UNIVERSITI PUTRA MALAYSIA

AN EVALUATION OF THE BELIA DI JALAN RAYA ROAD SAFETY PROGRAMME

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AN EVALUATION OF THE *BELIA DI JALAN RAYA* ROAD SAFETY PROGRAMME

By

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

ACF	Autocorrelation Function
AR	Autoregressive Model
BAC	Blood Alcohol Concentration
CARS	Computerized Accident Reporting System
HD BFI	"Had been Drinking" Fatal and Injury Accident
MRC	Motorcycle Safety Foundation's Motorcycle Rider Course
MSTOX	Motorcycle Moving Straight or Turning and others Cross
MA	Moving Average Model
NIFI	Night-time Fatal and Injury Accidents
OR	Odds Ratio
PACF	Partial Autocorrection Function
SAS	Statistical Package for the Statistician
Sdv	Standard Deviations
SPSS	Statistical Package for Social Scientist
SVNM FI	Single Vehicle Night-time Fatal and Injury Accident Involving Male Drivers

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Master of Science.

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August 1998

Chairman: **Associate Professor Radin Umar, Ph.D.**

Faculty: **Engineering**

In November 1996, a road safety programme known as the *Belia di Jalan Raya* road safety programme was carried out in Hulu Langat. The main objective of this programme was to reduce traffic accidents and injuries, especially among the motorcyclists.

This thesis presents the impact of the one year safety programme in the Hulu Langat district. It provides an integrated approach to address accident problems by the enhancement of traffic enforcement, education and public information.

The accident data were collected 23 months before and 12 months after the programme, in two comparison locations, Hulu Langat and Shah Alam. Shah Alam was used as a matched-pair control in this analysis.

The Before and After analysis and the Box-Jenkins time series modeling technique were used to evaluate the effectiveness of the safety programme. Using the Before and After Chi-square test, it was found that the proportion of accidents in these two districts are significantly different. This implies that the safety programme has a significant effect on the reduction in the number of accidents, injuries and fatalities in Hulu Langat.

The Box-Jenkins Time Series analysis indicates an average reduction of 57 accidents, 8 hospitalized non-motorcyclist casualties, 15 non-motorcyclist fatalities, 18 hospitalized motorcyclists, 3 motorcyclist deaths, 3 young hospitalized non-motorcyclist casualties and 1 fatal motorcyclist in every month during the study period. In contrast, there had been an average increase in accidents and casualties in the comparison district, Shah Alam.

The Survival Analysis shows that there was a significant improvement in overall traffic safety status in Hulu Langat after the implementation of the safety programme. In contrast, changes in traffic safety status in the comparison location, Shah Alam, did not resemble improvement in Hulu Langat in direction and magnitude.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia
Sebagai memenuhi keperluan untuk Ijazah Master Sains.

PENILAIAN PROGRAM KESELAMATAN JALAN RAYA "BELIA DI JALAN RAYA"

Oleh

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Ogos 1998

Pengerusi: **Profesor Madya Radin Umar, Ph.D.**

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Pada November 1996, satu program keselamatan jalan raya untuk mengatasi masalah kemalangan khususnya yang melibatkan motosikal di daerah Hulu Langat telah dilancarkan. Objektif utama program tersebut adalah untuk megurangkan kemalangan dan kecederaan akibat kemalangan jalan raya, terutamanya kecederaan melibatkan penunggang motosikal.

Keputusan penilaian bagi keberkesanan program keselamatan ini selama setahun dipaparkan dalam laporan ini. Pelbagai pendekatan telah dijalankan dalam menjayakan program ini, dan ini melibatkan penguatkuasaan, pendidikan dan penyebaran maklumat mengenai keselamatan jalan raya kepada orang ramai.

Data kemalangan selama 23 bulan sebelum dan 12 bulan selepas program untuk dua kawasan berlainan telah dianalisis untuk mengecamkan perubahan dalam kemalangan jalan raya. Data kemalangan di Shah Alam telah dijadikan kawalan dalam kajian ini.

