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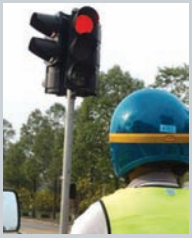
Research Report

The Effectiveness of OPS BERSEPADU



Conducted over the Hari Raya Period from 7–21 October 2007

Editors:
Mohd Faudzi Mohd Yusoff
Sumangala Pillai
Radin Umar Radin Sohadi

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Report Contributors

The *Ops Bersepadu Hari Raya* commenced on 7 October 2007 and was launched by the Y.A. Bhg. Datin Seri Jeanne Abdullah, the First Lady of Malaysia. Over the 2 weeks following the launch, and weeks before that, all the Research Officers of MIROS were out on the roads and in several government agencies collecting and synthesizing data, analyzing huge chunks of information and drawing meaningful inferences on the intervention strategies that had been implemented before the *Ops*. To ensure better analyses on the outcomes of the *Ops*, several additional measures, not found in previous analyses, were included in the evaluation. They are media dosage, trauma and injury management, vehicle kilometre travel and Real World Crashworthiness study. This report, completed so soon after the *Ops* , would not have been possible without the untiring efforts of the Research Officers to whom the editors would like to extend their appreciation. The Research Officers involved are:

1. Abdul Rahmat Abdul Manap
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1. Introduction

It is common practice for Malaysian city dwellers to take advantage of long holidays during festive seasons to *"balik kampung"* to their respective hometowns. This tradition inevitably generates a high volume of traffic on all highways and major roads nationwide. The consequent result of a high volume of traffic is an increased number of accidents with the number of deaths per day exceeding the annual daily average during this festive period. It is quite evident that in 1996, when no integrated intervention strategies were implemented, a total of 321 deaths, constituting 20 deaths per day during the 15 days of the festive season, was recorded (Radin, 1998).

In 2006, road accidents in Malaysia recorded a relatively high number with 341,232 accidents and 6,278 cases of fatalities contributing to an average of 17.2 deaths per day. To counteract this alarming problem, an integrated *Ops Bersepadu* for the Chinese New Year Celebration of 2007 was launched. Parallel to this integrated effort to curb the likely increase in road accidents and fatalities, MIROS, being a road safety research arm to the Ministry of Transport, conducted several studies to investigate the effectiveness of *Ops Bersepadu*. Our research revealed that *Ops Bersepadu* had contributed to a significant drop in fatalities and daily rates of fatalities nationwide. The evaluation criteria for effectiveness includes the perception level of being caught and enforcement visibility, spot speeds, profile of traffic volume, effectiveness of banning lorries and motorcycle shift to safer modes of transport.

The *Ops Bersepadu CNY 2007* study results reveal that the perception level of enforcement visibility and perception of being caught were below the expected targeted value by 21% and 28% respectively (Rahmat *et al.,* 2007). Drivers were not complying

with the gazetted lower speed limit of 80 km per hour at selected federal roads. On the brighter side, the percentage of heavy vehicles dropped by an average 4% that possibly contributed to the 58% reduction in lorry-related accidents. Motorcycle use during the festive season also dropped by 3%, contributing to a significant reduction in fatalities among motorcyclists. Overall, *Ops Bersepadu CNY 2007* is commendable for successfully reducing daily average deaths, from 17.2 to 13.8.

Tangible evidence clearly indicating the contribution of previous efforts towards reducing casualties, specifically fatalities among road users, impelled a more intensified and integrated *Ops Bersepadu for Hari Raya Aidilfitri 2007*. This *Ops Berse*padu *Hari Raya 2007* commenced on 7 October and was launched by Y. A. Bhg. Datin Seri Jeanne Abdullah, the First Lady of Malaysia. To ensure better analyses on the outcome of the *Ops*, several additional measures were implemented in this evaluation, not found in the four previous analyses. They are media dosage, trauma and injury management, Vehicle Kilometre Travelled, and Real World Crashworthiness study.

2. The Interventions

In an effort to reduce the possible increase in road accidents and casualties during Hari Raya Aidilfitri 2007 festive season, the Ministry of Transport (MOT) had prepared a comprehensive intervention plan to be carried out by all agencies during the *Ops* period. This comprehensive plan involved the government agencies of Polis DiRaja Malaysia (PDRM), Jabatan Keselamatan Jalan Raya (JKJR), Jabatan Kerja Raya (JKR), Lembaga Lebuhraya Malaysia (LLM), Kementerian Pengangkutan Malaysia (KPM), Jabatan Pengangkutan Jalan (JPJ), Lembaga Pelesenan Kenderaan Perdagangan (LPKP), Kementerian Pelajaran Malaysia, Kementerian Kesihatan Malaysia (KKM), Konsortium Transnasional Berhad (KTB), Plus Expressways Berhad (PEB), PETRONAS, PUSPAKOM, Non Governmental Organisations (NGOs) and the private sector. The four strategies adopted were as follows:

2.1 Exposure Control

This involved:

- Promoting the use of public transportation – adding more seats to buses, trains, and flights.
- Banning lorries and trucks on the festive days – this ban applied to different categories of lorries and trucks except those involved in critical services such as food delivery, petrol delivery, medical supplies and emergency services.
- Encouraging motorcyclists to opt for safer modes of transportation such as public transportation.
- Reducing the degree of peakness – peakness is defined as the density of traffic observed on a day.

2.2 Crash Prevention

This involved:

- Enforcement by Police and JPJ – apart from the conventional methods, new methods were introduced such as the use of undercover enforcement and unmarked vehicles.
- Campaign through mass media – all media channels were used to deliver campaign messages e.g. advertisements aired over television and reports of accident statistics in newspapers.
- Postponing all construction work – all construction that interrupted traffic flow was halted on the festive days.
- Reducing speed limit on the 90 km per hour road – the speed limit was reduced to 80 km per hour on the 90 km per hour zones along Federal and state roads.
- The "take-a-break" programme offered by Petronas – Petronas sponsored free refreshments at selected petrol stations along the highways.

2.3 Injury Control

This involved:

- Advocacy on the use of safety helmets.
- Advocacy on the use of belts and rear seatbelts.
- Paramedics and injury management – a strategy aimed at ensuring the paramedic team reaches the accident sites immediately.

2.4 Post Injury Control

This involved:

- Trauma management at hospitals – to ensure victims are treated within an hour's interval in the aftermath of an accident.
- Aftercare – to ensure victims recover fully after receiving treatment.

3. The Objectives

The *Ops Bersepadu Hari Raya Aidilfitri 2007* is an integrated intervention effort that involves inter-departmental and organizational co-operation. It is a coordinated endeavor to save lives and avoid unnecessary damage. This noble effort requires a high outlay of financial and human resources. As such a thorough evaluation of its effectiveness is essential to ensure not only its continuity but the introduction of more pervasive interventions in the future towards better road user safety in Malaysia.

The specific objectives of this study are:

1. To analyze the effectiveness of *Ops Hari Raya Aidilfitri 2007*
2. To propose improvements in required areas

4. Methodology

4.1 Cumulative Accidents Plot

The cumulative fatality plot provides an evaluation of the effectiveness of the *Ops* by comparing the Projected Cumulative Mean (PCM) of each variable during normal days against the Actual Cumulative Number (ACN) of each variable during the *Ops*.

Daily accident data was obtained from the *Bilik Gerakan Ops* at Bukit Aman on the following:

a) total number of accidents,
b) total number of fatal accidents,
c) total number of fatalities,
d) total number of accidents and number of fatalities by road type, and
e) total number of accidents and number of fatalities by vehicle type.

The average value of deaths for 15 days before the *Ops* was used to estimate the PCM. The *Ops* can be concluded as effective if the ACN value is proven to be lower than the PCM value.

4.2 Traffic Profile - Telemetric Data

Telemetric data provides the number of vehicles passing through HPU's counting stations of the Highway Planning Unit (HPU) at various locations in Peninsular Malaysia. These counting stations are at Kuala Muda, Kerian, Kuala Kangsar, Rompin, Setiu, Merlimau, Kangar, Bentong, Kuala Krai, Tampin, Kuala Pilah, Bera, Muadzam, Baling and Hulu Terengganu. The counting stations are installed at strategic locations on federal roads, and monitored on a weekly basis by the Ministry of Works' Highway Planning Unit.

The telemetric data is collected by Remote Traffic Microwave Sensors (RTMS) that measure the traffic volumes using microwave radar (Figures 4.1 and 4.2). It detects per lane presence as well as speed, volume and vehicle classification. Vehicles are classified according to their wheel base length and are termed as LongV for lorries, MiddS1 for cars, MiddS2 for Sport Utility Vehicles (SUVs) and vans and XtraLV for trucks and trailers. The rest of the total volume is considered to be motorcycles.

Counting is performed on a daily basis and the profile of the traffic volume was observed before, during and after the *Ops Bersepadu* campaign. This study revealed peak traffic flow as well as the percentage of different categories of vehicles compared to overall volume.

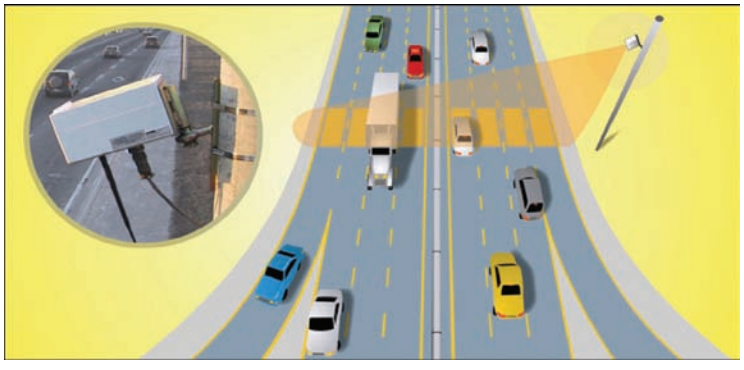


Figure 4.1 RTMS setup and its radar detection coverage to cater for multiple lanes

Figure 4.2 A counting station installed on a federal road in a side-fired mode (*Source:* HPU)

4.3 Perception Study

During this *Ops*, PDRM (Police Force) and the Road Transport Department had initiated both the Overt and Covert approaches in an attempt to reduce traffic violations and accidents. In order to gain an insight into public views on the effectiveness of these approaches, the road users' perception of being caught for traffic violations has to be evaluated. Basically, an increase or decrease in their perception will gauge the efficacy of the methods. Eight offences have been highlighted in the survey. They are:

(i) Over speeding
(ii) Beating the red light
(iii) Jumping queue
(iv) Overtaking at double lines
(v) Overtaking at the emergency lane
(vi) Not wearing a seatbelt
(vii) Not wearing a helmet
(viii) Weaving dangerously

This study employed a self-administered survey method using a questionnaire as the instrument. A series of surveys on alternate days for 6 weeks (25 September to 3 November 2007) were carried before, during and after the launch of the *Ops*. Specifically, this study measures several variables namely (i) changes in perception level of being caught, (ii) visibility of enforcement presence, (iii) factors influencing perception of being caught, and (iv) a correct balance of overt and covert approaches.

Studies were conducted at 4 locations: Sungai Buloh, Kuala Selangor district, Karak and Seremban with a total of 3,644 respondents being involved in this study. Locations at Sg. Buloh, Karak and Seremban represent samples from expressways while Kuala Selangor district (Kuala Selangor, Tanjong Karang, Sekinchan and Sungai Besar) represent samples from federal and municipal roads.

4.4 Speed Change Analysis

A crash injury reduction strategy implemented during the *Ops* was the reduction in the national speed limit from 90 km per

hour to 80 km per hour at all 90 km per hour zones. In order to assess the effectiveness of a national policy on speed limit and enforcement, speed observation was carried out before, during and after the launch of the *Ops* at 11 spots along 6 federal routes. The study locations are as follows:

Section Number 6, Federal Route 1 (Tampoi, Johor)
Section Number 40, Federal Route 1 (Kulai, Johor)
Section Number 311, Federal Route 1 (Senawang, Negeri Sembilan)
Section Number 802, Federal Route 1 (Sungai Petani, Kedah)
Section Number 6, Federal Route 3 (Johor Bahru, Johor)
Section Number 32, Federal Route 5 (Pekan Nanas, Johor)
Section Number 494, Federal Route 5 (Kuala Selangor, Selangor)
Section Number 684, Federal Route 5 (Tronoh, Perak)
Section Number 27, Federal Route 7 (Border of Kedah-Perlis)
Section Number 53, Federal Route 50 (Kluang, Johor)
Section Number 4, Federal Route 76 (Kuala Kangsar, Perak)

Speed-related fatal accident cases over the past 10 years were used as reference to determine the locations for speed observations. Besides, the ease of concealing the activity of observation and the ease of drivers freely selecting their speeds (congestion-free and at straight sections of roads) were also taken into consideration when choosing the most suitable spot for the routes determined earlier.

