

## **The Effectiveness of Driver Education Programs in Reducing Traffic Accidents in Saudi Arabia**

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**Abstract.** This study explores the relationship between young Saudi Arabian drivers' experience with formal driver education, their socio-economic background, their driving experience, and their accident records. In order to obtain the required information, a survey questionnaire of six parts was administered to approximately 600 university students in Saudi Arabia. The statistical procedures used to analyze the data led to the conclusion that there are few statistically significant differences in accident records among drivers who have and who have not attended driver education programs.

### **Introduction**

The increase in oil revenues beginning in 1973 initiated an entirely new era for Saudi Arabia and affected the nation's development in virtually every area, including transportation systems and traffic accidents. From 1971 to 1983, a significant upward trend occurred in many dimensions. We observed a great increase in the number of vehicles and, unfortunately, a dramatic increase in the number of road traffic accidents. In recent years, "road traffic accidents represent the second major medical problem in Saudi Arabia, second only to infectious diseases. They are also the leading cause of death for young adults" [1].

From 1970-71 to 1985-86 traffic accidents increased eight-fold, a dramatic rise indeed. The total number of accidents has increased from only 4,417 in 1970-71 to 32,092 in 1985-86. Fatalities and injuries have also increased sharply over the same period. In 1971-72, 570 people were killed and 4,583 were injured in traffic accidents. In 1985-86, the number of fatalities and injuries had increased to 2,703 and 22,602, respectively [2].

The trend of accidents, fatalities and injuries per 1,000 persons did not decrease during the period from 1971-72 to 1982-83. Accidents, fatalities, and injuries per

1,000 persons have increased from 63.9, 9.6, and 76.1 in 1971-72 to 236.66, 30.7, and 206.8 respectively in 1982-83. This means that accidents, fatalities, and injuries are increasing more sharply than the population over the same period.

Driver education and training has been perceived as an important form of policy intervention, reducing road traffic accidents by influencing drivers' actions through changes in their ideas, feeling, goals, and knowledge [3].

Driver education and training can be obtained from trained teachers at high schools, driving school instructors, and friends and/or relatives. In Saudi Arabia, there is no instruction in high schools. Thus drivers either learn in commercial driving schools or from a friend and/or relatives. This pattern is similar to the one existing in European countries, but in contrast to the U.S.A pattern where "driver training is largely provided within the framework of general education" [4].

Since these programs require considerable resources – both financial and personnel, their effectiveness is an important policy issue [5]. Therefore, a number of researchers have tried to evaluate these programs in the past. Their intention was to test the relationship between driver education program and traffic safety.

Most of previous studies suffered from lack of control of important variables such as experience, exposure, and socio-economic status [6,7]. Some of these studies suffered from selection bias. Therefore, it is important to do an experimental research design to evaluate such programs [8]. This approach will be discussed further in the concluding chapter.

Due to the difficulty of evaluating driver education programs, there is disagreement about their effectiveness in the developed countries. Proponents of driver education programs think that such programs will improve driving safety. However, the opponents of the program believe that such courses are a waste of resources and do not improve traffic safety [9]. In addition, Lema *et al.* [6] cited different studies which showed that there is no causal relationship between driver training and accident and/or violation frequency [6].

The role of human factors in road traffic accidents has received great attention in the past. On-the-spot accident investigations in the U.S., the U.K., and other countries have shown that human factors are responsible for the majority of accidents [10-12].

In the study by Sabey (1975) it was shown that human factors contributed to nearly 95% of accidents and were the sole contributor in 65%. Those factors playing the largest part in accidents were errors of perception, lack of skill, errors in executing manoeuvres, and impairment [13].

Similarly, in a limited study in five developing countries, the police indicated that the majority of road accidents are related to road user errors [14].

The importance of human factors, as they relate to road traffic accidents, varies from one country to another. When Eid (1980) investigated road traffic accidents in Qatar (a country neighbouring Saudi Arabia), he found that human factors (faults of drivers and pedestrians) represented the causes of 94.9% of all traffic accidents [15].

