Statistical Analysis of Mental Health in the Elderly in Chiang Mai Province, Thailand

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Abstract

Currently, Chiang Mai province of northern Thailand has a higher proportion of the elderly than in the past. This trend has affected to the elderly people in many ways. The aims of this research are to study the attitude of the elderly people in Chiang Mai with regard to problems of depression and/or self-abuse, as well as to study the method of self-abuse, to compare these phenomena between municipal and non-municipal area in Chiang Mai and to analyze the factors affecting the depressive problems and/or self-abuse of the elderly in Chiang Mai. Finally, we give and discuss the predictive equation used to forecast the number of people expected to commit self-abuse in Chiang Mai.

In our study, we sampled 1,200 elderly people, 400 from main district and 800 from other districts in Chiang Mai by using multistage random sampling methodology. The data were subsequently analyzed using various descriptive statistics techniques, nonparametric statistics, categorical principal components analysis, nonlinear canonical analysis, categorical regression analysis, logistic regression and log-linear regression methods.

With regard to our study results, the mean age was 69.74 years old, with males and females comprising approximately equal parts. Most of the study participants were Buddhist, married and had under primary school or primary school education. The mean income and expenses of our study participants were less than 5,000 baht[a] per month, and they were without debt. The general attitude of the participants was normal and

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[a] 35 baht = 1 US dollar approximately.

most of them had no depressive problem. Of those most affected by depressive problems, most had some personal diseases such as chronic disease or AIDS. The second factor affecting depression was loss of money or of a loved one. 15.8% used to some form of self-abuse and most of them used to self-abuse once. The most common method used to self-abuse was using sharp or solid object, and the second was hanging. For purposes of comparison, the municipal elderly had a higher level of depressive attitudes than for the non-municipal elderly. Factors affecting depression and/or self-abuse in the elderly could be categorized in two groups: a self-abuse factor and a general factor. The most factor affecting the being used to self- abuse was being used to commit suicide and the second was depressive moment and marital status with 98.3% forecasting power. The elderly who used to abuse themselves and always think of committing self-abuse is 1.02%.

1. Introduction

In 1997, we found that the suicidal rate in Chiang Mai before and between the period of economic crisis was highest in Thailand, 27.70 persons per 100 thousands persons [6]. These make us concern about the elderly people (people with at least 60 years old) in Chiang Mai. Although the elderly who have many life experiences have always commanded respect in Thai culture, some of them are deserted at present. Their important roles in family have been reduced due to the financial burdens that their offspring must work out. This leads to problems with depression and/or self-abuse. The purposes of this research are first, to study the attitude of the elderly in Chiang Mai with regard to problems of depression and/ or self-abuse. Second is to study the problems of depression and/ or self-abuse and the method which the elderly use in committing self-abuse. Third, is to compare these phenomena between municipal and non-municipal areas in Chiang Mai. Fourth, is to analyze the factors affecting depression and/ or self-abuse in the elderly of Chiang Mai. Lastly, is to predict the number of elderly expected to commit self-abuse from independent variables.

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2. Research Methodology

In our study, we sampled 1,200 elderly people. We took random samples 14 sub-districts from total 16 sub-districts of the main district, we got 400 people from within these 14 sub-districts in which about 30 were questioned per sub-district. We took random samples 20 outer districts from 23 districts , we got 800 people from within these 20 outer districts .We took random samples 2 sub-districts from each outer districts; thus, samples were taken 40 people from the 2 sub-districts. The questionnaire in this research consisted of the following three parts : Part 1 : General data of the elderly. Part 2 : The attitude of the elderly with regard to depressive and self-abuse problems. Part 3 : The scale of depression and the questions about depressive and self-abuse problems.

3. Results and Discussions

The following are the results from that research.

3.1 General data and the attitude of the elderly with regard to the problems of depression and/ or self-abuse

3.1.1 General data of the elderly

From the personal data, the following can be concluded: the participants included 50.20% of female and 49.80% of male . 50.3% of the elderly are 60-69 years old , 43.8% of the elderly are 70-79 years old, and over 79 years old are 5.9% . The mean age is 69.74 years old with a standard deviation of 6.2 years in which the lowest is 60 years old and the highest is 90 years old. Most of the study participants, 97.2% are Buddhist. In terms of health, 65.5% of the elderly are not in good health and the others 34.5%. 41.8% are dim-sighted and the others 58.2%. In regard to their level of education, 31.8% of the subjects received less than a primary school education, 30.3% completed their primary school education and 37.9% got higher education. About the marital status, 53.1% of the elderly still live with his/her spouse but 41.4% are widowed and the others 5.5%. With regards to the occupation before retirement, 52.8% of the elderly are agriculturists and hired laborers; 29.7% had their own business and the others 17.5%. The elderly had no job at the present are 57.6%. Their income and expenses which were under 5,000 baht per month are 72.8% and 77.2% , respectively. Most of the elderly, 83% had no debt. In regards to family, 89.9% of the participants lived with their family in which 61.1% had 2 to 4 family members. 53.6% of the subjects were the head of the household. 78.9% of the elderly sensed the warmth in their family and 60% are the municipal elderly. About the elderly who did not smoke, drink, take relaxation drugs ,or gamble, the proportion was 76%, 78.3%, 100%, and 86.9%, respectively.

