PENERBITAN PEGAWAI

Seat belt use among car users in Malaysia

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SEAT BELT USE AMONG CAR USERS IN MALAYSIA

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The car is the second (40%) most common mode of transportation in Malaysia. In terms of fatal road accidents, car drivers constitute about 9.0% and passengers 13.6% of fatalities. The major cause of car occupants' fatality in such accidents is head injuries, which consist of more than half (56.4%) of the fatalities. Thus restraining the head and body, the initial position is the most important injury control strategy for car users. The use of seat belts was deemed one of the most effective ways to reduce road accident fatalities in Malaysia and consequently the mandatory seat belt law was enforced in the early seventies. Therefore, a study on factors influencing the compliance behaviour of seat belt use among cars is needed as to date no such research has been undertaken in Malaysia. A questionnaire study was carried out in Selangor, Malaysia on the compliance behaviour of car occupants in relation to seat belt use. A total of 237 respondents were interviewed and the data analysed using logistic regression method. Six variables were found to be significant at 5 percent level (p<0.05): seating position, location of travel, education level, speeding, night-time driving and enforcement. Compliance with the seat belt law was higher among drivers, educated car users, in the presence of enforcement activities, travelling in city-center areas and car users with a positive attitude towards the risks of speeding and night driving.

1. INTRODUCTION

The car is the second most common mode of transportation in Malaysia after the motorcycle. In 2001 alone, of the 11,302,545 registered vehicles with the Department of Transportation, close to half (4,557,992) were cars, representing 40% of the total vehicles registered in Malaysia[1]. Of 5,849 fatalities registered in 2001, car drivers made up about 9.0% (527) of the deaths and 8.6% (4,335) of the casualties. Passenger fatalities for the same period stood at 797 (13.6%) and casualties at 4,712 (9.3%). Combined, the results indicate 1,324 fatalities (22.6%) and casualties of 9,047 (17.9%) for car occupants which stands next to motorcyclists in terms of number of fatalities and casualties.

The major cause of car occupant fatalities in car accidents is head injuries, which account for more than half (56.4%). This usually occurs when car occupants are thrown out of the vehicle through the windshield or when they collide with the car seat or dashboard. Thus this observation leads to the inevitable conclusion that the head and body are the most susceptible parts to injury and that restraining the head and the body in the initial position is important in any injury control strategy involving car users.

Experience from developed nations indicates that the use of seat belts is one of the most effective ways to reduce road accident fatalities[2,3]. Studies have also shown that when a road accident occurs, the use of the seat belt prevents certain types of injuries to vehicle occupants or mitigates their severity[4,5,6]. Safety seat belts which restrains the body in the original position to a seat have proved to reduce the risk of fatal injury to front-seat passengers by 45% and the risk of moderate to critical injury by 50%. The seat belt also helps the driver to control the car in a crash situation as it holds the passenger in place. Serious injuries occurring to passengers in motor vehicles are often caused by people being thrown into each other during a crash[7]. If a person does not wear his or her seat belt, that particular person could be thrown from his or her vehicle; through the windshield or door into trees, telephone poles or rocks, or run over by your own or someone else's car.

Similarly in Malaysia, the mandatory seat belt law was enforced in the early seventies following the passing of the seat belt law. Since then, the rate of seat belt use among private cars is believed to have increased, as no studies have been done to verify it. The closest study in this area in Malaysia was in 1993 among taxi drivers[8]. The results from a small sample (60) of taxi drivers in

the city of Kuala Lumpur showed a seat belt compliance rate of 40%. Violation of the seat belt law is a compoundable offence with a maximum confine of RM300 (1US$ = RM3.80). The amount of fine imposed, however, depends on the discretion of the traffic police officer on duty and in most cases an amount of RM100 is imposed on each unbelted driver/front passenger who is detected violating the law. Often in rural areas, violators may be given an oral warning and advice from the traffic police. This may suggest a relatively low compliance level for seat belt law despite the generally acceptable compliance rate of seat belt use. Other factors affecting compliance behaviour such as comfortability of the seat belt, speed of travel, trip purpose and driving location warrant further investigation. Therefore, a study on the factors influencing the compliance behaviour of seat belt use among private cars is needed as to date no such research has been undertaken in Malaysia.