In an investigation by Kraus *et al.* (quoted in Thygerson, [3]) of the major factors associated with high-risk young drivers, it was found that the high-risk driver typically:

- 1) Failed one or more grades in or before grade 8 or had been in a vocational high school course.
- 2) Became a regular cigarette smoker at or before age 16.
- 3) Had first full-time employment exclusive of school vacation time at or before age 17 and before obtaining a driving license.
- 4) Had been charged with a criminal offense.

Furthermore, those who had been in a one-vehicle accident showed still higher frequencies of these factors.

Researchers have found, too, that fathers with numerous traffic convictions tend to have sons who have numerous traffic convictions. How a young man drives seems to be influenced more by his family than by driver education or the actions of police and courts [3].

Also, it was found that higher socio-economic groups were less involved in accidents. This agrees with research conducted in the U.S.A. [16-12].

Age is an important factor in many road traffic accident events [3-12]. Each age group in the driver population has different road safety problems. For example, young drivers' problems in Saudi Arabia have been mainly related to misuse of the automobile (e.g. driving for fun or sport), reckless driving, and driving without license [17].

Exposure and experience are important factors in analyses and comparisons of the accident rates of different age groups of drivers. The differences in accident rates may contribute to differences in exposure to the risk of accidents and/or differences in experience. Therefore, it is important to control these two factors when comparing the accident rates of different age groups [4]. Vehicle miles driven is the measure most often used to measure driver exposure [18]. Many studies have found that young drivers usually have lower exposure values than older drivers.

Many previous studies used questionnaires to calculate exposure values. The estimated mileage driven each year is usually obtained from drivers by asking the driver to estimate his total yearly mileage (as in [19, 20], Quimby and Watts [12, 21]).

Such estimates of annual mileage have generally been assumed to be quite accurate and a study to confirm this was conducted by House and Waller (1971) who compared odometer readings over a specific period of time (actual mileage) with driver estimates. The correlation between estimates and actual monthly mileage was found to be 40.65, which being significant at  $p > .01$ , is a reliable but moderate correlation" [4].

The other concept, that of driving experience, is usually defined as "the time in years or months which has elapsed since the drivers concerned obtained a full driving license" [4]. Driving inexperience has been considered as a contributing factor in 10-15 percent of all car accidents [8]. The experience factor is also found to be a very important element in young drivers' accidents. "Many studies have indicated that a lack of driving experience is responsible for a large number of traffic accidents, especially where young drivers are concerned" [4]. Such experience of the driver can be measured by a questionnaire. Respondents are asked about how long they have been driving a motor vehicle [21].

### **Purpose of the Study**

This study is concerned with the effectiveness of driver education and training programs in Saudi Arabia. The study explores the relationship between young Saudi Arabian drivers' experience with formal driver education, their socio-economic background, their driving experience, and their accident records. The main objective of the study is to evaluate whether driver education has been effective in preventing automobile accidents.

The major contribution of this study will be to document the association of such factors as socio-economic background, driving education and driving experience. According to the knowledge of the have author, none of the previous studies have addressed the road traffic accident problem in this context in Saudi Arabia, nor have similar studies in developed countries addressed the question in connection with the experience of young drivers. In the report published by OECD in 1975, it is recommended that:

More research is clearly needed to delineate the contribution of experience and age-related factors to accident rate. Marek and Sten (1972) point out that to assess the relative importance of the factors in question, multivariate investigations are essential, making possible the simultaneous presence of the relevant factors and allowing the effects of their various interactions to be established [4].

In a more recent article, Quimby and Watts [12] reported much the same conclusion. The literature review shows that many of the studies in the past have investigated the importance of human factors to driving performance in isolation, so that their relative importance is unknown. In order to avoid this problem, a statistical techniques using many variables are recommended for such multivariate regression analysis [12].

### Methodology

In order to obtain the information needed, a survey questionnaire made up of six parts was administered to approximately 600 university students in Saudi Arabia. The survey questionnaire was ten pages in length and took approximately twenty-five minutes to complete. Questions included in it were the result of the literature review. Realizing the burden which is often placed on students, the questionnaire was kept as short and as simple as possible.

