Impacts of socio economic factors on perceptions of being safe while using Kuwaiti roads

An investigation of preferences and attitudes

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Abstract

Purpose – The purpose of this paper is to investigate road users attitudes and preferences towards accidents and safety measures in Kuwait. The paper also quantifies impacts of user's attitudes on the perception of being safe while using roads in Kuwait.
Design/methodology/approach – In this paper, a review of relevant literature, has been carried out, then a questionnaire has been piloted and implemented to collect data. The main survey was carried out in 2013. A total of 700 distributed questionnaires resulted in the return of 427 completed questionnaires.
Findings – Results show that socio economic, attitudes and work commitment factors, all contribute to the behaviour and attitudes of road users in Kuwait.
Research limitations/implications – Data are limited due to time constraints.
Originality/value – There is very little knowledge of modelling and analysing factors which affect drivers' behaviour towards safety in Kuwait.

Keywords Sustainability, R&D, Development policies, Traffic safety in Kuwait, Road safety attitudes, Socio economic characteristics
Paper type Research paper

Background

To date there are a limited number of studies in place that comprehensively analyse the traffic accident patterns which have occurred in the Kuwait and the region of the Persian Gulf. The majority of studies in existence are extremely dated and thus the conclusions that have been drawn from these may by now be significantly changed (Bener and Jadaan, 1990; Bener *et al.*, 2003). AlSaeid *et al.* (2015) carried out an investigation to analyse and investigate characteristics of road users' and drivers on the roads. They reported that journey purpose, mode of travel and regulations are all factors which contribute to road safety and behaviour of drivers. The necessity to carry out this form of study is clear due to the fact that the fatality rate for drivers is significantly higher in these countries when compared to those of Western countries. In 2007 mortality rates of 29, 37.1 and 16.9 per 100,000 were seen in Saudi Arabia, United Arab Emirates and Kuwait, respectively, due to road traffic accidents (WHO, 2013). Compared to the rates of 6.1 for the UK and 14.8 for the USA (WHO, 2013) it can be seen that there is a dramatic difference in the levels of fatalities being observed.

In 2002 AL-Ghamdi studied and analysed road of traffic accidents occurring in the capital city of Saudi Arabia – Riyadh. He found that the majority of severe accidents (58.7 per cent) were occurring at straight road sections rather than at intersections

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(AL-Ghamdi, 2002). It was also found that excess speeds were found to be the cause of the vast majority of these accidents and were due to vehicles colliding with pedestrians who were crossing the roads. He also reported that where accidents occurred at intersections (26 per cent) these were attributed to either excessive speed or running of red lights (AL-Ghamdi, 2002). A paper published by (Ziyab and Akhtar, 2012) examined trends in road traffic incidents in Kuwait during a ten year period from 2000 to 2009. From this paper it was shown that over the time period under consideration there was a 76.5 per cent increase in vehicle ownership levels in Kuwait, which correlated to a 121.3 per cent increase in road traffic crashes during the same period (Ziyab and Akhtar, 2012). Further work on this include Al-Madani and Al-Janahi (2002) and Koushki and Balghunaim (1991).

The specific characteristics of socio economic patterns as well as travel behaviour attitudes of road users in Kuwait make it a very interesting and unique area of research, which has its own characteristics and features. Within such countries there has been a dramatic increase in the level of vehicle ownership and use in recent years. This increase along with a distinct lack of strong traffic regulations and enforcement has led to a situation arising where attitudes and behaviour towards road safety are very alarming and very unsafe. The analysis of the main survey data was carried out in order to assess and investigate all factors that affect safety, attitudes and potential measures to improve safety issues in Kuwait. Socio economic, attitudes and work commitment factors, all contribute to the behaviour and attitudes of road users in Kuwait, as the results show.

Saleh *et al.* (2009) investigated the effects VMSs have on safety have been regularly researched in literature. VMS systems that provide drivers with information regarding fog or slippery road surfaces were generally found to be beneficial in reducing. Messages displaying the information of unexpected events were found to be important in influencing the probability of diversion. Investigations of the possible policies and measures to tackle the identified problems are investigated and discussed. However, socio economic variables and attitudes of drivers were not possible to measure and investigate in that case because of the limitations of data availability (Saleh *et al.*, 2009).