2. METHODOLOGY

The survey was carried out in the state of Selangor over two months from January to February 2003 from 8am to 6pm. Selangor was chosen as the study locality as it represents the state with the highest incidence of road accidents in Malaysia. In addition, it meets the requirement of being a town surrounded by both urban and rural areas, which is typical of any state in the country. Selangor also represents a typical state in Malaysia in terms of the ethnic composition of the population, living standards and economic development. Thus a sample study in Selangor has a higher tendency of reflection of the entire country population.

Based on the formula[9] for sample size, the sample size for this study was determined at 237. From this number, the samples were divided to a few categories of areas such as parking lots at government offices, shopping complexes and residential areas. For the town areas, locations with sizeable car parking lots were chosen while for the outskirts and out of town areas (country side, residential areas and housing estates), the locations which were easily accessible to all kinds of drivers in the community such as sundry shops, community centres and food stalls were chosen for this study. The data were collected through the use of a questionnaire, which consisted of four parts, namely, background, knowledge, attitude and practice. Altogether, the questionnaire contained fourteen questions to obtain information on motorcyclist's background and

fifteen questions to test motorcyclist's knowledge, attitude and practice. The questions were scored and categorized as 'high' or 'low' for knowledge, 'positive' or 'negative' for attitude and 'good' or 'poor' for practices. For the purposes of the study, high knowledge, positive attitude and good practice were considered desirable attributes of car users with a higher compliance to seat belt use.

The questionnaire was pre-tested in the same locations with the same methods in December 2002 to gauge acceptability and response level. A sample of 30 car users were approached, 21 of them responded giving a response rate of 70.0%. This showed that generally most of the drivers approached were willing to co-operate unless they were in a hurry. Based on the pre-test, the questionnaire was further improved to increase its reliability and to facilitate its acceptability by respondents.

A total of five sampling stations were selected to represent the typical town community. At each sampling station, every third car occupant was observed check for compliance with seat belt use as they parked their car. If the third car user refused to be interviewed, then the immediate next car occupant was approached. A total of 350 car users were approached, but only 237 agreed to be interviewed (response rate = 67.7%). A driver or front passenger who wore his seat belt was classified as complying with the regulation. This was followed by an on-the-spot interview in order to record responses which would help establish the independent variables. Since there was only one observer involved in field observation, human error subjectivity due to differing standards in identifying compliance levels would be minimized.

Data were analysed using the Statistical Package for Social Sciences Software (SPSS). Logistic regression method was employed to cater for the dichotomous variable (Table 1) conveniently classified in this study. At this analyses stage, only the driver and front passengers (187 respondents) were included in the analyses since only compliance with seat belt use was being studied. Rear passengers (50 respondents) were not included in the logistic regression analyses to determine relationship to compliance since they are not subject to mandatory use of seat belt.

3. RESULTS

3.1 Compliance level
Among car drivers, 76.6% were observed to be using their seat belt while 23.4% did not. Looking at the front passenger only 56.0% were wearing their seat belt

Table 1 Explanatory variables for compliance modelling on seat belt use

Variables	Description	Design Value (coding system)
Seating position	Seating position of the car user	(1) Front Passenger (2) Driver
Location	Driving location of the car users	(1) Outside city-centre (2) City-centre
Education	Education level of the car users	(1) Secondary and lower (2) Tertiary
Speeding	You only need a seat belt if you are speeding.	(1) Agree (2) Disagree
Night-time	You do not need a seat belt if you are driving in the night.	(1) Agree (2) Disagree
Enforcement	I will only wear a safety seat belt if police are present.	(1) Yes (2) No

whereas 44.0% were not wearing a seat belt. Thus of the respondents, 71.1% complied with the seat belt law compared to 28.9% who violated the seat belt law. Thus, less than three-quarters of the car users sampled actually complied with the seat belt law. Besides, the study also observed 50 rear seat passengers and found that none of them were using the seat belt despite having one in their car. Thus, this study found that when seat belt use is not made mandatory, its use stands at 0%, which is very alarming.

3.2 Seating position

Table 2 shows the compliance level of seat belt use according to the seating position of the car users - driver or front passenger. Seat belt use among drivers was significantly (p<0.05) higher than for the front passenger. The corresponding odds ratio is 2.578 times higher for drivers. This shows that seating position is a very strong influencing factor in determining compliance level of seat belt use.