In order to obtain normally distributed data for each spot, 100 speed measurements were found to be sufficient. However, 200 speed measurements were obtained at each spot. Hand-held laser metres were used to measure the speed of vehicles.

Using the Statistical Package for Social Sciences (SPSS) software, the speed data were stored and analyzed. The 85th percentile speed for each spot was determined and data for before and after the launch of the *Ops* were compared. The 85th percentile speed of vehicles was expected to be around 80 km per hour.

4.5 Modal Split Study

The modal split analysis describes the total or percentage of travelers using particular modes of transport while modal shift describe the changes in mode of transport usage. This analysis was confined to city dwellers who will "*balik kampung*" before and during the *Ops*. In order to analyze the needed information, a survey using telephone, household interview and a self-completion questionnaire were conducted. The survey focused on the Kuala Lumpur and Selangor areas. These locations were identified based on the criteria of being the city and state with the highest urban population in Malaysia respectively.

Only 709 of the 1,000 respondents were analyzed from 7 to 19 October 2007 using the Statistical Package for Social Sciences (SPSS) software. The survey results indicated that the use of public transport was expected to increase; reciprocally, the use of private transport would decrease during Raya.

4.6 Vehicle Kilometre Travelled (VKT) and Passenger Kilometre Travelled (PKT)

Risk in transport can be measured by various methods. Among the most important measures is the fatality rate. In Malaysia, the two common fatality rates used are the Registration Death Rate (RDR) and Population Death Rate (PDR).

However, in most developed countries such as the USA, the Mileage Death Rate (MDR) is the more usual method used as a main fatality indicator (Halperin, 1993). Due to the problem of getting reliable travel-related data, this fatality measure is still not available in most developing countries. Mileage Death Rate (MDR)/Fatality per Passenger Kilometre Travelled (PKT) or per Vehicle Kilometre Travelled (VKT) shows risk in terms of fatality or accidents as a function of distance travelled by passenger or vehicle respectively. This study examines both the VKT and PKT.

Efforts by MIROS to establish PKT and VKT data for various modes of transport are on the right track and Malaysia should have more meaningful data as the developed countries for international fatality rate comparison.

Vehicle kilometre travelled (VKT)

Vehicle Kilometre Travelled (VKT) is a method intended to investigate exposure patterns amongst the drivers and riders. This study was carried out using samples from among owners of registered cars and motorcycles from all over Malaysia.

This study covered both urban and rural areas to ensure representativeness of the multi-ethnic Malaysian society. A total of 570 respondents had initially given their odometre reading, but only 472 readings were usable after the follow-up. Four repeated telephone and questionnaire surveys were conducted from 23 September to 6 November 2007 for this study.

Respondents for phone interviews were chosen based on those who had replied to the Post-Card Method of Vehicle Kilometre Travelled. With the respondents/drivers background information available (through the Post-Card method), phone interviews were conducted to obtain odometre readings.

Questionnaire interviews were conducted to obtain background information on drivers and vehicles. The Vehicle Kilometre Travelled study questionnaire consisted of (i) respondent's background, (ii) current information on vehicle, and (iii) odometre reading (White, 1976). The questionnaire was prepared in the Malay language and comprised of nine (9) questions.

Riding exposure was calculated for each driver as the difference between odometre readings multiplied by 365 divided by the number of the days that elapsed between the 2 odometre readings (Harrison and Christie, 2004).

Driving exposure, VKT

$$VKT = \frac{(B - A) * 365}{\text{days elapsed}}$$

A : First odometre reading
B : Second odometre reading

Fatality index, I_f

$$I_f = \frac{D_r \times 10^8}{V_{(year)} \times VKT}$$

D_r : Road deaths
$V_{(year)}$: Registered vehicle
VKT : Average vehicle kilometre travelled
(Lassarre, 2000)

Preliminary data was obtained from 23 September 2007 until 20 October 2007 on a biweekly basis. This covers the Baseline, First Reading, and Second Reading requirement. The final reading i.e. the Third Reading which conclude the VKT for *Ops Bersepadu* will be taken from 2 - 4 November 2007. Phone interviews were carried out by 4 researchers while 8 enumerators, trained on how to approach respondents and how to fill up questionnaires, were chosen to conduct the interviews.

A baseline for odometre reading was obtained from 23 - 25 September 2007. Respondents were required to give their current odometre reading and were informed that three (3) follow-up readings would be required from them in the later weeks. The first odometre reading was taken on the following week (6 - 8 October 2007), while the second reading was taken after a two-week interval (18 - 20 October 2007) and the third odometre reading will be taken on 2 - 4 November 2007.

Passenger kilometre travelled (PKT)

In this study, both PKT and VKT of the public transport (express buses) were determined. Request for data was sent via formal

request (formal letters) to the respective respondents (the bus operators) mentioning the objectives, data requirements, duration period, etc of the study to be conducted. Additionally, requests were also sent to the government agencies such as PDRM, JPJ, LPKP for information or data relevant to the proposed study.

A car with 2 passengers on board travelling from point A to B with a total distances of 150 km will produce 450 PKT [3 occupants/passengers (2 passengers + a driver) times 150 km]. This concept seems too simple but care should be taken for a more complicated calculation, otherwise the results will be misleading. A simple calculation follows:

Calculation for PKT (based on Table 5.9, in page 44)

Weekly PKT = D x P x T x F

where

D = Travel Distance/Trip
P = Passenger/Trip
T = Trips
F = Number of Population/Number of Samples
Weekly PKT = (1,356,494/4,439) x (103,907/4,439) x (4,439) x (5,240/356) x 10^-9 billion PKT
= 0.47 billion PKT

Calculation for VKT (week 1)

Weekly VKT = Da x V

where

Da = Average Travelled Distance/Vehicle
Nv = Number of Vehicles in the Population
Weekly VKT = (1,356,494/356) x (5,240) x 10^-6 million VKT
= 19.97 million VKT

4.7 Trauma and Injury Management

Trauma and injury management is a new analytical measure included in the intervention program carried out during the *Ops*. This study, categorized under post injury control, was conducted to ensure that victims of any road traffic accident are treated within the minimum time interval after the occurrence of the accident. It is also to investigate the speed at which the response team can offer its paramedic services to the casualties.

This study was conducted for 6 consecutive weeks (2 weeks before, during and after the *Ops*). Tengku Ampuan Rahimah Hospital in Klang was chosen as the sample hospital as this hospital recorded the highest number of road traffic accident cases in the Klang Valley. Data was collected from the emergency and accident department of the Hospital where the response team (ambulance team) was stationed. Daily records were collected from the response team's log book and hospital records during the study period and subsequently a thorough analysis was conducted.

4.8 Media Dosage

The objective of this study is to determine the amount of media dosage on road accidents imparted to the public and subsequently to what extent this dosage influences the perception of being caught. Surveys on media dosage (Reach, TARPS, OTS) were done 2 weeks before and during the *Ops* and will be undertaken after the *Ops* from 24 September till 4 November 2007.

During the period of study, articles and news from selected newspapers on road safety were monitored daily while news and reports from radio and television networks were acquired from the respective electronic media stations irrespective of whether they were from government or private companies. Subsequently, time series graphs of media dosage were plotted comparing the intensity of coverage between types of newspapers and radio and TV stations.

4.9 Real World Crashworthiness Investigation

The task of the Crash Investigation Team is basically to investigate crashes that involve 3 or more fatalities (high profile) (Figure 4.3). This detailed investigation will provide specific insights into how accidents and corresponding injuries occur and thereafter provide recommendations on alternatives or how the incidence of such occurrences could be avoided or reduced.

Two teams were on-standby for any high profile case, whether regular or inquiry in nature, at all times before and during the *Ops*. The teams' areas of interests are environment, vehicle condition and driver/passenger condition. In the area of environment, the team will look into road profile, road geometry and road condition (including skid marks). Meanwhile in the vehicle area, the team will investigate damage profile, Delta-V, occupant contacts and seatbelt use. Finally, the team will investigate the condition of the driver/passenger after the crash; fatal injuries, any possible drug use by driver etc.

Figure 4.3 High profile case: collision between 4WD and lorry at Sungai Pelek involving 5 deaths

5. Results

5.1 Cumulative Plot Analysis

Figure 5.1 indicates the cumulative plot of total accidents with the cumulative mean total accidents for the period of 2 weeks before and during the *Ops*. The average number of accidents per day for 15 days before the *Ops* was 990, representing the projected number of daily accidents during the two periods. From the graph, it can be seen that the Projected Cumulative Mean (PCM) accidents would be 28,710 cases whereas the Actual Cumulative Number (ACN) of road accidents was 29,777 cases. This shows that the number of road accidents was 1,067 cases more than the projected cumulative mean accidents.

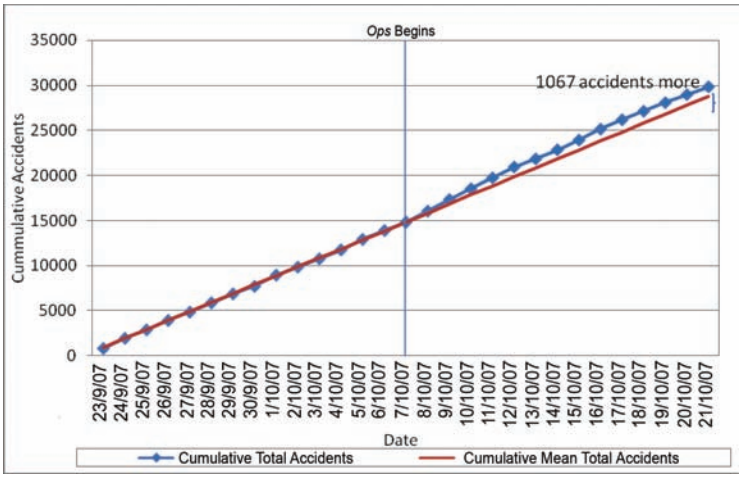


Figure 5.1 Cumulative total accidents with the cumulative mean total accidents before and during the *Ops*

Figure 5.2 shows the comparison between the cumulative fatal accidents and the cumulative mean fatal accidents. The average daily number of fatal accidents for 2 weeks before the *Ops* was 16 cases. Based on the data before the *Ops*, the Projected Cumulative Mean (PCM) fatal accidents would be 464. It is evident that the final actual cumulative fatal accident value was 427 cases, showing a decrease in fatal accidents by 37 cases from the cumulative mean fatal accidents.

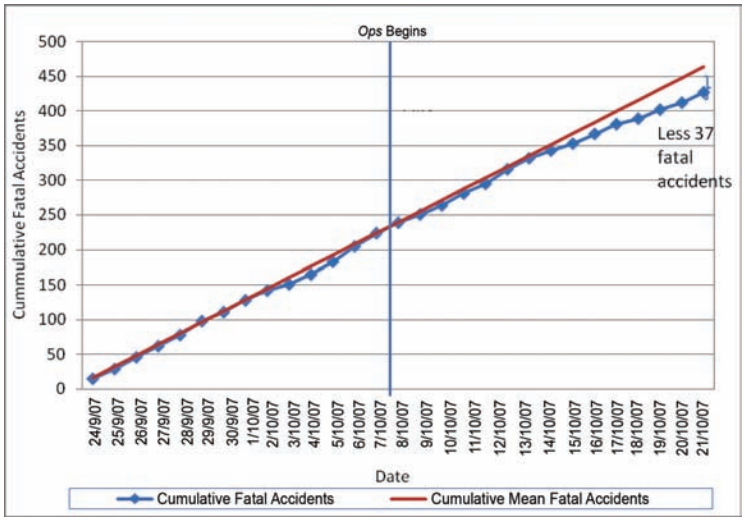


Figure 5.2 Cumulative fatal accidents and the cumulative mean fatal accidents before and during the *Ops*

Figure 5.3 shows the cumulative plot of total deaths and cumulative mean deaths before and during the *Ops*. The average daily number of deaths for 15 days before the *Ops* was 18 cases. Based on the figure, the cumulative mean deaths would be 522. However, the recorded cumulative actual deaths was 477 which indicates 45 less deaths compared to the cumulative mean deaths.

