Economic Policies Relating to Motorcycle Fatalities in Thailand *

นโยบายทางเศรษฐศาสตร์กับการเสียชีวิตอุบัติเหตุจราจร รถจักรยานยนต์ในประเทศไทย

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Abstract

The road safety education program, which includes motorcycle safety education program, plays an important role in reducing traffic injuries and fatalities in Thailand. Since 2011, the Department of Land Transport has enacted the law that requires drivers to attend the road safety education program for four hours before taking a driver's license. Therefore, the need for evaluating the program should be recognized. The objective of this study was to analyze the government budget for the road safety and evaluate cost-effectiveness of the motorcycle safety education program.

The results showed that, of the total budget 7.31% was allocated for the direct road safety and 92.69% was allocated for the indirect road safety program. The direct road safety budget accounted for a small proportion of the overall budget. Moreover, of the direct budget for road safety 0.17% was allocated to the road safety education program which had been proved statistically significant in its reduction of the number of motorcycle traffic

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fatalities. The cost effectiveness analysis shows that the motorcycle safety education program in 2012 is more effective in preventing motorcycle accidents than the original program in 2007. Therefore, the government should focus an economic policy for budget allocation for the motorcycle safety education program in Thailand.

บทคัดย่อ

โครงการการให้ความรู้ด้านความปลอดภัยทางถนนรวมถึงการขับขี่รถจักรยานยนต์ที่ปลอดภัยมีบทบาทสำคัญในการช่วยลดการบาดเจ็บและการเสียชีวิตจากอุบัติเหตุจราจร กรมการขนส่งทางบกได้ดำเนินการออกกฎหมายการอบรมความปลอดภัยทางถนนก่อนการสอบใบขับขี่เป็นเวลา 4 ชั่วโมงตั้งแต่ปี 2554 ดังนั้นจึงเป็นสิ่งที่จำเป็นในการที่จะประเมินผลโครงการ วัตถุประสงค์ของการศึกษานี้คือการวิเคราะห์งบประมาณภาครัฐที่เกี่ยวข้องกับความปลอดภัยทางถนน และการประเมินต้นทุนประสิทธิผลของโครงการการให้ความรู้ด้านการขับขี่รถจักรยานยนต์ที่ปลอดภัย

ผลของการศึกษาพบว่า งบประมาณภาครัฐที่เกี่ยวข้องกับความปลอดภัยบนท้องถนนร้อยละ 7.31 ได้จัดสรรให้กับความปลอดภัยบนถนนโดยทางตรง และงบประมาณร้อยละ 92.69 ได้จัดสรรให้กับความปลอดภัยทางถนนโดยทางอ้อม ซึ่งจะเห็นได้ชัดเจนว่างบประมาณภาครัฐที่ได้จัดสรรให้กับความปลอดภัยบนถนนโดยทางตรง เป็นสัดส่วนที่น้อยมาก ยิ่งไปกว่านั้น งบประมาณที่ได้จัดสรรให้กับการให้ความรู้ด้านความปลอดภัยทางถนนมีเพียงร้อยละ 0.17 ของงบประมาณความปลอดภัยบนถนนโดยทางตรง และได้ถูกพิสูจน์ให้เห็นว่าทำให้ช่วยลดจำนวนผู้เสียชีวิตจากอุบัติเหตุจราจรรถจักรยานยนต์อย่างมีนัยสำคัญทางสถิติ ผลการวิเคราะห์ต้นทุนประสิทธิผลของโครงการการให้ความรู้ด้านการขับขี่รถจักรยานยนต์ที่ปลอดภัยก่อนการสอบใบขับขี่ ในปี พ.ศ. 2555 จนถึงปัจจุบันมีประสิทธิผลในการป้องกันการเกิดอุบัติเหตุรถจักรยานยนต์ ที่ดีกว่าโครงการในปี พ.ศ. 2550 ดังนั้นรัฐบาลควรให้ความสำคัญกับนโยบายทางเศรษฐศาสตร์ในการจัดสรรงบประมาณสำหรับโครงการการให้ความรู้ในการขับขี่รถจักรยานยนต์ที่ปลอดภัยในประเทศไทย

