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PATTANI THAILAND



**Factors Associated with Fatal Events from the Unrest in the Southernmost  
Provinces of Thailand**

*Prince of Songkla University  
Pattani Campus*

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**A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of  
Master of Science in Research Methodology  
Prince of Songkla University  
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**Thesis Title** Factors Associated with Fatal Events from the Unrest in the Southernmost Provinces of Thailand

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ชื่อวิทยานิพนธ์	ปัจจัยที่มีความสัมพันธ์กับเหตุการณ์ความไม่สงบที่มีผู้เสียชีวิตในจังหวัดชายแดนใต้
ผู้เขียน	นายอับลฟาต๊ะห์ มะสาแม
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ปีการศึกษา	2561

### บทคัดย่อ

เหตุการณ์ความไม่สงบในจังหวัดชายแดนภาคใต้ของประเทศไทยเกิดขึ้นอย่างต่อเนื่องซึ่งส่งผลกระทบต่อการดำรงชีวิตของประชาชนในพื้นที่ การศึกษานี้มีวัตถุประสงค์เพื่อศึกษาแนวโน้มของเหตุการณ์ อธิบายลักษณะของการเกิดเหตุ ปัจจัยที่มีความสัมพันธ์กับเหตุการณ์ที่มีผู้ได้รับผลกระทบ และปัจจัยที่มีความสัมพันธ์กับความรุนแรงของเหตุการณ์ ไขข้อมุลย้อนหลัง 14 ปี ตั้งแต่ ปี พ.ศ. 2547 ถึง พ.ศ. 2560 จากศูนย์ประสานงานวิชาการให้ความช่วยเหลือผู้ได้รับผลกระทบจากความไม่สงบจังหวัดชายแดนใต้ (ศวชต.) ตัวแปรอิสระ ได้แก่ ปีที่เกิดเหตุ เดือนที่เกิดเหตุ วันที่เกิดเหตุ ช่วงเวลาที่เกิดเหตุ จังหวัดที่เกิดเหตุ บริเวณที่เกิดเหตุ พื้นที่เกิดเหตุ และลักษณะการก่อเหตุ และตัวแปรตามเป็นแบบสองค่าซึ่งมี 2 ตัวแปร คือ ตัวแปรเหตุการณ์ความไม่สงบที่มีเหยื่อและไม่มีเหยื่อ และตัวแปรความรุนแรงของเหตุการณ์ที่มีร้อยละของผู้เสียชีวิตมากกว่าหรือเท่ากับ 75 และน้อยกว่า 75 วิเคราะห์ข้อมูลด้วยค่าความถี่ และร้อยละ ทดสอบความสัมพันธ์ระหว่างตัวแปร ด้วยการทดสอบไควสแควร์ และการถดถอยโลจิสติกส์ ผลการศึกษาพบว่า ตั้งแต่ ปี พ.ศ. 2547 ถึง พ.ศ. 2560 มีเหตุการณ์ความไม่สงบจำนวน 17,724 ครั้ง เป็นเหตุการณ์ที่มีเหยื่อจำนวน 9,701 ครั้ง คิดเป็นร้อยละ 54.7 และในจำนวนนี้เป็นเหตุการณ์ที่มีร้อยละของผู้เสียชีวิตมากกว่าหรือเท่ากับ 75 จำนวน 3,125 ครั้ง คิดเป็นร้อยละ 32.2 การวิเคราะห์การถดถอยโลจิสติกส์ มี 2 ตัวแบบ ตัวแบบแรก พบว่า ปีที่เกิดเหตุ เดือนที่เกิดเหตุ วันเกิดเหตุ ช่วงเวลาที่เกิดเหตุ จังหวัดที่เกิดเหตุ บริเวณที่เกิดเหตุ และลักษณะการก่อเหตุมีความสัมพันธ์กับเหตุการณ์ที่มีเหยื่อและไม่มีเหยื่อ โดยปี พ.ศ. 2548 ถึง พ.ศ. 2560 มีโอกาสเกิดเหตุการณ์ที่มีเหยื่อน้อยกว่า ปี พ.ศ. 2547 จังหวัดสงขลามีโอกาสเกิดเหตุการณ์มีเหยื่อมากกว่าจังหวัดปัตตานี ในขณะที่จังหวัดยะลาและนราธิวาส มีโอกาสเกิดเหตุการณ์ที่มีเหยื่อน้อยกว่าจังหวัดปัตตานี พื้นที่ที่พิกอาศัยมีความเสี่ยงที่จะเกิดเหตุการณ์ที่มีเหยื่อสูงกว่าบนท้องถนน และการ

วางระเบิด การก่อวิน การวางเพลิง และอื่น ๆ มีความเสี่ยงที่จะเกิดเหตุการณ์ที่มีเหื่อนน้อยกว่าการใช้อาวุธปืน

ตัวแบบที่สอง พบว่า ปีที่เกิดเหตุ ช่วงเวลาที่เกิดเหตุ จังหวัดที่เกิดเหตุ บริเวณที่เกิดเหตุ และลักษณะการก่อเหตุ มีความสัมพันธ์กับความรุนแรงของเหตุการณ์ โดยที่ ปี พ.ศ. 2559 มีโอกาสเกิดเหตุการณ์ที่มีร้อยละของผู้เสียชีวิตมากกว่าหรือเท่ากับ 75 น้อยกว่า ปี พ.ศ. 2547 จุดตรวจหรือด่านตรวจมีความเสี่ยงที่จะเกิดเหตุการณ์ที่มีร้อยละของผู้เสียชีวิตมากกว่าหรือเท่ากับ 75 น้อยกว่าบนท้องถนน และการระเบิด การก่อวิน การวางเพลิง และอื่น ๆ มีความเสี่ยงที่จะเกิดเหตุการณ์ที่มีร้อยละของผู้เสียชีวิตมากกว่าหรือเท่ากับ 75 น้อยกว่าการใช้อาวุธปืน

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<b>Author</b>	Mr. Abdunfatah Masamae
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### ABSTRACT

The unrest in the southernmost provinces of Thailand continues to affect the people residing in the area. The purpose of this study was to describe the trend of the situation, to examine the characteristics of violent events, to determine associated factors of events involving victims, and to determine associative factors of severe violent events. Data from 14 years between 2004 to 2017 were obtained from the Deep South Coordination Center. Characteristics of the events were the date, day of the week, time of the day, province, zone, area and type of unrest. Two dichotomous outcomes were modelled: a violent event involving victims; and a severe violent event, defined as an event in which the percentage of people killed is 75 percent or higher. Separate logistic regression models were applied to determine the associative factors of each outcome.

A total of 17,724 violent events during 2004 to 2017 were detected, of which 9,701 (54.7%) involved victims and 3,125 (32.2%) were severe. The proportion of violent events involving victims was higher in Songkhla province compared to Pattani province, and in residential zones compared to the road. Bombings, arson and other violent events had a lower risk of involving victims compared to shootings.

The second model revealed that years, times, zones, and type of unrest were significantly associated with the severity of unrest. The odds of a severe violent event occurring in 2016 was lower than the baseline year of 2004. Check-points had a lower risk than roads. Bombings, aggravated assault, arson and other violent events had lower odds of being a severe event than shootings.

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## **Chapter 1**

### **Introduction**

#### **1.1 Background and rationale**

Terrorism happens in several parts of the world, it happens in the Middle East, South Asia, Europe, and Africa continent (Enders and Sandler, 2006). The main places around the world that were attacked by the terrorist since the attack on the Pentagon and the World Trade Center in the United State in September 11, 2001 including the airport attack in Moscow in 2011, the Pakistan Army General Headquarters attack in Pakistan in 2004, the bombing and killing of British Consul General Roger Short and his consul staff in Istanbul in 2003. The act of the terrorist attack was affected by the workplace, transportation, and against the individual that result in their daily work (Inness and Barling, 2007). Furthermore, these attacks were increasing and number of people who faced the fears either in their resident area or at the workplace are higher (Goodwin et al., 2005).

Trends of global terrorist activities undergone all around the world as they happened with the different formats. Statistical global terrorism index report indicated that is some countries it decreased and some faced higher. According to the Institute for Economics and Peace (2018), the ten countries most influenced by terrorism in the year 2016 were Iraq, Afghanistan, Nigeria, Syria, Pakistan, Yemen, Somalia, India, Turkey, and Libya. The rise in the terrorist incidents of those ten countries is contemplative to global terrorism. Those affected ten countries were involved with the internal conflict, which is facilitated to and led it to be terrorism issue, some of

them have an active terrorist group, which country under terror, and some of them are affected, but due to volatile government. The Asia Pacific was the third least affected, but there were still three suffering countries from terrorism including China, Philippines, and Thailand.

The terrorist attack of Thailand is placed at the sixteenth ranking position in a global where it is belonging to Malay Muslim. Consequently, the number of the terrorist attacks in Thailand is significantly increased from 55 percent in the year 2002 to 94 percent in 2016 of attacks. The increasing of terrorist attacks is related to the conflict of unknown groups with the Thai government and it depends on several factors causing the situation itself (Channel News Asia, 2017).

The three southern provinces unrest of Thailand is covered to Yala, Pattani, Narathiwat, and four districts of Songkhla neighboring province, which are Chana, Thepha, Na Thawi, and Saba Yoi. The unrest in the three southern provinces was happened a long time ago, which is the origin in 1948 (Pongsudhirak, 2007).

Meantime, the unrest of southern provinces has become more complex and increasingly violent level since 2004. International Crisis Group (2005) categorized the consequent unrest in the three southern provinces into three main majors. The first major happened with the gun robbery in one of the army bases in Cho Airong district of Narathiwat province in 2004. Since the first main major occurred in 2004 it led to happen and protract up to current now and it almost takes around 14 years long.

The unrest of the southern provinces of Thailand is a chronic problem, which is ongoing and it affected citizen daily life including job occupation, their transportation, and their properties. Several effects of the unrest included the

government healing budgets. Some of the effects caused to both physical and mental health problem. The effect may cause to the increasing number of orphans, widows and disables.

Type of unrest that involved with or not involved with people is considered an interesting issue of this study; the representation of what factors are caused to each unrest type happened. This finding may provide basic information to the involved southern problem-solving organizations.

## **1.2 Objectives of research**

The objectives of this research study are:

1. To describe the trends and characteristics of the unrest situation in the three southern provinces including four districts of Songkhla province.
2. To investigate the association between the determinants and the unrest.

## **1.3 Expected advantages**

The research can be stated findings as basic information for problem-solving of southern unrest to support the victim compensation management and to support the policies making of involving organization for peacebuilding.

## **1.4 Literature review**

The attacks of terrorism around the world with several types of occurred unrest were affected to both of victims and non-victims.

Bombing was a powerful type of attack which is caused by a large number of injuries.

The study of Hanfling (2014) represented the 250 were injured by the explosion of



two bombs in the Boston Marathon running at the finish line, which is crowded of people. Moreover, the explosive weapon was tended to be a large number of people killed or had injured than the gunshot or other forms of direct attacks (Moyes, 2012). The suicide bombing here also assured the full media of attention that created reflective fear and bullying to the general population (Poland, 2003).

Gunshot was the other type of terrorist attack, which is used in their act. Kellermann et al. (1993) interpreted their research that 2.7 times of gunshot homicide victims were likely to be the person who lives in the house. Hicks et al. (2011) represented that the explosive weapon was the main type of weapon used in Iraq. The result of mass murder was 57 percent and more of the assault attack by the gunshot (Koper et al., 2018). The other study of Braga and Cook (2018) represented the association of firearms caliber with the dead victims, the larger-caliber handguns were more likely to cause the victims dead than the smaller-caliber handguns. While, the small firearms mostly used a weapon to kill the civilian at their home (Hicks et al., 2011).

The study of Omoke (2017) illustrated the 214 patients of the Federal Teaching Hospital Abakaliki in Nigeria were attacked by gunshot. While the injury from the armed robbery was higher than the assault and accidental causes. Braga and Cook (2018) presented the effects of the 511 victims in Boston, the USA was caused by the fatal event of the gunshot has an association with the assailant's firearm caliber power. Liem et al. (2018) presented the 398 individual homicide offenders were attacked by firearms and followed by sharp instruments. Gataa and Muassa (2011) explored the injuries caused by the improvised explosive device was higher than another type of attacks. The victims caused by the gunshot and other weapon were

had the greater number of mortality than bomb blast (Chirtkiatsakul et al., 2010; Chirtkiatsakul et al., 2014). The seventy-one percent of injuries were attacked by an improvised explosive device and thirty-six percent of injuries were caused gunshot (Peleg et al., 2003; Peleg et al., 2004). Some of the injuries were attacked by the combination the weapon used such as bullet and blast (Bhandarwar et al., 2012). The indirect caused effects of the injuries occurred from the flying glass, the collapsed region, the blast wind-blown and trapped location (Glenshaw et al., 2009).