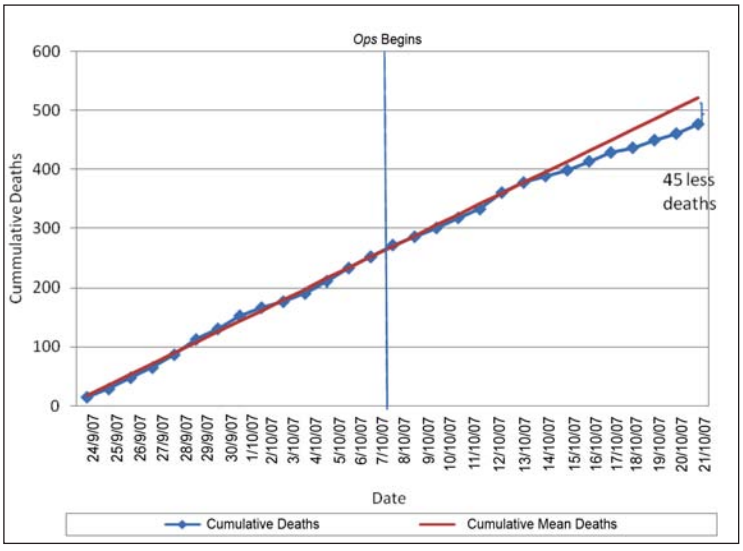


Figure 5.3 Cumulative deaths and cumulative mean deaths before and during the *Ops*

Figure 5.4 shows the cumulative plot of motorcycle deaths with the cumulative average motorcycle deaths. The average daily motorcycle deaths over the 15 days before the *Ops* was 11. Based on this data, the cumulative mean motorcycle deaths would be 317. From the graph, it can be seen that the actual final cumulative value was 277, showing that actual motorcycle deaths were 40 less than the projected cumulative mean motorcycle deaths.

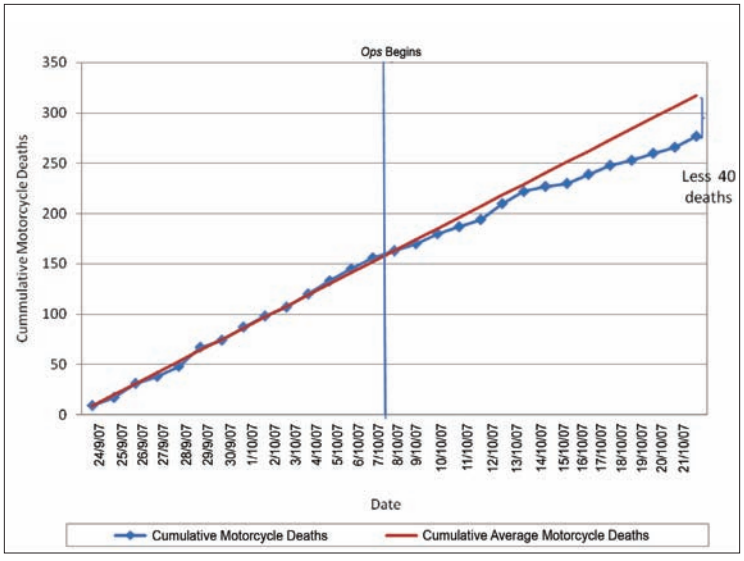


Figure 5.4 Cumulative plot of motorcycle deaths and cumulative average motorcycle deaths before and during the *Ops*

Figure 5.5 shows the cumulative plot of car deaths with the cumulative mean car deaths. The average daily number of car deaths for 15 days before the *Ops* was 4. Again, based on Figure 5.5, the cumulative mean car deaths would be 126. However, the figure shows that the final cumulative car deaths was 127, indicating an increase of 1 car death compared to the projected cumulative mean car deaths.

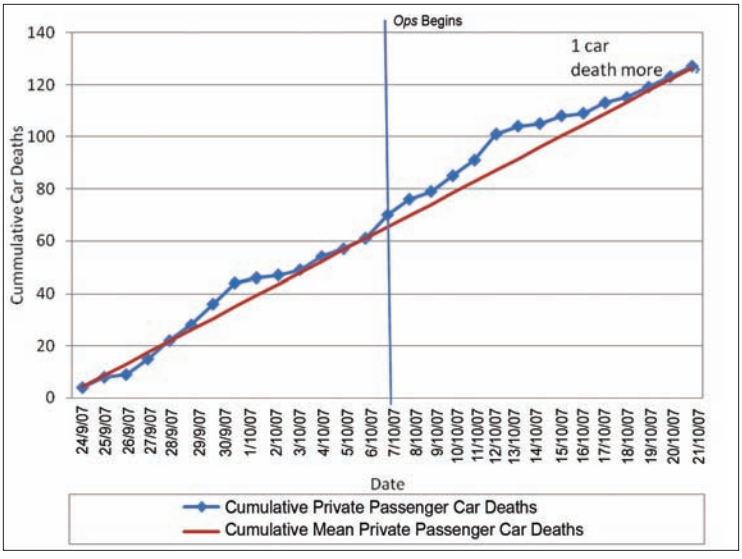


Figure 5.5 Cumulative plot of total passenger private car deaths and cumulative mean private passenger car deaths before and during the *Ops*

Figure 5.6 shows the cumulative plot of pedestrian deaths with the cumulative average pedestrian deaths. The average daily number of pedestrian deaths for 15 days before the *Ops* was 2. Based on this figure the estimated cumulative mean pedestrian deaths would be 57. However, as can be seen from Figure 5.6, the final cumulative pedestrian deaths were 47, indicating 10 deaths less compared to the projected cumulative average pedestrian deaths.

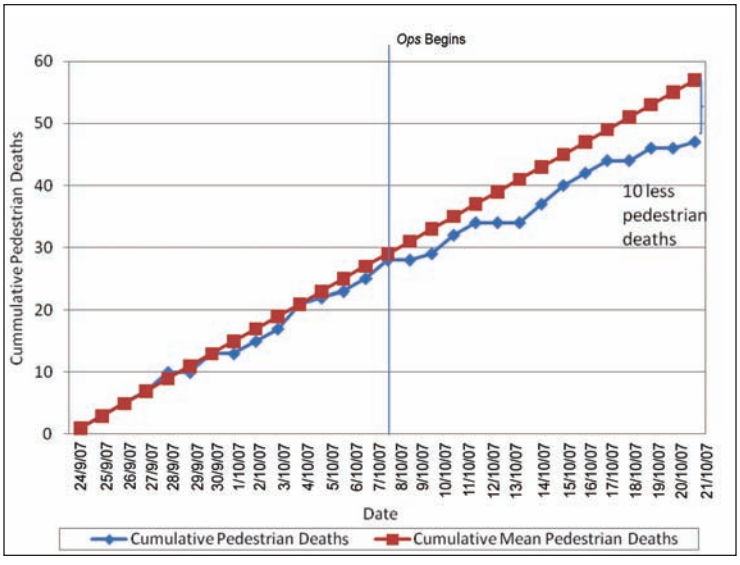


Figure 5.6 Cumulative pedestrian deaths with the cumulative mean pedestrian deaths before and during the *Ops*

Though the results from the above figures show differences before and during the *Ops*, it is important to know whether these differences are significant from the statistical point of view.

In order to arrive at a conclusion, a Chi-square analysis was performed to investigate whether there were existed differences in the number of fatalities (motorcycle and overall) and total accidents during, before and after the *Ops*. The results in Table 5.1 clearly indicate that the decrease in the number of fatalities between the two periods is significant ($p<0.05$). Similarly Table 5.2 also indicates that the decrease in the number of motorcycle fatalities between the two periods is significant ($p<0.05$).

Table 5.1 Chi-square analysis : Fatalities and total accidents

	Period		Total
	Before	After	
Total accidents	13 866	15 057	28 923
Fatalities	252	209	461
Total	14 118	15 266	29 384

($\chi^2 = 8.216, p = 0.004$)

Table 5.2 Chi-square analysis : Motorcycle fatalities and total accidents

	Period		Total
	Before	After	
Total accidents	13 866	15 057	28 923
Motorcycle fatalities	156	110	266
Total	14 022	15 167	29 189

($\chi^2 = 8.216, p = 0.004$)

5.2 Traffic Profile

Figure 5.7 shows the overall traffic profile over 2 weeks before and during the *Ops*. The average traffic volume before the first day of the *Ops* was around 17,000 with the figure climbing up to 21,000 during the *Ops* period. The highest point recorded was at 25,435, which was on the third day of *Hari Raya*. This figure is higher than the highest number recorded during the *Ops Bersepadu CNY 2007* which was 19,575. Generally, traffic volume trend is mostly influenced by the number of cars on the road.

Figure 5.8 shows the percentage of motorcycles and lorries from the overall traffic volume. The average percentage of motorcycles and lorries 2 weeks before the *Ops* started were 28.77 and 8.53%, respectively. It is noted that the average percentage of lorries dropped to 5.92% and the average percentage of motorcycles

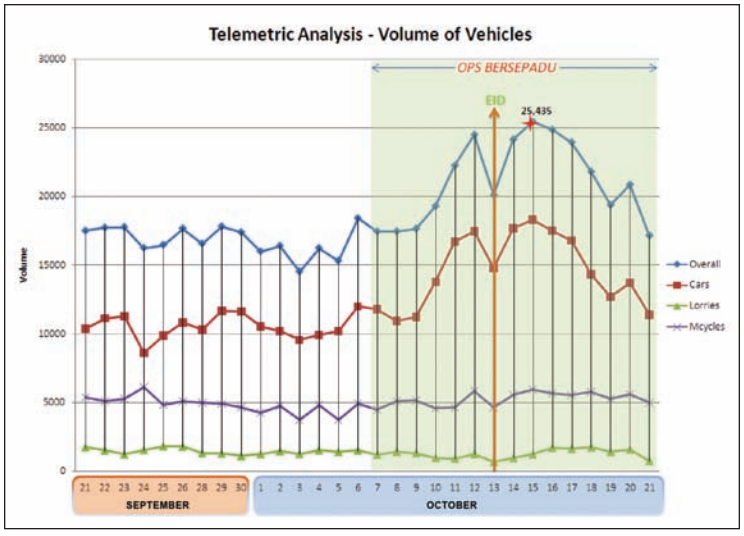


Figure 5.7 Telemetric analysis - volume of vehicles

dropped to 25.14% in the *Ops* period. The reduction in volume of these two modes of transportation can be attributed to the banning of heavy vehicles and a modal shift among motorcyclists.

Heavy vehicles were prohibited from the roads on the 10, 11, 12, 20 and 21 of October to enhance safety and reduce accidents involving heavy vehicles. However, this ban did not cover vehicles undertaking critical services such as sewerage services, tankers for transporting fuel and emergency services.

Meanwhile the motorcyclists appear to have changed their mode of transportation to cars or public transport. As they were encouraged to do so in the *Ops* campaign, the volume of motorcycles dropped about 3.6% mainly because this mode of transportation is neither convenient nor comfortable for a long trip.

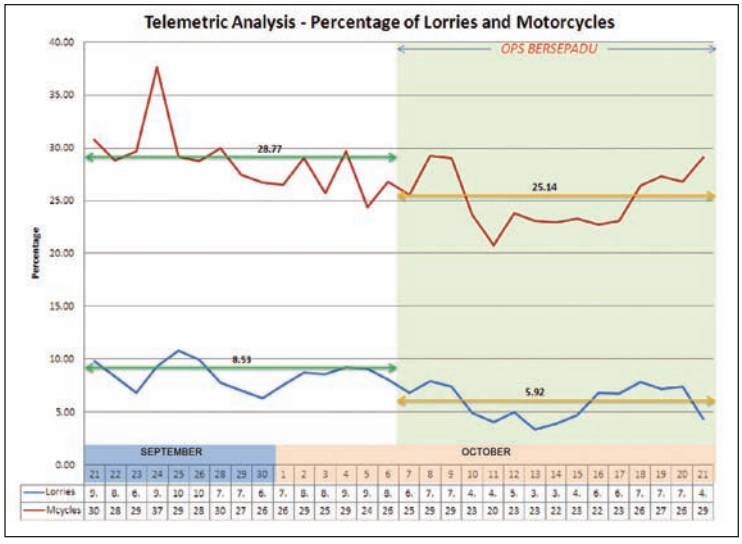
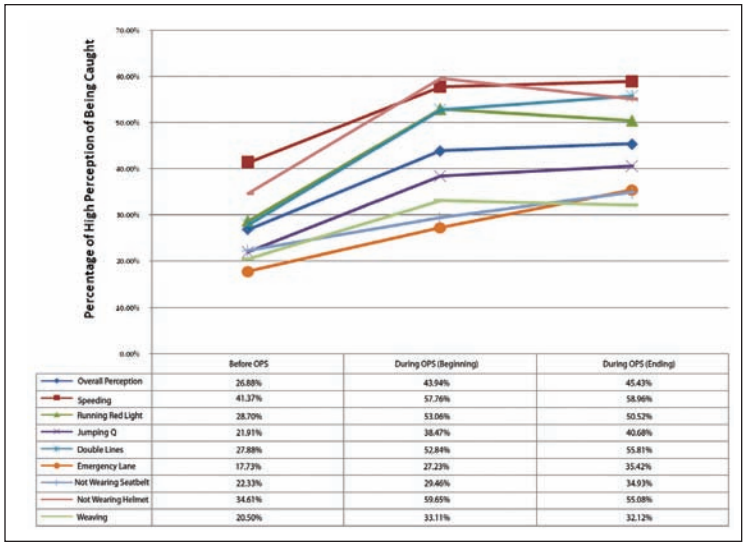


Figure 5.8 Telemetric analysis - percentages of lorries and motorcycles

5.3 Perception Study Analysis

This study was conducted over a period of 6 weeks. However, this report only presents the analysis of data over the 4 weeks before and during the *Ops*. Overall, our results show that road users have a high perception level of being caught (POBC) especially during the implementation of the *Ops*. This is clearly shown in Figure 5.9.

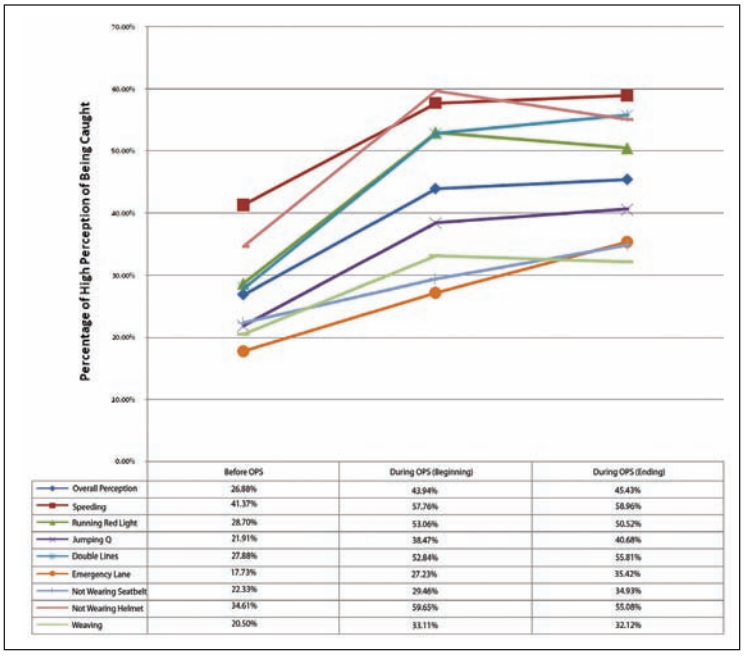


	Before OPS	During OPS (Beginning)	During OPS (Ending)
Overall Perception	26.88%	43.94%	45.43%
Speeding	41.37%	57.76%	58.06%
Running Red Light	28.70%	53.06%	50.52%
Jumping Q	21.91%	38.47%	40.68%
Double Lines	27.88%	52.84%	55.81%
Emergency Lane	17.73%	27.23%	35.42%
Not Wearing Seatbelt	22.33%	29.46%	34.93%
Not Wearing Helmet	34.61%	59.65%	55.08%
Weaving	20.50%	33.11%	32.12%

Figure 5.9 Percentage of perception of being caught at all locations

Expressway locations

Figure 5.10 shows an increase in the perception of being caught from 26.88% to 43.95% in a few days after the launch, suggesting that road users were aware of the enforcement activities being carried out. Towards the end of the *Ops*, the percentage further increased to 45.43% (refer to Figure 5.10). Again, this indicates that more road users were aware of the enforcement activities. However, the percentage is lower than the targeted value of 75%.

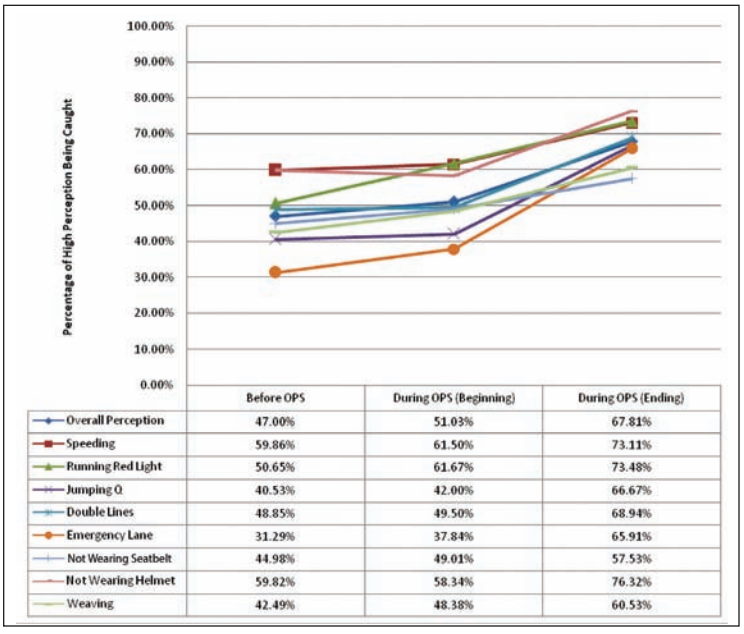


	Before OPS	During OPS (Beginning)	During OPS (Ending)
Overall Perception	26.88%	43.94%	45.43%
Speeding	41.37%	57.76%	58.96%
Running Red Light	28.70%	53.06%	50.52%
Jumping Q	21.91%	38.47%	40.68%
Double Lines	27.88%	52.84%	55.81%
Emergency Lane	17.73%	27.23%	35.42%
Not Wearing Seatbelt	22.33%	29.46%	34.93%
Not Wearing Helmet	34.61%	59.65%	55.08%
Weaving	20.50%	33.11%	32.12%

Figure 5.10 POBC survey at expressway locations of Sg. Buloh-Karak-Seremban

Federal and municipal routes

The perception level of being caught was higher in federal and municipal routes compared to locations in expressways before the *Ops* was launched. Figure 5.11 shows an increase of 4.03% a few days after the *Ops* compared to the overall percentage. Towards the end of the *Ops*, the percentage further increased to 67.81% but did not attain the expected value of 75%.



	Before OPS	During OPS (Beginning)	During OPS (Ending)
Overall Perception	47.00%	51.03%	67.81%
Speeding	59.86%	61.50%	73.11%
Running Red Light	50.65%	61.67%	73.48%
Jumping Q	40.53%	42.00%	66.67%
Double Lines	48.85%	49.50%	68.94%
Emergency Lane	31.29%	37.84%	65.91%
Not Wearing Seatbelt	44.98%	49.01%	57.53%
Not Wearing Helmet	59.82%	58.34%	76.32%
Weaving	42.49%	48.38%	60.53%

Figure 5.11 POBC survey at federal and municipal locations of Kuala Selangor-Tanjong Karang-Sekinchan-Sg. Besar

Traffic offences

It is also important to note that not all offences had the same probability of being caught by the authorities in the perception of road users. The above figures show that road users have different perceptions on each and every traffic offence depending on their knowledge and experience.

To simplify their likelihood of being caught for all the 8 offences, they were ranked in descending order and respondents were asked to prioritise (Table 5.3).

Table 5.3 Ranking of traffic offences according to possibility of being detected among respondents

Before *Ops Sikap XIII*				During *Ops Sikap XIII*			
Expressway		Federal and municipal roads		Expressway		Federal and municipal roads	
1.	Over speeding	1.	Over speeding	1.	Over speeding	1.	Beating the red lights
2.	Not wearing helmet	2.	Not wearing helmet	2.	Not wearing helmet	2.	Not wearing helmet
3.	Beating the red lights	3.	Beating the red lights	3.	Overtaking at double line	3.	Over speeding
4.	Overtaking at double line	4.	Overtaking at double line	4.	Beating the red lights	4.	Overtaking at double line
5.	Not wearing seatbelts	5.	Not wearing seatbelts	5.	Jumping queue	5.	Weaving
6.	Jumping queue	6.	Weaving	6.	Weaving	6.	Jumping queue
7.	Weaving	7.	Jumping queue	7.	Not wearing seatbelts	7.	Not wearing seatbelts
8.	Using emergency lane	8.	Using emergency lane	8.	Using emergency lane	8.	Using emergency lane

The above table suggests that over speeding, beating the red lights, not wearing helmets, and overtaking at double lines are among the top 4 offences that are of concern to road users.

Factors that influenced their perception

It is also important to understand as to why their perceptions rose drastically during the implementation of the *Ops*. Our survey shows that visibility of enforcement contributed the highest percentage (56.74%) to awareness of being caught. This is reflected in Figures 5.12 and 5.13.

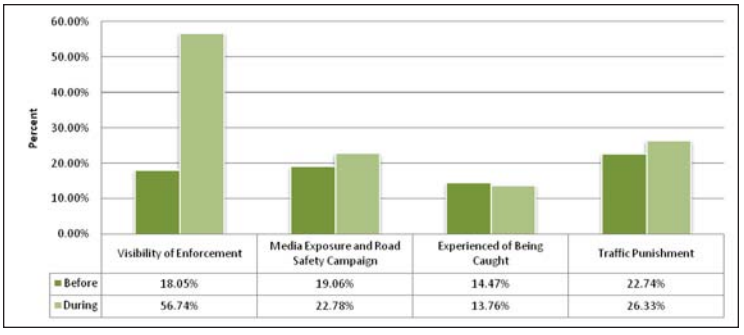


Figure 5.12 Factors that influenced the perception of being caught

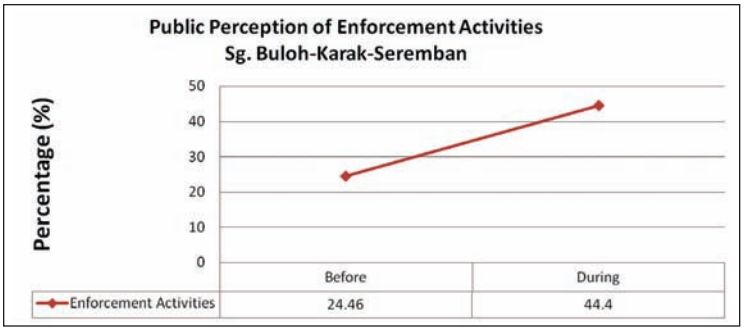


Figure 5.13 Public perception of enforcement activities in Sg. Buloh-Karak-Seremban

Two other factors, that is, traffic punishments and media coverage, also scored a high percentage. This confirms the effectiveness of high visibility of enforcement, media exposure and road safety campaigns. It is also important to note that media exposure and road safety campaigns were on the increase even before the *Ops*.

Overt and covert approaches

The survey also looked into the effectiveness of both the overt and covert approaches in influencing road user perception of being caught. Figure 5.14 shows that the mean value for the overt enforcement approach is 0.31 higher than the covert approach.

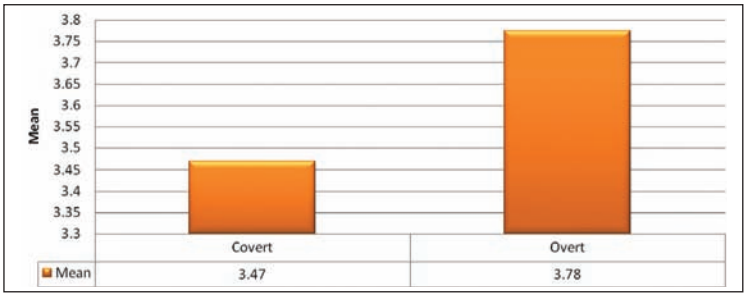


Figure 5.14 Effectiveness comparison of overt and covert enforcement approaches

In conclusion, the frequency of enforcement activities, media exposure and road safety campaigns had a high influence on the perception level of being caught. Hence, an attempt to increase the perception level of being caught can only be achieved by a parallel action of enforcement activities and publicity. However, despite the integrated efforts, public perception of being caught still did not reach 75%, as targeted.

5.4 Speed Change Analysis

The 85th percentile speed simply means the speed at which 85% of the road users are travelling within the given speed. Table 5.4 shows the 85th percentile speed at all the study locations. The mean of the 85th percentile speed for all periods exceeded the limit of 80 km per hour. The cause is believed to be the low public perception level of being detected at the study areas. This suggests that enforcement activities should be intensified to ensure a 75% minimum perception of being caught is achieved. Note that Johor Bahru and Kulai recorded the 85th percentile speed at below 80 km per hour during the *Ops*. However, this is expected due to the fact that the 85th percentile speeds at these two locations on normal days were found to be below 80 km per hour.

Table 5.4 Study locations and 85% percentile speed results

	Before *Ops*		During *Ops*	
	Week 1 (24/9 – 30/9)	Week 2 (1/10 – 6/10)	Week 1 (7/10 – 14/10)	Week 2 (15/10 – 21/10)
F001 Section 006 (Tampoi, Johor)	84.00	86.00	89.00	82.00
F001 Section 040 (Kulai, Johor)	73.00	72.00	70.00	71.00
F001 Section 311 (Senawang, N. Sembilan)	85.00	87.00	87.00	85.00
F001 Section 802 (Sg. Petani, Kedah)	86.85	88.00	88.85	85.00
F003 Section 006 (Johor Bahru, Johor)	80.85	74.00	72.00	67.00
F005 Section 032 (Pekan Nanas, Johor)	88.00	84.85	81.00	N.A
F005 Section 494 (Kuala Selangor, Johor)	95.00	94.35	88.00	90.00
F005 Section 684 (Tronoh, Perak)	94.00	100.85	94.00	98.00
F007 Section 027 (Sempadan Kedah/Perlis)	82.00	85.00	82.85	83.00
F050 Section 053 (Kluang, Johor)	90.00	97.00	95.00	95.00
F076 Section 004 (Kuala Kangsar, Perak)	97.85	99.70	100.00	100.00
Mean	**86.96**	**88.07**	**86.15**	**85.60**
Comparison with *Ops Bersepadu XII*	88.30		85.80	

Besides checking on the 85th percentile speed at the above mentioned locations, an analysis of road users whose travel speeds exceeded the speed tolerance of 10 km per hour was also carried out to ascertain any change in the compliance with speed limits. It was found that 5.6% of road users travelled at speeds

exceeding the 10 km/h tolerance on normal days (before launch of the *Ops* when the speed limit was 90 km per hour). During the *Ops*, however, 13.2% of road users were found to be exceeding the 10 km/h tolerance level (when speed limit was reduced to 80 km per hour). Again, this indicates that enforcement activity during the *Ops* should be improved so as to increase the perception level of being caught among road users.

In conclusion, overall there was a marginal drop (2 km/h) in the 85th percentile speed before and during the *Ops*. The mean 85th percentile speed, however, was within the 10 km/h tolerance level. In order to achieve better results, it is therefore important to increase the perception level of being caught among road users to the minimum benchmark of 75%.

5.5 Modal Split Study Analysis

Modal shift between private and public transport

This study investigates whether there was any change in terms of modal split before and during the *Ops*. Though the focus of this study was on modal shift before and during the *Ops*, we facilitated our respondents by asking them how they would travel before and during *Hari Raya*. Respondents were notified as to the commencement of the *Ops* before the interview. Figure 5.15 shows the proportion of public and private transport use of 14.7% : 85 3% before *Hari Raya*, while Figure 5.16 shows the proportion of public and private transport use of 18.3% : 81.7% during *Raya*. It is noted that the figure shows a slight increase in public transport use from 14.7% to 18.3%. Meanwhile, a drop of 3.6% in private transport use was recorded.

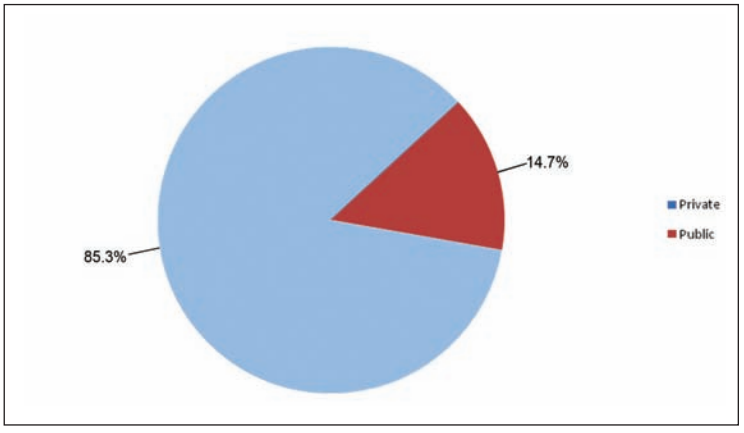


Figure 5.15 Proportion of private and public transport usage before *Hari Raya*

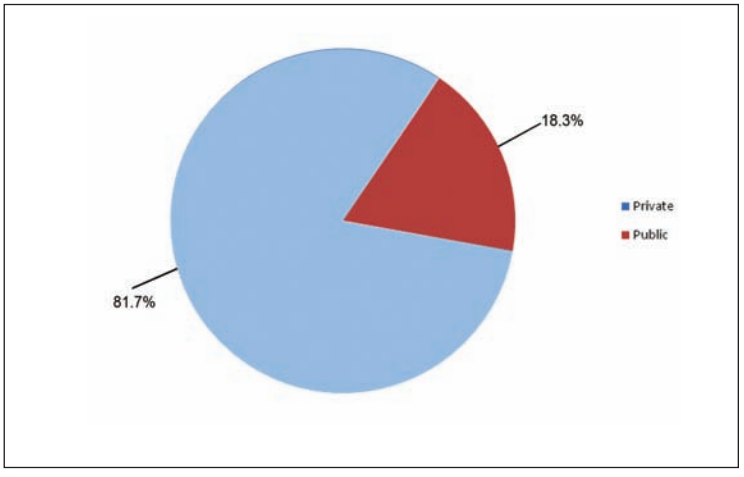


Figure 5.16 Proportion of private and public transport usage after *Hari Raya*

Modal shifts among different types of vehicles

Figure 5.17 shows the proportion of each mode of transportation before the *Ops*. Of the 709 respondents, the proportion of vehicle type usage is as follows: 420 (car), 158 (motorcycle (MC)), 27 (MPV/SUV/4WD), 69 (bus), 33 (commuter) and 2 (taxi). This study also identified a change in modal spilt amongst road users during the *Ops*. Figure 5.17 also shows the proportion of each mode of transportation during *Hari Raya*. A significant point to note is that the number of motorcycles used decreased drastically from 158 to 33, followed by commuters and taxi, while a significant increase of 79 was recorded in car use and 35 in air travel. The rest of the modes of transport show a slight increase.

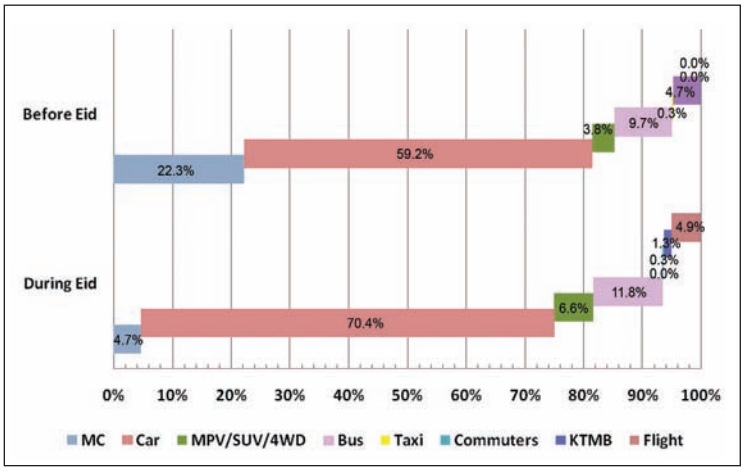


Figure 5.17 Proportion of each mode of transportation before and during *Hari Raya*

Figure 5.18 shows the changes in mode of transport from motorcycles to a safer mode. Most of the motorcyclists shifted to car as their transport during *Hari Raya*. There were 30 motorcyclists who opted for a bus, 6 for MPV/SUV/4WD, 4 for air travel and 5 for KTMB, respectively.

Factors that influenced modal shifts

This study also looks into why such modal shifts occur. Figure 5.19 highlights the factors that influenced users to choose private transport during *Hari Raya*. The figure shows that the highest contributing factor is the need to bring along their families. This

reason was chosen by 346 respondents who preferred to use the car as their transport during *Hari Raya*. A similar reason was given by those who preferred to use the MPV/SUV/4WD. Shelter from bad weather and perceived safer mode of impact were the other factors that influenced these road users. In the case of motorcyclists, reduced travel cost and avoiding road congestion were the influencing factors.

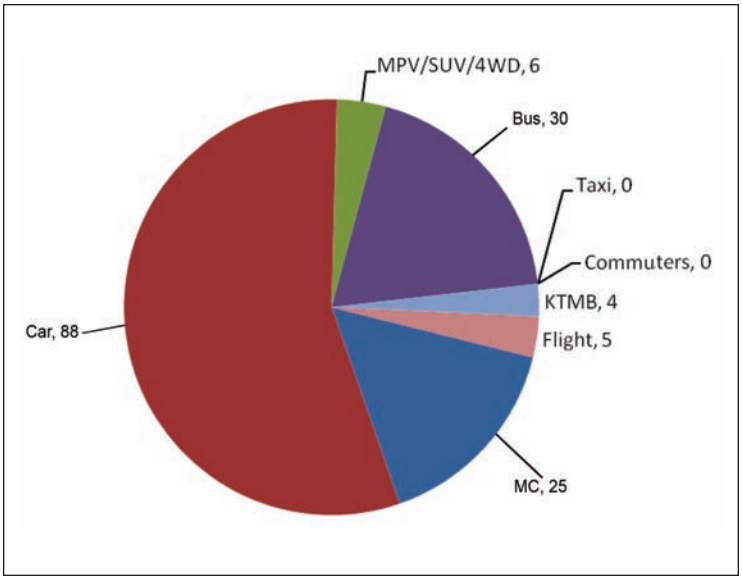


Figure 5.18 Modal shifts from motorcycle to other modes

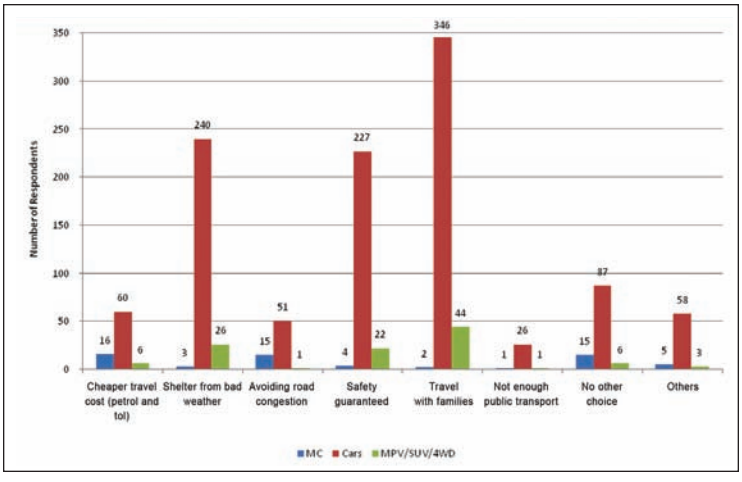


Figure 5.19 Factors that influenced the choice of private transport for each mode

Respondents were also asked the reasons why they preferred to take public transport during *Hari Raya*. From Figure 5.20, it can be seen that it was reasonable ticket price, cheaper travel cost, no other choice of transport and shelter from bad weather that compelled them to use the bus. Most of those who chose air travel had to do so because their home base was not in Peninsular Malaysia, while others chose air travel as their mode of transport due to the long distance travelled. For those who chose KTMB as their transport, the main factors were to avoid road congestion, reduced travel cost and enhanced safety.

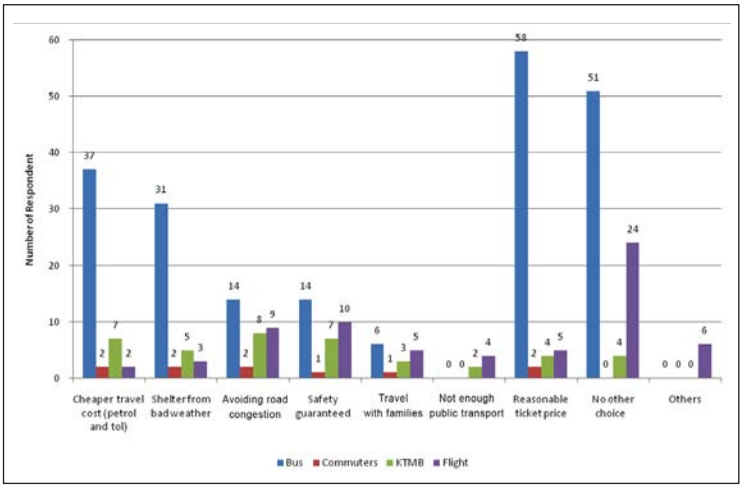


Figure 5.20 Factors that influenced choice of public transport for each mode

In summary, it is evident that there were modal shifts between public and private transport users. The bus recorded the highest mode of public transport while the car recorded the highest mode of private transport. The main factors that influenced the choice of each mode was travelling with families for car and MPV/SUV/4WD users and reduced travel cost and avoiding road congestion for motorcyclists. Meanwhile, the main factor that influenced the choice of bus was the reasonable ticket price, no other choice for flight users (due to geographical conditions), and perceived safer mode of transport.

5.6 Trauma and Injury Management Analysis

This study investigated the difference among the average response times before, during and after the *Ops*. The data has been categorized into two : day (7am-7pm) and night (7pm-7am). Due to influencing factors like density of congestion level and number of vehicles during both periods, comparisons between these categories and periods are indispensable.