The questionnaire was field tested twice on two groups of students. This pretesting cleared up a number of errors in the content, wording, and layout of the questionnaire, but showed that the framework as a whole was satisfactory.

This study covered five of the seven universities in Saudi Arabia. These universities are located in Daharan, Riyadh (the capital), Makkah, Jeddah, and Madinah. The total number of students in the five universities represents approximately 85% of the total university student population in Saudi Arabia. This way, the sampling is economical since the data collection efforts were concentrated on a few selected areas. The sampling unit upon which all survey measurements were based is the individual student.

An overall response rate of 81 percent was achieved. In all, 600 questionnaires were distributed, and of these 486 were returned. Of the 486 responses, 456 (93.83%) were usable in the study. In 57 (8%) of the questionnaires, there were missing values. The question regarding the respondent's father's income had the highest number (38) of missing values.

**The dependent variables:** The dependent variables measure the frequency of road traffic accidents during the respondent's driving career. The variables are as follows:

- a) Total number of road traffic accidents (**Ya**);
- b) Total number of road traffic accidents per 1,000 km. (**Yad**); and
- c) Total number of road traffic accidents per year (**Yay**).

**The independent variables:** Road traffic accident records for individual drivers depend on many factors. For this study the independent variables include socio-economic and demographic characteristics, driving exposure and experience and whether or not the respondent had taken a driver education course.

As it is discussed earlier, socio-economic characteristics of drivers may be as important as driving education in explaining the differences in accidents and violation records of young drivers. Fathers' level of income is used here because students at the university level are mainly dependent on their father's or their family income. Also, fathers' education level reflect their social status in the society and this definitely will have some impact on the behavior of their sons. Sex of the drivers is not considered in this study because women are not allowed to drive in Saudi Arabia.

**Age** = Age of drivers.

**Fath Ed** = Father's level of education.

**Fath Inc** = Father's level of income.

**Smoking** = Dummy variable.

**Smoking** = 0 Non-smoking drivers.

**Smoking** = 1 Smoking drivers.

**Ed of Resp** = Level of education of drivers.

The following variables are used to measure driver exposure and experience.

a.) Distance.

**Dist/Year** = Average distance traveled each year.

b.) Years.

**Year Exp** = Total number of years of experience.

In order to understand the measures for driver education, it is necessary to understand how the driver education system works in Saudi Arabia. Driver education is offered by private driver training programs. However, these do not exist in all parts of the country. The government has intended to encourage the establishment of more programs all over the country. Nowadays, more than twenty-five schools are operating in the country. However, many cities do not have any such programs. In areas where there is no school, young drivers must be taught by a friend or relative. In areas where there is a school, the government requires all applicants for driver's license to go to the driver education programs.

Usually, a driving education and training program consists of three elements: Lectures, on the road training, and use of simulators. The lectures provided by the school are designed to improve the drivers' knowledge with the purpose of making them safe drivers. These lectures usually cover general information about traffic laws and regulations.

If an applicant for a driver's license is in an area where a driver education program exists, and he has already learned to drive, he is still required to take the lecture part of the course. Students who have not learned to drive at all take the on-road training and the simulator elements. However, not all schools use simulators, so some attenders have had only on-road training for their practical experience.

The measures for driving education are all dummy variables.

a) Dummy variable for driver education school attendance.

**Edu Prog** = 0 for students who did not attend driver education schools.

**Edu Prog** = 1 for students who attended driver education schools.

b) Dummy variables for components of the driver education program.

It may also prove to be useful to explore exactly how much driver education the respondents have had in the driving school. Thus, it may be able to suggest which aspects of the driver education programs have the most impact on violation and accidents. Little is known about these aspects of the driver education programs. In fact, the OECD report (1975) recommends that this type of analysis be done [4]. Therefore, the following dummy variables are used:

**Lecture** = 0, **On-Road Tr** = 0, and **On-Simu Tr** = 0

For students who did not attend any of the driver education school program.

**Lecture**

For students who attended only the driver education school lecture programs.

**On-Road Tr.**

For students who attended only the driver education school lecture and the on-road-training programs.