The other associated factors of occurring the unrest, Liem et al. (2018) shown that the attack was happened at the public places, while the rest occurred at the religious or government buildings. Marohabout et al. (2009) presented the unrest in the southern part of Thailand mostly happened at the night time between 08.00 pm to 09.00 pm and the most likely day was Wednesday and Thursday. The study of Lu et al. (2011) presented the fatal event were occurred in the daytime between 08.00 am to 07.59 pm rather than others. While, the suicide terrorism was likely occurred in the daytime rather the night time (Sandler, 2015). The unrest may happen in several geographical areas and may due to the population density. Khongmark et al. (2013) shown the happened unrest has occurred in the rural area rather than the urban where non-Muslim resident lived. Glaeser and Shapiro (2001) presented the urban area was a more likely impact to have unrest than the rural area.

### **1.5 Scope of the research**

This study focuses on the unrest event of the three southern provinces; Yala, Pattani, Narathiwat, and four districts of Songkhla province between the year 2004 to 2017.

## **1.6 Outline of the thesis**

This thesis is consisting of five chapters including chapter 1, where the background and relational of research, objectives of the research, and the previous research revision. Chapter 2 describes the data source, sample size, variables and various statistical methods, which is used to analyze the data. Chapter 3 represents the influencing factors of southern unrest. Chapter 4 explores statistical modelling. While chapter 5 presents the research conclusion, discussion, and future research study.

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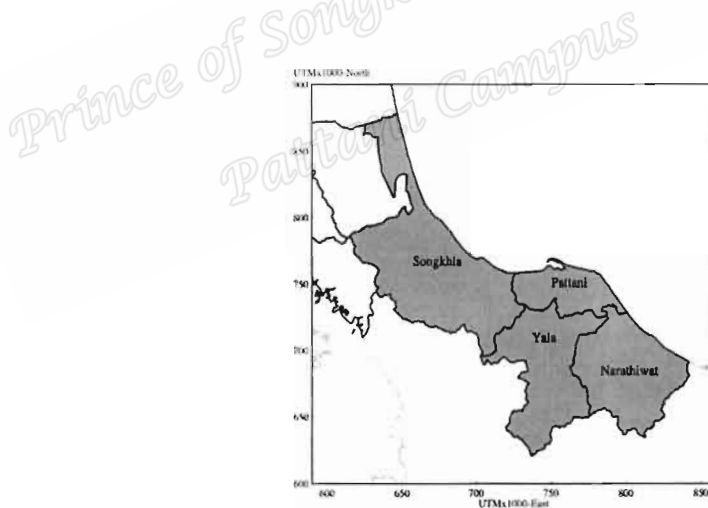
## Chapter 2

### Methodology

This chapter describes the methods used in this study. The methodology consists of the data source, variables and path diagrams, data collection, data management, and statistical method.

#### 2.1 Data source

A retrospective study was applied to this study that uses secondary data, which were obtained from the Deep South Coordination Centre (DSCC), Prince of Songkla University (PSU), Pattani Campus.

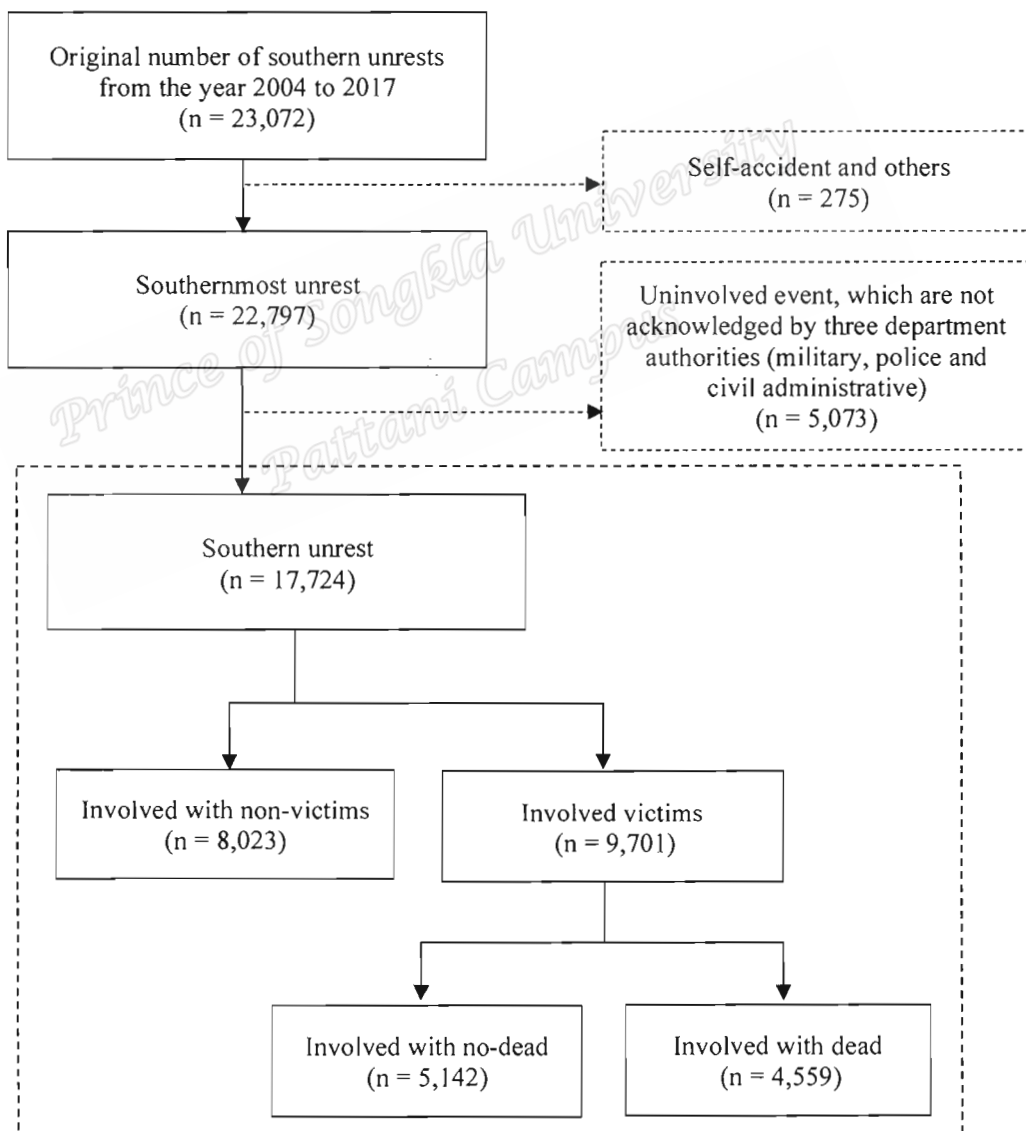


**Figure 2.1** Map of the three southern provinces of Thailand

Figure 2.1 represents the unrest area of this study covering the province of Pattani, Yala, Narathiwat, and Songkhla (including the district of Chana, Na Tawi, The Pa, and Saba Yoi).

The data were recorded as a daily unrest event, which was occurred in several areas in the three southern provinces of Thailand. The type of the reported unrest event was formed of explosives recovered, firecracker, kill and burn, motorcycle bomb, army base attack, waylay, gun robbery, raid blocked, firing the government offices and schools, found a dead body, sharp weapon attack, and some persecution events.

## 2.2 Data management



**Figure 2.2** The structure of the southern unrest

Figure 2.2 shows the 23,072 events of the southern unrest of the origin recorded number from the year 2004 to 2007. The data have filtered out 275 events, which is involved with self-accident and others. Next, they have remained 22,797 events and 5,073 events were filtered out the unacknowledged events. Finally, this study was finalized the unrest events number at 17,724 events. Furthermore, the 17,724 of the southern unrest were categorized into two groups. The 8,023 of events involved non-victims and 9,701 events involved victims. Moreover, the events involved victims are divided into two groups; 5,142 events of no-dead victims and 4,559 events of dead victims.

### **2.3 Variables and path diagrams**

#### *Outcome variable*

Outcome variables are the unrest that consisting of

- The unrest involved no-victim or victims
- The severity of unrest that less than 75 percent or greater than or equal to 75 percent

The unrest severity scale is stable and there was no fundamental difference between the large and small event (Clauset et al., 2007). The definition of unrest severity is the proportion of deaths in a particular event. In this study, the severity is categorized into groups where the proportion of dead less than 0.75 or greater than or equal to 0.75 or in term of the percentage that is less than 75 percent or greater than or equal to 75 percent.

### *Determinants*

The characteristic of southern unrest is consisting the years of the event, the months of the event, days of the event, times of the event, provinces of the event, the zones of the event, the areas of the event, and type of unrest.

### *Variable definition*

The definition of all eight determinant variables are described in the Table 2.1:

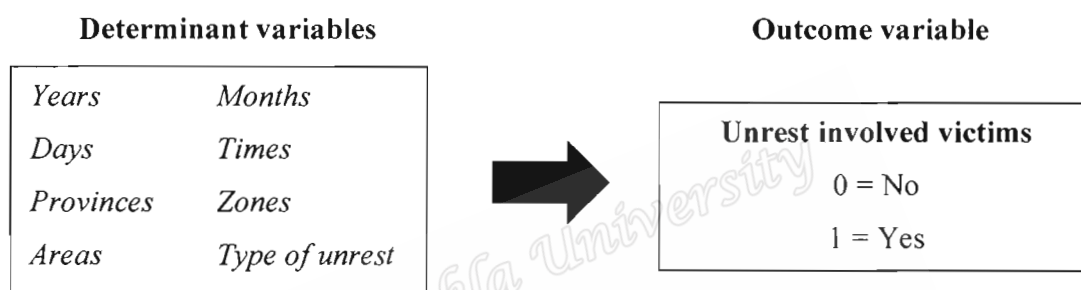
**Table 2.1** Variables definition

<b>Variable</b>	<b>Description</b>
Year	Year of unrest: 2004 - 2017
Month	Month of unrest: January - December
Day	Day of unrest: Monday - Sunday
Time	Time of unrest, categorized into eight time slots: 06.01 pm to 09.00 pm, 09.01 pm to 12.00 am, 12.01 am to 03.00 am, 03.01 am to 06.00 am, 06.01 am to 09.00 am, 09.01 am to 12.00 pm, 12.01 pm to 03.00 pm, and 03.01 pm to 06.00 pm
Province	Province where unrest happened, includes Pattani, Yala, Narathiwat and Songkhla
Zone	Zone where unrest happened, includes business zone, check point, public place, residential zone, road and others
Area	Area where unrest happened: rural or urban
Type of unrest	Type of occurred unrest, includes aggravate, arson, bomb, shooting and others (assault and nail trapping)
Unrest involved victims	Yes or No

Variable	Description
Severity of unrest	The proportion of dead categorized into two groups; $< 0.75$ and $\geq 0.75$ or in terms of percentage; $< 75$ percent and $\geq 75$ percent

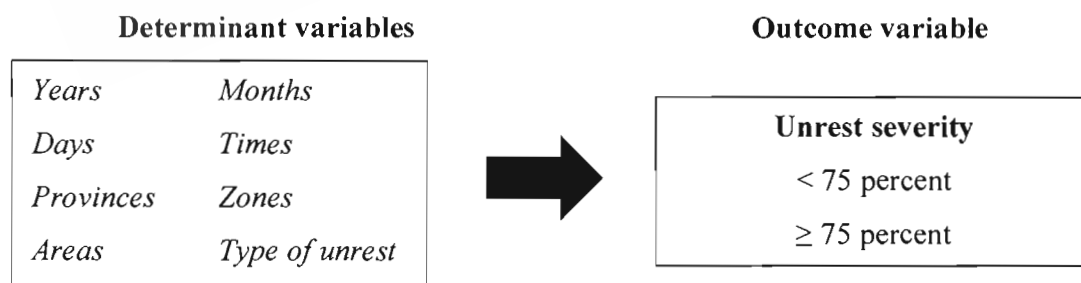
*Path diagrams*

*Unrest involved victims*



**Figure 2.3 (a)** Path diagram of unrest involved victims

*Severity of unrest*



**Figure 2.3 (b)** Path diagram of unrest severity

Figure 2.3 (a) and (b) illustrate the conceptual framework of the association between the determinants and the unrest.



## 2.4 Statistical analysis

### *Descriptive analysis*

Descriptive analysis is the conversion of raw data into a new format by providing useful information. It represents a frequency number, which is summarized and described by percentage.