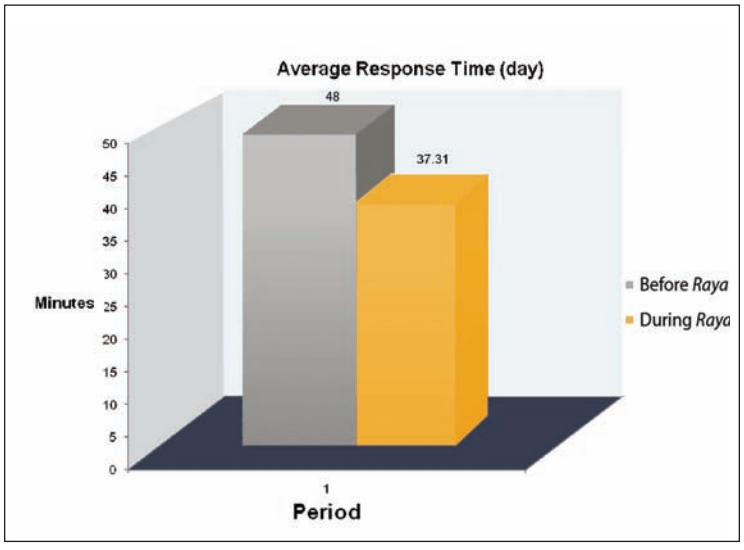


Figure 5.21 Response time of the ambulance team during the day

Data collected from the Accident and Emergency Unit shows a faster response time by the ambulance teams during the *Ops* compared to the response time before the *Ops* during the day. As shown in Figure 5.21, the average response time of the ambulance teams before and during the *Ops* is 48 minutes and 37.31 minutes, respectively. There is an improvement of 10.69 minutes in response time during the *Ops*.

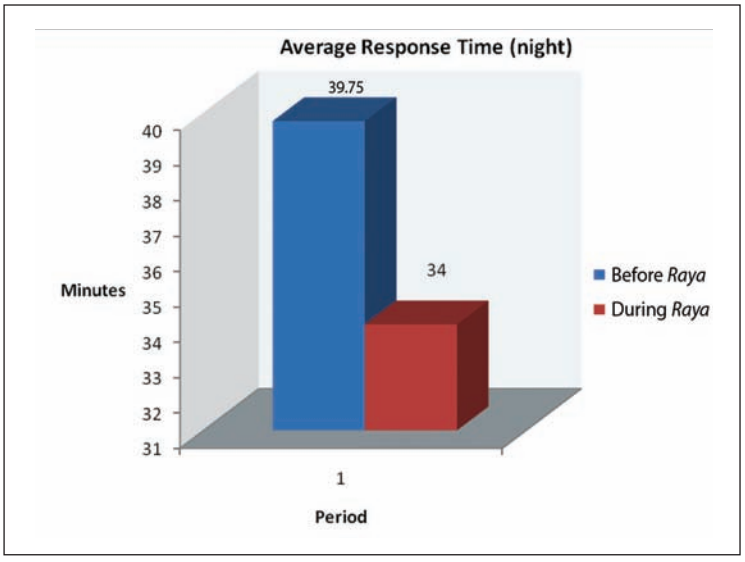


Figure 5.22 Response time of the ambulance team during the night

Figure 5.22 also shows a faster response time of the ambulance teams of 5.75 minutes during the *Ops* compared to before the *Ops* at night. The average response time of the ambulance teams before and during the *Ops* was 39.75 and 34 minutes respectively. The difference in response time between before the *Ops* and during the *Ops* is much smaller at night than during the day.

In appreciating this result, it is important to note that this data is only limited to the paramedic activities at the Hospital Tengku Ampuan Rahimah, Klang. Despite higher traffic volume along highways and federal roads during the *Ops*, our result still shows an improvement in response time before and during the *Ops* with the difference being greater during the day. This could be due to the higher commitment of the hospital management to reduce the suffering of road accident victims during the integrated intervention campaign. Perhaps more staff, time and effort were extended to handle emergency cases in expectation of more casualties during the high peak travel period.

However, there is still room for improvement in this area since we are still far from the international benchmark response time for emergency cases i.e.

- 50% of emergency cases responded to within 7 minutes
- 90% of emergency cases responded to within 12 minutes.

(SAASAR, 2005-2006)

5.7 Vehicle Kilometre Travelled Analysis

Fatality Index per billion VKT

Vehicle odometre readings were collected over 2 weeks before the commencement of the *Ops* from 23 September to 6 October 2007. According to the accident data collected from the PDRM database, road deaths for the duration of the 2 weeks numbered 252. Mean travel exposure was calculated to be 981.32. Using the formula mentioned earlier, the Fatality Index per billion VKT before the *Ops* is 16.26.

Ops Bersepadu began on 7 October 2007 and continued until 21 October 2007. As shown in Table 5.5 and Figure 5.23, the number of deaths due to road accidents during the *Ops* was 225. Based on the third vehicle odometre readings collected, mean travel exposure was calculated to be 1020.06. This increase in mean travel was most probably due to more drivers returning to their hometowns for the *Hari Raya* festivities. It is evident that the Fatality Index per billion VKT during the *Ops* is 13.97.

Table 5.5 Fatality Index *Ops* (All)

	Registered vehicles	Road deaths	Average VKT	Fatality Index (per bilion VKT)
Before *Ops*	15 790 732	252	981.32	16.26
During *Ops*	15 790 732	225	1020.06	13.97
After *Ops*	15 790 732	206	723.30	18.04

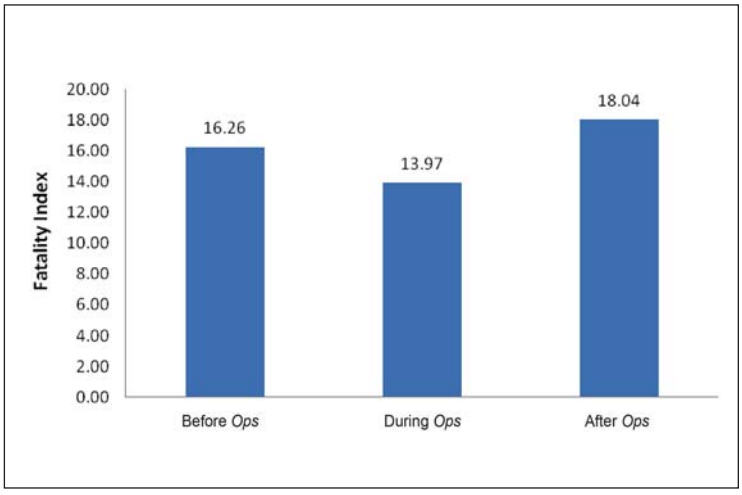


Figure 5.23 Fatality Index for All

Fatality Index per billion VKT for cars

Table 5.6 and Figure 5.24 show the Fatality Index per billion VKT for cars. The index per billion VKT before the *Ops* was 7.18 while during the *Ops*, it was 7.68. However, the increase is not significant. This result perhaps is due to the high increase in the number of cars on the road during the *Hari Raya* period.

Table 5.6 Fatality Index *Ops* (cars)

	Registered vehicles	Road deaths	Average VKT	Fatality Index (per bilion VKT)
Before *Ops*	6 941 996	61	1224.25	7.18
During *Ops*	6 941 996	66	1238.457	7.68
After *Ops*	6 941 996	48	847.3465	8.16

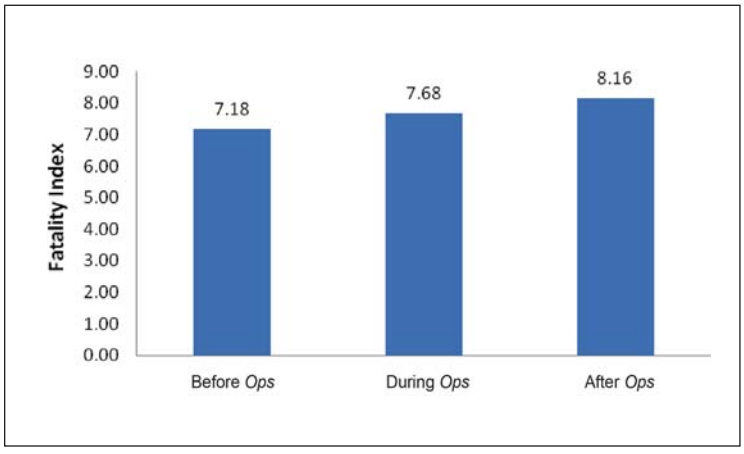


Figure 5.24 Fatality Index (car)

Fatality Index per billion VKT for motorcycles

On the brighter side, the Fatality Index per billion VKT for motorcycles has shown a significant drop during the *Ops* compared to before the *Ops*. As indicated in Table 5.7 and Figure 5.25, the index dropped by 18.42 from 49.97 to 31.55.

Table 5.7 Fatality Index *Ops* (motorcycles)

	Registered vehicles	Road deaths	Average VKT	Fatality Index (per bilion VKT)
Before *Ops*	7 458 128	156	418.623	49.97
During *Ops*	7 458 128	121	514.7963	31.55
After *Ops*	7 458 128	115	502.17	30.71

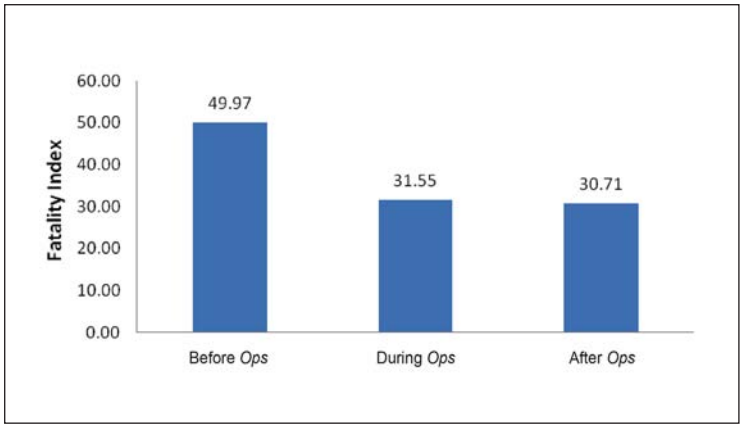


Figure 5.25 Fatality Index (motorcycle)

Road Accidents Index per billion VKT

Table 5.8 and Figure 5.26 show the Road Accidents Index per billion VKT. It can seen that the accident rate per billion VKT increased during the *Ops* from 894.82 to 987.80. Two weeks after the *Ops*, the number of road accidents was recorded at 14,050. The index increased due to the decrease of kilometre travelled from 1,020 km to 723 km.

Table 5.8 Road accidents during *Ops*

	Registered vehicles	Road accidents	Average VKT / 2 weeks	Road Accidents Index (per bilion VKT)
Before *Ops*	15 790 732	13 866	981.32	894.82
During *Ops*	15 790 732	15 911	1020.06	987.80
After *Ops*	15 790 732	14 050	723.30	1230.15

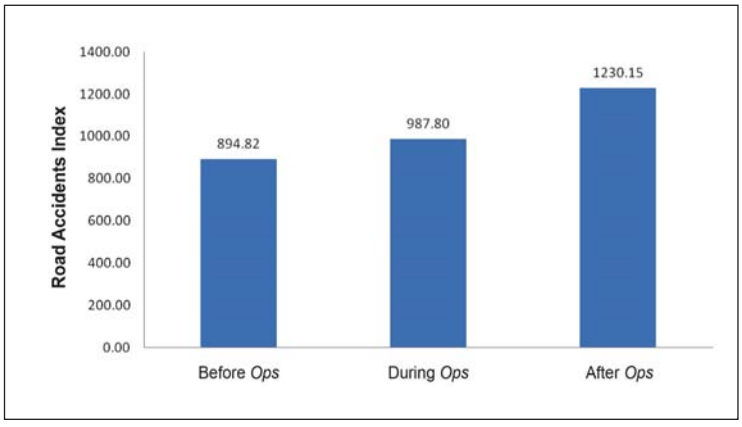


Figure 5.26 Road Accidents Index

In conclusion, travel exposure increased slightly during the *Hari Raya* Festival. The marginal increase of VKT over a period of 2 weeks before and during the *Ops* is probably due to several factors. It was found that the distance travelled to work on a daily basis is almost equal to the distance respondents' travelled on a 'one -time basis' of *'Balik Kampung'.* Change in mode of transport which resulted in the respondents leaving their vehicles and opting for public transport also contributed to the lack of difference in the VKT reading before and during *Ops*.

Passenger kilometre travelled analysis

For this study, data collection was divided into three phases i.e., first 2 weeks right before the *Ops*, 2 weeks during and last 2 weeks right after the *Ops*. Public transport travel-related data such as travelled distance, number of passengers, trips, and number of buses involved were collected on a per weekly basis. Summonses, accidents, casualties, and fatalities were obtained from the PDRM records on a weekly basis too in order to arrive at the weekly analysis results such as casualties/PKT, fatalities/PKT, summonses/VKT, and accidents/VKT per week. Table 5.9 shows the tabulated data collected from a nationwide express bus operation namely Transnasional Express.