**On-Simu Tr**

For students who attended the driver education school lectures, on-road-training, and simulator programs.

### Statistical techniques

The multiple linear regression is mainly employed to identify the significant variables that explain the variation in accident records. The regression analysis is used to investigate the effects on the dependent variables of several independent variables simultaneously.

The analysis uses different functional forms of the relationship between the dependent and independent variables. The simplest form is the linear relationship,

and the other form is the non-linear relationship. Different kinds of transformations can be performed on the non-linear relationship between the variables so that a linear regression can be done. Exponential or logarithmic functions are widely used to transform the non-linear relationship between the variables to a linear relationship. Fig. 1 shows the distribution of the accident records of the respondents; the distribution is positively skewed. It is usually recommended that the positively skewed distribution be transformed by Log function [22].

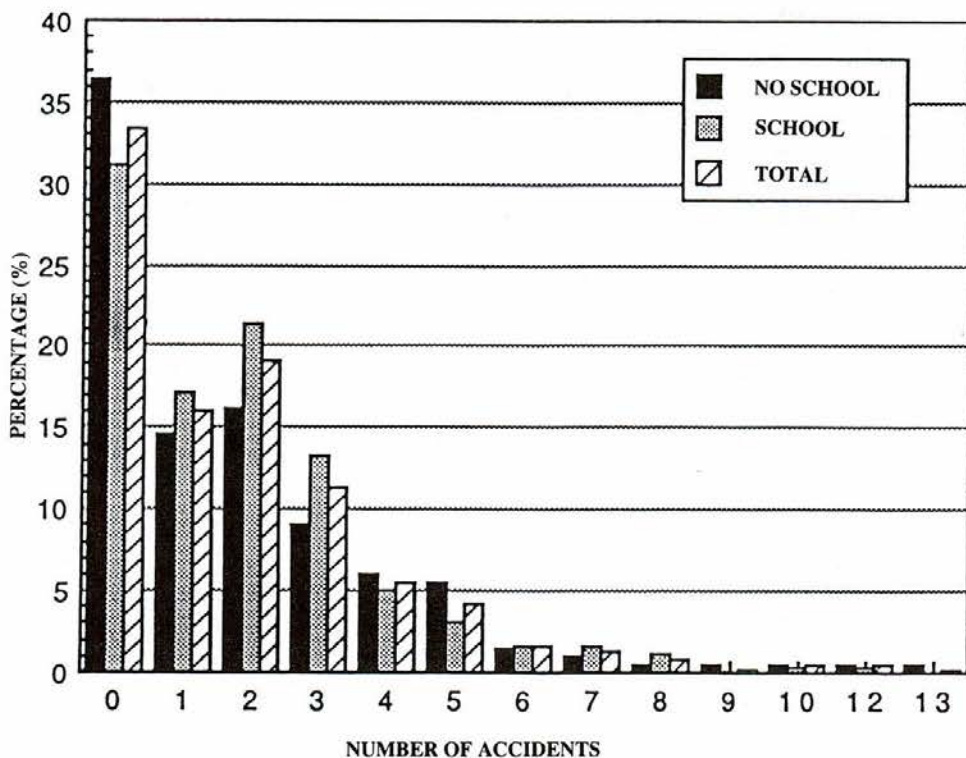


Fig. 1. Distribution of respondents' accident records.

Since many values of accident and violation variables are equal to zero, it is recommended that they be re-expressed as  $Y+c$ , where  $c$  is constant. This re-expression will help to avoid special difficulty in transforming these variables. For example, the logarithm of  $Y=0$  will give a value of infinity. Therefore,  $c=1$  is used in this study [23].



For each model, t-statistic, multiple R, and R-square are shown. Usually, the t-statistics is used to test the hypothesis that there is no linear relationship between  $X_i$  and  $Y_j$ -such that the  $b_i$  coefficient is 0. These t-statistics and their two-tailed significance levels are provided by the SPSS program.

It is noted that the independent variables in the regression models follow very similar patterns for each of the dependent variables' accident records. In addition, the models showed that there is a very weak relationship between drivers' attendance at the driver education program and their driving records.