Introduction

Thailand became the country with the third highest traffic fatalities in the world with a rate of 38.1 per 100,000 inhabitants per year in 2010 (WHO, 2013). According to a report from the Bureau of Non Communicable Disease, Department of Disease Control (2015), the number of motor vehicle traffic fatalities in Thailand increased from 14,059 deaths in 2012 to 14,789 deaths in 2013. The major types of motor vehicles in traffic accidents were from motorcycles-related accidents, accounting 65% for all types of traffic accidents in 2012 (Department of Diseases Control, 2012). The cost of treatment for motorcycleaccident victims was approximately 2,476 million baht in 2012 (Ministry of Public Health, 2012). In addition, Thai citizens from the

working class and between the ages of 15 to 59 years old died from motorcycle-related accidents at a higher rate. The motorcycle traffic fatality problem in Thailand has raised the concern of public health officials, economists and policy makers as a result of a high number of from motorcycle-related accidents, economic loss, premature death, and the years of life lost (YLL) from motorcycle accidents.

Most motorcycle safety programs were conducted in the program of all motor vehicles safety programs by both government and non-government agencies in Thailand. Government policies related to road safety have been evaluated by various economics and government agencies over several decades. For example, Tosutho (1997) and Kosalakorn (2001) evaluate government budget for both direct and indirect road safety programs with deaths from road accidents. Yet, there is scant research directly economic evaluation budget for motorcycle safety education program in Thailand. It was important to analyze the government budget for both direct and indirect road safety programs for reducing motorcycle traffic fatalities and to evaluate the budget for motorcycle safety education programs in Thailand.

Therefore, it is crucial to evaluate the measurement of motorcycle safety education programs in Thailand. The Department of Land Transport has enacted a law that requires drivers attend the road safety education program for four hours before taking the driver license test since 2011. The budget for motorcycle safety education program should be studied and examined in terms of the major influence of motorcycle traffic fatalities.

Objectives

1. To analyze the government budget for road safety during 2004 to 2013.

2. To prove that budget for road safety education program would affect the fatality rate from in motorcycle traffic accidents.

3. To study on cost-effectiveness of budgets for motorcycle safety education programs issued by the Department of Land Transport.

Conceptual Framework

The conceptual framework of budget for motorcycle safety education program was conducted in three main methods that could effect in motorcycles traffic fatalities. The framework includes 1) analysis of the government budget for road safety 2) proving the budget for road safety education program, and 3) cost-effectiveness analysis for the motorcycle safety education program. The details were as shown in figure 1.