3.1.2 The attitude of the elderly with regard to depression and/ or self-abuse

Let the score of positive attitude as follows

1 = strongly agree (no depressive state)   2 = agree

3 = moderate   4 = disagree

5 = strongly disagree (most aggressive depression)

Let the score of negative attitude as follows

1 = none (no depressive state)   2 = little

3 = moderate   4 = much

5 = most (most aggressive depression)

The study showed the mean of the elderly 's opinion about the general attitude at 2.64 (the normal rate), that is, most of them have no depressive problems. When we considered each problem, we found that the mean of elderly people who depend on dharma for relaxing and who have a close relationship in the family without the self-abuse is at 2.77 and 2.67 with a standard deviation of 1.42 and 1.36, respectively.

The level of the attitude which causes depression in the elderly is moderate with a mean of 3.00 and a standard deviation of 1.33. When we examined each problem affecting the depression, we found that factors which had the most influence over a depressive state are chronic disease/ AIDS/ deformity/disfiguration of face and the depressed person with a mean of 3.29 and 3.06, respectively and the same standard deviation of 1.29. The second factor affecting depression is the loss of money/disaster/loss from gambling and loss of a loved one with the same mean of 3.03 and standard deviation of 1.30, and 1.36, respectively.

3.2   The problems of depression and/ or self-abuse as well as the method the elderly use in self-abuse

3.2.1 The problems of depression and/ or self-abuse

From the part of the scale of depression and the questions about depressive and self-abuse problems, we have scored the various states of depression [7] as follows:

Normal depression   :   the score is between < 13 points

A bit more depression   :   the score is between 13-18 points

Moderate depression   :   the score is between 19-24 points

Aggressive depression   :   the score is between 25-30 points

The study showed that 89.4% of the elderly expected to receive good things in the future. The second, 87.5% were satisfied with their life at present. According to the view of daily life, the percent of the subjects who felt delighted, happy, cheerful, and fresh when waking up was 85.9, 85.3, 84.5, and 84.1, respectively. Most elderly people,

73.5%, experienced normal depression, while 13.8% were at a higher level; thus, 12.7% shows the aggressive problem of depression.

3.2.2 The method the elderly used in self-abuse

A large number of the elderly, 84.1% had never abused themselves. 15.8% used to commit self-abuse, and no answer 0.1% ; and 87.8% commit self-abuse once. The most common method of using a sharp or solid object involved 32.3%, the second method by hanging included 21.7% and else 46% . In the present, 93.3% of the elderly had no inclination towards self-abuse as well as 85.2% had not thought about suicide.

3.3 Compare and analyze the attitude and factor affecting the depression and self-abuse state between living place of elderly people

For this research, we used the Mann Whitney U Test : U [3] and found that the score of the elderly in the municipal area was different from that of the elderly in the non-municipal one in terms of the attitude between general problems and the factors affecting depression. The municipal elderly had a higher level of attitude toward general problems and depressive state than the non-municipal elderly.

3.4 Analyze the factor affecting the depressive problems and/ or self-abuse of the elderly

We used many variables from 3 parts of the questionnaire as follows.

3.4.1 Analyze the depressive problems and/ or self-abuse of the elderly

The following factors have influence totally on depressive problems and/ or self-abuse in the elderly of Chiang Mai: the family relationship, health problems, educational level, marital status, past occupation before retirement, living place, drinking behavior, attitude with regard to general problems, attitude towards stimulus, having known the news of self-abuse, thinking to hurt themselves, thinking to commit suicide, and their depressive state. Moreover, we divided the elderly following the location of their home, that is, municipal or non-municipal area in Chiang Mai. After that we analyzed this data by using the Categorical Principal Components Analysis: CatPCA [1]. The results are as follows.

Table 1. The relation between the factors affecting depression and/ or self-abuse in the elderly of Chiang Mai.

Model Summary

Dimension	Cronbach's Alpha	Eigenvalue
1	0.761	3.454
2	0.425	1.658
Total	0.862[a]	5.112

a Total Cronbach's Alpha is based on the total Eigenvalue.
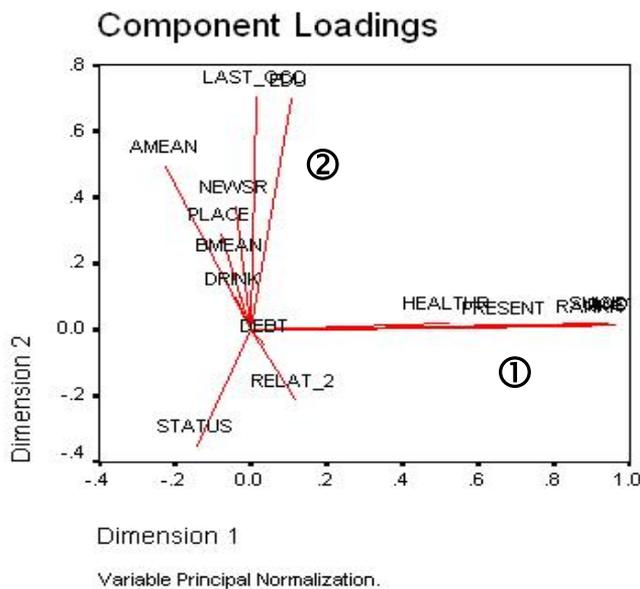
Figure 1. Component loadings of the variables which affected depression and/ or self-abuse in the elderly of Chiang Mai.