Dua kaedah iaitu Analisis Sebelum dan Selepas dan model siri masa Box-Jenkins telah digunakan untuk menilai keberkesanan program keselamatan. Analisis Sebelum dan Selepas membuktikan jumlah kemalangan sebelum dan selepas di Hulu Langat dan Shah Alam adalah berbeza secara bererti. Ini menunjukkan program keselamatan telah berjaya dalam mengurangkan bilangan kemalangan, kecederaan dan kematian di Hulu Langat.

Analisis siri masa Box-Jenkins menunjukkan pengurangan sebanyak 57 kemalangan, 8 kecederaan bukan penunggang motosikal, 15 kematian bukan penunggang motosikal, 18 kecederaan melibatkan

penunggang motosikal, 3 kematian melibatkan penunggang motosikal, 3 kecederaan melibatkan pemandu remaja dan 1 kematian melibatkan penunggang motosikal remaja setiap bulan dalam tempoh pelaksanaan program keselamatan. Diperhatikan penurunan dalam kemalangan tidak berlaku dalam kawasan kawalan, Shah Alam dalam tempoh masa yang sama.

Analisis Survival menunjukkan terdapat kemajuan dalam status keselamatan trafik secara keseluruhan selepas pelaksanaan program keselamatan. Sebaliknya tidak ada peningkatan dalam status keselamatan trafik di lokasi kawalan, Shah Alam.

CHAPTER I

INTRODUCTION

Malaysia has undergone rapid socioeconomic development in the last decade. As a newly industrializing country Malaysia has achieved average economic growth rates of 8% per year, which is roughly three times to that witnessed by Europe and North America. As a result, Malaysia is currently in different phases of the motorization transition. As of December 1996, the total number of registered vehicles has amounted to 7,686,684, which in turn increases the opportunity for individuals to utilize motor vehicles. Keeping pace with these developments is the increasing fatality rate resulting in 6,304 deaths in 1996 (Table 1). The disastrous figure of an average of 4,520 fatalities per year for the past 10 consecutive years is also alarming (Figure 1). The number of fatalities is expected to increase to 9,127 (Radin, 1996a) if no proper action is taken to offset the growth in traffic exposures.

Table 1: General Road Accident Statistics in Malaysia

Year	Vehicles Registered	Vehicles Involved in Accidents	Deaths	Casualties	Total
1976	1,429,84	80,995	2,405	16,922	19,327
1977	1,621,27	86,688	2,512	17,793	20,305
1978	1,829,95	91,122	2,561	19,098	21,659
1979	1,989,39	94,788	2,607	20,004	22,611
1980	2,357,38	99,485	2,568	19,836	22,404
1981	2,901,18	107,552	2,769	19,529	22,298
1982	3,246,79	126,474	3,266	19,554	22,820
1983	3,594,94	139,006	3,550	23,007	26,557
1984	3,941,03	140,012	3,637	21,865	25,502
1985	4,243,14	142,653	3,603	20,321	23,924
1986	3,52367	137,175	3,822	19,738	23,560
1987	3,674,48	131,609	3,320	18,479	21,799
1988	3,865,71	124,922	3,335	19,203	22,538
1989	4,155,19	127,279	3,773	26,264	30,037
1990	4,547,41	146,747	4,048	25,766	29,814
1991	4,942,04	161,823	4,331	25,776	30,107
1992	5,259,83	186,805	4,557	31,714	36,271
1993	5,656,03	220,939	4,666	37,020	41,686
1994	6,166,43	251,686	5,159	43,344	48,503
1995	6,802,37	275,430	5,712	46,440	52,152
1996	7,686,68	325,915	6,304	47,171	53,475

(Source: Royal Malaysia Police 1996)