3.3 Location

Table 3 shows the driving location of respondents by compliance to seat belt use. Most respondents tended to comply with the seat belt safety law when they were in the city-center areas. Conversely, the compliance level decreased significantly (p<0.05) outside the city-center areas. This suggests that car users driving in city-center

Table 2 Seat belt use by seating position (n=187)

Seating position	Compliance	(%)	Non-Compliance	(%)
Front passenger	28	56.0	22	44.0
Driver	105	76.6	32	23.4
Total	133	71.1	54	28.9

Variables	Coefficient	Standard Error	95% Significance	Odds Ratio	95% Confidence Interval
Seating position	0.947	0.349	0.007	2.578	1.300 – 5.111
Constant	-0.706	0.605	0.243		

Table 3 Compliance on seat belt use by location (n=187)

Location	Compliance	(%)	Non-Compliance	(%)
Outside City-center	76	65.5	40	34.5
City-center	57	80.3	14	19.7
Total	133	71.1	54	28.9

Variables	Coefficient	Standard Error	95% Significance	Odds Ratio	95% Confidence Interval
Location	0.762	0.357	0.033	2.143	1.065 – 4.310
Constant	-0.120	0.492	0.807		

areas were about 2.143 times more likely to comply with seat belt use compared with those driving outside city-center areas. As such, driving location seems to be an influencing factor in determining seat belt use among car users.

3.4 Education

Table 4 shows the level of seat belt use according to education level of car users. The analysis on an odds ratio of the compliance level of seat belt use shows a significant increase (p<0.01) in seat belt use with respect to education level. The odds ratio increases by approximately 2.4 times for highly educated drivers (tertiary) compared with less educated drivers (secondary and below).

3.5 Speeding

Table 5 shows the level of seat belt use according to the need to wear a seat belt if you are speeding. Note

that the compliance level of seat belt use was lower for those drivers who agreed that a seat belt was only needed when they were speeding compared with those who disagreed with the statement. This shows that the compliance level of seat belt use is greatly related to attitude of seat belt users who feel that when they are driving slowly, they are not in danger. Therefore there is no need to use a safety belt. The odds ratio of seat belt use increased by almost 2.3 times for those who felt that a seat belt is needed at all times for their safety irrespective of whether they are speeding or not.

3.6 Night-time

Night-time driving factor reflects attitude of car seat belt users towards seat belt use in the night-time. The relationship between compliance levels with seat belt use with the respondent attitude to seat belt use during night-time is shown in Table 6. It can be seen that most of the respondents complied with the seat belt law when they

Table 4 Seat belt use by education level (n=187)

Education Level	Compliance	(%)	Non-Compliance	(%)
Lower (Secondary and below)	35	58.3	25	41.7
Higher (Tertiary)	98	77.2	29	22.8
Total	133	71.1	54	28.9

Variables	Coefficient	Standard Error	95% Significance	Odds Ratio	95% Confidence Interval
Education level	0.881	0.337	0.009	2.414	1.248 – 4.668
Constant	-0.545	0.565	0.335		

Table 5 Seat belt use by attitude on speeding (n=186)

Seat belt needed if speeding only	Compliance	(%)	Non-Compliance	(%)
Agree	16	55.2	13	44.8
Disagree	116	73.9	41	26.1
Total	132	71.0	54	29.0

Variables	Coefficient	Standard Error	95% Significance	Odds Ratio	95% Confidence Interval
Speeding	0.832	0.415	0.045	2.299	1.019 – 5.188
Constant	-0.625	0.769	0.416		

Table 6 Seat belt use by attitude on night-time driving (n=186)

Seat belt not needed during night-time	Compliance	(%)	Non-Compliance	(%)
Agree	9	47.4	10	52.6
Disagree	123	73.7	44	26.3
Total	132	71.0	54	29.0

Variables	Coefficient	Standard Error	95% Significance	Odds Ratio	95% Confidence Interval
Night-time	1.133	0.492	0.021	3.106	1.184 – 8.146
Constant	-1.239	0.936	0.185		

disagreed that they do not need to wear a seat belt in the night because of lower enforcement activity and low visibility of violation of the seat belt law. Thus the compliance level increases by 3.1 times for car users with a positive attitude on the importance of wearing a seat belt irrespective of day or night travel.