From Figure 1, the Eigen value in each dimension is high (the value is greater than 1). This Figure can well explain the variation of the variables in that dimension and the total relation between the variables affecting depression and/ or self-abuse in the elderly of Chiang Mai in each dimension by Cronbach's Alpha. We obtained a high of 0.862 related between these variables. This means when these variables were seen in the figure in that dimension, they showed such a clear distinction that it was enough to use the figure to show the relation of these variables in only 2 dimensions.

Figure 1 showed the relation between these variables which affected depression and/ or self-abuse in the elderly of Chiang Mai by using component loadings of each variable from Table 1, we can group the relation between these variables as 2 major factors, they are :

Factor ①, the factor affecting self-abuse problems, consisted of thoughts to commit suicide in the past (PAST), thinking of self-abuse at present (PRESENT), health problems

(HEALTHR), depressive state rank (RANKR), and self-abuse in the past (SUICIDE). The variables of self-abuse in the past (SUICIDE), thoughts to commit suicide in the past (PAST), and health problems (HEALTHR) had a close relation to the thinking of self-abuse at present (PRESENT) variable in a positive direction. This means that the elderly people who have aggressive depressive problems and/ or abuse themselves were the ones who had health problems.

Factor ②, the basic factors in which the variables were divided into 2 parts. Part 1 consisted of educational level (EDU), last occupation before retirement (LAST_OCC), the mean score of the general attitude towards depressive state (AMEAN), having known the news of self-abuse (NEWR), living place (PLACE), the mean score of attitude with regard to depressive state (BMEAN), and drinking behavior (DRINK). These variables are related in the same way. For example, if the elderly have much debt, they will be more likely to drink and the attitude towards the depressive state will be higher. Part 2 consisted of debt (DEBT), the relationship in the family (RELAT_2), and marital status (STATUS). From Figure 1, we can see that the elderly who have a higher education level will also have a higher attitude towards the depression state and have the more they drink.

Similarly ,we used the CatPCA to analyze the elderly in the municipal and non-municipal areas. The Eigen value is high and the relation between variables which affected the depressive state and/ or self-abuse of the elderly people in both the municipal and non-municipal areas by using Cronbach's Alpha are 0.862 and 0.867, respectively. Moreover, we found that the factors affecting the depressive state and/ or self-abuse in the elderly in both the municipal and non-municipal areas can be divided into 2 factors: one is the factor of self-abuse and the other is the basic factor, as well as the elderly in the municipal and non-municipal areas.

3.4.2 Analyzing the relation between sets of attitudes of the elderly

We studied the relation between the elderly 's general information, general attitude, the attitude towards a depressive state, and the problem of depression or self-abuse by using Nonlinear Canonical Correlation: OVERAL [1]**.**
 The relation between variables in each set and the canonical correlation between sets of variables in the 1st dimension and 2nd dimension are shown in Table 2.

Table 2. The relation between 4 sets of variables and the loss in 1st dimension and 2nd dimension.

Variable sets	Dimension 1		Dimension 2		Sum Loss
	Loss	R^2	Loss	R^2	
- The basic data of the elderly (Set 1) (part 1 of questionnaire)	0.257	.743	0.642	.358	1.064
- The general attitude (Set 2) (part 2.1 of questionnaire)	0.517	.483	0.548	.452	1.101
- The attitude with regard to depressive problem (Set 3)	0.425	.575	0.773	.227	1.054
(part 2.2 of questionnaire) - The problem of depression and self-abuse (Set 4)	0.413	.587	0.380	.620	0.780
Eigen Value	0.597		0.414		
Nonlinear canonical correlation coefficient	0.537		0.781		
Fit Value	1.011				

According to Table 2, the basic data of the elderly (Set 1) is the set that shows the Loss value is the least in dimension 1. Dimension 1 can be explained as where the variation of variables is 74.30% and in dimension 2 is 35.8%. However, the problem of depression and self-abuse (Set 4) in dimension 2 can better explain the variation of variables than dimension 1 due to the higher R^2 . The relation in 4 sets of these variables in dimension 1 is 0.537 and in dimension 2 is 0.781. The fit value in Figure 2 is 1.011 (the maximum of fit value will be equal to the number of the dimension that is 2 dimensions). In this study, the value of fit is over 50%.