Alnaqbi and Saleh (2009) investigated and analysed pedestrian accidents at signalised pedestrian crossings in Edinburgh. Saleh (2010) and Saleh and Sammer (2009) assessed impacts of information and ITS on accidents rates and severities in Scotland. However, socio economic data and attitudes were not possible to investigate. AlSaeid *et al.* (2015) investigated characteristics and travel behaviour data for work travellers in Kuwait. The current paper presents a further insight into the analysis of the attitudes and behaviour of work travellers in Kuwait and an investigation of their perception towards traffic safety.

Methodology

In order to reduce or potentially eliminate the causes of accidents, investigations must identify the causal factors so that preventative measures can be identified. The proposed research is an important applied research in this area that is worthy of investigation. This project is designed to investigate and analyse the safety and increasing accident rate problems in Kuwait. The project is also aimed at investigating road users' attitudes and perception of the problems, identifying possible countermeasures and policies to overcome these problems and investigating the attitudes and acceptance of these possible policies and measures, which can be considered in order to tackle these problems. It should be noted, however, that this is the first step of research into this important area, and recommendations for further research will also be concluded from this research. Further and future attention to this important topic has to continue in order to achieve improvement in this area. Within developing countries there has been a dramatic increase

in the level of vehicle ownership in recent years. This increase along with a distinct lack of coherent and efficient safety regulations, has led to a situation arising where accident levels increased dramatically and the level of awareness of implications of unsafe behaviour has deteriorated. In this paper, we developed analysis and investigations to examine patterns and travel behaviour of households in Kuwait towards road safety.

Survey design

A road user's questionnaire has been designed and piloted in May 2013. The questionnaire has four main sections. These are current travel patterns, information about driving behaviour, information on ability to change time of travel and information on socio economic characteristics. The questionnaire is comprehensive in order to collect as much as possible of data related to driving behaviour, household characteristics and attitudes to safety.

Data collection

The main survey was finalised and carried out over the period of September-November 2013. This is in order to avoid the months of holidays of schools and other government organisations, in order to target a season where work and school activities are "typical". The aim has been to collect data from all sectors which represent government, public, private sectors as well as health and education sectors in Kuwait.

For the main survey, the number of questionnaires which were distributed has been 700 in order to guarantee a return of at least 400 completed questionnaires. The number of completed surveys was 427, with a completion rate of about 64.6 per cent. Data collection continued over 75 during September-November 2013. At each one of the selected organisation, an employer volunteer was selected to be in charge of distributing the questionnaires and collecting them back. A short training period of time was spent with each of these volunteers in order to guarantee the randomness of the selection of respondents from the companies' employees. The questionnaires were distributed according to instructions then were collected again one week later. All respondents including employees and students had access to a private car. The surveys have been distributed over a large number of public, private and public sectors and government organisations.

Results and discussion

Data were collected on a number of issues including mode of travel and other travel characteristics. Respondents to the survey were required to provide information on some attitudinal statements regarding their level approval or disapproval of some behaviour related to road safety. "Driving without a valid driving license", "The very young age of drivers on the roads" and "How important is SAFETY to you?" are the three attitudes which have been included in the model. These attitudes are very important since they represent major safety issues and important problems relating to road safety in Kuwait. From the analysis of the results, the very young age of drivers on the roads was a concern to about 73.35 per cent of the respondents who indicated that it is a serious problem to them whilst 16.27 and 6.30 per cent of all responses obtained on this question considered it as a moderate problem and neutral to the society, respectively. Driving without a valid driving licence was a major concern to about 64.17 per cent of the respondents who considered it as a serious problem whereas 20.14, 7.26 and 6.09 per cent of the respondents believe it is a moderate problem, neutral and a slight problem, respectively.

Responding to a question on which group of drivers is the most responsible of road accidents/unsafe driving. Results obtained show that the worse type of driving behaviour in terms of leading to accidents was over speeding and the use of mobile

phone while driving. Over speeding accounted for almost 36 per cent of responses while about 24 per cent of responses accounted for the use of mobile phones while driving. Careless driving was the third highest considered to be worse driving behaviour as perceived by respondents. In addition, unnecessary overtaking was rated one of the lowest worse driving behaviour that respondents considered can lead to accidents, which was only mentioned by about 2 per cent, which is the same as drivers doing other things while driving such as eating.