Table 5.9 Travel data for PKT and VKT calculation

		Respondent records				PKT & VKT results	
Week	Duration	Travelled distances (KM)	Total passengers	Total trips	Total numbers of buses	PKT population	VKT (million)
1	23 - 29 Sept 2007	1 356 494	103 907	4 439	356	0.47	19.97
2	30 Sept - 6 Oct 2007	1 578 696	119 948	5 090	390	0.50	21.21
3	7 - 13 Oct 2007	1 701 054	162 345	5 539	416	0.63	21.43
4	14 - 21 Oct 2007	1 902 518	202 097	6 542	425	0.72	23.46
	TOTAL	**6 538 762**	**588 297**	**21 610**	**1 587**		

As shown in Figure 5.27, there was an increase in passenger kilometre travelled by 0.19 billion during the first 2 weeks of the *Ops* from 0.485 to 0.675 billion per week. This simply means that there were more passengers travelling in public buses during the *Ops* and the surge may be attributed to the '*balik kampung*' phenomenon for *Hari Raya*.

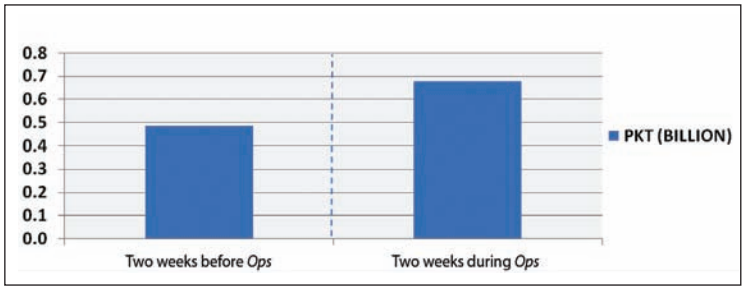


Figure 5.27 Passenger kilometre travelled (PKT)/week

In another scenario, public buses were also found to travel longer distances during the *Ops*. Table 5.28 indicates that the vehicle kilometre travelled for express buses increased from 20.59 two weeks before the *Ops* to 22.4 million VKT per week during the *Ops*.

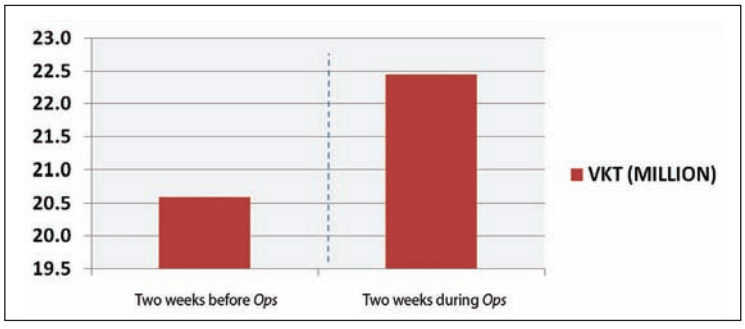


Figure 5.28 Vehicle kilometre travelled (VKT)/week

5.8 Media Dosage Analysis

The purpose of analyzing media dosage for *Ops Bersepadu Hari Raya Aidilfitri 2007* is to determine the total road safety news reported through newspapers, radio and television. To attain this objective, news and advertisements on road safety that were most frequently aired and advertised were analysed. The study period started 2 weeks before and during *Ops*, that is, on the 24 September 2007 until 4 November 2007.

Newspapers

A total of 14 newspapers were used as reference in this study. As shown in Table 5.10, 5 of the newspapers are in the Malay language, 2 in English, 4 in Chinese and the remaining 3 are in Tamil.

Table 5.10 Referred newspaper in the study

Malay	English	Chinese	Tamil
Utusan Berita Harian Sinar Metro Kosmo	The Star New Straits	Chinese Press Nan Yang Sin Chew Daily Guang Ming	Tamil Nessan Makkal Osai Malaysia

Figures 5.29 to 5.32 show the dosages from newspapers of 4 different languages. Overall, there was an increase in media dosage among all newspapers. However, a closer look at the graphs will indicate that the Indian and Chinese newspapers have injected higher dosages before the *Ops*. The Malay and English newspapers appear to be less excited in covering road safety issues. This is especially true for English papers where it can be seen that no news on road accidents was reported from 24 September to 2 October 2007. However, on 12 October 2007, the total media dosage on road safety rose dramatically, but dropped significantly on 14 October as many newspaper companies were closed on that day.

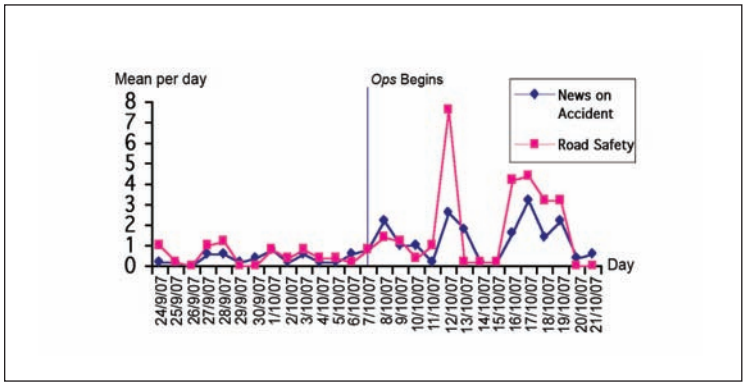


Figure 5.29 Road safety dosage in Malay newspapers

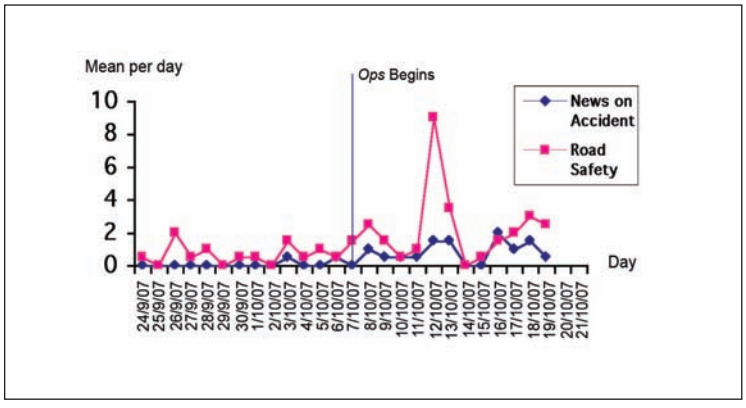


Figure 5.30 Road safety dosage in English newspapers

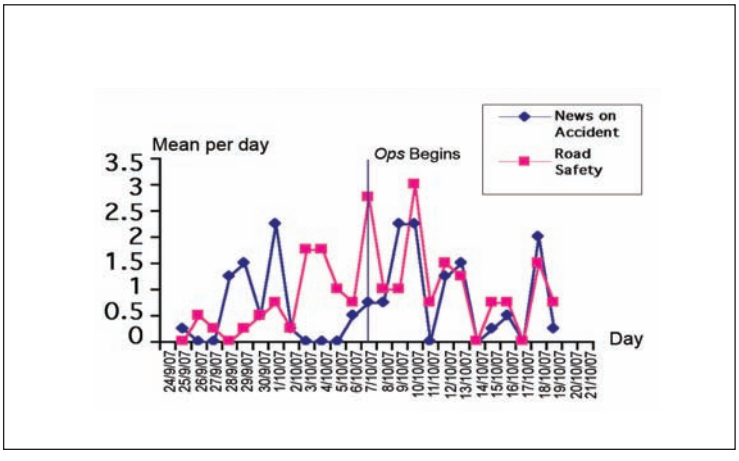


Figure 5.31 Road safety dosage in Chinese newspapers

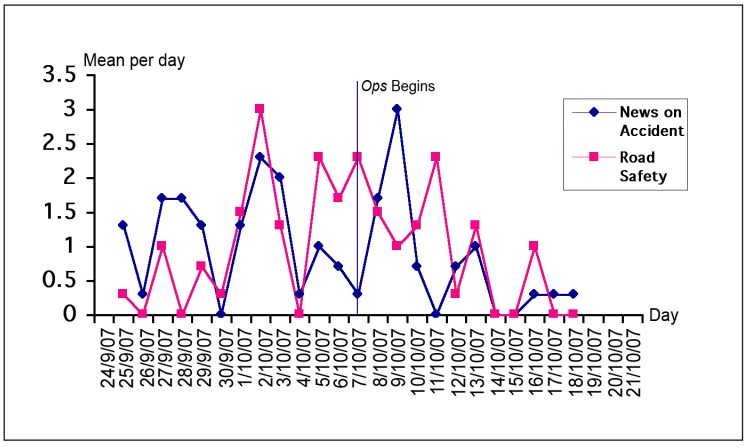


Figure 5.32 Road safety dosage in Tamil newspapers

The study also compared the types of information provided by the newspapers during the 4 weeks . The two types are news and information on road safety and news on road accidents. Figures 5 33 and 5.34 show all newspapers included in the study together with the data on the two types of information. It can be seen that more news and information on road safety were provided than news on accidents.

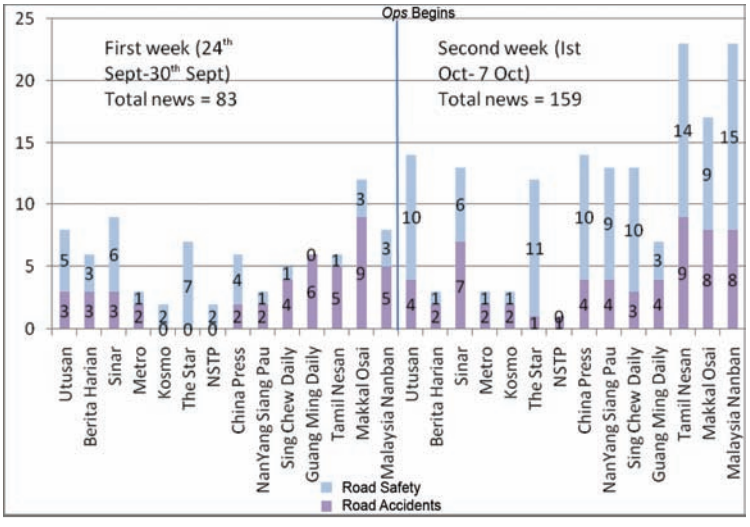


Figure 5.33 Amount of media dosage by individual newspapers (1st and 2nd weeks)

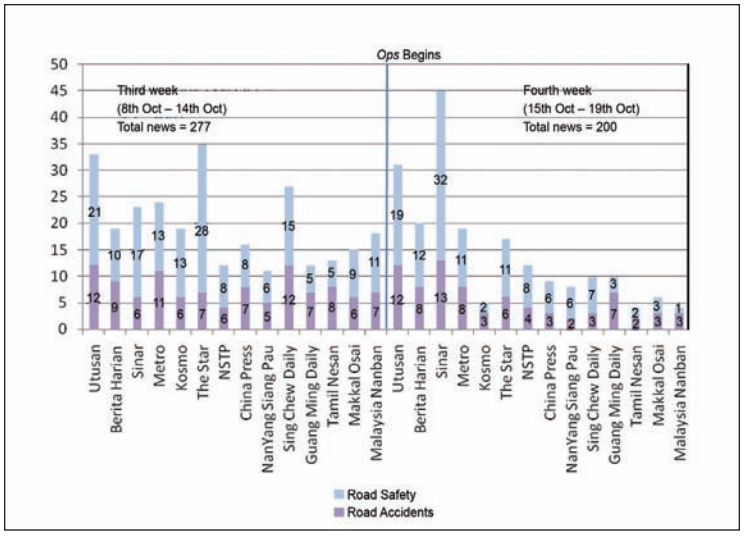


Figure 5.34 Amount of media dosage by individual newspapers (3rd and 4th weeks)

Radio

For radio news, 13 radio stations were selected for the study. Table 5.11 gives the names of the radio stations categorized into 4 different languages.

Table 5.11 Radio stations in the study

Malay	English	Chinese	Tamil
Era	Hitz	Ai FM	Minnal FM
Klasik Nasional	Mix FM	My FM	
X-Fresh	Traxx FM		
Muzik FM	Light FM		
Sinar	THR		

The media dosage for radio in relation to road safety coverage appears to show a different trend on closer observation. As shown in Figure 5.35, it is evident there were 2 stages of coverage before and during the *Ops*. During the first week beginning 24 October, coverage on road safety was minimal. The first wave began after 29 September where frequency of coverage doubled. However, a steep hike was recorded beginning the first day of the *Ops* on 7 October where a four- to five-fold increase in coverage frequency was recorded. This level of frequency stabilized and then continued to increase till the end of the *Ops*. The top 5 radio stations were THR, My FM, MIX, and ERA.