Component Loadings
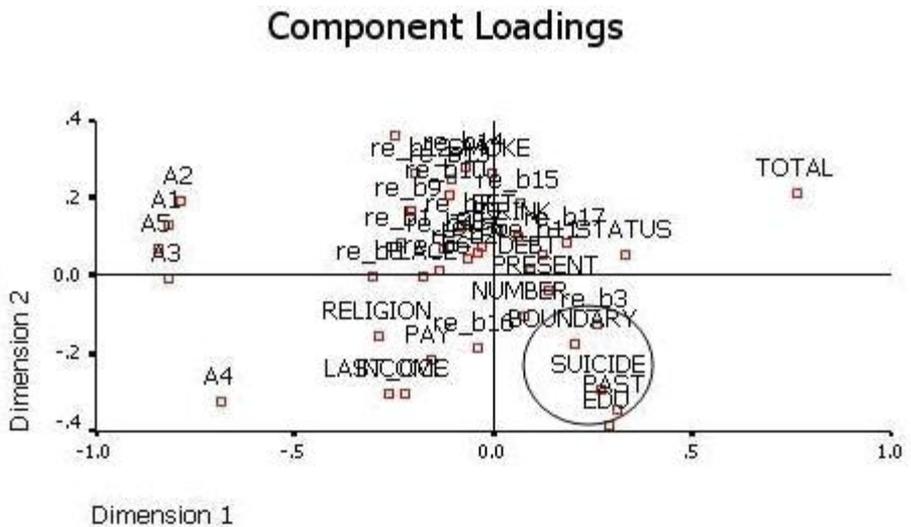
Figure 2. Component loadings of the various variables in each dimension.

From Figure 2 which showed the relation among variables in each set, shows the variables regarding the depressive problem or self-abuse (Set 4) are self-abuse in the past (SUICIDE), thoughts to commit suicide in the past (PAST), and the basic data of the elderly (Set 1), that is, educational level (EDU), and living boundary (BOUNDARY). These variables are grouped near one another because of relation between variables. To consider the Centroids of those variables, they are shown in Figure 3.
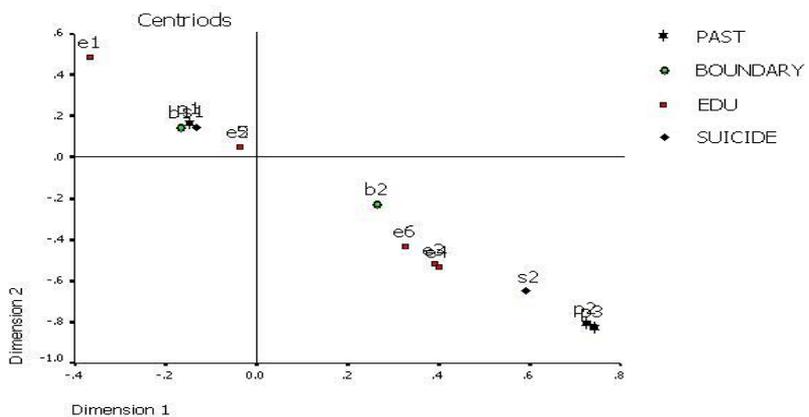
Figure 3. Centroids of each variable.

From Figure 3, the elderly who live in the municipal area (b1), who have under a primary education (e1), primary education (e2), and bachelor's degree (e5) have never thought both of suicide (p1) and of committing self-abuse. The elderly who live in the non-municipal area (b2), who have a secondary education (e3), associate's degree(e4), and higher than bachelor's degree (e6) think to commit suicide sometimes (p2), always think to commit suicide (p3), and sometimes abuse themselves (s2).

3.4.3 Analyzing self-abuse in the past of the elderly

We analyzed the variable relation affecting self-abuse in the elderly of Chiang Mai from the coincident of basic data, the attitude, and the depressive problems by using the Categorical Regression Analysis and Logistic Regression Analysis.

 Categorical Regression Analysis [1] is a method to find the linear relation with a dependent variable in the nominal scale and independent variable which can be of any scale. The results are shown in the following table.

Table 3. The variables and the important weight of each variable which affected self-abuse in the elderly of Chiang Mai.

	Beta	F	Sig.	Correlations			Importance
				Zero-Order	Partial	Part	
Think to commit suicide in the past	0.813	2100.654	.000	0.939	0.800	0.440	0.857
The points of depressive state	0.139	61.308	.000	0.831	0.222	0.075	0.130
Marital status	0.041	17.994	.000	0.175	0.122	0.041	0.008
Living Place	-0.021	4.220	.000	-0.065	-0.060	-0.020	0.002
The relationship in family	0.020	3.781	.023	0.072	0.056	0.019	0.002

As shown in Table 3, at a significant level of 5 % , we can conclude that the variable which has the most influence on the elderly abusing themselves are past thoughts of suicide with 85.7% importance for all variables in this Table. The following variables were also found to affect self- abuse, in order of highest to lowest, 13.0% of the points from depressive state, 0.8% from marital status, 0.2% from living place, and 0.2% from the relationship in family. For these results, the variable of past thoughts of suicide and the variable of the depressive state, have 98.7% affect on self-abuse (85.7 + 13.0). The variables of thoughts to commit suicide in the past, used to do self-abuse, of the depressive state and the relationship in family are related in the same direction. That is,

the elderly who have thought to commit suicide, who had a high depressive state, and whose family are not warm, tend to self-abuse. On the other hand, if the elderly have never thought to commit suicide, had a normal score in the depressive state, and their families are warm, have never abused themselves. These independent variables in this Table can explain the variation of variables about self-abuse in the past which is dependent variable (R^2) of 89%.