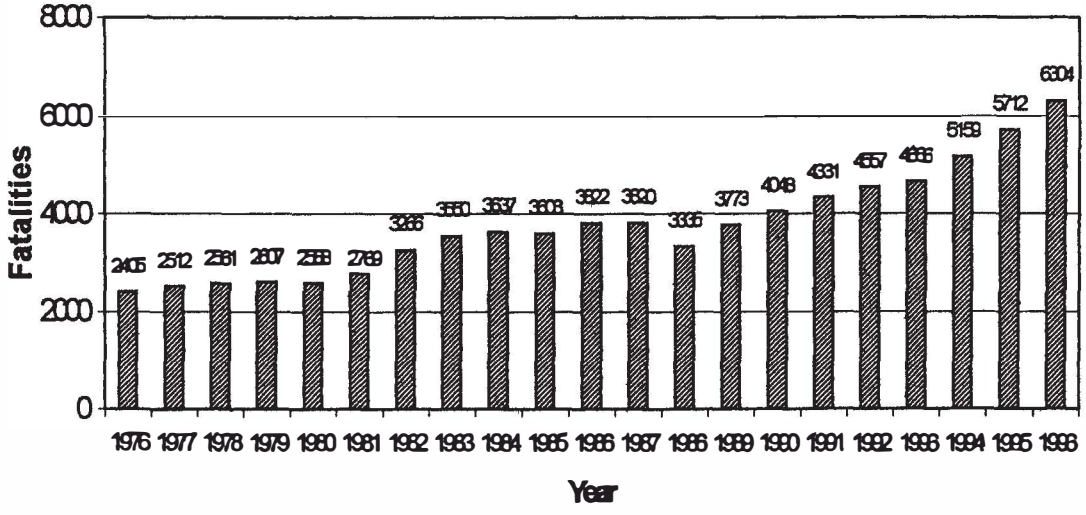

Figure 1: Malaysia Road Deaths 1976-1996

In Malaysia, riding a motorcycle is 17 times more dangerous as compared to driving a passenger car (Radin, 1995). In 1996 alone (Table 2) motorcycles made up approximately 51 percent of all registered motor vehicles and accounted for 22 percent of traffic accidents. In addition, a disproportionately large share of all traffic fatalities (60 percent) are resulted from motorcycle accidents.

Table 2: Motorcycle Accident Statistics in Malaysia

Year	Registered Motorcycles		Motorcycles Involved in Accidents		Deaths		Casualties	Total
1976	743,132	51.9%	18,187	22.4%	394	16.3%	5,601	5,995
1977	891,321	54.9%	19,170	22.1%	585	23.8%	6,823	7,408
1978	1,091,12	59.6%	20,556	22.5%	658	25.6%	7,864	8,522
1979	1,183,39	59.4%	19,839	20.9%	642	24.6%	7,496	8,138
1980	1,391,89	59.0%	19,969	20.0%	981	38.2%	7,365	8,346
1981	1,556,51	53.6%	20,433	18.9%	1,041	37.5%	9,005	10,046
1982	1,744,43	53.7%	26,706	21.1%	1,264	38.7%	10,308	11,572
1983	2,037,17	56.6%	30,992	22.2%	1,517	42.7%	12,796	14,313
1984	2,236,16	56.7%	30,451	21.7%	1,609	44.2%	12,726	14,335
1985	2,408,56	56.7%	30,433	21.3%	1,674	46.4%	12,563	14,237
1986	2,534,34	71.9%	27,779	20.2%	1,658	43.3%	12,233	13,891
1987	2,609,69	71.0%	25,074	19.0%	1,466	44.1%	10,947	12,413
1988	2,701,14	69.8%	23,145	18.5%	1,391	41.7%	11,329	12,720
1989	2,848,71	68.5%	23,974	18.8%	1,608	42.6%	14,994	16,602
1990	3,035,93	66.7%	27,845	18.9%	1,826	45.1%	15,857	17,683
1991	3,251,28	65.6%	29,225	18.0%	2,062	47.6%	16,235	18,297
1992	3,473,64	66.0%	39,272	21.0%	2,307	50.6%	21,957	24,264
1993	3,703,83	65.4%	46,511	21.0%	2,416	51.7%	26,226	28,642
1994	3,977,04	64.4%	58,921	23.4%	2,946	57.1%	31,957	34,903
1995	3,564,75	52.4%	66,508	24.1%	3,362	58.8%	34,372	37,734
1996	3,951,93	51.4%	73,268	22.4%	3,778	59.9%	35,960	39,738

(Source: Royal Malaysia Police 1996)

The increasing number of motor-vehicle crashing through the 1980s and 1990s has precipitated efforts to identify effective remedial programmes that should be directed toward enhancing traffic safety. As a result, the Malaysian Government proposed the implementation of a pilot traffic safety programme in Hulu Langat as a first step to address the above problems.