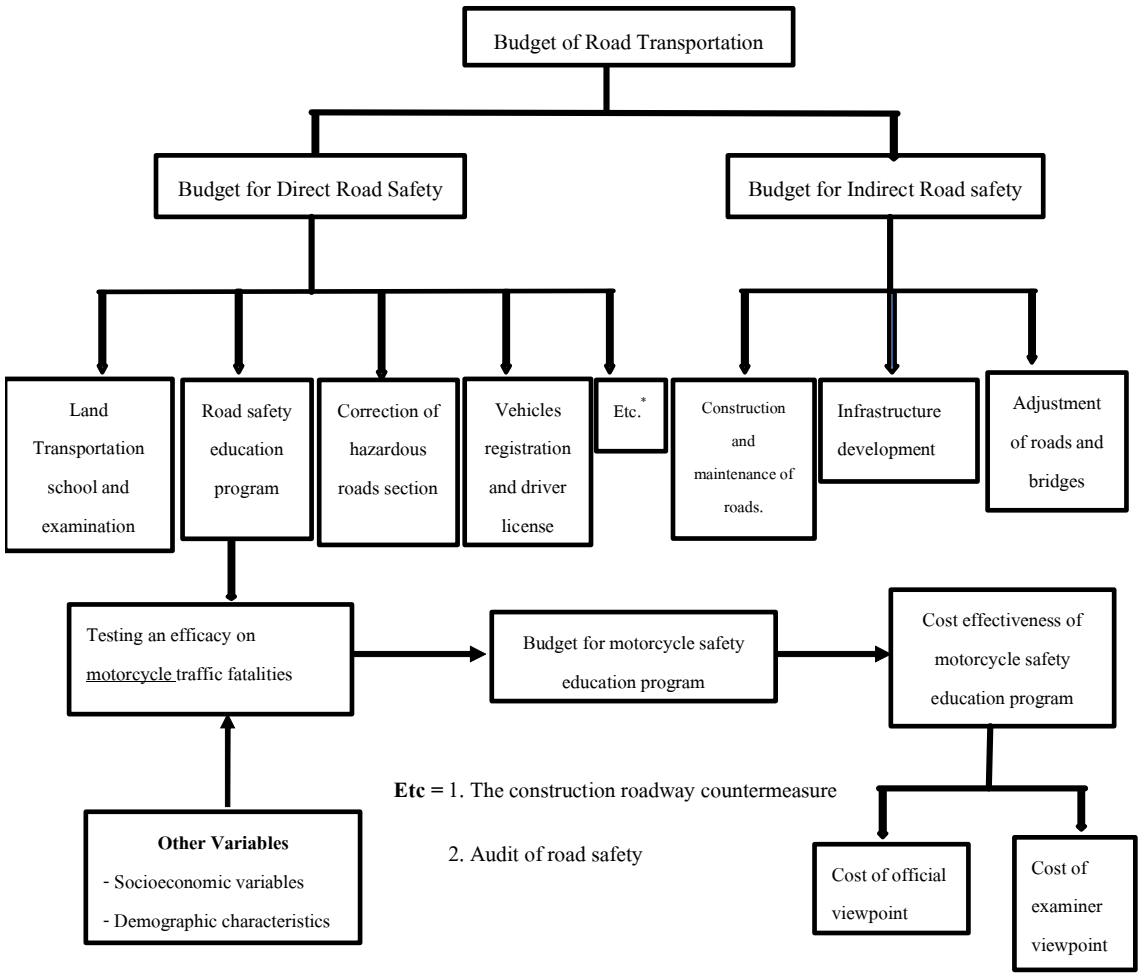


Figure 1 : Conceptual Framework of budget for motorcycle safety education program

Definition

Budget for motorcycle safety education program is cost for the original program issued in 2007 and training curriculum on motorcycle safety, the latter program issued in 2012 before taking the driver license test in the Department of Land Transport.

Methodology

The methodology of budget for the motorcycle safety education program was conducted three main methods that could affect motorcycles traffic fatalities as listed below :

1. Analysis of the government budget for road safety during 2004 to 2013.

The study analyzed the budget of road transportation in order to find the value of road transportation for direct and indirect road safety programs from the Bureau of the Budget. The data were collected by looking at the pattern of road transportation for direct and indirect road safety. Tosutho (1997) studied the efficacy of direct and indirect road safety budgets on traffic accidents. This study applied her study that the budget allocated for a direct road safety program was used for; (i) land transportation for schools; (ii) land transportation examination; (iii) monitoring of motor vehicles and road users; (iv) vehicle inspection; (v) vehicles registration and the processing driver license; (vi) road safety education programs; (vii) correction of hazardous road; and lastly (viii) an audit of road safety. The budget for the indirect road safety program was used for; (i) maintenance of roads; (ii) construction of roadways and countermeasures; (iii) development infrastructure; and lastly (iii) adjustment of roads and bridges.

2. Proving budget for road safety education program

Kosalakorn (2001) studied the economic consequences of policy-related variables on reductions in motor vehicles traffic fatalities. The study implemented the direct and indirect budgets for road safety transportation in the group of policy-related variables. The budgets were used for investing safety measurements on motor vehicles traffic accidents. In this study, the number of motor vehicles traffic fatalities per vehicle kilometer of travel was assigned as a dependent variable while the independent variables were divided into four groups, including: policy-related, socioeconomic, demographic characteristics and geographical characteristics.