The Binary Logistics Regression [4,5] is used to classify dependent variables from independent variables as in the following equation

$$\text{Logit}\,[P(Y = 1 / X)] = \hat{B}_0 + \hat{B}_1\,X_1 + \hat{B}_2\,X_2 + ... + \hat{B}_p\,X_p$$

For   Y = dependent variables of which the value is 0 of 1

Let   0 = no interesting event has occurred

                   1 = an interesting event has occurred

X_i = Independent variable in ratio scale or dummy variables;   i = 1, 2, ..., p

$\hat{B}_i$ = Logistic regression coefficients of X_i ; i = 1, 2, ..., p

$$\text{Prob}\,(\text{event}) = \frac{1}{1 + e^{-y}}$$

If   Prob. (event) < 0.5   it can be concluded that no interesting event has occurred in that case

Prob. (event) > 0.5 it can be concluded that an interesting event has occurred in that case

Prob. (event) = 0.5 it can be concluded that both events can occur equally in that case.

We analyzed the elderly 's self-abuse by logistic regression, the result is shown in Table 4.

Table 4. The parameter estimated of variables which affected the elderly self-abuse in
Chiang Mai.

Variables	B	S.E.	Wald	df	Sig.	Exp(B)
RANK (the point of depressive state)			31.457	3	.000	
RANK(1)	-5.008	1.458	11.806	1	.001	.007
RANK(2)	-3.691	1.486	6.168	1	.013	.025
RANK(3)	-1.401	1.549	.818	1	.366	.246
PAST (has thought to commit suicide in the past)			88.119	2	.000	
PAST(1)	-23.745	11753.062	.000	1	.998	.000
PAST(2)	-17.645	11753.062	.000	1	.999	.000
STATUS (marital status)			14.182	3	.003	
STATUS(1)	-3.155	1.587	3.953	1	.047	.043
STATUS(2)	-2.739	.794	11.901	1	.001	.065
STATUS(3)	-2.900	.807	12.931	1	.000	.055
Constant	26.581	11753.062	0.000	1	0.998	0.000
-2 Log likelihood		157.270				
Cox & Snell R Square		0.523				
Nagelkerke R Square		0.899				

From Table 4, the Hosmer and Lemeshow Test for goodness of fit of the model
at a significant level of 5 %, is a good model. The affected variables in terms of self-
abuse in the elderly are the point of the depressive state, past thoughts to commit
suicide and their marital status. It predicted a correlated classification result of 98.3%,
where R^2 is 0.899.

As shown in Table 3 and Table 4, the same independent variables in the
Categorical Regression and Logistic Regression Analysis which affected whether the

elderly committed self-abuse are the elderly who used to have thoughts to commit suicide in the past, the point of the depressive state, and their marital status.

3.4.4 Analyze the idea of self-abuse at present in the elderly

We analyzed the relation between variables which affected the idea of committing self-abuse at present in the elderly from their basic data, attitude, and the agreeing depressive problem by using the Categorical Regression Analysis [3]. The result is shown in Table 5.

Table 5. Important weight of independent variables on the idea to commit self-abuse at present in the elderly of Chiang Mai.

Independent variables	Beta	F	Sig	Correlations			Importance
				Zero-Order	Partial	Part	
Having had the idea of committing suicide in the past	0.827	2620.805	.000	0.829	0.830	0.825	0.989
Educational level	-0.037	5.300	.000	-0.074	-0.067	-0.037	0.004
Debt	0.052	6.546	.011	0.069	0.074	0.041	0.004
Marital status	0.048	10.183	.000	0.038	0.092	0.05	0.003

From Table 5, at a significant level of 5%, we can conclude that the variables which have influence on the idea to commit self-abuse in the elderly at present are past thoughts to commit suicide , educational level, debt, and marital status. Having had the idea of committing suicide in the past has the most effect of all the variables, which was 98.9% of importance. The variables, past thoughts to commit suicide and debt were found to be related to the used to commit self-abuse in the same direction; but they related in opposite direction to educational level. For example, if the elderly had thoughts of self-abuse, many debts, low educational level, then they tend to abuse themselves at present. Independent variables in this table can explain the variation of the dependent variable (idea to commit self-abuse at present in the elderly) or where R^2 is 69%.

3.4.5 Analyze the attempts to commit suicide by the elderly

To analyze the relation between variables which affected the attempts to commit suicide by the elderly in Chiang Mai from basic data, attitude, and depressive state by Categorical Regression Analysis. The result is as follows.

Table 6. Important weight of independent variables on using to commit suicide of the elderly in Chiang Mai.

Independent variables	Beta	F	Sig	Correlations			Importance
				Zero-Order	Partial	Part	
The points of depressive state	0.215	172.687	.000	0.858	0.360	0.115	0.203
Used to commit self-abuse in the past	0.661	145.361	.000	0.938	0.746	0.333	0.679
Think of committing self-abuse at present	0.139	180.552	.000	0.600	0.367	0.117	0.091
The attitude with regard to depressive problems	-0.032	12.891	.000	-0.171	-0.105	-0.031	0.006
Educational level	0.019	4.733	.000	0.133	0.064	0.019	0.003
Health problems	0.042	19.154	.000	0.413	0.127	0.038	0.019

As shown in Table 6, at a significant level of 5%, we can conclude that the variables which most affect the idea to kill themselves in the elderly of Chiang Mai is to have had thoughts of committing self-abuse in the past. This thinking has the most effect of all the variables, which was 67.9% of importance. The second are the variables including the points of depressive state, and thinking of committing self-abuse at present, which has an importance of 20.3% and 9.1%, respectively. The important weight of these 3 variables on thoughts of committing suicide is 97.3% (67.9 + 20.3 + 9.1).

