982	71.5	100.1	34.4	490.7
1983	70.1	93.9	32.2	n.a
1984	69.8	91.2	31.4	n.a
1985	68.9	87.9	30.6	n.a

Table 4

Distribution of road trffic accidents in Saudi Arabia according to days of the week (1973 - 1985)

Day	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
No. of Accidents	42571	41611	42251	46092	51534	50574	45453
Percentage	13.3	13.0	13.2	14.4	16.1	15.8	14.2

Table 5
Casualties per 100 traffic accidents

Year	Traffic Regions				
	Average in Saudi Arabia	Riyadh	Jeddah	Kuwait	Nigeria (Oyo State)
1973	81	38	119	26	n.a
1974	80	31	128	25	n.a
1975	78	42	129	23	n.a
1976	74	45	120	21	n.a
1977	72	40	103	19	n.a
1978	82	42	125	16	131
1979	95	45	122	14	135
1980	86	50	124	13	191
1981	89	50	118	13	144
1982	87	42	127	12	133
1983	86	36	133	n.a	n.a
1984	80	38	126	n.a	n.a
1985	78	35	140	n.a	n.a

n.a. = Not available.

Table 6

Fatalities per 100 traffic accidents in Saudi Arabia, Kuwait and Nigeria

Year	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
Average in Saudi Arabia	10.8	10.6	11.8	12.6	12.8	13.2	16.2	14.6	13.6	14.1	13.0	12.1	12.3
Riyadh	2.8	3.1	4.1	3.7	5.1	3.9	3.9	4.5	3.8	3.0	3.6	3.3	3.4
Jeddah	10.1	9.3	9.5	10.3	12.1	11.3	12.1	12.5	12.8	13.2	12.2	11.6	11.2
Kuwait	1.8	2.6	2.6	1.8	1.7	1.6	1.6	1.5	1.6	1.5	n.a	n.a	n.a
Nigeria (Oyo State)	n.a	n.a	n.a	n.a	n.a	41.2	40.0	38.2	32.8	31.2	n.a	n.a	n.a

Table 7

Causes of traffic accidents in Saudi Arabia (1973 - 1985)

Causes of Accident / Traffic Region	Excessive speed		Not obeying traffic lights		Drug and Alcohol		Other reasons		Total accidents	
	No.	%	No.	%	No.	%	No.	%	No.	%
Riyadh	66770	59.6	26327	23.5	448	0.4	18485	16.5	112030	
Jeddah	22556	62.7	6511	18.1	468	1.3	6439	17.9	35974	
Average in Saudi Arabia	188211	58.8	69139	21.6	2881	0.9	59855	18.7	320086	

Table 8

Type of road traffic accident in Saudi Arabia (1973 - 1985)

Type of Accident / Traffic Region	Crashing*		Pedestrians		Overturning		Others		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Riyadh	91304	81.5	11315	10.1	6946	6.2	2465	2.2	112030	100
Jeddah	17339	48.2	11656	32.4	5072	14.1	1907	5.3	35974	100
Average in Saudi Arabia	206776	64.6	56015	17.5	48653	2.7	8642	2.7	320086	100

* Crashing with vehicles or other fixed objects.