In terms of a group of socioeconomic variables, Beeck EF.(2000) examined the association between prosperity and traffic accident mortality in the industrialized countries. The result found that economic development could lead to a growing number of traffic-related factors. Grimm and Treibich (2010) evaluated gross national income per capita (GNI) with road traffic accident fatalities in countries of low and middle income. Their study found that GNI in low and middle income countries had negative impact on road traffic fatalities. Level of education as normalizing variables was used in the models in the study by Fowles et al. (2014), Blattenger et al. (2012), Kosalakorn (2001) and Tosutho (1997). Their study found that motor vehicles fatality rate has a negative impact on motorcycle traffic fatalities.

Demographic characteristics were used as a proxy for motor vehicle usage. The studies by Permpoonwiwat and Kotrajaras (2012) used the number of motor

vehicles registrations as the independent variables. The study by Torre et al.(2005) evaluated the number of motor vehicles circulating and road length as the independent variables with the number of traffic mortality and injured people rate. The results of their study found that the number of motor vehicles circulating and road length had an inverse association with the number of traffic mortality and injured people rate.

Zlatoper T.J. (1984) provided regression analysis of time series using data on motor vehicle deaths in the United States to estimate the equation. Data collected on his study were annual time series capturing motor vehicle deaths occurred during 1947 to 1980. Fowles et al. (2014) studied motorcycle accidents revisited in the United States. This study, data were analyzed by using a classical fixed model and Ordinary Least Squares technique.

The methodology of this study was applied from the review of studies mentioned the prior section. The multiple regression analysis was applied to prove the budget for road safety education program. Independent variables were divided into three groups, including: policy-related, socioeconomic, and demographic characteristics on motorcycle traffic fatalities in Thailand. The equation that incorporates these variables can be written as:

Motorcycle Fatality Rate = f (Policy-Related, Socioeconomic, Demographic)

The independent variables included budgets of road transportation for direct and indirect road safety programs issued by the Bureau of the Budget, national Income per capita from the office of the National Economic and Social Development Board, the percent of students who attend vocational schools from the Ministry of Education and the number of bus registrations from the Department of Land Transport. The study estimated model by regressing the rate of motorcycle fatalities rate per 10,000,000 motorcycle kilometer travel on a set of explanatory variables. Time series data were used to analyze the budget for road safety education program. Definitions of the variables for motorcycle traffic fatality model during 2004 to 2013 are as shown in table 1. The model of motorcycle traffic fatalities in Thailand to be tested for road safety education program was specified as below:

$$\text{LnFatalmcvkt} = \beta_0 + \beta_1 \ln(\text{Budgetedu}) + \beta_2 \ln(\text{Budgetcorrect}) + \beta_3 \ln(\text{Budfestother}) + \beta_4 \ln(\text{Budgetindirect}) + \beta_5 \ln(\text{NIcap}) + \beta_6(\text{Eduvocational}) + \beta_7 \ln(\text{busregis}) + \varepsilon$$

Table 1 : Variables Definition Motorcycle Traffic Fatalities Model Year 2004 – 2013

Variables	Definition	Sources	Expected Effect on the Dependent Variables
Dependent Variable:			
FATALMCVKT	Motorcycle traffic fatalities per motorcycle vehicle travel	Ministry of Public Health, Department of Highway	
Independent Variables:			
Policy-related variables			
Budget of Road Transportation for Direct Road Safety			
Budgetedu	Budget for road safety education	The Bureau of the Budget and Department of Land Transport	-
Budgetcorrect	Budget for hazardous correction	The Bureau of the Budget	-
Budfestother	Budget for festival campaign and other direct budget	The Bureau of the Budget	-
Budget of Road Transportation for Indirect Road Safety			
Budgetindirect	All indirect budget for road safety	Department of Highway	-
Socioeconomic variables			
NIcap	National income per capita	National Statistical Office	+/-
Eduvocational	Percent of students in a vocational school	Ministry of Education	-
Demographic characteristics			
Busregis	the number of bus registrations	Department of Land Transport	+

3. Cost-effectiveness analysis for motorcycle safety education program

Cost effectiveness analysis (CEA) in the areas of public health, health outcomes are expressed in natural units including the number of cases of disease prevented, number of lives saved, or number of life years gained. CEA were useful in comparing alternative programs (Nord, 1999). The study by Tangrattanapitak.S et al. (2013) and Tangsayan et al.(2014) assessed cost effectiveness in controlling blood glucose in diabetic patients. The study incorporated both provider and patient's perspectives into the analysis. Drummond et al. (1987)

gave an example of two programs including program A – hypertension screening and treatment at work by a nurse and program B – hypertension screening at work and treatment by community. They calculated the cost-effectiveness of two programs by dividing cost of program (C) with effectiveness of program (E). It can be written as E/C. These studies also focused on the cost-effectiveness for motorcycle safety education program.