The variables of used to commit self-abuse, the points of a depressive state, and thoughts of committing self-abuse at present related to the variables of attempts to commit suicide in the same direction. That is to say that if the elderly used to think of killing themselves, got higher points of a depressive state, and thoughts to abuse themselves at present, they will think about committing suicide. However, the elderly who got lower points of a depressive state, who have never committed self-abuse, and who have never thought of committing suicide, do not commit self-abuse at present, and never think about committing suicide. These independent variables in this table can explain the variation of the dependent variable (attempts to commit suicide by the elderly in Chiang Mai) or where R^2 is 91.10%.

3.4.6 Predict the number of the elderly who used to commit self-abuse

The objective of this study is to predict the number (expected frequency) in each level of independent variables which make up the nominal scale by using the Log linear model analysis [1,2].

3.4.6.1 The prediction a number of the elderly who used to commit self-abuse by using the General

Log Linear Model

$$\ln(m_{ijk}) = \mu + \alpha_i + \beta_j + \gamma_k + (\alpha\beta)_{ij} + (\beta\gamma)_{jk}$$

Let m_{ijk} : the expected frequency of factor 'i' , factor 'j', and factor 'k'

μ : Constant term

α_i , β_j , γ_k : Main effect term of factor 'i' is health problems (HEALTHR)

factor 'j' is used to commit self-abuse (SUICIDER) and factor 'k' is to think of committing self-abuse at present (PRESENT), respectively.

$(\alpha\beta)_{ij}$, $(\beta\gamma)_{jk}$: the Interaction between factor i and factor j ; and factor j and factor k, respectively.

The relation between variables in this equation, we have idea from Factor ① in Figure 1. The result is shown in Table 7 and Table 8 as follows :

Table 7. Correspondence between parameters and terms of the design (variables : used to commit self-abuse , health-problems and the idea of committing self- abuse at present).

Parameter	Estimate
1) Constant	1.1144
2) [HEALTHR = 1]	1.0776
3) [HEALTHR = 2]	0.0000
4) [PRESENT = 1]	2.2858
5) [PRESENT = 2]	1.5926
6) [PRESENT = 3]	0.0000
7) [SUICIDER = .00]	-9.4968
8) [SUICIDER = 1.00]	0.0000
9) [HEALTHR = 1]*[SUICIDER = .00]	-2.1587
10) [HEALTHR = 1]*[SUICIDER = 1.00]	0.0000
11) [HEALTHR = 2]*[SUICIDER = .00]	0.0000
12) [HEALTHR = 2]*[SUICIDER = 1.00]	0.0000
13) [[PRESENT = 1]*[SUICIDER = .00]	12.6921
14[[PRESENT = 1]*[SUICIDER = 1.00]	0.000
15) [[PRESENT = 2]*[SUICIDER = .00]	8.4436
16[[PRESENT = 2]*[SUICIDER = 1.00]	0.0000
17) [[PRESENT = 3]*[SUICIDER = .00]	0.0000
18) [[PRESENT = 3]*[SUICIDER = 1.00]	0.0000

Goodness-of-fit Statistics	Chi-Square	DF	Sig.
Likelihood Ratio	4.6371	4	0.3266
Pearson	2.9296	4	0.5697

Model: Multinomial

Design: Constant + HEALTHR + PRESENT + SUICIDER + HEALTHR*SUICIDER + PRESENT*SUICIDER

From the test for the goodness of fit of model at a significant level of 5 %, we can conclude that this model is appropriate where the significance of Likelihood Ratio Chi-Square is 0.3266. The frequencies as we expected are shown in Table 8.

Table 8. Observed frequencies, expected frequencies and the percent (%) of the elderly who used to commit self-abuse with health problems and the idea of committing self-abuse at present.

Health Problem	Used to commit self-abuse												Total
	No						Yes						
	self-abuse at present						self-abuse at present						
	Never think		Sometimes think		Always think		Never think		Sometimes think		Always think		
	Observed frequencies	Expected frequencies	Observed frequencies	Expected frequencies	Observed frequencies	Expected frequencies	Observed frequencies	Expected frequencies	Observed frequencies	Expected frequencies	Observed frequencies	Expected frequencies	
No	250	248.23	0	1.77	0	0	90	88.03	42	44.02	9	8.95	391
(%t)	(21.26)	(21.11)	(0)	(0.16)	(0)	(0)	(7.65)	(7.49)	(3.57)	(3.74)	(0.77)	(0.76)	(33.26)
Yes	**730**	731.77	7	5.23	0	0	28	29.97	17	14.98	3	3.05	785
(%)	**(62.07)**	(62.22)	(0.60)	(0.44)	(0)	(0)	(2.38)	(2.54)	(1.45)	(1.28)	(0.26)	(0.26)	(66.74)
Total	980		**7**		0		118		59		121		1,176
(%)	(83.33)		**(0.60)**		(0)		(10.03)		**(5.02)**		**(1.02)**		(100)