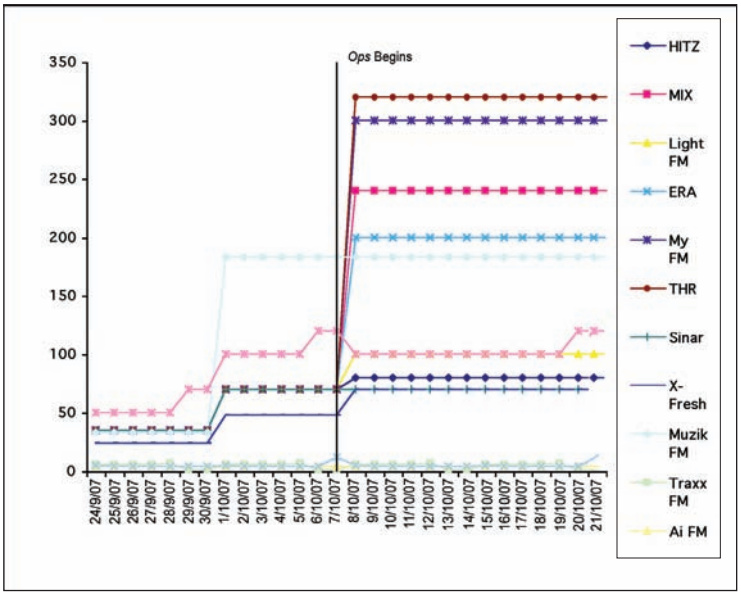


Figure 5.35 Media dosages for radio

Television

Television also plays a pertinent role in disseminating information and news on road safety. A total of 17 television stations were used as reference in this study. The television stations that were selected are listed in Table 5.12.

Table 5.12 Television stations included in the study

TV Stations		Astro		
TV1	CHA 9	Wah Lai Toi	CNN	Ria
TV2		Star Sports	Cartoon Network	Prima
TV3		ESPN	Nicklodeon	Vaanavil
8TV		Star World	Adventure	
NTV7		AXN	National Geographic	

The media dosage for television broadcasting is shown in Figure 5.36. The increase in road safety related coverage gained momentum in the first week before the *Ops*. Thereafter, the media dosage increased and stabilized on and after the commencement date of the *Ops*.

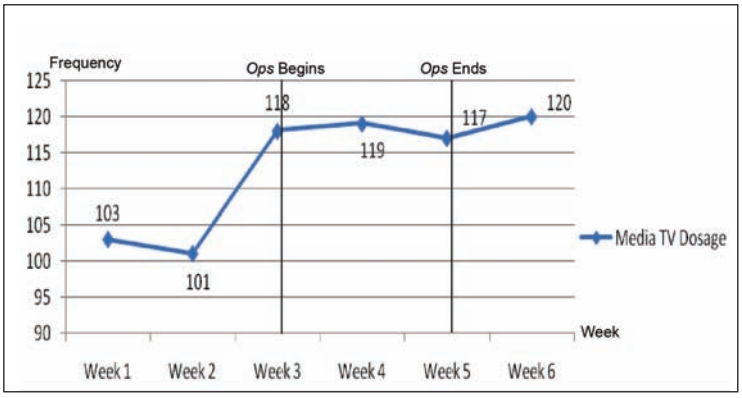


Figure 5.36 Media dosages on TV by week

Overall, the printed and electronic mass media have played an active role in disseminating campaigns, news and information on road safety. Figure 5 37 shows a combined illustration of all media contribution to uplift the awareness of road safety amongst Malaysians. Obviously, most media had started campaigning aggressively a week before the *Ops Bersepadu Hari Raya Aidilfitri 2007*. Unnoticed by some but realized by most is that the media have laid a strong foundation of awareness amongst road users long before the commencement of awareness campaigns by other agencies.

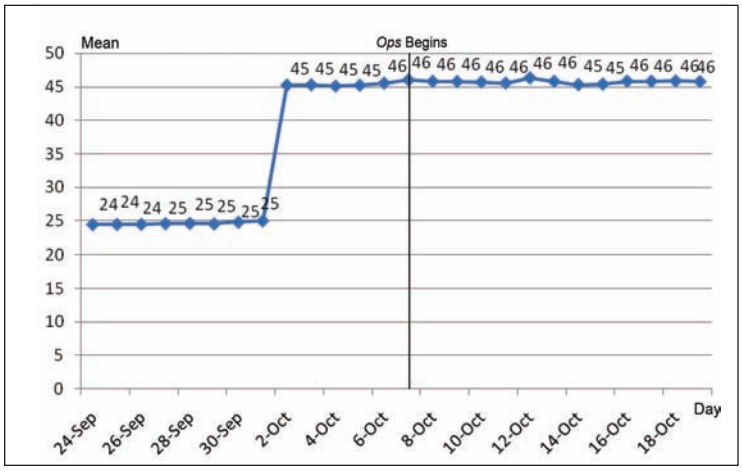


Figure 5.37 Overall media dosages for all media (newspaper, radio and television)

5.9 Real World Crashworthiness Investigation

Before the *Ops Bersepadu Hari Raya*, 4 high profile cases had been investigated involving 19 deaths. During the *Ops*, despite the increase in traffic on most of roads in Malaysia, there was only 1 high profile case that occurred in Sungai Pelek which involved 5 deaths (Table 5.13).

Table 5.13 High profile cases and fatalities before and during *Ops Bersepadu XIII*

High Profile Case Before *Ops*	Date	Fatalities
Paloh Hinai	17/09/2007	4
Kululut	29/09/2007	5
Marang	30/09/2007	3
Cherating	30/09/2007	7
	Total	19
High Profile Case During *Ops*	**Date**	**Fatalities**
Sungai Pelek	7/10/2007	5

In order to provide a more conclusive impact of the *Ops* on high profile cases of road accidents a chi-square analysis was conducted between other accidents and high profile accidents. Table 5.14 shows that the decrease in number of high profile cases was not significant during the *Ops* (> 0.05). Meanwhile, by using a similar analysis, the decrease in number of fatalities in high profile cases shows a significant improvement (< 0.05)(Table 5.15).

Table 5.14 Results of chi-square analysis on high profile cases compared to other road accidents

		Period		Total
		Before	After	
Type	Other accidents	249	187	436
	High profile	5	1	6
	TOTAL	254	188	442

($P > 0.05$)

Table 5.15 Results of chi-square analysis on high profile fatal accidents compared to other fatal road accidents

		Period		Total
		Before	After	
Type	Other accidents	249	187	436
	High profile	5	1	6
	TOTAL	254	188	442

($P < 0.05$)

6. Conclusion

An analysis of *Ops Bersepad*u was conducted to study the effectiveness of the integrated intervention. The analyses involved telemetric data plot, cumulative fatality plot, perception of being caught, speed change, vehicle kilometre travelled, passenger kilometre travelled, real world crashworthiness, media dosage and finally trauma and post injury management.

a. Impact on Fatal Accidents and Fatalities

Our analyses shows that *Ops Bersepadu* has been effective in reducing fatal accidents, fatalities and motorcycle fatalities. The actual cumulative number of fatal accidents was less than the projected cumulative mean of fatal accidents by 37 cases during the 14-day period of the *Ops*. The number of fatalities also dropped by 45 cases and specifically the ACN for motorcyclists was lower than the PCM by 40 cases.

From another perspective, deaths per billion VKT dropped from 16.3 to 13.7 which indicate that despite the higher kilometre travel recorded during the festive season, there was an actual reduction in the number during the *Ops*. Deaths per billion VKT for motorcyclists also saw a significant decline from 50.0 to 31.6 before and after the *Ops* respectively.

b. Impact on Overall Accidents

Our analyses shows that there was an increase in the number of total accidents by 1,067 cases compared to the projected number of total accidents. The accident per billion VKT indicator also shows a slight increase from 894.8 to 987.8. However, the less number of fatalities recorded basically shows that the increase was more of damage only accidents not involving casualties. Evidence from

deaths per billion VKT for cars also shows no significant change as the Fatality Index per billion VKT was only 7.18 and 7.68 before and during the *Ops* respectively.

c. High Profile Cases

There was a drop in high profile cases during this festival from 5 cases to only 1 case before and after the *Ops* respectively. Consequently, the number of fatalities involving high profile cases also plummeted from 19 before to only 5 cases after the *Ops*.

d. Perception of Being Caught

The overall perception of being caught for traffic offences during the *Ops* increased from 26.9% before to 45.4% during the *Ops*. Further analyses that focused on traffic offences show a definite increase in awareness between before and during the *Ops*. Dangerous overtaking at double lines captured the highest score of 27.9% perception difference with 27.9% before and 55.8% after the *Ops* followed by red running with 21.8% from 28.7% before and 50.5% after, not wearing helmet with 20.4% from 34.6% before and 55% after, queue jumping with 18.8% from 21.9% before and 40.7% after and speeding with 17.6% from 41.4% before and 59% after, respectively.

e. Speed Profiles

Our findings indicate that there was a marginal drop in speed of 2 km/h during this *Ops*. Although, the overall 85th percentile speed shows that road users exceeded the 80 km per hour speed limit which was enforced in the 90 km per hour zone along the federal routes during the *Ops* period, they are within the 10 km/h tolerence. Though speeding is considered a serious offence with a high penalty, our results on perception of being caught shows that this offence did not attract high attention among road users. This result specifically shows the importance of increasing awareness because despite the high increase in perception during the *Ops*, it did not come close to the minimum benchmark of 75%.

f. Modal Shift

It is very obvious from this study that the percentage of motorcyclists not riding their motorcycle to '*balik kampung*' saw a decline from 22.3% to 4.7%. Most of them shifted to other safer modes mainly to cars (56%) and buses (19%). Further, the ratio of private to public transport use increased from 85:15 to 82:18 during the *Hari Raya* period. From this data, it would be appropriate to accept that the campaign discouraging the use of the motorcycle and conversely encouraging the use of public transport has been successful.

g. Media Input and Dosage

Evidence from the electronic and printed media show that safety messages were doubled during the *Ops* compared to before the *Ops* began. Safety messages by television also increased though only by 20% during the *Ops* period. A thorough search into the contents of safety messages in the newspapers revealed that there was a good balance between safety messages and accident news reported to the public. High credit goes to the Chinese and Tamil newspapers for publishing more safety messages compared to other newspapers even before the commencement of the *Ops*. However, it is also important to note that the English newspapers contributed marginally towards this noble effort.

h. Trauma and Post Injury Management

It is important to note that data on trauma and post injury management is only limited to the paramedic activities at the Hospital Tengku Ampuan Rahimah, Klang. Our research explicitly shows that the average response time for day and night crashes improved from 48 minutes to 37 minutes and from 40 minutes to 34 minutes respectively. With increasing traffic during the *Ops*, our results show better performance in response time in treating the injured. This reflects a higher commitment among hospitals to reduce the agony of road accident victims during the integrated intervention

campaign. However it is worth noting that the international benchmark of response time for emergency cases is

- 50% of emergency cases responded to within 7 minutes
- 90% of emergency cases responded to within 12 minutes.

Despite the gap between international standards and our average response time for day and even at night crashes, we have improved and the time frame is well within the golden hour.

7. Recommendations

- The above evidence on significant improvements in several aspects of road safety speaks volumes on how the Integrated Approach has impacted on the reduction in fatalities and other casualties. This approach has proven to be successful and offers a compelling reason for it to be continued throughout the year.

- Enforcement, whether covert or overt, has greatly influenced awareness of complying with traffic regulations. As conventional enforcement has shown its effectiveness, the government should embark on the more sophisticated method of Automated Enforcement System Project (AES). Experience and research from developed countries have shown that AES can improve the awareness and perception of being caught and thereafter facilitate year-round enforcement. In short, AES must be expedited.

References

Abdul Rahmat, A.M., Ahmad Azad, A.R., Alvin Poi, W.H , Sharifah Allyana, S.R , Zulhaidi M.J., Radin Umar, R.S. (2007). *Ops Bersepadu Conducted Over the Chinese New Year Period from 11-25 February 2007*. MRR 01/2007 : 16 -18.

Halperin, K. (1993). *A Comparative Analysis of Six Methods for Calculating Travel Fatality Risk*. Volume 4.

Harrison, W.A. and Christie, R. (2005). Exposure Survey of Motorcycles in New South Wales. *Accident Analysis and Prevention* 37 : 441-451.

Lassarre, S. (2001). Analysis of Progress in Road Safety in Ten European Countries. *Accident Analysis and Prevention* 33 : 743-751.

Radin Umar, R.S. (1998). *Analisis Keberkesanan Program Keselamatan Bersepadu Semasa Perayaan Berkembar RR2/1998*. Universiti Putra Malaysia.

South Australian Ambulance Service Annual Report (SAASAR). 2005-2006.

White, S.B. (1976). On the Use of Annual Vehicle Miles of Travel Estimates from Vehicle Owners. *Accident Analysis and Prevention* 8 : 257-261.

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Research Report

The Effectiveness of OPS BERSEPADU

Conducted over the Hari Raya Period
from 7–21 October 2007

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