This study used a cross-sectional study of cost-effectiveness for the motorcycle safety education program issued in 2012 to compare with the program that was issued in 2007. The steps for conducting cost-effectiveness analysis for the motorcycle safety education program included:

3.1. Programs for motorcycle safety education.

The programs were divided into two programs, including program A, the original program two-hour program for motorcycle education issued in 2007 and program B, a four-hour training curriculum program in motorcycle safety issued in 2012. Motorcycle riders were required to attend the programs before taking the driver license test.

3.2. The total cost based on the official's viewpoint for the original program issued in 2007 and training curriculum on motorcycle safety, the latter program issued in 2012. The cost composed of labor cost, operating cost and capital cost which can be described as:

3.2.1 The labor cost is cost that occurred from the officials working in the original program for two hours in 2007 and training curriculum on motorcycle safety for four hours in 2012. The labor cost was calculated by multiplying the number of officials, work hours, work days, wages per hour and the number of offices for traffic license test in Thailand.

3.2.2 The operating cost was from the reports of each program and campaigns for each project from the Department of Land Transport.

3.2.3 The capital cost was the cost of officials who provided training on motorcycle schools and field tests for the original program in 2007 and training curriculum in 2012. The cost of construction and maintenance buildings did not take in to account because the cost of both programs was not different.

3.3 The total cost based on the examiner's viewpoint for the original program issued in 2007 and training curriculum on motorcycle safety, the latter program issued in 2012. The cost composed of travel cost, meal cost and opportunity cost that were due to absence from work for 1 day.

3.4. Effectiveness of motorcycle safety education program

The interventions were modeled to result in outcomes in the saving from

the victims of motorcycle accident related fatal and injury. The effectiveness of motorcycle safety education program or the outcomes of intervention was measured in the context of a number lives saved by injuries and fatalities. The value of effectiveness of the program was calculated from the group of rider's license card whose lives were saved from motorcycle traffic accidents.

3.5 Cost effectiveness analysis of motorcycle safety education program

Cost effectiveness analysis of motorcycle safety education program was assessed by total cost compared with the number of lives saved by injured persons and fatalities relating to motorcycle accident in 2007 and 2012. The outcomes of CEA were taken to estimate which year had the lowest cost of conducting the program.

Results

The results of economic policies relating to motorcycle fatalities of budget for motorcycle safety education program in Thailand were comprised of three parts, including

1. Analysis of the government budget for road safety
2. Testing budget for road safety education program
3. Cost effectiveness analysis of motorcycle safety education program

1. Analysis of the government budget for road safety

The results of the analysis of the government budget for direct and indirect road safety during the years of 2004 to 2013 revealed that o the total budget for road transportation, about 7.31% was allocated for direct road safety and about 92.69% was allocated for indirect road safety. Additionally, 0.17% was allocated for the budget for road safety education from the Department of Land Transport. The results clearly show that such a small amount of the budget was conducted road safety education. The finding details of analysis the government budget for road safety were shown in table 2 and figure 2.

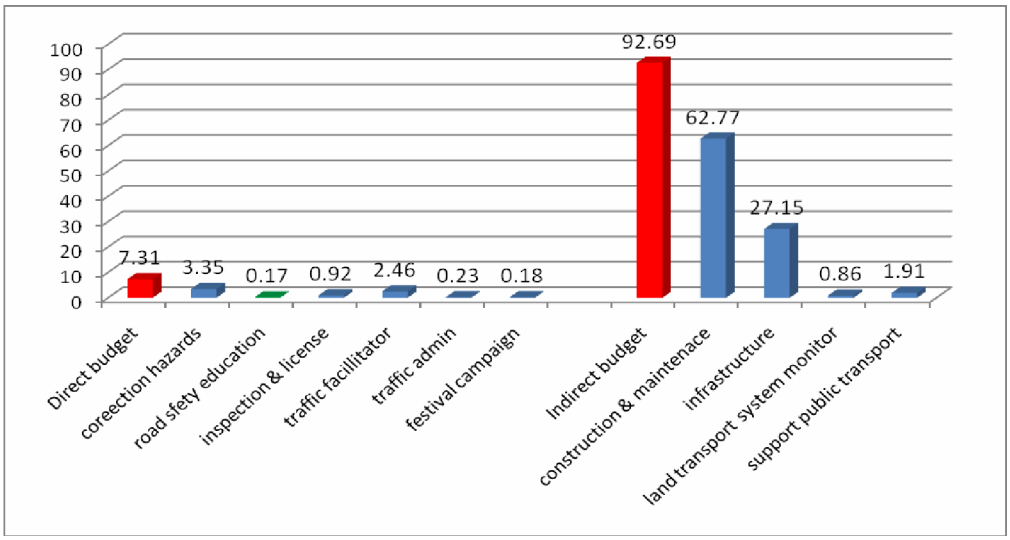
Table 2 : Budget for direct and indirect road safety

List	Budget ($)	Office
Direct road safety		
1. Correction hazards on roads	670,720,935.48	Department of Highway
2. Road safety education program	33,365,855.13	Department of Land Transport
3. Automobiles inspection, vehicles registration and driver license	183,560,780.65	Department of Land Transport
4. Traffic facilitator and strong enforcement	493,320,887.10	The Royal Thai Police
5. Traffic administration	45,763,064.52	The Office of Transport and Traffic Policy and Planning
6. Festival campaign	35,513,896.77	Department of Disaster and Mitigation
Indirect road safety		
7. Construction and maintenance of highway roads and bridges	12,566,229,737.32	Department of Highway
8. Infrastructure development and maintenance of rural roads	5,434,658,977.42	Department of Rural Roads
9. Land transportation system administration	171,449,970.42	Department of Land Transport
10. Support for public transportation	382,902,777.42	Special administration region namely; Bangkok and Pattaya
Total	**20,020,067,527.93**	

Source : The Bureau of the Budget during the year 2004 - 2013

Budget allocation for the direct and indirect road safety programs for each countermeasure was shown in the figure 2. The figure shows that the budget for the road safety education accounted for 0.17% which considered a small budget when compared with other measures related to the programs for traffic accident prevention in Thailand.

Figure 2 : The Percent of Budget for direct and indirect road safety during the year 2004 to 2013



Source : The Bureau of the Budget during the year 2004 to 2013

2. Testing the budget for road safety education program

This paper aimed to study the cost-effectiveness for the motorcycle safety education program. This section proved the significance of the budget for the road safety education program. The time series was applied to evaluate an effectiveness of the budget for road safety education programs. The study found that policy-related, socioeconomic and demographic characteristics variables were statistically significant and had an impact on motorcycle traffic fatality rates. The findings can be found in table 3.

Policy-related variables

The analysis found that there was a statistically significant negative relationship between policy-related variables such as budget for road safety education programs, relevant campaigns issued during festivals and motorcycle traffic fatality rate. The analysis also showed that there was statistically significant positive relationship between the budget for road correction and the

fatality rate. In addition, all indirect budgets for road safety variables yielded insignificant relationship with motorcycle traffic fatality rate.

Socioeconomic variables

Socioeconomic variables such as national income per capita and the percent of students with a vocational training school were significant results associated with motorcycle traffic fatality rates in Thailand. National income per capita had a positive relationship but the percent of students in a vocational training school had a negative relationship with motorcycle traffic fatalities rate.

Demographic characteristics

Demographic characteristic was represented by the number of bus registration. The study found that the number of bus registrations had a significantly negative relationship with motorcycle fatalities. It seemed that the number of bus registrations increases the people who would use the bus for transportation representative motorcycle. Moreover, it can be explained that the number of bus registrations was higher, the travel speed was lower, so the motorcycle traffic fatalities were reduced.