The type of worse driving behaviour that received a considerable number of respondents' concerns were the no lane discipline behaviour, the lack of enforcing the law (i.e. non-compliance by drivers) and going through red-light which accounted for about 6, 5 and 2 per cent, respectively. Driving while turning without signalling, at low speed and driving while tired received low attention from the respondents but other behaviours that respondents considers can be deemed worse but did not specified was 5.52 per cent of the total responses.

Respondents were asked on what type of policies they think are most effective in reducing accident rates/severities. From the results it can be seen that applying the law (i.e. enforcing the law) was the main effective policy that respondents thought when enforced will reduced the accident rates or severities on the road. Enforcing the law accounted for about 17 per cent of all responses surveyed. Speed cameras installation at some location was the second policy that the respondents thought will be effective in curbing the accident rate or the severity on the road, this accounted for about 15 per cent of the total responses. About 15 per cent of respondents also indicated that other effective road safety policies can include increasing police presence and enforcement on the road. Education was defined as an important and effective measure by about 7 per cent of respondents. Other respondents indicated that issuing fines or points on the licence will also be an effective policy which received (about 7 per cent of responses). About 5 per cent of responses agreed that signals or visible road makings or good roads, and no use of mobile phone while driving will be effective in accident reduction. About 5 per cent of responses indicated that withdrawing driving licence from a person will be effective policy in reducing the accident rates.

Over half of the respondents surveyed, when asked about receiving safety education of any kind at school indicated that they have not had any. When asked to indicate whether they have had any theoretical education before obtaining their driving licences, again more than half of them indicated that they had not. Respondents were then asked to report on the optimal maximum speed which should be imposed to improve safety. Results show that majority of the respondents preferred the speed limit on the urban roads to be a maximum of 80 Km/hr (about 40 per cent of respondents), while about 25 per cent suggested a speed of 60 Km/hr and 18 per cent suggested a speed of 100 Km/hr. It is interesting to mention that those who tend to favour the higher speeds are the lower age groups.

Respondents were asked then to report on their usual and maximum driving speeds. Results showed that a speed of 120 km/hr the maximum speed been reported by a high number of respondents. In terms of shopping trips, a total of 135 respondents reported driving 120 Km/hr as their maximum speed while 107 reported driving to work by this speed as their maximum speed, and 93 respondents drove at a speed (120 km/hr) as their usual speed. Consequently, respondents were asked to report on how they learnt driving. Results show that mostly, individual respondents learnt driving without the assistance of anyone which was reported by almost 31 per cent of respondents (see Table I). Interestingly, only just over 13 per cent of respondents reported that they were taught how to drive by driving instructor. When respondents were asked if they have driven illegally

Age	Yes = 183 Respondent	%
12	1	0.55
13	4	2.19
14	22	12.02
15	30	16.39
16	48	26.23
17	48	26.23
18	24	13.11
19	2	1.09
20	2	1.09
21	1	0.55
33	1	0.55
	183	
	No = 243	
	Total respondent (yes and no) = 427	
Percentage responded yes		42.86
Percentage responded no		56.91

Table I.
Age respondents started driving illegally

before obtaining their driving licence, about 40 per cent of all respondents surveyed indicated that they have driven illegally before obtaining their driving licence (see Table II). Results also show that those are mostly are the 16 and 17 year olds which is very alarming.

Modelling approach

This section discusses further analysis and modelling of the reported preferences and attitudes towards road safety in in Kuwait. The reported preferences and choices of various options as well as characteristics of the respondents have been investigated and analysed in order to reveal factors which are associated with travel behaviour and attitudes to road safety, using discrete choice analysis. A logit model has been explored to find the effects of various characteristics on the attitudes and behaviour. Respondents were asked to report on the mode chosen, the reasons for choosing the mode as well as reporting on other household and travel characterises. In this case, a number of socio economic as well as attitudinal factors have been investigated as

Learning drive	Total	Responses	%
By myself	137		30.79
Parent/relative	126		28.31
A friend	117		26.29
Driving instructor	59		13.26
Other (please specify)	7		1.57
Total responses		445	
More than responses		18	
Total respondents		427	
Specified other			
Desert driving	Do not drive		Driving school
1	7		1