### *Chi-squared test*

Univariate analysis is applied by using a chi-squared test. The comparison among determinants and outcomes, non-stratified  $r \times c$  table was applied to see the association among the determinants and outcomes. For example,  $x$  is defining the years of the unrest events and  $y$  is defining the binary outcome of southern unrest events involving non-victim or victims (0, 1).

		$y$	
		1	2
$x$	1	$a_{11}$	$a_{12}$
	2	$a_{11}$	$a_{12}$
	...	..	..
	$r$	$a_{r1}$	$a_{r2}$

Pearson's chi-squared statistic for the independence (no association) in an  $r \times c$  table is defined as

$$\chi^2_{(r-1)(c-1)} = \sum_{i=1}^r \sum_{j=1}^c \frac{(a_{ij} - \hat{a}_{ij})^2}{\hat{a}_{ij}} \quad (2.1)$$

where  $a_{ij}$  = Observed frequency,  $\hat{a}_{ij}$  = Expected frequency

### Logistic regression

Logistic regression is an analysis method that represents the odds ratio logarithm, which is presenting the relationship between determinants and binary outcome. It provides the estimated odd ratio and confidence interval for a specific combination of risk factor (McNeil, 1996). Predictor variable sets of  $x_1, x_2, \dots, x_n$  and the outcome  $y$ . The logistic regression model is shown below:

$$\ln\left(\frac{P}{1-P}\right) = \alpha + \sum_{i=1}^k \beta_i x_i \quad (2.2)$$

where

$P$  = The southern unrest probability

$x$  = The determinants set

$\alpha$  = The constant coefficient

$\beta$  = The regression coefficient set

$k$  = The predictor variables' number

The outcomes' probability  $y = 1$  as defined by

$$P[y = 1] = \frac{e^{\alpha + \sum_{i=1}^k \beta_i x_i}}{1 + e^{\alpha + \sum_{i=1}^k \beta_i x_i}} \quad (2.3)$$

The measurement of the association arising from the contingency table  $2 \times 2$ , given that both of victims and dead victims of the unrest events had only two possible outcomes of  $x$ , which 0 is referred to non-victims or no-dead and 1 is referred to victims or dead of the unrest events. Therefore, the logistic regression model that given the outcome is equal to ( $x = 1$ ) then

$$\ln = \left( \frac{P(Y = 1 | X = 1)}{1 - P(Y = 1 | X = 1)} \right) = \alpha + \beta \quad (2.4)$$

While the logistic regression model of the presented outcome is equal to ( $x = 0$ ) then

$$\ln = \left( \frac{P(Y = 1 | X = 0)}{1 - P(Y = 1 | X = 0)} \right) = \alpha \quad (2.5)$$

After the exponential in the Equation 2.4 and 2.5, odds ratio for victims or dead and non-victims or no-dead can be applied as  $e^{\alpha+\beta}$  and  $e^{\alpha}$ , respectively. Thus, the odds ratio is represented then

$$OR = \frac{e^{\alpha+\beta}}{e^{\alpha}} = e^{\beta} \quad (2.6)$$

### *Comparing models*

Adequate checking of the logistic model after removing a subset of the variable from the model will use the value of the likelihood function of the model (Woodward, 2005). The representation of adequate maximum likelihood value of sub-model and full model that defined as  $L_{sub}$  and  $L_{full}$ . The theory of standard likelihood implies that if the sub-model is adequate, then the difference  $2\log L_{full} - 2\log L_{sub}$  will have an approximately distribution of  $\chi_d^2$  where  $d$  is denoted the number of the removed variables, if the removed variable is a categorical variable with multiple categories,  $d$  is denoted the number of categories. The difference of deviance can be defined as the following:

$$2\log L_{full} - 2\log L_{sub} = \text{deviance of sub model} - \text{deviance of full model} \quad (2.7)$$

The increasing of the deviance after removing the  $d$  terms from the model that expresses the difference and it will always be positive. If the increase is small, the

removed extra terms will not increase much the deviance then. Thus, the variables can be removed to get model simpler. If the removed variables are not needed in the model, the distribution of  $\chi_d^2$  has approximately difference of the deviance. Hence, the comparison of this difference in the deviance to a  $\chi_d^2$  distribution, a p-value is calculated to examine the hypothesis of the removed variables. A small p-value gives an evidence alongside the sub-model that designates that all  $d$  of the variables should not be removed from the models.

#### *Receiver operating characteristic (ROC) curve*

The ROC curves represent the correct and incorrect model prediction by calculating the proportion of positive outcomes (Fan et al., 2006). The area under the curve (AUC) is a standard method that used to test model accuracy. The AUC value that near to 1 represents the good separability measurement. The value of AUC near to the 0 shows the worst separability measurement (Narkhede, 2018).

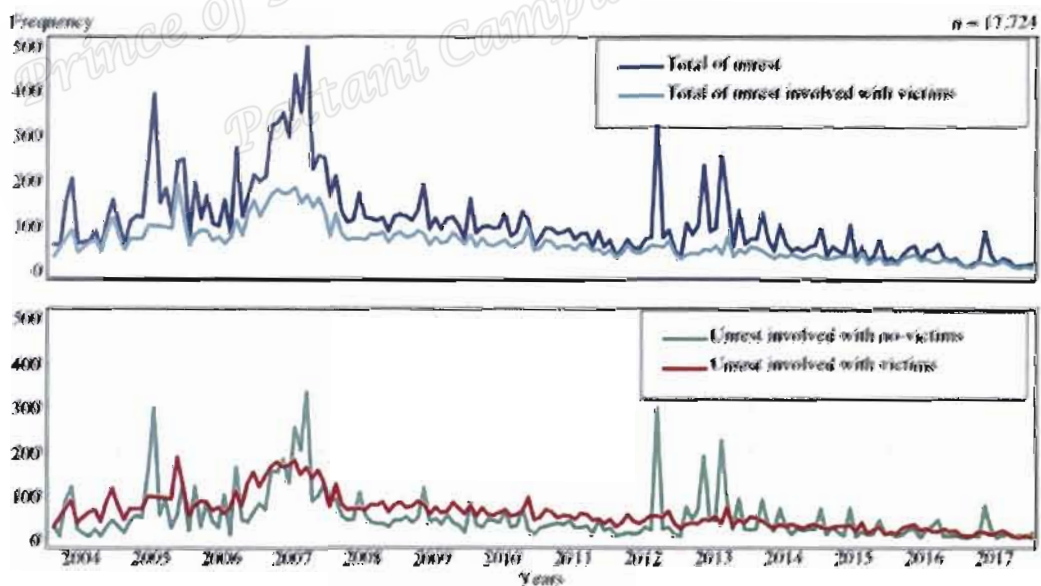
## Chapter 3

### Preliminary Analysis

This chapter consists of the preliminary analysis of unrest in the three southernmost provinces of Thailand. This preliminary analysis comprises the trends of the three southernmost provinces, the frequency distribution of determinants and the outcome and the association between determinants and the outcome.

#### 3.1 Distribution of the unrest

Trends of the distributed unrest, which had victims or dead in overall 14 years are represented in Figure 3.1.

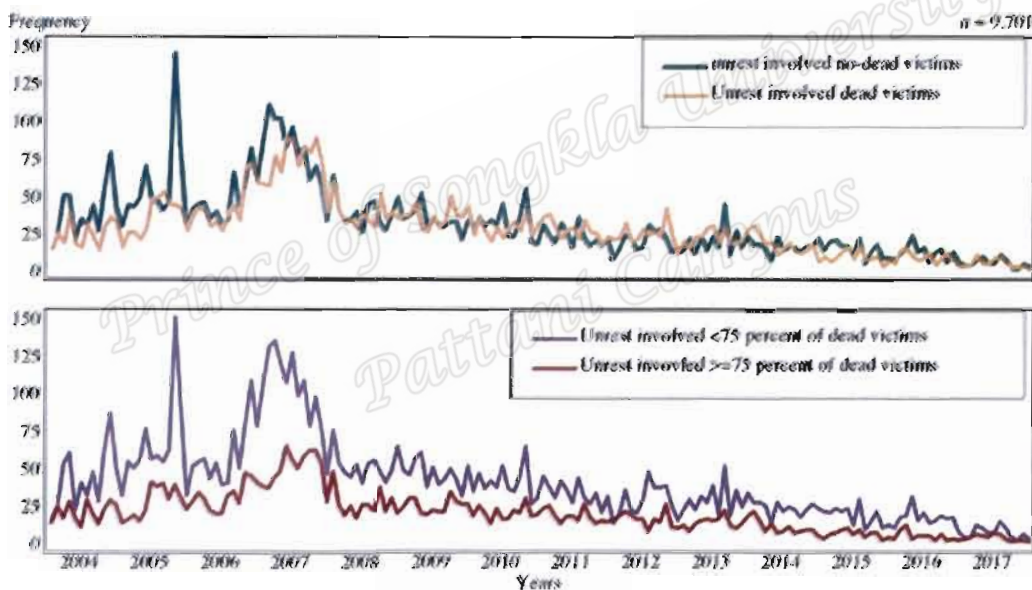


**Figure 3.1** Trend of the southern unrest

The 14 years of the related southern unrest from the year 2004 to 2017, a total of 17,724 events. There were 9,701 (54.7%) of the southern unrest involved victims

while 8,023 (45.3%) involved non-victims. The above graph shows the number of unrests were increased from 2004 to 2007 and decreased until 2011. The number of unrests were again increased in the year 2012 to 2013 and decreased from the year 2014 to 2017. At the same time, the below graph shows the overall number of unrests involved victims had higher than the unrest involved with no victims.

Next, the focus only the unrest involved victims, the unrest involved dead victims, unrest involved no-dead victims, and severity of unrest has been presented in Figure 3.2.

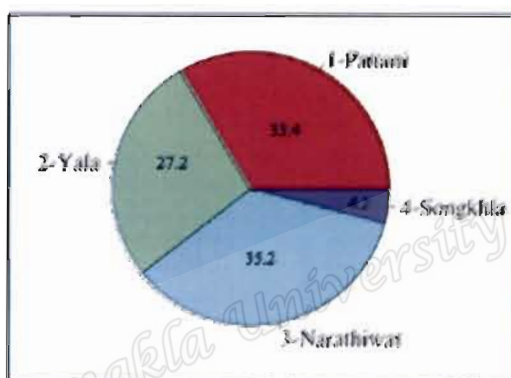


**Figure 3.2** Trend of southern unrest victims

The above graph of Figure 3.2 describes the trend of both of unrest involved no-dead victims and unrest involved dead victims were not much different. The number of unrests involved dead victims were getting high than unrest involved no-dead victims since the year 2008 to 2014. The high number of unrests involved dead victims were taking as an interesting point of unrest severity. The unrest severity was categorized into two groups as presented in Chapter 2. The below graph of Figure 3.2 presents the

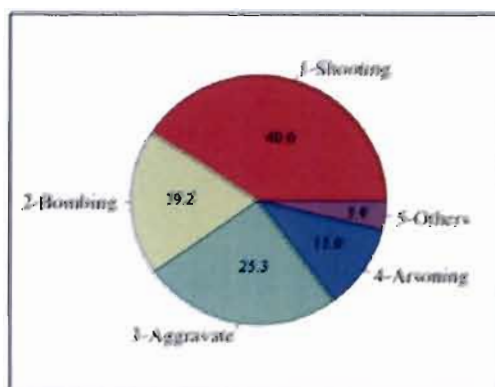
overall number of unrests severity that less than 75 percent were higher than the unrest severity that greater than or equal to 75 percent. To get more understanding of unrest description, the distribution of the unrest determinants is described in the next section.

**3.2 Distribution of determinants**



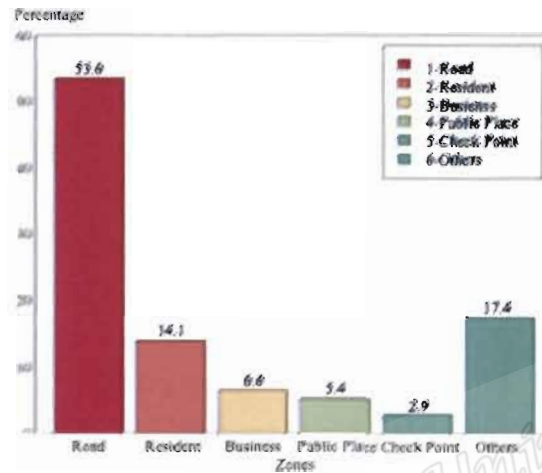
**Figure 3.3** Provinces of the southern unrest

Representation of a number of the southern unrest in Figure 3.3 shows that the unrest in Narathiwat (35.2%) was higher than Pattani (33.4%), Yala (27.2%), and four districts of Songkhla province (4.2%).



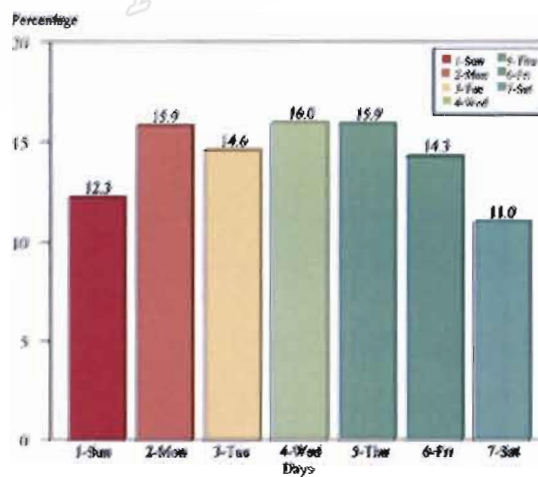
**Figure 3.4** Types of occurred unrest

Figure 3.4 shows shooting (40.6%) was the most occurred unrest type and followed by aggravate, bombing, arson, and others (25.3%, 19.2%, 11.0%, and 3.9% respectively).



**Figure 3.5** Zones of the southern unrest

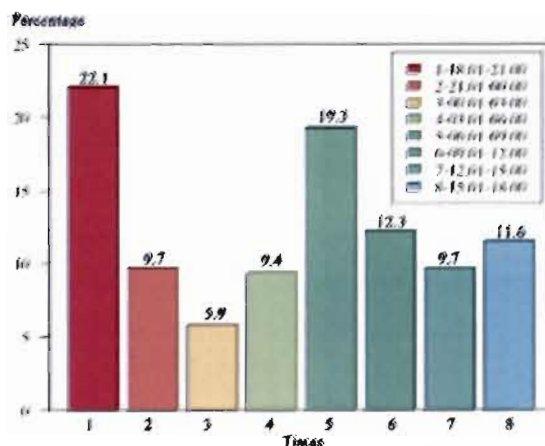
The six zones of unrest in Figure 3.5 represents that 53.6 percent of unrest occurred on the roads and followed by other zones, resident zone, business zone, public places, and checking point (17.4%, 14.1%, 6.6%, and 5.4% respectively).



**Figure 3.6** Days of the southern unrest



Figure 3.6 shows that more than 14 percent of southern unrest occurred on the official working days (Monday to Friday) rather than on the weekend (Saturday and Sunday).



**Figure 3.7** Times of the southern unrest

Figure 3.7 shows that the unrest mostly occurred in the time at 06.01 pm to 09.00 pm (22.1%) followed by the time at 06.01 am to 09.00 am (19.3%).

The frequency distribution of the characteristic of the unrest which had victims or non-victims is explained in the next section.

### 3.3 Univariate analysis

**Table 3.1** Association between the southern unrest that involved victims and its factors

Variables	Unrest involved victims		Chi-squared	p-value
	No (%)	Yes (%)		
	8,023 (45.3%)	9,701 (54.7%)		
<b>Years</b>			471.03	< 0.001
2004	383 (33.8)	750 (66.2)		
2005	947 (46.9)	1,072 (53.1)		
2006	765 (41.4)	1,084 (58.6)		
2007	1,846 (50.5)	1,807 (49.5)		
2008	569 (38.4)	911 (61.6)		
2009	553 (40.1)	827 (59.9)		

Variables	Unrest involved victims		Chi-squared	p-value
	No (%)	Yes (%)		
	8,023 (45.3%)	9,701 (54.7%)		
2010	394 (36.2)	695 (63.8)		
2011	318 (35.1)	588 (64.9)		
2012	441 (46.7)	503 (53.3)		
2013	895 (64.4)	495 (35.6)		
2014	400 (51.9)	371 (48.1)		
2015	216 (44.9)	265 (55.1)		
2016	154 (40.1)	230 (59.9)		
2017	142 (58.0)	103 (42.0)		
<b>Months</b>			465.28	< 0.001
January	515 (41.0)	740 (59.0)		
February	538 (39.9)	811 (60.1)		
March	662 (44.3)	834 (55.7)		
April	911 (52.9)	812 (47.1)		
May	736 (48.9)	769 (51.1)		
June	943 (54.3)	795 (45.7)		
July	677 (45.9)	799 (54.1)		
August	1,191 (58.1)	859 (41.9)		
September	374 (33.2)	752 (66.8)		
October	501 (33.5)	994 (66.5)		
November	487 (36.4)	852 (63.6)		
December	488 (41.6)	684 (58.4)		
<b>Days</b>			1,17.41	< 0.001
Sunday	988 (45.5)	1,185 (54.5)		
Monday	1,357 (48.3)	1,452 (51.7)		
Tuesday	1,146 (44.2)	1,447 (55.8)		
Wednesday	1,264 (44.6)	1,570 (55.4)		
Thursday	1,379 (48.9)	1,443 (51.1)		
Friday	1,207 (47.6)	1,331 (52.4)		
Saturday	682 (34.9)	1,273 (65.1)		
<b>Times</b>			1,336.84	< 0.001
18.01 - 21.00	1,878 (47.9)	2,041 (52.1)		
21.01 - 00.00	764 (44.2)	964 (55.8)		
00.00 - 03.00	641 (61.8)	396 (38.2)		
03.01 - 06.00	1,281 (76.8)	386 (23.2)		
06.01 - 09.00	1,571 (45.8)	1,856 (54.2)		
09.01 - 12.00	829 (38.1)	1,345 (61.9)		
12.01 - 15.00	584 (34.0)	1,135 (66.0)		
15.01 - 18.00	475 (23.1)	1,578 (76.9)		
<b>Provinces</b>			47.38	< 0.001
Pattani	2,537 (42.8)	3,387 (57.2)		
Yala	2,184 (45.3)	2,640 (54.7)		
Narathiwat	2,898 (46.4)	3,348 (53.6)		

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Variables	Unrest involved victims		Chi-squared	p-value
	No (%)	Yes (%)		
	8,023 (45.3%)	9,701 (54.7%)		
<b>Songkhla</b>	404 (55.3)	326 (44.7)		
<b>Zones</b>			443.12	< 0.001
Road	4,360 (45.9)	5,145 (54.1)		
Resident	831 (33.5)	1,652 (66.5)		
Business	411 (35.0)	763 (65.0)		
Public place	590 (61.9)	363 (38.1)		
Checking point	370 (71.2)	150 (28.8)		
Others	1,461 (47.3)	1,628 (52.7)		
<b>Areas</b>			0.13	0.721
Urban	1,271 (45.0)	1,556 (55.0)		
Rural	6,752 (45.3)	8,145 (54.7)		
<b>Type of unrest</b>			7,507.04	< 0.001
Shooting	782 (10.9)	6,413 (89.1)		
Bombing	1,408 (41.4)	1,992 (58.6)		
Aggravate	3,937 (87.6)	555 (12.4)		
Arson	1,476 (75.5)	479 (25.5)		
Others	420 (61.6)	262 (38.4)		

Table 3.1 shows that most of the unrest involved victims happened in the year 2004 (66.2%). September was the highest percent of unrest involved victims (66.8%) followed by October (66.5%). Most of the unrest involved victims happened on Saturday (65.1%) followed by Tuesday and Wednesday (55.8% and 55.4% respectively). Meanwhile, the time at 03.01 pm to 06.00 pm was the highest percent of unrest involved victims (76.9%) than at other times. The unrest involved victims in all provinces were higher than 50 percent except Songkhla province (44.7%). Sixty-six percent of unrest involved victims happened in the residential zone and 55 percent in the urban area. In consequence, shooting (89.1%) was the main type of occurred unrest that caused to have victims.

Next, the frequency distribution of their characteristics and the severity of unrest were shown in Table 3.2.

**Table 3.2** Association between the southern severity of unrest with its factors

Variables	Severity of unrest		Chi-squared	p-value
	<75 percent (%) n = 6,576 (67.8)	>=75 percent (%) n = 3,125 (32.2)		
<b>Years</b>			40.97	< 0.001
2004	510 (68.0)	240 (32.0)		
2005	756 (70.5)	316 (29.5)		
2006	715 (66.0)	369 (34.0)		
2007	1,217 (67.3)	590 (32.7)		
2008	606 (66.5)	305 (33.5)		
2009	538 (65.1)	289 (34.9)		
2010	467 (67.2)	228 (32.8)		
2011	385 (65.5)	203 (34.5)		
2012	324 (64.4)	179 (35.6)		
2013	337 (68.1)	158 (31.9)		
2014	262 (70.6)	109 (29.4)		
2015	203 (76.6)	62 (23.4)		
2016	185 (80.4)	45 (19.6)		
2017	71 (68.9)	32 (31.1)		
<b>Months</b>			15.51	0.160
January	489 (66.1)	251 (33.9)		
February	547 (67.4)	264 (32.6)		
March	584 (70.0)	250 (30.0)		
April	578 (71.2)	234 (28.8)		
May	524 (68.1)	245 (31.9)		
June	542 (68.2)	253 (31.8)		
July	531 (66.5)	268 (33.5)		
August	575 (66.9)	284 (33.1)		
September	478 (63.6)	274 (36.4)		
October	689 (69.3)	305 (30.7)		
November	578 (67.8)	274 (32.2)		
December	461 (67.4)	223 (32.6)		
<b>Days</b>			13.38	0.037
Sunday	782 (66.0)	403 (34.0)		
Monday	995 (68.5)	457 (31.5)		
Tuesday	956 (66.1)	491 (33.9)		
Wednesday	1,070 (68.2)	500 (31.8)		
Thursday	1,020 (70.7)	423 (29.3)		
Friday	918 (69.0)	413 (31.0)		
Saturday	835 (65.6)	438 (34.4)		
<b>Times</b>			46.95	< 0.001
18.01 - 21.00	1,404 (68.8)	637 (31.2)		
21.01 - 00.00	700 (72.6)	264 (27.4)		
00.00 - 03.00	300 (75.8)	96 (24.2)		
03.01 - 06.00	265 (68.7)	121 (31.3)		
06.01 - 09.00	1,271 (68.5)	585 (31.5)		
09.01 - 12.00	908 (67.5)	437 (32.5)		
12.01 - 15.00	743 (65.5)	392 (34.5)		
15.01 - 18.00	985 (62.4)	593 (37.6)		
<b>Provinces</b>			26.50	< 0.001
Pattani	2,212 (65.3)	1,175 (34.7)		

Variables	Severity of unrest		Chi-squared	p-value
	<75 percent (%) n = 6,576 (67.8)	>=75 percent (%) n = 3,125 (32.2)		
Yala	1,770 (67.0)	870 (33.0)	78.85	< 0.001
Narathiwat	2,350 (70.2)	998 (29.8)		
Songkhla	244 (74.8)	82 (25.2)		
<b>Zones</b>				
Road	3,356 (65.2)	1,789 (34.8)	11.09	< 0.001
Resident	1,119 (67.7)	533 (32.3)		
Business	575 (75.4)	188 (24.6)		
Public place	238 (65.6)	125 (34.4)		
Checking point	136 (90.7)	14 (9.3)		
Others	1,152 (70.8)	476 (29.2)		
<b>Areas</b>				
Urban	1,111 (71.4)	443 (28.6)	1,555.13	< 0.001
Rural	5,465 (67.1)	2,647 (32.9)		
<b>Type of unrest</b>				
Shooting	3,525 (55.0)	2,888 (45.0)	1,555.13	< 0.001
Bombing	1,930 (96.9)	62 (3.1)		
Aggravate	478 (86.1)	77 (13.9)		
Arson	474 (99.0)	5 (1.0)		
Others	169 (64.5)	93 (35.5)		

Table 3.2 shows the percentage of unrest severity that greater than or equal to 75 percent, the year 2012 (35.6%) was the highest percent and the year 2016 (19.6%) was the lowest percent. It was approximately 30 percent of the unrest severity that greater than or equal to 75 percent had happened in all 12 months. The most frequently happened days of the severity of unrest that greater than or equal to 75 percent was on the weekend where occurred on Saturday (34.4%) and followed by Sunday (34.0%). Most of the unrest severity that greater than or equal to 75 percent happened in the day time between 12.01 pm (34.5%) to 06.00 pm (37.6%). Moreover, the highest percent of the severity of unrest that greater than or equal to 75 percent was in Pattani province (34.7%) and followed by Yala province (33.0%). The highest percent of the severity of unrest that greater than or equal to 75 percent occurred on the road (34.8%) and the lowest percentage was at the checking point (9.3%). The rural area (32.9%) was the highest percent of the severity of unrest that greater than or

equal to 75 percent than the urban. The most common type of occurred unrest of the unrest severity that resulting to greater than or equal to 75 percent was shooting (45.0%) and followed by the others (35.5%), which is including assault and nail trapping.

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## Chapter 4

### Statistical Modelling

Logistics regression was used to assess the effects of the determinants on the outcomes using treatment contrast. There are two models of this study including the unrest involved victims and the unrest severity involved greater than or equal to 75 percent.

#### 4.1 Logistic regression model

##### *Unrest involved victims*

The result after fitting a logistic regression model with all determinants to the outcome are shown in Table 4.1. The reference groups were the first category of the unrest factor.

**Table 4.1** Full model of unrest victims

	Estimate	Std. Error	z-value	p-value
<b>Constant</b>	3.032	0.154	19.698	< 0.001
<b>Years</b>				
2004*	0	-	-	-
2005	-0.554	0.107	-5.201	< 0.001
2006	-1.040	0.108	-9.627	< 0.001
2007	-1.267	0.098	-12.953	< 0.001
2008	-0.935	0.115	-8.138	< 0.001
2009	-0.908	0.116	-7.814	< 0.001
2010	-0.813	0.122	-6.661	< 0.001
2011	-0.916	0.126	-7.278	< 0.001
2012	-0.687	0.130	-5.286	< 0.001
2013	-1.117	0.118	-9.453	< 0.001
2014	-0.940	0.133	-7.047	< 0.001
2015	-0.779	0.147	-5.287	< 0.001

	<b>Estimate</b>	<b>Std. Error</b>	<b>z-value</b>	<b>p-value</b>
2016	-0.794	0.159	-4.980	< 0.001
2017	-1.528	0.186	-8.212	< 0.001
<b>Months</b>				
January*	0	-	-	-
February	0.110	-0.527	0.598	0.110
March	0.107	-3.175	0.001	0.107
April	0.104	-3.644	< 0.001	0.104
May	0.106	-4.895	< 0.001	0.106
June	0.105	-5.268	< 0.001	0.105
July	0.112	-0.837	0.403	0.112
August	0.104	-5.286	< 0.001	0.104
September	0.118	-0.447	0.655	0.118
October	0.109	1.692	0.091	0.109
November	0.112	-0.719	0.472	0.112
December	0.114	-2.470	0.014	0.114
<b>Days</b>				
Sunday*	0	-	-	-
Monday	0.098	0.082	1.202	0.229
Tuesday	0.237	0.082	2.876	0.004
Wednesday	0.188	0.080	2.345	0.019
Thursday	0.022	0.080	0.275	0.783
Friday	0.183	0.083	2.198	0.028
Saturday	0.359	0.088	4.073	< 0.001
<b>Times</b>				
18.01-21.00*	0	-	-	-
21.01-00.00	0.446	0.079	5.632	< 0.001
00.01-03.00	-0.003	0.096	-0.029	0.977
03.01-06.00	-0.440	0.092	-4.799	< 0.001
06.01-09.00	0.539	0.068	7.949	< 0.001
09.01-12.00	0.550	0.076	7.253	< 0.001
12.01-15.00	0.524	0.082	6.388	< 0.001
15.01-18.00	0.820	0.082	9.961	< 0.001
<b>Provinces</b>				
Pattani*	0	-	-	-
Yala	-0.252	0.056	-4.467	< 0.001
Narathiwat	-0.309	0.052	-5.909	< 0.001
Songkhla	0.218	0.110	1.985	0.047
<b>Zones</b>				
Road*	0	-	-	-



	<b>Estimate</b>	<b>Std. Error</b>	<b>z-value</b>	<b>p-value</b>
Resident	0.930	0.069	13.501	< 0.001
Business	0.281	0.084	3.364	0.001
Public Place	-0.626	0.094	-6.641	< 0.001
Check point	-2.108	0.121	-17.455	< 0.001
Others	0.614	0.061	9.996	< 0.001
<b>Areas</b>				
Urban*	0	-	-	-
Rural	-0.072	0.060	-1.203	0.229
<b>Type of unrest</b>				
Shooting*	0	-	-	-
Bombing	-1.856	0.059	-31.447	< 0.001
Aggravate	-4.322	0.068	-63.585	< 0.001
Arson	-3.507	0.077	-45.336	< 0.001
Others	-3.199	0.099	-32.269	< 0.001

Note: \* represents the reference group

Table 4.1 represents the initial model of the unrest involved victims. The model found that the only areas were not significantly associated with the unrest involved victims. This model represents the residual deviance of 14,491 on 17,673 degrees of freedom. The final model after omitting the determinants with a p-value greater than 0.05 using a backward eliminating method is shown in Table 4.2.

**Table 4.2** Final logistic regression model of the unrest involved victims

	<b>Estimate</b>	<b>Std. Error</b>	<b>z-value</b>	<b>p-value</b>	<b>OR (95% CI)</b>
<b>Constant</b>	2.971	0.145	20.455	< 0.001	-
<b>Years</b>					
2004*	0	-	-	-	1
2005	-0.558	0.107	-5.237	< 0.001	0.57 (0.46, 0.71)
2006	-1.042	0.108	-9.649	< 0.001	0.35 (0.29, 0.44)
2007	-1.266	0.098	-12.944	< 0.001	0.28 (0.23, 0.34)
2008	-0.937	0.115	-8.152	< 0.001	0.39 (0.31, 0.49)
2009	-0.910	0.116	-7.826	< 0.001	0.40 (0.32, 0.51)
2010	-0.817	0.122	-6.695	< 0.001	0.44 (0.35, 0.56)
2011	-0.918	0.126	-7.290	< 0.001	0.40 (0.31, 0.51)

	Estimate	Std. Error	z-value	p-value	OR (95% CI)
2012	-0.689	0.130	-5.298	< 0.001	0.50 (0.39, 0.65)
2013	-1.118	0.118	-9.469	< 0.001	0.33 (0.26, 0.41)
2014	-0.944	0.133	-7.078	< 0.001	0.39 (0.30, 0.51)
2015	-0.780	0.147	-5.295	< 0.001	0.46 (0.34, 0.61)
2016	-0.800	0.159	-5.017	< 0.001	0.45 (0.33, 0.61)
2017	-1.536	0.186	-8.264	< 0.001	0.22 (0.15, 0.31)
<b>Months</b>					
January*	0	-	-	-	1
February	-0.058	0.110	-0.529	0.597	0.94 (0.76, 1.17)
March	-0.340	0.107	-3.193	0.001	0.71 (0.58, 0.88)
April	-0.382	0.104	-3.663	< 0.001	0.68 (0.56, 0.84)
May	-0.521	0.106	-4.893	< 0.001	0.59 (0.48, 0.73)
June	-0.557	0.105	-5.305	< 0.001	0.57 (0.47, 0.70)
July	-0.095	0.112	-0.849	0.396	0.91 (0.73, 1.13)
August	-0.550	0.104	-5.301	< 0.001	0.58 (0.47, 0.71)
September	-0.055	0.118	-0.464	0.643	0.95 (0.75, 1.19)
October	0.182	0.109	1.672	0.095	1.20 (0.97, 1.49)
November	-0.080	0.112	-0.719	0.472	0.92 (0.74, 1.15)
December	-0.285	0.114	-2.493	0.013	0.75 (0.60, 0.94)
<b>Days</b>					
Sunday*	0	-	-	-	1
Monday	0.098	0.081	1.197	0.231	1.10 (0.94, 1.29)
Tuesday	0.236	0.082	2.861	0.004	1.27 (1.08, 1.49)
Wednesday	0.188	0.080	2.352	0.019	1.21 (1.03, 1.41)
Thursday	0.023	0.080	0.282	0.778	1.02 (0.87, 1.20)
Friday	0.182	0.083	2.195	0.028	1.20 (1.02, 1.41)
Saturday	0.361	0.088	4.095	< 0.001	1.44 (1.21, 1.71)
<b>Times</b>					
18.01-21.00*	0	-	-	-	1
21.01-00.00	0.449	0.079	5.668	< 0.001	1.57 (1.34, 1.83)
00.01-03.00	-0.002	0.096	-0.017	0.987	1.00 (0.83, 1.20)
03.01-06.00	-0.440	0.092	-4.794	< 0.001	0.64 (0.54, 0.77)
06.01-09.00	0.537	0.068	7.924	< 0.001	1.71 (1.50, 1.95)
09.01-12.00	0.547	0.076	7.221	< 0.001	1.73 (1.49, 2.01)
12.01-15.00	0.520	0.082	6.346	< 0.001	1.68 (1.43, 1.97)
15.01-18.00	0.816	0.082	9.924	< 0.001	2.26 (1.92, 2.66)
<b>Provinces</b>					
Pattani*	0	-	-	-	1
Yala	-0.240	0.055	-4.323	< 0.001	0.79 (0.71, 0.88)

	Estimate	Std. Error	z-value	p-value	OR (95% CI)
Narathiwat	-0.315	0.052	-6.048	< 0.001	0.73 (0.66, 0.81)
Songkhla	0.207	0.110	1.891	0.059	1.23 (0.99, 1.53)
<b>Zones</b>					
Road*	0	-	-	-	1
Resident	0.930	0.069	13.497	< 0.001	2.53 (2.21, 2.90)
Business	0.298	0.082	3.619	< 0.001	1.35 (1.15, 1.58)
Public Place	-0.621	0.094	-6.595	< 0.001	0.54 (0.45, 0.65)
Check point	-2.111	0.121	-17.482	< 0.001	0.12 (0.10, 0.15)
Others	0.614	0.061	9.999	< 0.001	1.85 (1.64, 2.08)
<b>Type of unrest</b>					
Shooting*	0	-	-	-	1
Bombing	-1.848	0.059	-31.523	< 0.001	0.16 (0.14, 0.18)
Aggravate	-4.320	0.068	-63.586	< 0.001	0.01 (0.01, 0.02)
Arson	-3.507	0.077	-45.341	< 0.001	0.03 (0.03, 0.03)
Others	-3.198	0.099	-32.264	< 0.001	0.04 (0.03, 0.05)

Note: \* represents the reference group

The result represents that years, months, days, times, provinces, zones of happened unrest, and type of occurred unrest were associated with the unrest involved victims.

The result expressed that all seven determinants were statistically significant. The model was fitted and gave residual deviance of 14,493 with 17,674 degrees of freedom. The comparison of the residual deviance value of the initial model from Table 4.1 and the final model from Table 4.2 found that the difference between the deviances was two, the number of omitted parameters was one, with 0.157 of the corresponding p-value. The reduced model is adequate and all variables were statistically significant.

The 95% confidence interval of odds ratio represented the association between the unrest involved victims and each factor from the logistic regression model. Figure 4.1, the baseline odds ratio is implied by the red horizontal line. The green dots indicate the crude odds ratio while the black dots represent the adjusted crude odds

ratio with the upper and lower bounds based on the 95% confidence interval. The 95% CI that not involved one indicated that there is an association between unrest involved victims and its factor.

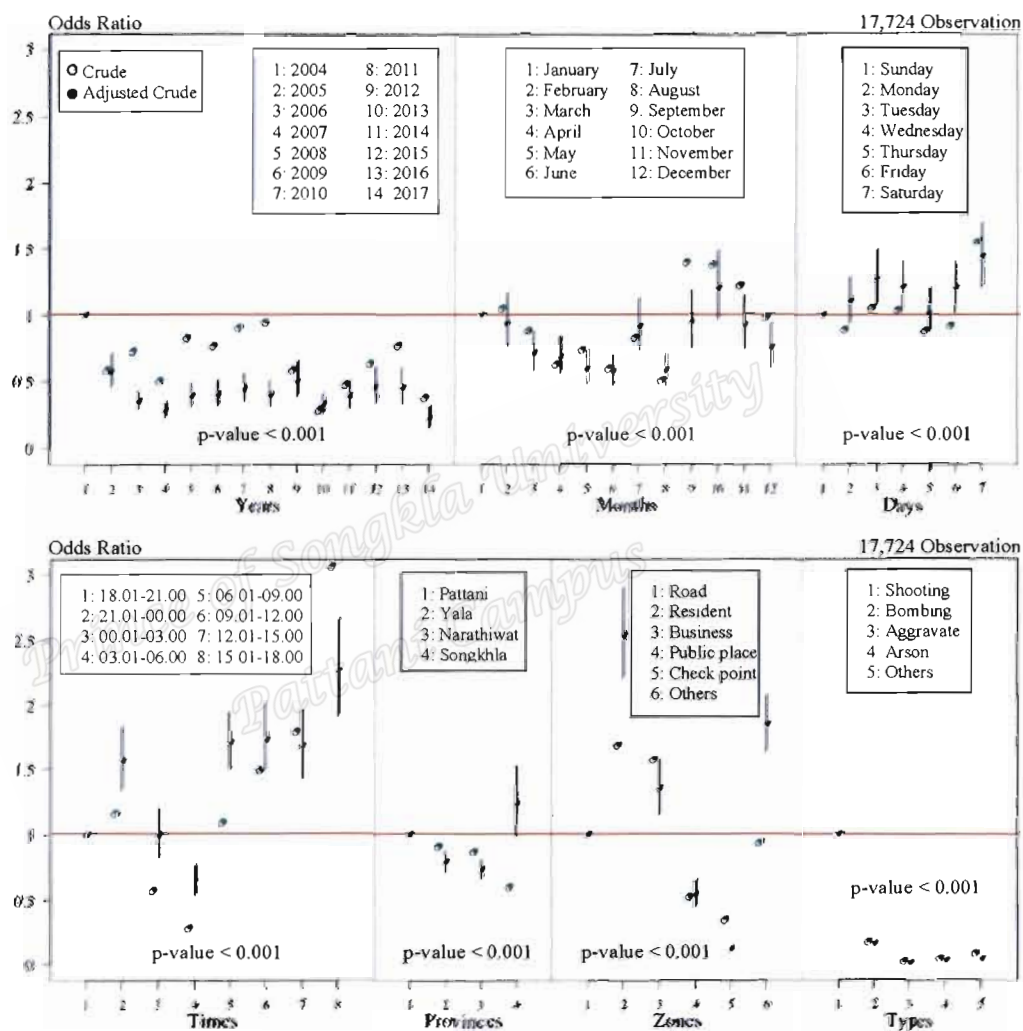
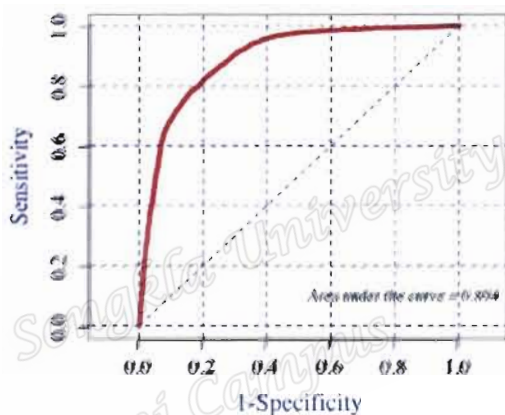


Figure 4.1 95% CI of the unrest involved victims and its factor

Figure 4.1, the odds of unrest involved victims from the year 2005 to 2017 were lower than the year 2004. The odds of unrest involved victims of February, July, September, and November were not different from January while other months were lower. Monday to Saturday expressed that the odds of occurring unrest involved

victims were not different from Sunday. Time at 03.01 am to 06.00 am was lower risk to have unrest involved victims compared to the time at 06.01 pm to 09.00 pm. The odds of Yala and Narathiwat province were the lower risk to occur unrest involved victims than Pattani province. Public places and checking point were lower risks to have unrest involved victims compared to on the road. Bombing, aggravate, arson and others were lower risks to arise the unrest involved victims than shooting.



**Figure 4.2** ROC curve of the unrest involved victims

Figure 4.2 displays the ROC curves of the model of the unrest involved victims. The AUC was 0.89, which is showing a fair classification of the unrest involved victims' categories.

#### *Severity of unrest*

The result after fitting a logistic regression model with all determinants to the outcome are shown in Table 4.3. The reference groups were the first category of the unrest severity factors.

**Table 4.3** Full logistic regression model of unrest severity

	Estimate	Std. Error	z-value	p-value
<b>Constant</b>	-0.293	0.162	-1.805	0.071
<b>Years</b>				
2004*	0	-	-	-
2005	-0.268	0.117	-2.301	0.021
2006	-0.214	0.113	-1.899	0.058
2007	-0.178	0.105	-1.691	0.091
2008	-0.200	0.118	-1.701	0.089
2009	-0.042	0.121	-0.348	0.728
2010	-0.107	0.126	-0.847	0.397
2011	-0.046	0.132	-0.347	0.729
2012	0.139	0.138	1.004	0.315
2013	0.150	0.144	1.041	0.298
2014	-0.031	0.157	-0.201	0.841
2015	-0.239	0.185	-1.288	0.198
2016	-0.475	0.204	-2.327	0.020
2017	0.287	0.270	1.065	0.287
<b>Months</b>				
January*	0	-	-	-
February	0.013	0.119	0.109	0.913
March	-0.146	0.119	-1.220	0.223
April	-0.073	0.122	-0.599	0.549
May	-0.002	0.121	-0.019	0.985
June	0.035	0.121	0.288	0.773
July	0.002	0.119	0.017	0.986
August	0.122	0.119	1.023	0.306
September	0.061	0.119	0.510	0.610
October	-0.115	0.115	-1.004	0.316
November	-0.072	0.118	-0.612	0.540
December	-0.068	0.124	-0.548	0.584
<b>Days</b>				
Sunday*	0	-	-	-
Monday	-0.020	0.091	-0.222	0.824
Tuesday	0.134	0.091	1.472	0.141
Wednesday	0.061	0.090	0.680	0.497
Thursday	-0.072	0.092	-0.781	0.435
Friday	0.050	0.094	0.527	0.598
Saturday	0.047	0.093	0.509	0.611

	Estimate	Std. Error	z-value	p-value
<b>Times</b>				
18.01-21.00*	0	-	-	-
21.01-00.00	-0.022	0.096	-0.225	0.822
00.01-03.00	-0.173	0.139	-1.251	0.211
03.01-06.00	0.183	0.133	1.373	0.170
06.01-09.00	0.380	0.079	4.797	< 0.001
09.01-12.00	0.233	0.084	2.768	0.006
12.01-15.00	0.216	0.087	2.484	0.013
15.01-18.00	0.212	0.078	2.725	0.006
<b>Provinces</b>				
Pattani*	0	-	-	-
Yala	0.068	0.062	1.090	0.276
Narathiwat	-0.025	0.059	-0.422	0.673
Songkhla	-0.221	0.147	-1.504	0.132
<b>Zones</b>				
Road*	0	-	-	-
Resident	0.076	0.069	1.104	0.270
Business	-0.091	0.101	-0.901	0.368
Public Place	0.182	0.129	1.404	0.160
Check point	-1.620	0.292	-5.552	< 0.001
Others	0.128	0.075	1.701	0.089
<b>Areas</b>				
Urban*	0	-	-	-
Rural	0.040	0.071	0.562	0.574
<b>Type of unrest</b>				
Shooting*	0	-	-	-
Bombing	-3.344	0.134	-24.929	< 0.001
Aggravate	-1.601	0.132	-12.173	< 0.001
Arson	-4.307	0.453	-9.517	< 0.001
Others	-0.438	0.138	-3.184	0.001

Note: \* represents the reference group

Table 4.3, the initial model of the severity of unrest that greater than or equal to 75 percent found that the months, days, provinces, and areas of happened unrest were not statistically associated with the severity of unrest that greater than or equal to 75 percent. The model shows the residual deviance of 10,081 on 9,650 degrees of

freedom. The final model after omitting the determinants with a p-value greater than 0.05 using a backward eliminating method is shown in Table 4.4.

**Table 4.4** Final logistic regression model of unrest severity

	Estimate	Std. Error	z-value	p-value	OR (95% CI)
<b>Constant</b>	-0.262	0.104	-2.526	0.012	-
<b>Years</b>					
2004*	0	-	-	-	1
2005	-0.247	0.116	-2.133	0.033	0.78 (0.62, 0.98)
2006	-0.209	0.112	-1.866	0.062	0.81 (0.65, 1.01)
2007	-0.162	0.104	-1.554	0.120	0.85 (0.69, 1.04)
2008	-0.173	0.117	-1.485	0.137	0.84 (0.67, 1.06)
2009	-0.020	0.120	-0.166	0.868	0.98 (0.78, 1.24)
2010	-0.087	0.125	-0.693	0.488	0.92 (0.72, 1.17)
2011	-0.028	0.131	-0.210	0.834	0.97 (0.75, 1.26)
2012	0.159	0.138	1.155	0.248	1.17 (0.90, 1.54)
2013	0.172	0.143	1.205	0.228	1.19 (0.90, 1.57)
2014	-0.020	0.156	-0.127	0.899	0.98 (0.72, 1.33)
2015	-0.216	0.184	-1.172	0.241	0.81 (0.56, 1.16)
2016	-0.485	0.204	-2.382	0.017	0.62 (0.41, 0.92)
2017	0.280	0.268	1.044	0.297	1.32 (0.78, 2.24)
<b>Times</b>					
18.01-21.00*	0	-	-	-	1
21.01-00.00	-0.032	0.095	-0.337	0.736	0.97 (0.80, 1.17)
00.01-03.00	-0.169	0.138	-1.227	0.220	0.84 (0.64, 1.11)
03.01-06.00	0.181	0.133	1.363	0.173	1.20 (0.92, 1.55)
06.01-09.00	0.376	0.079	4.769	< 0.001	1.46 (1.25, 1.70)
09.01-12.00	0.223	0.084	2.666	0.008	1.25 (1.06, 1.47)
12.01-15.00	0.218	0.086	2.523	0.012	1.24 (1.05, 1.47)
15.01-18.00	0.212	0.077	2.736	0.006	1.24 (1.06, 1.44)
<b>Zones</b>					
Road*	0	-	-	-	1
Resident	0.077	0.069	1.118	0.264	1.08 (0.94, 1.23)
Business	-0.089	0.101	-0.887	0.375	0.91 (0.75, 1.11)
Public Place	0.184	0.129	1.428	0.153	1.20 (0.93, 1.55)
Check point	-1.619	0.291	-5.564	< 0.001	0.20 (0.11, 0.35)
Others	0.134	0.074	1.795	0.073	1.14 (0.99, 1.32)
<b>Type of unrest</b>					
Shooting*	0	-	-	-	1

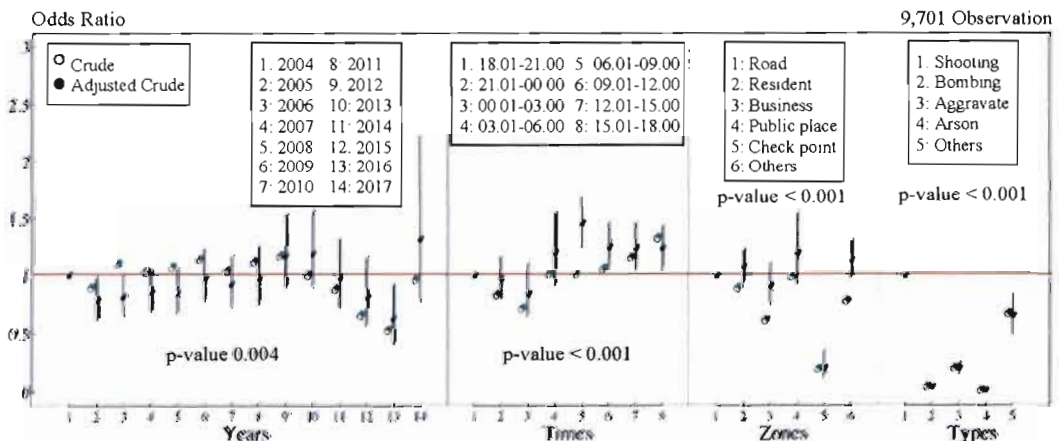


	Estimate	Std. Error	z-value	p-value	OR (95% CI)
Bombing	-3.333	0.134	-24.965	< 0.001	0.04 (0.03, 0.05)
Aggravate	-1.626	0.130	-12.462	< 0.001	0.20 (0.15, 0.25)
Arson	-4.323	0.452	-9.556	< 0.001	0.01 (0.01, 0.03)
Others	-0.435	0.137	-3.169	0.002	0.65 (0.49, 0.85)

Note: \* represents the reference group

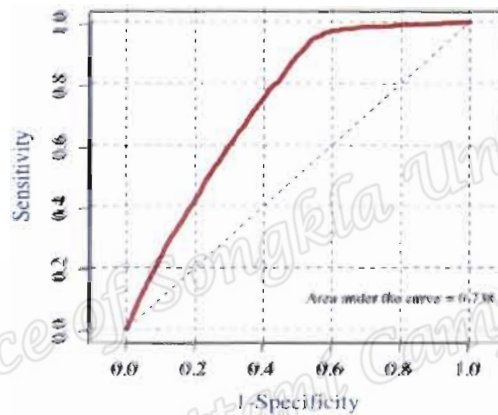
The result shows that the years, times, zones of happened unrest and type of occurred unrest were associated with the severity of unrest that greater than or equal to 75 percent. As a fitted model, the four factors were giving residual deviance of 10,102 with 9,671 degrees of freedom. The comparison of the residual deviance value of the initial model from Table 4.3 and the final model from Table 4.4 found that the difference between the residual deviance was 21. The number of omitted parameters was four, with the corresponding to 0.459 of the p-value. The final model is adequate and the variables were statistically significant.

Figure 4.3, a 95% CI plot was displayed from the odds ratio values of the logistic regression model of the unrest severity that greater than or equal to 75 percent and its factors.



**Figure 4.3** 95% CI of the unrest severity that greater than or equal to 75 percent and its factor

Figure 4.3 illustrates that the year 2016 was lower odds of having unrest severity that greater than or equal to 75 percent compared to the year 2004. All times of having unrest severity that greater than or equal to 75 percent were not different from the baseline of time at 06.01 pm to 09.00 pm. Checking point was lower risk to have unrest severity that greater than or equal to 75 percent than on the road. Type of occurred unrest including bombing, aggravate, arson, and others were lower risks to arise the unrest severity that greater than or equal to 75 percent than shooting.



**Figure 4.4** ROC curve of the unrest severity that greater than or equal to 75 percent

Figure 4.4 presents the ROC curves of the model of the unrest severity that greater than or equal to 75 percent. The AUC was 0.74 was observed for the unrest severity that greater than or equal to 75 percent and expressed a fair classification of its categories.

## Chapter 5

### Conclusion and Discussion

This chapter includes the conclusion of the study, discussion of the finding as well as the recommendation for further study.

#### 5.1 Summary of findings and discussion

The findings of this study explore the trends of unrest in the three southern provinces of Thailand from the year 2004 to 2017, which 9,701 (54.7%) involved victims and 3,125 (32.2%) were a severe of unrest that greater than or equal to 75 percent. The first model discovered that years, months, days, times, provinces, zones and type of occurred unrest were significantly associated with the unrest involved victims. The odds of unrest involved victims happening from the year 2005 to 2017 were lower than the baseline year of 2004. The odds of unrest involved victims of February, July, September, and November were not different from baseline of January while other months were lower. Time at 03.01 am to 06.00 am was lower risk compared to the time at 06.01 pm to 09.00 pm. The odds of unrest involved victims of Yala and Narathiwat province were lower compared to Pattani province. Public places and checking point were lower risks compared to on the road. Bombings, arson and other types of occurred unrest had a lower risk to cause the unrest involved victims compared to shooting.

The second model revealed that years, times, zones, and type of occurred unrest were significantly associated with the severity of unrest. The odds of severe of unrest that

greater than or equal to 75 percent occurring in 2016 was lower than the baseline year of 2004. Check-points had a lower risk than on the roads. Bombings, aggravated assault, arson and other types of occurred unrest had lower odds of being severe of unrest than shooting.

#### *Days and times of the unrest events*

Time of both of the unrest involved victims and severity of unrest that greater than or equal to 75 percent were located in the daytime rather than nighttime. The finding indicated that people spend their daily routine in the daytime. This might be a reason for causing to arise both of unrest categories especially in rush hours; morning and afternoon. It was similar to the study of Lu et al. (2011) that fatal event more likely to arise in the daytime in between 08.00 am to 07.59 pm rather than the nighttime. The other supportive study of Sandler (2015) explored that suicide terrorism mostly occurred in the daytime even the daytime has difficult to escape from the public. The most likely day of arising unrest involved victims was Saturday. This might show that on Saturday or the weekend, most of the people love to stay at their home rather than visit other places. Contrastingly, the study of Marohabout et al. (2009) presented that unrest risk in the southern provinces most happened at the nighttime between 08.00 pm to 09.00 pm while the most likely day of occurred unrest was Wednesday and Thursday.

#### *Zones of the unrest event*

Due to a tight safety awareness and protection zone, both of these unrest categories rarely occurred at the checking point zone. The finding showed that the checking

point was lower risk to have unrest involved victims and severity of unrest than other zones. Contrastingly, the zone that crowded of people were more risks to have terrorism, which cause to have victims and dead victims than other zones. The study of Guohui et al. (2014) shown that in the urban zone and the place that involved the density of population were more likely to have violent (Glaeser and Shapiro, 2001).

#### *Types of occurred unrest*

Shooting was the most occurred unrest type that involved victims and severity of unrest. The finding might indicate that the shooting was a direct weapon used to kill the right target of occurring unrest and it had more chance to cause the victim dead. Consequently, Bhandarwar et al. (2012) represented that 62.9 percent of the victims killed by gun shooting than blast explosive. Chirtkiatsakul et al. (2010) reported that gunshot and other weapon were had high mortality number than the bomb blast. In contrast, the bombing or other types of weapon used might be considered as a widely used weapon that used to kill the target group. A finding of Gataa and Muassa (2011) presented that 71.0 percent of victims were killed by the improvised explosive device than other types. The study of Peleg et al. (2004) expressed that 54.0 percent of the victim were injured from the explosion weapon. While Hicks et al. (2011) represented that the greatest of dead victims were caused by the explosive weapon. Chaiphrom et al. (2009) represented that 71.0 percent of victims were occurred by the blast rather than a firearm.

These findings imply the southern awareness of the relevant organization. Since the attacks from the unknown party are unpredictable of timing, place or location and type of attacks. Such a management plan of both of victims and severity of unrest

would be included a pre-protection and post-protection of population daily life. Somewhat surprisingly, most of the unrest involved victim occurred on Saturday (34.4%) rather than other days and more likely to arise in the resident zone (66.5%). Those may due to the weekend that most of the people stay in their home life rather than visit other places. While the urban area (55.0%) were more chance to had unrest involved victims. The severity of unrest expressed that on the road (34.8%) and the rural area (32.9%) were more chance to had the dead victims.

## **5.2 Recommendation for further study**

Since the outcome of this study was a binary outcome that applied with the logistic regression. The applicable of the study outcome, which is called unrest and it could be applied with three categories, non-victim, survived, and dead victim. Thus, the multinomial logistic regression could be applied for further statistical modeling. Nonetheless, more in deep-view of the unrest, the other relevant factors involved with the southern unrest such as the geographical area in both of district and sub-district of the unrest, the demographic background of the victims suit to discuss in detail. Those further studies could be included as a piece of useful information for the unrest prevention, awareness, and supportive rescue team.

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## Unrest in the Three Southernmost Provinces of Thailand

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### Abstract

The insurgency in the three southernmost provinces is frequently happened and took 15 years long since 2004. The aim of this study was to study the characteristic of southern incidents and to investigate the association of incident factors, which is related to mortality. This study was retrospective study of 9,701 incidents of the three southernmost provinces of Thailand from year 2004 to 2017. There were 4,578 (47.2%) of incidents that were causing to fatalities. The outcome variable was a binary value where 1 is denoted as the southern incidents that involving with dead and 0 is denoted as the southern incidents that involving with injured and survived. The determinants were consisting of year, month, day, time, province, zone, urban or rural area, and the incident type. Statistical analysis method was described with a descriptive analysis and the testing of Pearson's chi-square test to assess the associations of each incident case. The result found that highest fatality is in year 2007, where the month is different in frequency number of all twelve months. The incidents were mostly happened on Tuesday and Wednesday in a rush hour during both of morning and evening. The target zone is more likely happened on the road and in the rural area where Pattani province was a high frequency of incidents. Lastly, the shooting was more causing to fatality than other incident types. It is explored that all variables are associated with the incidents that causing to mortality.

**Keywords :** unrest, the southernmost provinces of Thailand, the incidents involving with injured and dead

### Introduction

World terrorist is undergone all around the world which continuing happened with the different formats. Statistical global terrorism index report represented that the incidents in some countries are decreased and some are increased. According to the Institute for Economics and Peace (2018), reported the ten countries that most influence by terrorism (weighted with score of based 10 logarithmic banding system) in the year 2016 were Iraq (10.0), Afghanistan (9.4), Nigeria (9.0), Syria (8.6), Pakistan (8.4), Yemen (7.8), Somalia (7.6), India (7.5), Turkey (7.5) and Libya (7.2). The rising in terrorism of those ten countries is contemplatively led to being

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global terrorism. Consequently, the impact of terrorisms of those ten countries was involved with the internal conflict, which is facilitated to and led it to be terrorism issue, some of them have an active terrorist group, which is caused its country under the terrorist country, and some of them are caused of destabilization of their government. Meanwhile, the Asia Pacific is considered as the third lowest impact from terrorism but there are three countries were suffering from the largest amount of terrorism in their countries. The most impact terrorism of those three countries including China, Philippines, and Thailand. The incidents of Thailand are placed at the sixteenth ranking position in a global. The incidents of Thailand are belonging to the three southernmost border provinces. Meanwhile, the number of terrorist attack in Thailand is significantly increased from 55% in the year 2002 to 94% in the year 2016 of attacks. While, those attacks depend on the several factors of causing the situation itself (Channel News Asia, 2017).

The causing of mortality of terrorism all around the world mostly related to seven types of weapon used are shooting, bombing, stoning, chemical, fire, biological methods and stabbing wounds. While, the risk of mortality of the weapon used of the happened terrorism all around the world were mostly involved with the bombing than the gun shooting (53.4 and 19.9 percent respectively) (Bogen and Jones, 2006). The duration that suite the terrorism happening is taking time long. A study in Israel represented that the terrorism in Israel was taking 13 months long, which is starting from October 1, 2000, to October 31, 2001. The result of the study found that 70 percent of shooting was causing high mortality than other types of weapon used (Mintz et al. 2002). Furthermore, the effects of the terrorist attack will show the number of some mortalities and damages. As reported by Hakimoglu (2015), explored the number of victims after the civil war in Syria. The result found that the survival rate of the civilian is higher than the mortality rate of 89.6 percent approximately. Meanwhile, the type of occurred events is varying to cause a high rate of survival and mortality.

The incidents in the three southernmost provinces of Thailand is covered with the province of Yala, Pattani, Narathiwat, and including four districts of Songkhla neighboring province, which are Chana, Thepha, Na Thawi, and Saba Yoi. In the year 1948 is considered as the origin year of the three southernmost incidents (Pongsudhirak, 2007). It is continuing happened until the current now with several incident formats. In the meantime, the incident of southernmost provinces has become more complex and increase the violent level since the year 2004. International Crisis Group (2005) categorized the consequently incident situation in the three southernmost provinces into three main incidents. The first major is undertaken with the gun robbery in one of the army bases in Cho Airong district of Narathiwat province, the

protesting of thousand Muslim at Takbai police station, and the attacking at the Kruesae Mosque. Since the first main major occurred in 2004, it led to happen and protract up to current now and it almost takes around 15 years long. The incidents in the three southernmost provinces of Thailand is a chronical problem, which is ongoing and it affected citizen daily life which is including job occupation, their transportation, and their properties. Several effects of the incident situation included the government healing budgets. Some of the effects caused to both physical and mental health problem. The effect may cause to the increasing number of orphans, widows and disables.

Accordingly, this study is limited to the only interested incidents that involving with the victims either dead or survived. This finding may provide basic information to the involved southernmost problem-solving organizations.

### **Objective**

To explore the characteristic of the incidents in southernmost provinces of Thailand and to investigate the association between relevant factors and the incident that involving with mortality.

### **Method**

The secondary data were obtained from the Deep South Coordination Centre (DSCC), Prince of Songkla University (PSU), Pattani Campus, Thailand. The data are covering to southernmost provinces incident of Pattani, Yala, Narathiwat and Songkhla (including the district of Chana, Na Tawi, The Pa and Saba Yoi) from January 1, 2004 to December 31, 2017. There are 9,701 observations. All records had been acknowledged by three parties including military, police, and civilian. The outcome variable of this study is binary variable representing whether the fatal event involving with dead or survived. Meanwhile, the determinant variables of this study represent the characteristic of southernmost incidents including year of incidents, month of incidents, time of incidents, day of incidents, province of incidents, zone of incidents, area and type of incidents. Years of incidents consists of the year 2004 to 2017. The months of incidents consists of January to December. The seven days in a week are Sunday to Saturday. Time of incidents is categorized into eight time slots, which are 18.01 to 21.00 hrs., 21.01 to 00.00 hrs., 00.01 to 03.00 hrs., 03.01 to 06.00 hrs., 06.01 to 09.00 hrs., 09.01 to 12.00 hrs., 12.01 to 15.00 hrs. and 15.01 to 18.00 hrs. The provinces of incidents are Pattani, Yala, Narathiwat, and Songkhla. The zone of incidents is involving with road, dormitory (including residents), business, public place, checking point, and others. The area of incidents is

categorized into two areas; urban and rural. The type of incidents divided into three types; shooting, bombing, and others.

Descriptive analysis is used in this study by displaying of frequency number and percentage. Pearson's chi-square test is used to evaluate the association between outcome and determinant variables. All the statistical analyses and graphical representations were accomplished by using R program (R Core Team, 2017).

## Result

The record of DSCC database with 9,701 numbers of southern incidents from January 2004 to December 2017 represented in Table 1 by showing the incidents frequency over fourteen years. The percentage of incidents was high in two years are 2006 and 2007 (11.2% and 18.8% respectively). Meanwhile, it is approximately 8.0% of the month of the incident have happened when comparing to all twelve months. The most frequently happened day of the incident is Wednesday (16.2%) and Tuesday (15.6%). However, the incident in Pattani is the highest percentage than Narathiwat, Yala, and Songkhla province (37.2%, 33.1%, 27.3%, and 2.4% respectively). The highest incident rate is 57.1% happened on the road and 85.0% in the rural area. Nonetheless, 87.2% of incident type is occurred by the shooting.

Figure 1 describes the overall of southern incident, which is involving with dead and survived from the year 2004 to 2017. It looks similar to all of 14 years of incident. The increasing trend is starting from the beginning of incident in year 2004 to 2007. The incident trend in those years were 4,713 incidents where 2,081 incidents were involving with dead and 2,632 incidents were involving with survived. Meanwhile, the number of incidents that involving with dead was greater than survived in the mid-year of 2010 to the mid-year of 2013. In contrast, the number of incidents that involving with survived was higher than dead at the beginning of year 2014 to ending of year 2017.

Table 2 shows the association between outcome and each determinant. Pearson's chi-square is used to evaluate the association of each case. The result represents that year, time, province, zone, and incident type are strongly associated with incidents that involving with dead.

Figure 2 represents the number incidents that involving with dead in each province. Overall incident numbers of the southernmost provinces are explored the same number in year 2017, where 319 incidents were occurred in Pattani, 286 incidents were occurred in Narathiwat, 220 incidents were occurred in Yala, and 37 incidents were happened in Songkhla. Meantime, in the year of 2007 to 2017 there was only Pattani province (211 incidents) that highly happened



in year 2011, while others are decreased. In other hand, Figure 3 represents the number of incidents that related to the survived. The number of survived incidents (296 incidents in Yala, 221 incidents in Pattani, and 72 incidents in Songkhla) is larger than the represented number of dead incidents in Figure 3. While, the 356 of incidents in Narathiwat province is high number of survived.

### Conclusion

The result of this study represented that the majority of fatalities in the southern incident were in 2007. The month of the happened incidents is not much different in all twelve months. The frequently day of incidents happened were on Tuesday and Wednesday. The time of incidents was allocated in a rush hour from 06.00 am to 09.00 am and 06.00 pm to 09.00 pm. Meanwhile, the target zone is more happened on the road and in the rural area. Pattani province was a high-frequency number of incidents. Nonetheless, the gun shooting was more causing to fatality than other incident types. Consequently, the result was going along with the previous study, which is shown that the fatal incidents are more frequently happen in between 08.00 pm to 09.00 pm where the night time is more facilitated to occurred the fatal event rather than day time (Marohabout et al., 2009). While the type of incidents rate was indicated that 49.7 percent as belonging to the gun shooting and it is 6.7 percent higher rate than the bomb blast (Mintz et al. 2002; Shapira et al. 2006). In contrast, another study represented that 37.0 percent of incidents are caused by the firearm attack and it usually happens in the center of the city and public places, religious or government building (Liem et al. 2018).

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Table 1 The frequency distribution of fatal event factors

Variables	Southern incidents involving with dead (%)				Total n = 9,701 (100)	
	Yes n = 4,578 (47.2)		No n = 5,123 (52.8)			
<b>Year</b>						
2004	289	(6.3)	461	(9.0)	750	(7.7)
2005	417	(9.1)	655	(12.8)	1,072	(11.1)
2006	513	(11.2)	571	(11.1)	1,084	(11.2)
2007	862	(18.8)	945	(18.4)	1,807	(18.6)
2008	447	(9.8)	464	(9.1)	911	(9.4)
2009	428	(9.3)	399	(7.8)	827	(8.5)
2010	328	(7.2)	367	(7.2)	695	(7.2)
2011	318	(6.9)	270	(5.3)	588	(6.1)
2012	282	(6.2)	221	(4.3)	503	(5.2)
2013	261	(5.7)	234	(4.6)	495	(5.1)
2014	187	(4.1)	184	(3.6)	371	(3.8)
2015	102	(2.2)	163	(3.2)	265	(2.7)
2016	95	(2.1)	135	(2.6)	230	(2.4)
2017	49	(1.1)	54	(1.1)	103	(1.1)
<b>Month</b>						
January	360	(7.9)	380	(7.4)	740	(7.6)
February	373	(8.1)	438	(8.5)	811	(8.4)
March	390	(8.5)	444	(8.7)	834	(8.6)
April	336	(7.3)	476	(9.3)	812	(8.4)
May	357	(7.8)	412	(8.0)	769	(7.9)
June	392	(8.6)	403	(7.9)	795	(8.2)
July	389	(8.5)	410	(8.0)	799	(8.2)
August	404	(8.8)	455	(8.9)	859	(8.9)
September	387	(8.5)	365	(7.1)	752	(7.8)
October	452	(9.9)	542	(10.6)	994	(10.2)
November	403	(8.8)	449	(8.8)	852	(8.8)
December	335	(7.3)	349	(6.8)	684	(7.1)
<b>Day</b>						
Sunday	585	(12.8)	600	(11.7)	1,185	(12.2)
Monday	673	(14.7)	779	(15.2)	1,452	(15.0)
Tuesday	712	(15.6)	735	(14.3)	1,447	(14.9)
Wednesday	740	(16.2)	830	(16.2)	1,570	(16.2)
Thursday	650	(14.2)	793	(15.5)	1,443	(14.9)

Variables	Southern incidents involving with dead (%)				Total n = 9,701 (100)	
	Yes n = 4,578 (47.2)		No n = 5,123 (52.8)			
Friday	591	(12.9)	740	(14.4)	1,331	(13.7)
Saturday	627	(13.7)	646	(12.6)	1,273	(13.1)
<b>Time</b>						
18.01 - 21.00	933	(20.4)	1,108	(21.6)	2,041	(21.0)
21.01 - 00.00	361	(7.9)	603	(11.8)	964	(9.9)
00.00 - 03.00	147	(3.2)	249	(4.9)	396	(4.1)
03.01 - 06.00	186	(4.1)	200	(3.9)	386	(4.0)
06.01 - 09.00	857	(18.7)	999	(19.5)	1,856	(19.1)
09.01 - 12.00	661	(14.4)	684	(13.4)	1,345	(13.9)
12.01 - 15.00	581	(12.7)	554	(10.8)	1,135	(11.7)
15.01 - 18.00	852	(18.6)	726	(14.2)	1,578	(16.3)
<b>Province</b>						
Pattani	1,701	(37.2)	1,686	(32.9)	3,387	(34.9)
Yala	1,251	(27.3)	1,389	(27.1)	2,640	(27.2)
Narathiwat	1,517	(33.1)	1,831	(35.7)	3,348	(34.5)
Songkhla	109	(2.4)	217	(4.2)	326	(3.4)
<b>Zone</b>						
Road	2,612	(57.1)	2,533	(49.4)	5,145	(53.0)
Dormitory	706	(15.4)	946	(18.5)	1,652	(17.0)
Business	358	(7.8)	405	(7.9)	763	(7.9)
Public place	195	(4.3)	168	(3.3)	363	(3.7)
Checking point	50	(1.1)	100	(2.0)	150	(1.5)
Others	657	(14.4)	971	(19.0)	1,628	(16.8)
<b>Area</b>						
Urban	686	(15.0)	870	(17.0)	1,556	(16.0)
Rural	3,892	(85.0)	4,253	(83.0)	8,145	(84.0)
<b>Incidents type</b>						
Shooting	3,992	(87.2)	2,421	(47.3)	6,413	(66.1)
Bombing	377	(8.2)	1,615	(31.5)	1,992	(20.5)
Others	209	(4.6)	1,087	(21.2)	1,296	(13.4)

Table 2 Association between outcome and determinants

Determinants	$\chi^2$	Degree of freedom	p-value
Year	106.50	13	< 0.001
Month	22.06	11	0.024
Day	14.01	6	0.029
Time	94.18	7	< 0.001
Province	42.02	3	< 0.001
Zone	87.87	5	< 0.001
Area	7.16	1	0.007
Incidents type	1,723.89	2	< 0.001

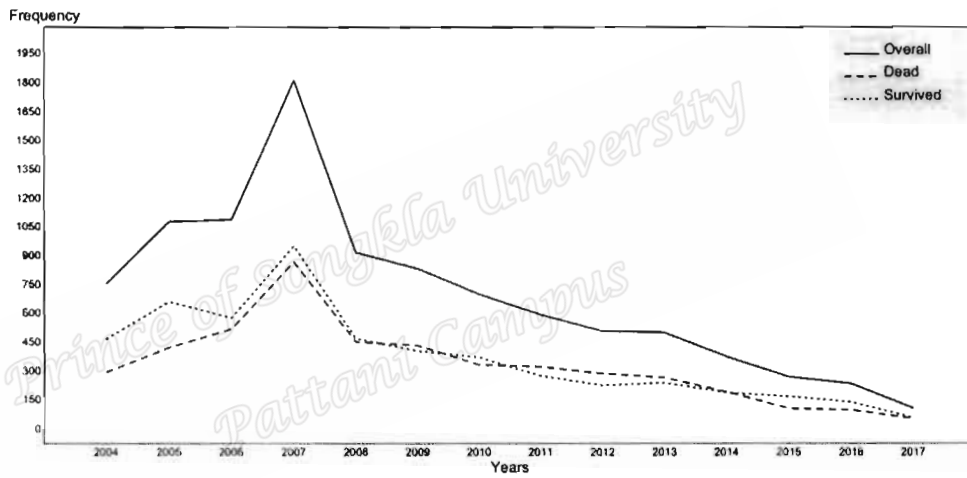


Figure 1 The trend southern incidents during the year 2004-2017

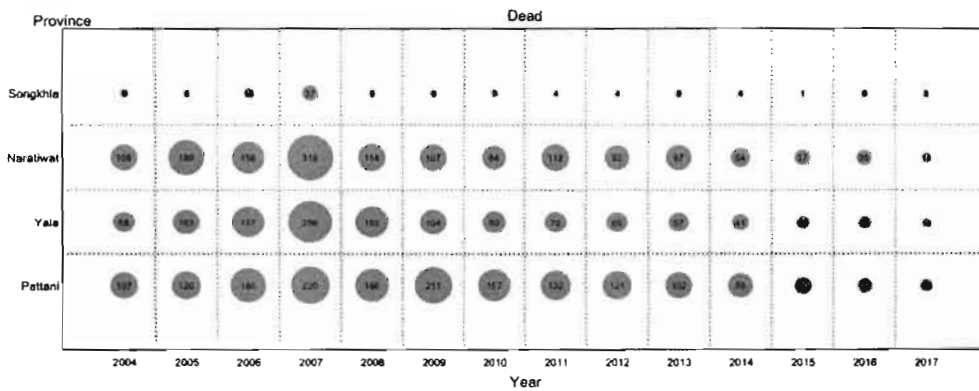


Figure 2 Bubble plot of the incidents involving with dead by year and provinces

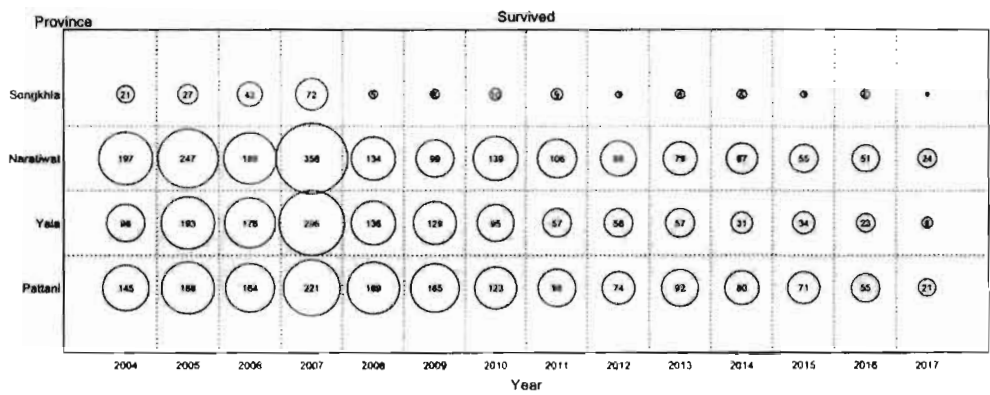


Figure 3 Bubble plot of the Incidents involving with survived by year and provinces

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