The dependent variables were the total number of road-traffic accidents (Ya); total number of road traffic accidents per 1,000 km (Yad); and total number of road traffic accidents per year (Yay).

All the independent variables were used to explain the variation in accident records. Drivers are categorized according to their attendance at different aspect of driver education program. The four groups are represented by three dummy variables. In this model, the three dummy variables (Lecture, On-road Tr, and On-simul Tr) represent the presence or absence of driving education program, lectures, on-road training, and on-simulator training.

The logarithmic model was the best model by which to relate both the independent and dependent variables to the problem of road traffic accidents. This model was chosen because it satisfied the condition needed to get an unbiased estimate of the regression equation. Other models suffered from heteroscedasticity problem and this poses a serious problem in interpreting the independent variable coefficient. Nevertheless, other models showed very slight differences. The regression equation for this model is as follows:

$$\begin{aligned}
 \text{Ln (Accid/Dist)} &= 4.48 + 0.03 \text{ Edu Prog} - 0.80 \text{ Ln (Dist/year)} \\
 &\quad (3.96) \quad (0.43) \quad (-15.72) \\
 &- 0.88 \text{ Ln (Year Exp)} + 0.27 \text{ Ln (Age)} \\
 &\quad (-9.13) \quad (0.65) \\
 &- 0.04 \text{ Ln (Fath Ed)} + 0.18 \text{ Ln (Fath Inc)} \\
 &\quad (-0.54) \quad (3.52) \\
 &+ 0.38 \text{ Smoking} - 0.18 \text{ Ln (Ed of Resp)} \quad (1) \\
 &\quad (5.19) \quad (-1.18) \\
 \mathbf{R = 0.78} \quad \mathbf{R^2 = 0.61} \quad \mathbf{R_{ad}^2 = 0.60}
 \end{aligned}$$

The regression procedure provides the significance of each coefficient. If any coefficient is not significantly different from zero, the implication is that the variable has no strong relationship with the dependent variable.

The multiple-correlation coefficient,  $R$ , equals .78, and the coefficient of determination,  $R^2$ , is 0.61 or 61.0 percent of the variations in  $Y_{ad}$ , which is explained by the independent variables. The significance of the above equation was tested at 0.05, and the null hypothesis that either the coefficient in the equation or the multiple  $R$  is equal to zero was rejected.

Equation 1 showed that the relationship between the dependent variable,  $Y_{ad}$  (accidents per km traveled), and the independent variables,  $Dis/year$  (average distance traveled each year),  $Year\ Exp$  (years of driving experience),  $Fath\ Inc$  (father's income), and  $Smoking$  (dummy variable for smoking) is significant.

From regression analysis (equation 1), it can be concluded that the driver-education program has little effect on drivers' accident records per distance traveled, because there is no significant relationship between the measures of traffic accidents and the driver-education program ( $Edu\ Prog$ ). The other regression analyses also showed that there is no significant relationship between driver education programs and total number of accidents, or accidents per year of experience. In other words, drivers who attended the program have a similar accident records to other drivers.

Again, this regression analysis reveals that the average distance traveled each year ( $Dis/Year$ ) and total number of years of experience ( $year\ Exp$ ) were the most powerful predictors of accidents. Both variables are negatively related to road-traffic accidents. A number of studies have demonstrated the importance of these two variables [20, 12]. The more experienced drivers are in term of years of driving and mileage driven each year, and they were less involved in traffic accidents per mile traveled.

The regression model also showed that there is a positive relationship between traffic accidents, on one hand, and father's income ( $Fath\ Inc$ ) and smoking behavior of the drivers ( $Smoking$ ), on the other hand. We have already looked at smoking behavior as it related to violation. Here the effect is even greater. Smokers have 38% more accidents per km traveled than nonsmokers. Drivers coming from high income families tend to have more accidents per mile traveled. The reason could be that they are less concerned about the cost of repairing of the vehicles or buying a new vehicle in case of an accident. Also, high income family tended to have more vehicles than low income families. Therefore, they may be less concerned about losing a vehicle.