Table II.
How respondents learn how to drive

independent variables using probit analysis. These included income of respondents, gender, and position in household, place of work and frequency of filling petrol. In addition, in the questionnaire, respondents were asked to provide their responses to questions in order to further investigate respondents' attitudes and preferences to safety issues as discussed above. Almost half the respondents indicated that when they are faced with a situation which may have been caused by the car ahead they will be patient and calmly drive behind the car as the traffic moves on, while almost the other half indicated that they will operate the horn and try to force overtaking of the car causing the traffic situation. This response has been assumed to reflect respondents' attitudes towards road safety (the dependent variable). Therefore, this investigation is devoted to further analysis of the factors which might have contributed to this attitude.

A binary model has been estimated for the investigation of attitudes to road safety in which the dependent variable represents the respondent as a "Safe Driver" or a "Non-Safe Driver". This includes modelling of attitudinal factors which affect speeding on the road using binary logit model. In this model, data from two reported attitudinal responses have been investigated for their effect on attitudes to safety, as well as other socio economic data.

The formulation of the logit model begins by specifying a function that determines travellers' choice of the mode of travel. In this case, the utility function is written as (see also Hensher *et al.*, 2006) as shown in following equation:

$$U_{in} = \beta'_n X_{in} + \varepsilon_{in} \quad (1)$$

where U_{in} is the propensity function that determines the probability of discrete adoption level n for individual traveller i; X_{in} is a vector of observed variables such as rider attributes, system characteristics, β_n is a vector of parameters associated with X_{in}; and ε_{in} is error term. In this model, it is assumed that the error term is γ distribution.

To determine whether a model is statistically significant, the analyst compares the Log likelihood (LL) function of the estimated model to that of the base comparison model. If the LL function of an estimated model can be shown to be a statistical improvement over the LL function of the base model (i.e. statistically closer to zero), then the model may be thought of as being statistically significant overall. See also Train, Hensher *et al.* (2006) for further discussions on model estimation.

Modelling parameters

The list of the parameters is given in Table III and coefficient estimates and p-values for the calibrated logit model are reported in Table IV.

In this binary model the dependent variable is a dichotomous variable taking a value of 1 when the subject (road user in this case) is considered to be a "Safe driver", as explained in Table III. As for the rule for the independent variables selected to estimate the models, the trial-and-error method, commonly used in building models, was applied and the variables with insignificant p-values were excluded. The independent variables included in the calibrated models are explained below.

Respondents to the survey were required to provide information on some attitudinal statements regarding their level approval or disapproval of some behaviour related to road safety. "Driving without a valid driving license", "The very young age of drivers on the roads" and "How important is SAFETY to you?" are the three attitudes which have been included in the model. These attitudes are very important since they represent major safety issues and important problems relating to road safety in Kuwait. From the analysis

Code	Description of variable
Dependent variable	
	A binary variable takes a value of: 1 when the subject (road user in this case) is considered to be a "Safe driver", 0 Otherwise
Independent variables	
Family head	A factor represent the family position is "Head"
Wife	A factor represent the family position is "Wife"
Oldest son	A factor represent the family position is "Oldest Son"
Gender2	Respondent's gender group 2 (female)
Attitude1	Attitudes expressed to the statement "Driving without a valid driving license" with a positive sign for its disapproval and a negative sign for approval
Attitude2	Attitudes expressed to the statement "The very young age of drivers on the roads"
Attitude3	How important is SAFETY to you?
Income	Income category "Low"
Family position (Son)	Family position is "Son"
Education (secondary)	A variable that represents the level of education of the respondent is secondary school

Table III.
A list of variables used in the models

Variable	Coefficient	*t*-Statistic
Constant	0.107758	12.95
Age1	0.04163	2.47
Gender2	2.119641	1.925
Attitude1	0.743913	2.588
Attitude2	0.743913	2.588
Attitude3	0.89713	2.761
Income	1.295684	0.744
Family position (son)	2.160359	1.966
R^2		
No coefficients		0.1478
Constants only		0.02496
R^2		0.3250
R^2 adjusted		0.291
Number of observations	427	
Iterations completed	7	

Table IV.
Modelling of attitudinal factors which affect speeding on the road using binary logit model

of the results, the very young age of drivers on the roads was a concern to about 73.35 per cent of the respondents who indicated that it is a serious problem to them whilst 16.27 and 6.30 per cent of all responses obtained on this question considered it as a moderate problem and neutral to the society, respectively. Driving without a valid driving licence was a major concern to the 427 respondents of which 64.17 per cent of the respondents considered it as a serious problem whereas 20.14, 7.26 and 6.09 per cent of the respondents believe it is a moderate problem, neutral and a slight problem, respectively.