Table 8 shows that the observed frequencies and expected frequencies of the elderly who used to commit self-abuse with the idea of committing self-abuse at present and health problems are almost equal. For example, the percent of the elderly who never abuse themselves now turn to think about committing self-abuse sometimes is 0.60% ,and now turn to always think about committing self-abuse is 0% .The percent of the elderly who used to abuse themselves now still think of committing self-abuse sometimes is 5.02%, and who always think of committing self-abuse is 1.02%. We found

that the elderly who used to abuse themselves in the past and still think of committing self-abuse at present sometimes is 8.2 times (5.02 / 0.60) that of the elderly who have never thought to commit self-abuse in the past but sometimes think to commit self-abuse at present. From this prediction we can plot adjusted residual shown in Figure 4.
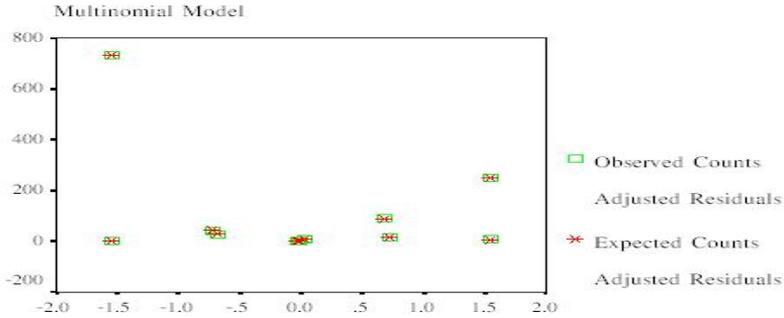

Figure 4. Adjusted residuals of Multinomial Model.

Figure 4 shows graph of adjusted residuals & observed counts and adjusted residuals & expected counts in the same graph. Adjusted residuals are between -1.5 and 1.5. Observed and expected counts of each residual are almost equal . The greatest number of the elderly people who never used to self-abuse, never think about self-abuse at present and get health problem are 730 (62.07%) with adjusted residuals -1.5.

3.4.6.2 Prediction the number of the elderly who used to commit self-abuse according to the

Logit Log Linear Model

$$\ln(m_{ijkl}) = \mu + \alpha_i + (\alpha\beta)_{ij} + (\alpha\gamma)_{ik} + (\alpha T)_{il}$$

Let m_{ijkl} : The expected frequencies of factor i, factor j, factor k, and factor l

μ : Constant term

α_i , β_j , γ_k ,T_l : Main effect term of factor i (SUICIDER), factor j (DEBT), factor k (RANKR) and factor l (PLACE), respectively

$(\alpha\beta)_{ij}$,$(\alpha\gamma)_{ik}$, $(\alpha T)_{il}$: the Interaction between factor i and factor j; factor i and factor k; and factor i and factor l, respectively

The relation between variables in this equation, we have idea from Factor ② in Figure 1. The result is shown in Table 9 and Table 10 as follows.

Table 9. Correspondence between parameters and terms of the design (dependent variable : used to self-abuse ; independent variables : depressive problem, living place and debt).

Parameter		Aliased Term	Estimate
1		Constant for [RANKR = 1.00]*[PLACE = 1]*[DEBT = 1]	0.2813
2		Constant for [RANKR = 1.00]*[PLACE = 1]*[DEBT = 2]	-1.1843
3		Constant for [RANKR = 1.00]*[PLACE = 2]*[DEBT = 1]	1.7776
4		Constant for [RANKR = 1.00]*[PLACE = 2]*[DEBT = 2]	0.3741
5		Constant for [RANKR = 2.00]*[PLACE = 1]*[DEBT = 1]	1.4700
6		Constant for [RANKR = 2.00]*[PLACE = 1]*[DEBT = 2]	-0.2683
7		Constant for [RANKR = 2.00]*[PLACE = 2]*[DEBT = 1]	3.0873
8		Constant for [RANKR = 2.00]*[PLACE = 2]*[DEBT = 2]	1.8765
9		Constant for [RANKR = 3.00]*[PLACE = 1]*[DEBT = 1]	2.5296
10		Constant for [RANKR = 3.00]*[PLACE = 1]*[DEBT = 2]	1.9171
11		Constant for [RANKR = 3.00]*[PLACE = 2]*[DEBT = 1]	4.6519
12		Constant for [RANKR = 3.00]*[PLACE = 2]*[DEBT = 2]	2.8827
13		Constant for [RANKR = 4.00]*[PLACE = 1]*[DEBT = 1]	-0.1002
14		Constant for [RANKR = 4.00]*[PLACE = 1]*[DEBT = 2]	0.0000
15		Constant for [RANKR = 4.00]*[PLACE = 2]*[DEBT = 1]	1.1795
16		Constant for [RANKR = 4.00]*[PLACE = 2]*[DEBT = 2]	-0.1711
17		[SUICIDER = .00]	-1.6786
18	x	[SUICIDER = 1.00]	0.000
19		[SUICIDER = .00]*[DEBT = 1]	0.208
20	x	[SUICIDER = .00]*[DEBT = 2]	0.000
21	x	[SUICIDER = 1.00]*[DEBT = 1]	0.000
22	x	[SUICIDER = 1.00]*[DEBT = 2]	0.000
23		[SUICIDER = .00]*[PLACE = 1]	-0.7798
24	x	[SUICIDER = .00]*[PLACE = 2]	0.000
25	x	[SUICIDER = 1.00]*[PLACE = 1]	0.000
26	x	[SUICIDER = 1.00]*[PLACE = 2]	0.000
27		[SUICIDER = .00]*[RANKR = 1.00]	6.1839
28		[SUICIDER = .00]*[RANKR = 2.00]	2.9381
29		[SUICIDER = .00]*[RANKR = 3.00]	-1.0756
30	x	[SUICIDER = .00]*[RANKR = 4.00]	0.000