Interestingly, the budget for road safety education from the Department of Land Transport had proved a statistically significant in a reduction of the number of motorcycle traffic fatalities. Moreover, the percent of students with a vocational education was a statistically significant in a reduction of the number of motorcycle traffic fatalities. Education was highly related to the motorcycle traffic fatalities and a reduction of the number of motorcycle traffic fatalities. Therefore, this study selected the program of the motorcycle safety education program in order to analyze the effectiveness in the allocation of funds from government budget for the motorcycle safety.

Table 3 : Estimation Coefficient

Variable	Coefficient	Std.Error	t-Statistic	Prob
Constant	8.50	1.20	7.10	0.01 **
Independent Variables				
Policy – related Variables				
Budget for road safety	- 0.32	0.05	-7.11	0.01 **
education				
Budget for correction	0.31	0.06	5.20	0.03 **
hazardous				
Budget for festival	- 0.12	0.02	- 5.47	0.03 **
campaign and others				
All indirect budgets	- 0.05	0.05	- 0.99	0.42
Socioeconomic Variables:				
Vocational school	- 2.89	0.29	- 9.84	0.00 **
National Income capita	0.00	0.00	10.00	0.01 **
Demographic Characteristics:				
Number of bus	- 0.00	0.00	-11.83	0.00 **
registrations				

R-squared : 0.9973 **Durbin-Watson stat** 2.28

** Significance at the 0.05 level

3. Cost effectiveness analysis of motorcycle safety education program

The results of cost effectiveness analysis of the motorcycle safety education program found that cost-effectiveness of the original program for motorcycle education of injuries was a value of 7.69 dollars in 2012 and training curriculum program for motorcycle safety education was 7.98 dollars in 2007. The cost-effectiveness for injuries of motorcycle safety education program in 2012 was lower than the cost-effectiveness of the original program for motorcycle education in 2007. It was obvious that the cost-effectiveness of the training curriculum program for motorcycle safety education was cheaper than the original program for motorcycle education for two hours. The CEA for program A and program B injuries data details are shown in table 4.

Table 4 : CEA of motorcycle safety education program with saving life from injuries.

Year	Interventions	Total Cost ($) (1)	Adjusted total cost ($) (2)	Effectiveness from injuries (persons) (3)	Cost effectiveness from injuries ($) (5)
2007	Program A: original program for motorcycle education for two hours	73,174,920.28	88,460,718.92	11,090,245	7.98 *
2012	Program B: training curriculum program in motorcycle safety for four hours	90,167,458.42	94,630,310.25	12,299,918	**7.69** *

(* = By calculation)

Source : Department of Land Transport 2007, 2012

Cost effectiveness with program A: original program for motorcycle education of fatalities was a value of 7.65 dollars in 2012 and program B : training curriculum program for motorcycle safety education was 7.91 dollars in 2007. Similarly the cost-effectiveness of injuries and fatalities of motorcycle safety

education program B in 2012 was lower than the original program A in 2007. It could be explained that the cost with program B was cheaper than program A as well. The cost-effectiveness of program A and B intervention from fatalities data details are shown in table 5. Additionally, the effectiveness of training curriculum in motorcycle safety education program from fatalities and injuries were better than theoriginal program for motorcycle education in 2007. The curriculum in the motorcycle safety education program was conducted from the year 2011 until the present and has shown the effectiveness of the program for motorcycle accidents in Thailand.

Table 5 : CEA for motorcycle safety education program with saving life from fatalities

Year	Interventions	Total Cost ($) (1)	Adjusted total cost ($) (2)	Effectiveness from fatalities (persons) (3)	Cost effectiveness from fatalities ($) (4)
2007	Program A: original program for motorcycle education for two hours	73,174,920.28	88,460,718.92	11,187,630	7.91 *
2012	Program B: training curriculum program in motorcycle safety for four hours	90,167,458.42	94,630,310.25	12,371,964	**7.65 ***

(* = By calculation)

Source : Department of Land Transport 2007, 2012

Tables 4 and 5 showed the value of the CEA of Program A and B which were not much different. However, if the value of the cost-effectiveness for the motorcycle safety education program with saving lives from injuries is calculated by using the persons who had rider license cards in the year 2014 (1,103,563 cards), it can be shown that program B could save money approximately 320,033.27 dollars or 10,401,081.28 baht (Program A = 8,806,432.74 and Program B = 8,486,399.47$). It was pointed out that program B could save the government budget and have the effectiveness for motorcycle accidents. On the other hand, program B was better than program A.