The regression model which includes the four groups with different degrees of driving education produces the same results as the model which has only two groups,  $Edu\ Prog$  (attenders and nonattenders). In this model, the three dummy variables ( $Lecture$ ,  $On-road\ Tr$ , and  $On-simul\ Tr$ ) represent the presence or absence of driving education program lectures, on-road training, and on-simulator training. None of

these variables was found to be significant, meaning that none of the variables related to driver education causes have any relationship with accidents per mile traveled. The regression equation for this model is as follows:

$$\begin{aligned} \text{Ln}(\text{Accid}/\text{Dist}) = & 4.77 - 0.06 \text{ Lecture} + 0.05 \text{ On-road Tr} \\ & (3.86) \quad (-0.44) \quad (0.67) \\ & + 0.02 \text{ On-simul Tr} - 0.79 \text{ Ln}(\text{Dist}/\text{year}) \\ & (0.20) \quad (-15.57) \\ & - 0.88 \text{ Ln}(\text{Year Exp}) + 0.29 \text{ Ln}(\text{Age}) \\ & (-9.05) \quad (0.69) \\ & + -0.03 \text{ Ln}(\text{Fath Ed}) + 0.19 \text{ Ln}(\text{Fath Inc}) \\ & (-0.50) \quad (3.54) \\ & + 0.39 \text{ Smoking} - 0.18 \text{ Ln}(\text{Ed of Resp}) \quad (2) \\ & (5.27) \quad (-1.20) \\ \mathbf{R = 0.78} \quad \mathbf{R^2 = 0.61} \quad \mathbf{R_{ad}^2 = 0.60} \end{aligned}$$

In addition to the regression analysis, a t-test was used to test the difference between the number of reported accidents ( $Y_a$ ) for driver-educated young drivers and that for non driver-educated young drivers. As shown in table 1, there is no significant difference between the number of reported accidents for driver-educated young drivers and that for non-driver-educated young drivers. As before, this conclusion is valid for all three measures of reported accidents (total number of road traffic accidents ( $Y_a$ ); total number of road traffic accidents per 1,000 km ( $Y_{ad}$ ); and total number of road traffic accidents per year ( $Y_{ay}$ )). Therefore, the null hypothesis is accepted.

**Table 1. T-test and Mann-Whitney results for respondents' driving safety records.**

Variables		Mean score		Level of significance	
		School attendance Yes	No.	T-test	Mann-Whitney
Number of road traffic accidents	$Y_a$	2.81	2.82	0.59	0.28
Number of road traffic accidents per 1,000 km	$Y_{ad}$	0.08	0.12	0.17	0.32
Number of road traffic accidents per year	$Y_{ay}$	0.60	0.52	0.15	0.13

Also, as shown in Table 2, there are no significant differences in the number of reported accidents among the four groups. This conclusion is valid for all three measures of reported accidents.

**Table 2.** ANOVA and Kruskal-Wallis tests results for respondents' driving safety records.

Variables		Mean score				Level of significance	
		1	2	3	4	ANOVA	Kruskal Wallis
Number of road traffic accidents	Ya	2.82	2.66	2.78	3.00	0.95	0.59
Number of road traffic accidents per 1,000 km	Yad	0.12	0.07	0.08	0.08	0.15	0.02
Number of road traffic accidents per year	Yay	0.52	0.51	0.60	0.65	0.17	0.09

### Conclusion and Recommendation

In summary, all of the statistical procedures used to analyze the data led to the conclusion that there are few statistically significant differences in accident records among university students who have and who have not attended driver education programs. It appears that this specific educational experience is not as highly influential in affecting the safety records of drivers as is believed by many policy makers and researchers in Saudi Arabia.

This conclusion, while suggestive, is not definitive because of the specific sampling and methodological limitations of this study. Most obviously, it surveyed only university students who clearly are not representative of the entire driving population in Saudi Arabia. The argument was made early that the samples of driving school attenders and nonattenders are not biased so that one is likely, by the way it was chosen, to have better or worse driving records than the other. However, obviously, this sample is more educated and younger than the driving population as a whole, factors which might significantly affect conclusions of the study.

What are possible explanations of this findings? They might relate to (1) failures in the specific driver education programs being used in Saudi Arabia, (2) motivations among drivers or cultural patterns in Saudi Arabia, or (3) unrealistic general expectations about the possible impacts of drivers education, unrelated to this particular country. This discussion of explanations can only be speculative, since the empirical study reported on here was not designed to answer this question. However, it may be useful to bring together the evidence that does exist to throw some light on this issue.

Driver education programs in Saudi Arabia may suffer from specific problems which could reduce their potential effectiveness. These relate to curriculum, implementation, training of instructors and the licensing process itself.

Since the negative findings of this study might be due to the ineffectiveness of these particular driver education programs, not to the idea of driver education in general, it is important to do some research evaluating the programs.

While the programs themselves may have weaknesses, these may be compounded by the way that they relate to the motivations of students. Attenders may not take the programs seriously. These programs are perceived as devices designed only to collect money from attenders (many such comments were made on the questionnaire). For example, people who attended only the lecture part of the program had to pay the same fees as those who attended all three parts of the program.

The programs also do not seem to challenge students, and this may reduce their possible impact. Respondents who attended the program thought that the lectures, on-road training, and simulator training programs were very easy.

More broadly, in Saudi Arabian society, safe driving may not have a high priority especially among young drivers. Mufti [1] found that one of the main factors related to accidents in Saudi Arabia is the usage of roads for entertainment (driving competitions). Also, this study showed that the speed limit violation is a common behavior of young drivers. In addition, drivers coming from high income families also tend to have more accidents per mile traveled perhaps because they are less concerned about the cost of repairing of the vehicles or buying a new vehicle in case of an accident.

Studies on other countries also indicate that driver education schools basically prepare students for drivers license examinations, rather than for safe driving. This may mean that the expectations about the positive impact of driver education are unrealistic.

Overall, the safety education in Saudi Arabia is poor. For example, drivers' knowledge of traffic laws and emergency services is minimal. The government in the past has encouraged the establishment of private driving schools, but instruction in those schools is mainly theoretical rather than practical [1]. Many drivers think that these schools are useful only as tools to obtain a driving licence. Thus, the courses may not have been well designed for the purpose of actually improving the safety.

### **Need of Future Research**

This study has suggested that the driver education program has not been effective in improving the safety records of its attenders. However, the conclusions of this study cannot be generalized to other groups of drivers in Saudi Arabia. Therefore, from this study, we cannot conclude that other groups of drivers in the country would show the same results as those obtained here.

Therefore, there is a need for research to study a larger and nationally representative sample of drivers. One of the questions which this study should address is related to the issue whether drivers other than the young ones may benefit more from such programs than young drivers.

This research should also address why these programs are not achieving their objectives. For example, management and administration practices that are likely to affect the performance of driver-education programs in the country need to be evaluated: are the programs being carried out as designed? For example, this study showed that some schools are lax in requiring students to practice on simulators.