This thesis presents findings of an evaluation of the *Belia Di Jalan Raya*, Hulu Langat safety programme, undertaken by the Malaysian Government since November 1996. The aim of the study was to evaluate and take stock of what had been achieved thus far and to consider what further action is required to maintain a downward trend for road casualties for at least the remainder of the present century.

The study was commissioned by the Ministry of Transport and Malaysia Gerakan 4B Movement with the intention that it should be conducted on a fully inter-departmental basis. Whilst the primary responsibility for road safety policy lies with the Department of Transport, a number of other departments have a substantive interest in the subject. Their involvement and support can be crucial to the success of certain approaches to the problem.

The focus of the study is centred on two key issues below:

- Has there been a measurable reduction in the number of accidents and fatalities, especially in accidents involving motorcyclists, during the implementation of *Belia di Jalan Raya* safety programme?

- Is there reasonable evidence to indicate that such reduction can be attributed to *Belia di Jalan Raya* safety programme?

Objectives of *Belia di Jalan Raya* Safety Programme

The main objectives underpinning the *Belia di Jalan Raya* safety programme are:

- to place the road safety issue on the public agenda so that safer forms of behavior can be fostered
- to deter road users from unsafe behaviors by increasing their perceived risk of being involved in any traffic crash and of the painful consequences
- to deter road users from unsafe behaviors by increasing the perceived risk of being apprehended by the police
- to provide information to support decision-making that would lead to the adoption of safer forms of behavior

Objectives of the Study

The objectives of this study are as follows:

- to examine the effect of the *Belia di Jalan Raya* safety programme in reducing the number of accidents, especially the motorcycle accidents
- to examine the effect of the *Belia di Jalan Raya* safety programme in reducing the number of casualties, especially the motorcyclist casualties
- to examine the effect of the *Belia di Jalan Raya* safety programme in reducing the number of young casualties, especially the young motorcyclist casualties

Structure of the Thesis

The thesis consists of five chapters. Chapter I present the objectives of the study and describe the need to implement the traffic safety programme in the Hulu Langat district.

Chapter II reviews the literature concerning the motorcycle safety programme centering on two aspects. The first aspect depicts the approaches taken in safety programmes. These include education, public information and police enforcement. The second aspect describes the statistical analysis used to evaluate the effectiveness of previous traffic safety intervention, policies or programmes.

A complete discussion on the methodology of this study is presented in Chapter III. The discussion is divided into three parts:

- Part one discusses the details of road safety talks, police enforcement and public information programmes, which have been carried out in conjunction with the safety programme
- Part two discusses the process of data collection and processing
- Part three covers the design and method of the evaluation of safety programme

The discussion on the results is carried out in Chapter IV. The methods that are used in the analysis include the Before and After Chi-Square Test, Survival Analysis and Box-Jenkins Time Series Intervention analysis. The analysis has been carried out by using statistical softwares, such as Forecast Pro, SAS and SPSS Windows95.

The final chapter presents the main conclusions of the study. The limitations of the study and the recommendations for further study are also documented in this section.

CHAPTER II

ROAD SAFETY INTERVENTION AND EVALUATION METHOD

Road Safety education plays an increasingly important part in a systematic approach to road accident prevention. This is due to the realization that human errors are an important contributory factor in accident causation. Road safety education can reduce the probability of these human errors by influencing the road user in changing his perceptions, cognitions, attitudes, skills and behaviours. Hence, the fundamental approach to road safety lies in having a sustained programme of safety education with three main objectives. Firstly, the programme must aim to educate the road users in the safe and proper use of the road system. Secondly, efforts must be directed at inculcating the general public on the constant awareness that accidents can happen to anyone and at any time. Finally, it is to gain the acceptance of the road users for the various counter measures taken to prevent road accidents.

As in other areas of traffic safety, considerable effort has been placed on the education of motorcyclists as an effective means to address motorcycle crash problems. Education and training have been typically taken in two forms: