



Determinants of Suicide Rates in Thailand

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Abstract

This paper attempted to explore the factors leading to suicide rates in Thailand. The statistics provided in this study were provincial data derived and collected from the National Statistics Bureau of Thailand, the Ministry of Public Health, and the Center of Alcohol Problem Research. The data was first presented and followed by the regression analysis. The results suggested that both alcohol and household income led to higher suicide rates whereas household debt had a negative impact on suicide rates. Other social factors which contributed to the higher suicide rates were divorce rates, ratio of elderly (60+) and type of employment such as corporate firms and government-related sectors. On the other hands, population density and percentage of woman that are counted as the head of the family were negatively related to suicide rates. Findings indicated that an appropriate fiscal policy and effective law enforcement on underage drinking should be under urgent consideration by the Thai government. Moreover, proper social security programs for senior should be effectively improved, which will lead to lower suicide rates of the elderly.

Keywords: Suicide Rates, Economic Factors, Social Factors

Introduction

Over the past ten years, the number of suicides in Thailand has been consistently ranging between 3,600 to 4,000 people every year. To be more specific, there were 3,941 and 3,950 suicides in 2005 and 2014, respectively. Although there was a sharp decrease of 329 in 2006, the number of suicides has generally been increasing over the last decade. Similarly, in 2005, the suicide rate in Thailand was 6.34 per 100,000 people and it drops to 6.08 per 100,000 people in 2014. However, it can be clearly seen that the suicide rate has generally been rising since 2011, at higher than 6 suicides per 100,000 inhabitants.

The question of whether or not economic factors such as level of income, debt, unemployment rate, as well as social factors would leads to high suicide rates of individuals has received wide attention among scholars. A huge number of empirical studies using data of developed economies have been reviewed in an attempt to combat rising suicide rates worldwide (Hamermesh and Soss, 1974; Kimenyi and Shughart, 1986; Yang, 1992; Chuanc and Huang, 1997; Lin, 2006; Chen, Choi, and Sawada, 2009; Minoiu and Andrés, 2008; Halicioglu and Andrés, 2010). Thailand, however, is a country which differ from those industrialized nations in terms of economic and social contexts. Besides, the research on this topic using macro-level data of Thailand was very limited. In particular, there was only the work of Punyasavatsut (2011) which used time-series exploration in order to find out the determinants which may explain the suicide rate in Thailand. This research, in contrast, employed the cross-sectional analysis, as it can better explain the impact of cultural, social, and economic differences among regions.



Theoretical Framework

From economics viewpoint, the relationship between economic factors and suicide rates began with Hamermesh and Soss' article in 1974. According to the theory, income and age of an individual determine the probability of the suicide.

Utility Maximization Model is adopted and detailed as follows:

$$Z(a, I) = \int_a^d e^{-r(m-a)} U[C(m, I) - K(m)] P(m) dm$$

$U[\cdot]$ and $C[\cdot]$ utility and consumption function, respectively.

- Where
- m is life expectancy
 - I is permanent income which is average income expected over a person's lifetime.
 - K is cost of living
 - d is maximum life expectancy
 - $P(m)$ is probability of living till age m , where the current age is a
 - a is current age at which an individual decides to commit suicide
 - r is discount rate

Utility of a person is function of consumption, which is determined by permanent income as well as current age of an individual. As a person tends to consume more as he is getting older, there is a positive association between age of individual and consumption. This is also true for the relationship between income and consumption. Thus, $\frac{\partial C}{\partial m} > 0, \frac{\partial C}{\partial I} > 0$. However, cost of living (K), which has a negative association with utility, is expected to rise with ages, $\frac{\partial K}{\partial m} > 0$. When we examine the lifetime utility in present value at age a , we can see that this lifetime utility would reduce as current age rises or $\frac{\partial Z}{\partial a} < 0$, whereas $\frac{\partial Z}{\partial I} > 0$.

An Economic theory of suicide of Hamermesh and Soss (1974) is developed further by Crouch (1979). He suggested that a person commits suicide when the combination between enjoyment of life and distaste for suicide is larger or equivalent to zero.

$$E + D \leq 0$$

Where D is distaste for suicide

E is enjoyment from life, which is determined by their family income and cost of living of their family.

In conclusion, the theory delivered five assumptions as follows (Lester and Yang, 1997).

1. The more the income, the less the probability of the suicide.
2. The more the expenditure or cost of living, the more the probability of suicide.
3. As one is getting older, one tends to have more expenditure. Thus, the probability of suicide is expected to magnify for elderly.
4. Divorce lead to the reduction of household income. Therefore, an individual who experiences such a circumstance is more likely to commit suicide.

Regarding income variables, since a majority of Thais works in agricultural, which is different from those in industrialized countries, it was necessary to incorporate factors presenting agrarian employment in model. Citizens of Thailand in the agricultural sector tend to have lower and unsteady income. Other social factors which



were often included in previous literatures were as follows: alcohol consumption, population density, and status of female in family relationship. Alcohol can increase the chance of a person committing suicide as he is incapable in controlling his actions appropriately. Population density is usually an outcome of urbanized, industrialized and thus modernized economy. This is often claimed as one of the major factors leading to more suicide rates due to the privation of social supports. Next, in a society in which females are considered inferior to their male counterpart, Japan for example, the hardship on families usually leads to depression of women, in addition to the suffering by the abuse of their husband. Therefore, as happiness reduces, the tendency of women committing suicide is more prevalent.

Model and Data

From a theoretical viewpoints in the previous section, the factors which may have relationship with suicide rates can be found using multiple regression analysis. The models can be presented as follows. Since ALR20 and ALR15 were highly correlated with the coefficient of 0.81, they can not be included in the same model due to multicollinearity problem.

Model 1

$$SUICIDE = \beta_0 + \beta_1 EXPENDITURE + \beta_2 INCOME + \beta_3 DEBT + \beta_4 U + \beta_5 FEMH + \beta_6 AGE60 + \beta_7 POPD + \beta_8 DIV + \beta_9 NAGRI + \beta_{10} ALR20 + \varepsilon$$

Model 2

$$SUICIDE = \beta_0 + \beta_1 EXPENDITURE + \beta_2 INCOME + \beta_3 DEBT + \beta_4 U + \beta_5 FEMH + \beta_6 AGE60 + \beta_7 POPD + \beta_8 DIV + \beta_9 NAGRI + \beta_{10} ALR15 + \varepsilon$$

The dependent variable was suicide rate (SUICIDE). The detail of all variables was provided in Table 1 and can be summarized as follows:

INCOME was average household income. EXPENDITURE and DEBT were average household expenditure and debt, respectively.

U was unemployment rate.

FEMH was the percentage of woman that are counted as the head of the family.

AGE60 was the percentage of individual above 60.

POPD was the population density.

NAGRI was the percentage of the type of employment in corporate firms and government-related sectors.

DIV was divorce rates.

ALR20 was the prevalence of alcohol consumption for adult over the age of 20. This is the percentage of adult consuming alcohol within one year.

ALR15 was the percentage of youth (age 15–19) consuming alcohol within one year. Note that this is prohibited by Thai law.

**Table 1** Variable, symbol, and source of data used in the study

Variable	Symbol	Source
Suicide rate	SUICIDE	Ministry of Public Health
Unemployment rate	U	National Statistics Bureau of Thailand
Average household expenditure (monthly)	EXPENDITURE	National Statistics Bureau of Thailand
Average household income (monthly)	INCOME	National Statistics Bureau of Thailand
Average household debt	DEBT	National Statistics Bureau of Thailand
Prevalence rate of alcohol consumption (age over 20)	ALR20	Center of Alcohol Problem Research
Prevalence rate of alcohol consumption of the underage (15-19 years old)	ALR15	Center of Alcohol Problem Research
Female as head of family (percentage)	FEMH	National Statistics Bureau of Thailand
Population with age over 60 (percentage)	AGE60	National Statistics Bureau of Thailand
Population density (percentage)	POPD	National Statistics Bureau of Thailand
Population with occupations in government - related as well as private enterprises (percentage)	NAGRI	National Statistics Bureau of Thailand
Divorce rate	DIV	National Statistics Bureau of Thailand

The data which were used in the analysis was provincial data of 2011 as it is the only year in which data on alcohol consumption available. The economic variables; U, EXPENDITURE, INCOME, DEBT and social factors, which includes POPD, AGE60, FEMH, NAGRI, DIV, were derived from the 2011 collection from the National Statistics Bureau of Thailand, whereas the suicide rates, SUICIDE, were collected from the Ministry of Public Health. The percentage of alcohol consumption, ALR20 and ALR15, were derived from the Center of Alcohol Problem Research (see Table 1). The overview of each variable is shown in the following sections.

At a Glance: Suicide Rates in Thailand

As mentioned earlier, the number of suicides as well as the suicide rates in Thailand has generally been increasing over the last decade. Suicide rates continue to be higher for men than for women. The suicide rates in 2014 were 9.6 per 100,000 population for men and 2.65 per 100,000 for women. These rates have remained fairly steady over the 2005 to 2014 period. Thus, the suicide rate for males was approximately three times higher than the rate for females. In 2014, suicide rate in men was 2.62 times higher than in women in Thailand whereas it was 3.43 times higher in 2005. When suicide deaths were examined across age groups, the highest suicide number was among people aged 30 to 39, at 1,001 and 894 in 2005 and 2014 respectively. The second highest number occurred in those between 40 and 49 years of age, at 737 and 824 in 2005 and 2014 respectively. Younger and middle-aged had higher suicide number than older adults. In 2014, for example old adults aged 70 to 79 had a suicide number of about 200 while the lowest suicide number (below 200) was among people 81 years or older.

Provinces in the northern region had the highest suicide rate compared with any other geographic regions in Thailand. The provinces in the southern region ranked second and central region ranked third. In 2011 there were nine provinces in the northern region which ranked in the top ten suicide list, Lamphun, Chiang Mai, Nan, Chiang Rai, Phayao, Phetchabun, Nakhon sawan, Phrae, and Uttaradit. The province which has the highest ratings of suicides, as of 2011, was Lamphun, with 15.58 suicide victims per 100,000 inhabitants. The opposite was Narathiwat, with 1.08 suicide victims per 100,000 inhabitants. In fact, with more than 6 suicides per 100,000 population in every province with the exception of Phichit, Northern region was the worst-performing region in



Thailand. In addition, there were more than ten provinces with the suicide rates higher than 10 victims per 100,000 inhabitants. The northeastern region performed relatively better than the other region, with a suicide rate below 6.1 deaths per 100,000 inhabitants. Similarly, the central region, Bangkok and its vicinity had comparatively lower suicide rates. Lamphoon's suicide rate has averaged 15.26 per 100,000 inhabitants from 2005 until 2014, with its highest level of 20.02 in 2010. Broken down by province, Narathiwat had the lowest suicide rate and followed by Pattani, Bangkok, Samut Songkhram, Pathumthani, Yala, Mahasarakham, Pijit, Nonthaburi, and Chainat, respectively.

According to the information provided by the Department of Mental Health, in 2013, suffocation (including hanging) was the most common method of death by suicide, accounting for a little less than 67% of all suicide deaths. The next most common method was poisoning at 19.80%.

Economic and Social Factors

Unemployment Rate

The unemployment rate in Thailand was quite low with an average of 0.70 percent of labor force. Provinces with unemployment rate above 1.60 percent were Nakhonpanom, Khonkaen, Singburi, Anghong, Narathiwat, and Pattani.

Expenditure

Provinces in the southern and eastern regions, Bangkok and its vicinity had the highest expenditure whereas those in the northern and northeastern area had the lowest. The 10 provinces with the highest expenditure included Bangkok, Nonthaburi, Ranong, Prajinburi, and Suratthani, respectively. The province with the lowest expenditure was Maehongson and was followed by Tak, Petchaboon, Srisaket, and Prajinburi, respectively.

Income

Similar to Expenditure, provinces in the southern and eastern regions, as well as Bangkok and its vicinity had the highest household income whereas those in the northern and northeastern area had the lowest. Unsurprisingly, Bangkok was the province with the highest average household income, 48,951 Baht per month, and followed by Trang, Nonthaburi, Suratthani, and Krabi. The average household income in these provinces was higher than 25,000 Baht per month. The province with the lowest income was Maehongson, with an average income less than 10,000 Baht, and was followed by Tak, Srisaket, Nakhonpanom and Phayao, respectively. They all had household income lower than 16,000 Baht. Thus the provinces with higher income tend to have higher expenditure and vice versa.

Debt

Provinces in the western region and the two southern border provinces, Yala and Narathiwat, had the lowest household debt while those in the northeastern area had relatively high household debt. Nonthaburi and Bangkok were the two provinces with highest average household debt per year, which were 258,853 and 218,741 Baht, respectively, and followed by Surin, Roi-et, Chonburi, and Mukdahan. The province with the lowest household debt was Samut Songkhram, 9,244 Bath.

Not in Agricultural Sector

The percentage of population engaging in corporate firms and/or government-related sectors was the lowest in the northeast region, which is the largest and poorest agrarian area of Thailand. In contrast, the industrialized and urban provinces of Bangkok, Nonthaburi, Pathumthani, Phranakhonsriadhudyaya, Samutsakorn, Samutprakarn,



Chonburi, Phuket, and Rayong, all had the high proportion of people working in this sector with the rate above 60%.

Divorce Rate

Average divorce rate in Thailand is 5.14 couple per 1,000 household. Provinces with the divorce rate higher than 8 couple per 1,000 household were Phranakhonsriadhudyaya, Saraburi, Pathumthani, Samutprakan, Chonburi, Rayong, and Phuket. This info indicated that in Thailand divorce can be found in more educated and prosperous societies. In other words, people with economic success were more likely to feel confident in leaving their spouse and being on their own. The provinces with the lowest divorce rates were in the southern border area. To be more specific, Narathiwat and Pattani were the two provinces with the lowest rates, 1.37 and 1.56, respectively.

Age 60+

Bangkok and its vicinity, as well as provinces in the western areas, tend to have a younger population with less people over 60. Samutsakorn was the province with lowest AGE 60+ and was followed by Phuket, Ranong, Pathumthani, and Rayong, respectively. These provinces are urban and industrialized. In contrast, rural provinces in the north and northeast region had relatively higher proportion of AGE 60+.

Female as Head of Family

Most provinces had percentage of female as head of family around 31–45%. Regarding this indicator, Angthong ranked first while Samutsongkram and Singburi ranked second and third, respectively.

Population Density

Since vast area of Thailand is still rural, population density in Thailand is relatively low. Provinces in the northern, northeastern, as well as upper southern regions, had population density less than 100 person per km^2 . The province with the lowest population density was Maehongsorn, with 15.2 person per km^2 . The provinces with population density higher than 1,000 100 person per km^2 were Bangkok, Nonthaburi, Samutprakan, and Samutsakorn, with 5,258.6, 2143.1, 1,820.6, and 1,015.2 person per km^2 .

Alcohol

Provinces in the north and northeast regions had the highest prevalence of alcohol consumption in adult over 20. More than 38.5% of adults in these provinces consumed alcohol within one year of the questionnaire. To be more specific, Phayao was the province with the highest percent of adult consuming alcohol, 56.40%, followed by Phrae. The percentage of adult drinking alcohol tended to be lower in provinces in the southern and western regions including Bangkok and its vicinity, e.g. lower than 31.7%. Pattani and Narathiwat were the two provinces with the lowest percentage of adult consumption; 4.1 and 4.3, respectively, and followed by Yala, Stoon, Krabi, Songkhla, respectively.

Regarding the prevalence of underage drinking, Phayao was also the province with the highest percentage of 30.40, and followed by Sukhothai, Loei, Phrae, and Srisaket. Similar to alcohol consumption of adult, the underage drinking was concentrated in the northern and northeastern regions e.g. more than 17.7 % of youth in these provinces consumed alcohol. The provinces with the lowest prevalence of underage drinking were Pattani and Narathiwat and followed by Stoon, Yala, Petchburi, and Samutsongkram, respectively. It can be clearly seen that alcohol consumption both for adults and those prohibited were lower in area with higher economic prosperity as people are generally more educated and there is relatively better law enforcement.



Regression Results

The results, which were derived from both models in Table 1 showed that suicide rates in Thailand were significantly driven by alcohol and household income. That is, for example, for model 1, for every additional unit of population consuming alcohol as well as household income, one can expect suicide rates to increase by an average of 0.086 and 0.010, respectively. Next, the findings showed that divorce rates as well as other social backgrounds statistically had impact on the suicide rates. The estimated coefficient on DIV, AGE60 and NAGRI is 0.508, 0.704, 0.071, respectively, while the estimated coefficient on FEMH and POPD is -0.396 and -0.001, respectively. Thus, the results drawn from the study suggested that factors leading to the higher suicide rates were divorce rates, age of individuals (60+), as well as the type of employment; such as corporate firms and government-related sectors. In contrast, the population density and the percentage of woman that are counted as the head of the family were negatively related to suicide rates in Thailand. However, note that while INCOME had a significant effect on suicide rates in Model 1, it lost its significance in Model 2. Next, the prevalence of underage drinking, ALR15, played a role in influencing the suicide rates in Thailand with the estimated coefficient of 0.090. The findings from both models demonstrated that unemployment had no significant impact on suicide rates in Thailand. Note that EXPENDITURE was excluded from the model because it was highly correlated with INCOME, with the coefficient of 0.89, and thus can cause the multicollinearity problem. Regarding the correlation between other independent variables, the coefficients were less than 0.50. Thus, there was no multicollinearity problem existed. As regards to the heteroskedasticity problem, the Harvey test was adopted and all statistics accepted the null hypothesis of homoskedasticity. Since the data used in this study was not time series, the serial correlation was not a major concern. However, the Durbin-Watson statistics in Table 2 also showed the value around 2.00, suggesting the absence of serial correlation problem.

Table 2 OLS Regression Results

Model 1		Model 2	
Variable	Coefficient	Variable	Coefficient
ALR 20	0.086**	ALR 15	0.090*
INCOME	0.010**	INCOME	0.008
DEBT	-0.015**	DEBT	-0.015**
U	-0.784	U	-0.885
AGE 60	0.704***	AGE 60	0.755***
FEMH	-0.396***	FEMH	-0.401***
POPD	-0.001**	POPD	-0.001**
NAGRI	0.071***	NAGRI	0.063**
DIV	0.508***	DIV	0.670***
R ² = 0.609 Durbin-Watson = 1.964		R ² = 0.595 Durbin-Watson = 1.948	
F-Statistic = 11.271 (prob = 0.000)		F-Statistic = 10.603 (prob = 0.000)	

Note: * Significance at 0.1 level
 ** Significance at 0.05 level
 *** Significance at 0.01 level



Discussion

The economic factors that had significant relationship with suicide rates were income and debt of household. Suicide rates increased as income increased, while the level of debt went in opposite direction. Next, the higher the percentage of population engaging in corporate firms and/or government-related sectors, the higher the suicide rates in the province. It is worth mentioning that in Thailand people who work in agricultural sector are normally under deprivation in terms of economic and social status, when compared with those working for government and private enterprises. For example, those individuals do not receive any welfare from their employers as required by law and their earnings are dependent on the weather, which is not easily predicted. To add to the hardship, crop prices are very low in Thailand.

These results revealed an interesting implication of Thailand. Household with economic hardship and financial problems tends to have lower suicide rates. The findings were associated with Egoistic suicide proposed by Durkheim (1897). Suicide often occurred when individuals feel they do not belong to a family, community, or society and thus lack social integration. More commonly this usually takes place among the middle and upper income society. Individual's happiness seems to be more likely the results of having a good relationship with their friends and family. In this, those individuals in good economic status tend to have low interactions with their neighbors whereas the individuals living in rural areas have more social connection within their community. Individuals in household with good economic status are more likely raised in a less restrictive environment. More often, they are overwhelmingly coddled by their parents to the point where they are less likely tolerating the severe hardship which may occur at any point in life. Since there is lack of support emotionally and socially from the neighboring community, this increases the tendency of committing suicide as problems arise.

The social factors contributing to higher suicide rates included alcohol, ratio of elderly, ratio of people working for government-related and private sectors, and divorce rates. The prevalence of drinking in general population as well as those underage, the variables which were used as proxies of alcohol consumption among population and youth respectively, led to the increase in rate of suicide. This showed that alcohol prevents self-control and more often motivate and bring out courage for people under severe depression to commit suicide.

The ratio of elderly (people aged over 60) is worth mentioning. Provinces with higher percentage of elderly had higher suicide rates. The elderly, in general, has lower capability to help themselves as they age and in many cases they do live without family assistance. In Thailand, to be more specific, there are no effective programs to support the elderly financially and socially. Consequently, the suicide rates were higher among this group. The regression result was in parallel with the descriptive statistics about suicide in Thailand shown in earlier section in the sense that there are increasing trends of suicide rates for people over the age of 40. The finding was in accordance with previous literatures such as Lester and Yang (2005).

The ratio of female as head of family had a negative association with the suicide rates. When the male counterpart is considered the head of household, the female counterpart, in many cases, are abused to point they are suppressed emotionally and financially in their relationship. Therefore, when women are listed as the head of household, they are less overwhelmed by their male counterpart. This could lead to the increase of happiness in life. Thus, the rates of suicide in such provinces with more ratio of female as head of household were significantly lower. Next, as the population density rises, the suicide rates are lower. This finding was similar to various findings such as Lester and Yang (2005). Divorce rates, in contrast, resulted in higher rates of suicide. This outcome was



in accordance with the theory (Crouch, 1979) and many studies, for example Yang (1992) and Lester and Yang (2005).

The only variable which had no significant impact on suicide rates in Thailand was unemployment rate. This outcome went in line with Noh (2009) which indicated that unemployment rate does not necessarily lead to higher suicide rates of a nation. To be more particular, unemployment rate led to reduced suicide rates in low-income nations.

Conclusions

The results suggested that income level correlated with suicide rates whereas economic hardship did not increase suicide rates. This revealed an important fact that, in the case of Thailand, people with higher economic status tend to live independently and do not have much interaction with their neighbors whereas people in rural settings has more social support between one another in the community. The government should create a program encouraging collaboration between people in their community, especially in the provinces with higher income. Next, the findings show that alcohol leads to more suicide rates. Therefore, fiscal policy such as an alcohol tax should be raised, which may consequently lower the suicide rates. Governments should initiate programs to help prevent those considered high risk of committing suicide from consuming alcohol. In addition, the results imply that violations of laws regarding underage drinking (under 20) results in higher suicide. Thus, an effective law enforcement on such issue should be under urgent consideration of Thai government. For example, bars and other related businesses, which sell alcohol, must not be located near schools, colleges, and universities. There must be regular inspections to check whether the retail shops sell alcohol to those underage. Regarding the elderly, proper social security programs should be effectively improved which will consequently lead to lower suicide rates of those with age higher than 60.

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