### References

- [ 1 ] Mufti, M.H. "Road Traffic Accidents as a Public Health Problem in Riyadh, Saudi Arabia." *Inter Assoc Accid Traffic Medic*, 11, (1983).
- [ 2 ] Ministry of Interior. *Statistical Book. 1975-1986*, Riyadh, Saudi Arabia.
- [ 3 ] Thygerson, A.L. *Accidents and Disasters: Causes and Countermeasures*. New Jersey: Prentice-Hall, Inc. Englewood Cliffs, 1977.
- [ 4 ] Organization for Economic Co-operation and Development. *Young Drivers Accidents*. Paris, OECD, 1975.
- [ 5 ] Organization for Economic Co-operation and Development. *Effectiveness of Road Safety Education Programmes*. Paris, OECD, 1986.
- [ 6 ] Lema, J.E. *et al. The National Highway Safety Needs Study*. U.S. Department of Transportation, Washington, D.C., 1976.
- [ 7 ] Naatanen, R. and Summala, H. *Road-User Behavior and Traffic Accidents*. Amsterdam: North-Holland Publishing Company, 1976.
- [ 8 ] Organization for Economic Co-operation and Development. *Road Safety Research and Synthesis*. Paris, OECD, 1986.
- [ 9 ] Robertson, L. and Zador, P. *Driver Education and Fatal Crash Involvement of Teenaged Drivers*. Insurance Institute for Highway Safety, 1977.
- [10] Wright, P.H. and Baker, E.J. "Factors which Contribute to Traffic Accidents." *Transp Plann Tech*, 3, (1976), 75-79.
- [11] Kemp, R.N. *et al., A Preliminary Report: On-the-Spot Survey of Accidents*. Department of the Environment, Transport and Road Research Laboratory, Crowthorne, 1972.
- [12] Quimby, A.R. and Watts, G.R. *Human Factors and Driving Performance*. Department of the Environment, Transport and Road Research Laboratory, Crowthorne, 1981.
- [13] Jacobs, G.D. and Sayer, U. "Road Accidents in Developing Countries." *Accid Anal Prev*, 15, (1983), 337-353.
- [14] Jacobs, G.D.; Sayer, I.A. and Downing, A.J. *A Preliminary Study of Road User Behavior in Developing Countries*. Transport and Road Research Laboratory, U.K., 1981.
- [15] Eid, A.M. "Road Traffic Accidents in Qatar: The Size of the Problem." *Accid Anal Prev*, 12, (1980), 287-298.
- [16] Harano, R.M.; Peck, R.C. and McBride, R.S. "The Prediction of Accident Liability Through Biographic Data and Pyrometric Tests." *J Safe Res*, 7, (1975), 16-52.

- [17] Lee, K.W. "An Analysis of Automobile Accidents in Riyadh." *Instit Trans Eng J.* 56, No. 2 (1986), 35-39.
- [18] Carroll, P.S. "Classification of Driving Exposure and Accident Rates for Highway Safety Analysis." *Accid Anal Prev*, 5, (1973), 81-94.
- [19] Pelz, D.C. and Schuman, S.H. "Are Young Drivers Really More Dangerous after Controlling for Exposure and Experience?" *J Safe Res*, 3, No. 2 (1971), 68-79.
- [20] Hoinville, G.; Berthoud, R. and Mackie. *A Study of Accidents Rates amongst Motorists who Passed or Failed an Advanced Driving Test.* Department of the Environment, Transport and Road Research Laboratory, 1972.
- [21] Mostyn, B.J. and Sheppard, D. *A National Survey of Drivers' Attitudes and Knowledge about Speed Limits.* Department of the Environment, Transport and Road Research Laboratory, Crowthorne, 1980.
- [22] Norusis, M.J. *SPSS/PC + for the I.B.M. PCIXTIAT*, SPSS Inc., 1986.
- [23] Mosteller, F. and Turkey, J.W. *Data Analysis and Regression.* Addison-Wesley Publishing Company, Inc., 1977.

كفاءة برامج تعليم القيادة في تخفيض الحوادث المرورية  
في المملكة العربية السعودية  
سهيل بن سليمان الصبحي

قسم تخطيط المدن والأقاليم، كلية تصاميم البيئة، جامعة الملك فهد للبترول والمعادن،  
الظهران ٣١٢٦١، المملكة العربية السعودية

ملخص البحث. تناولت هذه الدراسة العلاقة بين كلٍ من تجربة السائقين الشباب في المملكة العربية السعودية في مدارس تعليم القيادة وخلفيتهم الاجتماعية والاقتصادية وخبرتهم في قيادة السيارات مع سجلهم في الحوادث المرورية.

للحصول على المعلومات الضرورية لإتمام البحث فقد وزع استبيان يتألف من ستة أجزاء على ما يقارب ٦٠٠ طالب جامعي في المملكة العربية السعودية. إن العمليات الإحصائية التي استخدمت لتحليل الإحصاءات أدت إلى نتيجة أن هناك قليل من الاختلاف الحقيقي في عدد الحوادث المرورية بين الطلاب الذين شاركوا والذين لم يشاركوا في برامج تعليم القيادة.