Conclusion

The total budget of road transportation that was allocated to direct road safety was about 7.31% and that which was allocated to indirect road safety was about 92.69%. However, the direct budget for road safety that was allocated to the budget for road safety education was only 0.17%. In addition, the budget for the road safety education program from the Ministry of the Department of Land Transport had proved statistically significant in a reduction of the number of motorcycle traffic fatalities. Interestingly, the percent of students with a vocational education, which had launched wearing helmet 100% program and motorcycle safety education program, was a statistically significant in a reduction of the number of motorcycle traffic fatalities. The budget for the motorcycle safety education program had the effectiveness to prevent motorcycle accidents in Thailand.

The government budget for motorcycle accident prevention in reducing the economic burden from motorcycle accidents, many methods are also unavoidable. Public policies include an universal helmet law, motorcycle traffic training in schools, riding at a high speed, riding while under the influence of alcohol and strong law enforcement needed for motorcycle safety in Thailand. To set the standard on safety of motorcycles would be conducted to prevent motorcycle modifications in Thai teenagers group as well. As supported by Hung and Huyen (2011) stated that the human factor was also conducted to be the central element and influences of traffic safety measures on driver awareness and behavior which were essential to take into consideration.

Discussion

Becker G. (1992) pointed out in the theory of human capital that investment in human capital for training or education would increase the marginal of trainees who would get more in safety knowledge. Based on the future success of reduction of the loss of life

and injuries associated with motorcycle traffic accidents, the government and other organizations should allocate the budget for motorcycle safety education programs by training curriculum program in order to support good behavior for motorcyclist. Although, the government budget for the road safety education program was a small amount of money, it appeared to be an effective program for society for saving life from motorcycle accidents. In other words, this intervention could save human life by training the group of motorcycle license test. That is, the government budget has taken the concept of human capital to conduct the program. As supported by Grossman (1972), human capital increases productivity.

However, Thailand would put effort to prevent motorcycle accident by the other programs including road improvement, motorcycle inspection and helmet law enforcement as well. These interventions could help to press the problem of motorcycle accidents besides the motorcycle safety education program. These efforts would achieve results to reduce motorcycle traffic accidents in Thailand.

The result of the CEA for the motorcycle safety education program had been a related to reducing motorcycle traffic fatalities. That is, investment in the training program on motorcycle safety in order to prevent injuries and save lives. As supported by Ingsatit et al. (2009), the safety riding training program for the riding license course could reduce the number of motorcycle accidents by 30% when compared with a group of non-training participants. Such results do make strong cases for the investment from the government for road safety especially in the cases of motorcycles.

This study would support economic policies for a decision making of budget allocation for motorcycle safety education program. The investment of this program focused on training motorcyclist examiner and educating road safety through media campaign in order to reduce injuries and fatalities from motorcycle accidents in Thailand. To increase effectiveness, the government should support the Department of Land Transport to work with this program to further increase efficiency. It is important to improve motorcycle safety training courses every year. In addition, the government should support public and private organizations to give motorcycle safety education programs for Thai citizens including in schools and academic institutions. Because spending on motorcycle safety education is an investment in human capital in order to realize over the quality of life of the individual. The next research should study the determinants of motorcycle accidents in Thailand to understand the causes of motorcycle accidents and the methods

of policy implementation to reduce them. These factors should be examined to determine their efficacy in reducing motorcycle fatality and injury rates.

The contribution of this study was effective procedures to reduce the loss of life and injuries associated with motorcycle traffic accidents. Therefore, the regular budget for motorcycle accident prevention should be taken into account to allocate funds for motorcycle safety education program.

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