3.7 Enforcement

Level of enforcement reflects car user compliance with seat belt use in the presence of police only (Table 7). The results show that car users who use a seat belt irrespective of police presence are more likely to comply (p<0.01) compared with those who wear a seat belt only in the presence of police. The compliance level will be low among car users who view using a seat belt as fulfilling a traffic law rather than for their own safety benefits. The odds ratio obtained is 2.224 times. Therefore, enforcement is an influencing factor in determining compliance behaviour of seat belt use among car users.

4. DISCUSSION

It is universally accepted that vehicle crashes cannot be totally prevented, but that the resultant injuries and severity can be prevented or minimised by protective devices like seat belts for car occupants especially car drivers and front passengers. This study was therefore undertaken to investigate factors that influence seat belt use among Malaysian car users.

From this study, it was found that the seating position in the car has a strong correlation with seat belt use. Seat belt use was higher among drivers followed by front passengers and, an alarming non use level by rear passengers. Studies elsewhere on this area also furnished similar outcomes. For instance the North Carolina study[10] between 1993 and 1994 found driver belt use was higher (64%) compared to front passenger (52%) seat belt use.

This could be due to risk perception among car users that the driver seat location carries a much higher risk compared to front seat passengers and followed by rear seat passengers. The other possible reason could be that the duration in a car is always higher among drivers, followed by front seat passengers and rear seat passengers. As such, a person with a shorter time stay in a car (passengers) may find it uncomfortable or think it is unnecessary to use the safety belt compared to the driver who has to stay all the time in a car. A complete non-use of seat belt among rear passengers in Malaysia could also be attributed to the seat belt law which only covers driver and front seat passengers and does not make seat belt use mandatory for rear passengers. A study in New Zealand[11] also found high front seat belt usage (85–96%) compared to rear use (29–47%). This could be due to respondents who perceive the risk of injury in the rear seat as so low that it did not warrant using a seat belt. Although the risk of injury could be lower in the rear than in the front, a rear seat belt itself could reduce the risk of fatality by around 20% mainly by eliminating ejection from the vehicle[12]. Besides, in the event of a crash, an unrestrained rear seat occupant may be projected forward, increasing the risk of injury for front seat occupants. Thus a useful strategy is to encourage the front seat occupants to insist that rear seat passengers are restrained, for the protection of both the rear and front occupants.

The study also suggests that there is a strong relationship between compliance level of seat belt use and driving location. Results from this study show that car users driving in city-centers were more likely to comply with seat belt use compared with car users driving in outside city-centers areas. This is in line with the Great Britain study[13] on seat belt use among motorists where they found that the usage rate was high in town centers (built up) areas compared to outside town-centers (non-built up) areas. The North Carolina study[10] between November 1993 and August 1994 at 72 sites also found higher seat belt use rates in urban areas compared to rural areas. A

Table 7 Seat belt use by enforcement activity (n=187)

Seat belt use in police presence only		Compliance	(%)	Non-Compliance	(%)
Yes		78	65.5	41	34.5
No		55	80.9	13	19.1
Total		133	71.1	54	28.9

Variables	Coefficient	Standard Error	95% Significance	Odds Ratio	95% Confidence Interval
Enforcement	0.799	0.364	0.028	2.224	1.090 – 4.536
Constant	0.643	0.193	0.001		

seat belt use study in Hawaii looking at the crash data over a period of 6 years from 1986 to 1991 also yielded similar findings on lower seat belt use in areas outside predominantly urban Honolulu in Hawaii[14]. The latest reported study in Hawaii[15] pointed out that drivers are 1.7 times more likely to be unbelted in rural areas than drivers in urban areas. This could be due to car users' perception of lower enforcement activity outside city-centers compared with city-centers. Usually, enforcement activities tends to be lower outside city-centers due to limited resources and the larger spatial coverage to be undertaken by enforcement teams. This explains the lower compliance level outside city-center areas.

Another aspect studied was the effect of education level attained which has long been recognised as one of the contributing factors for compliance of traffic rules and involvement in traffic accidents[16,17]. The Seattle[16] and Thailand[17] study findings show that educated road users have a significantly lower violation rate on traffic rules compared with the less educated group. This study also shows a similar finding whereby as education level increases, the compliance level of seat belt use also increases. The findings are in line with various studies on seat belt use in many countries. In New Zealand[11], the study looked at seat belt use and related behaviours among young adults between 1993 and 1994. They found seat belt use to be higher among drivers and passengers with high academic qualification. Thus the North Carolina[18] study on identifying the characteristics of unbelted drivers between 1993 and 1994 found that drivers without a college degree are most likely to be unbelted compared to drivers with a college degree. A study done in Columbia, United States[19] in 1998, also reported similar findings on seat belt use rates among taxicab drivers. A lower belt use rate prevailed among taxicab drivers with less years of formal education. The latest study[20] on seat belt use among African Americans, Hispanics and Whites in 2000 too yielded similar findings where it was found that higher educational attainment strongly correlates with seat belt use.

The relationship between speeding and compliance level of seat belt use is an interesting area to be studied. Low rates of seat belt use are also attributed to the low perceived risk of being involved in an accident[21,22]. This is based on risk compensation, which postulates that under certain conditions individuals compensate for reduced risk by acting more carelessly and recklessly. Based on this concept, when drivers wear safety belts, they feel safer and exhibit more risky driving behaviours than they otherwise would, thereby reducing the beneficial effects

of belt use. In this study, results show that respondents felt that the seat belt is only needed for those travelling in high speed to protect them in the car. Thus respondents who felt that seat belts are only needed for those travelling at higher speeds are less likely to comply with the seat belt use law. This is in line with a study[23] on Dutch freeways over a one-year period where they found that drivers adopted slightly higher speeds over the year after they switched from non-use to use of seat belts. Thus by switching from non-use to use of seat belts, they actually lost their safer driving behaviour over a long time.

The travel behaviour of a motorist is believed to vary according to time of travel i.e. either in the day or night. Travel volume is high during daytime to accommodate work trips compared to night-time where the number of vehicles on roads is less. Enforcement activities are widely expected to move along with the number of vehicle movements[24]. Thus this study looked into the relationship between compliance level of seat belt use and night-time driving. The finding showed that respondents who felt there is no need to wear a seat belt during night-time are less likely to comply with the seat belt law. This shows that car users who felt that enforcement activities are less during night-time and that visibility violation is low, tend to violate the seat belt law. This could probably be the reason why the compliance level to the seat belt use was low in this study among those who have a negative attitude towards the benefits of seat belts. Earlier studies looking at this factor also obtained similar findings. The study[14] in Honolulu, Hawaii found that driving at night is related to a lower likelihood of seat belt use. Thus in their study, time of the day showed a strong and significant association with safety belt use. A recent study in Hawaii[15] also pointed out that as time approaches late night, belt use decreases for both drivers as well as passengers. Their results showed that during the night, drivers are 2.24 times more likely to be unbelted than during the day, while passengers are 1.78 times more likely to be unbelted.

Lastly this paper discusses the relationship between compliance level to seat belt use and enforcement which has been well documented by various researchers. It is a known fact that as enforcement activities increase, the compliance rates to traffic rules will also increase[25]. This study also obtained a similar trend. In this study it was found that when enforcement activities were carried out and police presence was visible, compliance to seat belt use rose. This is in line with an earlier study carried out to look at the relationship between seat belt use and enforcement in Florida, where results showed that during

heightened enforcement activities, there was an increase in seat belt use[26]. Similar findings were also obtained in North Carolina[10] where seat belt use rose among drivers and front seat passengers. Thus the presence of enforcement activities by police is able to reduce violations and increase compliance[27]. This confirms that enforcement is a powerful way to change motorist behaviour, although admittedly the effect may be short lived[28].

5. CONCLUSIONS

Based on the findings, it can be concluded that the seating position, driving location, education level, enforcement activity, attitude to speeding and night-time driving are the contributing factors that influence the compliance behaviour to seat belt use in Malaysia. Therefore, road safety programs should be focused on front and rear passengers, less educated drivers and front passengers and those travelling in outside city-center areas and those respondents with a negative attitude towards seat belt use during speeding and night-time driving. With road safety programs targeting on the negative characteristics of car drivers and passengers, it is greatly hoped the usage of seat belt could be further increased.

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