Modelling results

A binary model has been estimated for the investigation of attitudes to road safety in which the dependent variable represents the respondent as a "Safe Driver" or a "Non-Safe Driver" as discussed above. A discussion of the results of all the model is presented.

From the results presented in Table IV, it appears that all the variables which are listed in the tables and included in the models are statistically significant at a 95 per cent level and with the expected signs of the coefficients. The overall statistical significance of the models are reasonable and found in to be approximately 0.3 in all models.

The results also show that the safety parameter "SAFETY" is found to exhibit more likelihood of being associated with travellers being safe drivers, than the non-safe drivers. This is an expected result which highlights the need of education programmes and schemes in order to improve drivers' awareness of importance of safety.

Interestingly, the "Attitude1" and "Attitude2" coefficients are also statistically significant and associated with positive signs, which indicate that in most cases respondents who expressed disapproval of the statement "Driving without a valid driving license" to be safe drivers than those who expressed their approval of this statement. Moreover, on the other hand, high level of education is seen to be positively correlated with those who are safe drivers than non-safe drivers.

Conclusions and recommendations

In this research, data were collected on a number of issues including mode of travel and other travel characteristics. In terms of safety aspects and driving characteristics which are relevant to speeding, a number of attributes and information have been collected. Initially respondents were asked to report on how often they were caught speeding. From the data collected it was seen that a considerable percentage of respondents reported that they were caught speeding with more than 46 per cent of respondents were caught up speeding at some stage of the year. This percentage could be in reality even higher. The data have been analysed in relation to the mode of travel, to show that the most caught speeding were the respondents who travel while driving alone. Taxi riders on the other hand were the least group to report being caught up speeding with about 93 per cent of the overall responses indicated that they had never been caught speeding while being a passenger in a taxi. The second highest group of respondents caught speeding were those who drive to the shops. Driving with a family member attracted the third highest of the responses of being caught speeding with about 30 per cent of responses reporting being caught at least once.

Respondents were then asked to report on how often they were in a hurry or late when you drive to work, shopping or other activities. From the data collected, it was seen that interestingly, just under 60 per cent of responses indicated that they have been in a hurry or late while driving to work at some stage during the week. On the other hand, while driving for shopping trips, a considerable number admitted that they did not experience being in a hurry while driving. When asked by the respondents to specify the activities that keep them late or in a hurry only a few commented, that work trips were the most associated with being in a hurry or late compared with, for example, shopping trips.

Respondents were asked then to report on their usual and maximum driving speeds. Results showed that a speed of 120 km/hr the maximum speed been reported by a high number of respondents. In terms of shopping trips, a total of 135 respondents reported driving 120 Km/hr as their maximum speed while 107 reported driving to work by this speed as their maximum speed, and 93 respondents drove at a speed (120 km/hr) as their usual speed. Consequently, respondents were asked to report on how they learnt driving. Results show that mostly, individual respondents learnt driving without the assistance of anyone which was reported by almost 31 per cent of respondents. Interestingly, only just over 13 per cent of respondents reported that they were taught how to drive by driving instructor. When respondents were asked if they have driven illegally before obtaining

their driving licence, about 40 per cent of all respondents surveyed indicated that they have driven illegally before obtaining their driving licence. Results also show that those are mostly are the 16 and 17 year olds which is very alarming.

The above results all show that high-driving speeds, illegal driving without a driving license as well as speeding are the main causes of road safety concerns in Kuwait. Tougher regulations and penalties are urgently needed in order to improve safety and driving behaviour. Finally, this research has been a starting point in order to reveal the factors and the statistics regarding safety and accident statistics in Kuwait. Further research is still needed in order to have a better understanding of all the factors which affect safety.

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