31	x	[SUICIDER = 1.00]*[RANKR = 1.00]	0.000
32	x	[SUICIDER = 1.00]*[RANKR = 2.00]	0.000
33	x	[SUICIDER = 1.00]*[RANKR = 3.00]	0.000
34	x	[SUICIDER = 1.00]*[RANKR = 4.00]	0.000

Note: 'x' indicates an aliased (or a redundant) parameter.

These parameters are set to zero.

Goodness-of-fit Statistics	Chi-Square	DF	Sig.
Likelihood Ratio	7.3126	10	0.6956
Pearson	6.5214	10	.7697

Model: Multinomial Logit

Design: Constant + SUICIDER + SUICIDER*DEBT + SUICIDER*PLACE + SUICIDER*RANKR

At a significant level of 5 %, we concluded that this model is appropriate where the significance of Chi-Square is 0.6956. The relation of independent variables on the dependent variable (used to commit self-abuse) in the equation is 0.7697. The expected frequencies in each level of independent variables is shown in Table 10.

From Table 10, the observed frequencies and expected frequencies of the elderly who used to commit self-abuse where the result is from debt, depressive problems and living place, are equal. The percentage of the elderly who used to commit self-abuse is 15.8% (1.67+0.59+11.28+2.26).The elderly, who get much depressive problem, stay in old people's home ,with debt, and never commit self-abuse is 0%. The greatest percent of the elderly, who get normal depressive problem, stay with family, have no debt, and never commit self-abuse is 661 people (99.40%) . The greatest percent of the elderly, who stay with family, have no debt, never commit self-abuse is 63.83% .From this prediction we can plot adjusted residual is shown in Figure 5.

Table 10. Observed frequencies, expected frequencies and the percent (%) of the elderly with depressive problems, living place, debt, and the used to commit self-abuse.

Living Place																Depressive problem
Old people's home								Stay with family								
No debt				Debt				No debt				Debt				
Never self-abuse		Used to self-abuse		Never self-abuse		Used to self-abuse		Never self-abuse		Used to self-abuse		Never self-abuse		Used to self-abuse		
Observed frequencies	Expected frequencies	Observed frequencies	Expected frequencies	Observed frequencies	Expected frequencies	Observed frequencies	Expected frequencies	Observed frequencies	Expected frequencies	Observed frequencies	Expected frequencies	Observed frequencies	Expected frequencies	Observed frequencies	Expected frequencies	
67 (97.10)	67.68 (98.08)	2 (2.90)	1.32 (1.92)	13 (100.0)	12.69 (97.65)	0 (0.00)	0.31 (2.35)	**661 (99.40)**	659.08 (99.11)	4 (0.60)	5.92 (0.89)	130 (97.74)	131.55 (98.91)	3 (2.26)	1.45 (1.09)	Normal (%)
8 (61.54)	8.65 (66.54)	5 (38.46)	4.35 (33.46)	2 (100.0)	1.24 (61.77)	0 (0.00)	0.76 (38.23)	95 (81.20)	95.08 (81.27)	22 (18.80)	21.92 (18.73)	21 (77.78)	21.03 (77.89)	6 (22.22)	5.97 (22.11)	Little (%)

| Living Place																Depressive problem
Old people's home								Stay with family								
No debt				Debt				No debt				Debt				
Never self-abuse		Used to self-abuse		Never self-abuse		Used to self-abuse		Never self-abuse		Used to self-abuse		Never self-abuse		Used to self-abuse		
Observed frequencies	Expected frequencies	Observed frequencies	Expected frequencies	Observed frequencies	Expected frequencies	Observed frequencies	Expected frequencies	Observed frequencies	Expected frequencies	Observed frequencies	Expected frequencies	Observed frequencies	Expected frequencies	Observed frequencies	Expected frequencies	
1 (7.69)	0.45 (3.47)	12 (92.31)	12.55 (96.53)	0 (0.00)	0.20 (2.84)	7 (100.0)	6.80 (97.16)	7 (6.19)	8.21 (7.27)	106 (93.81)	104.79 (92.73)	2 (10.53)	1.14 (5.99)	17 (89.47)	17.86 (94.01)	Moderate (%)
0 (0.00)	0.10 (9.53)	1 (100.0)	0.90 (90.47)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	1 (25.0)	0.75 (18.69)	3 (75.00)	3.25 (81.31)	0 (0.00)	0.16 (15.73)	1 (100.0)	0.84 (84.27)	Much (%)
76 (79.17)		20 (20.83)		15 (68.18)		7 (31.12)		764 (84.98)		135 (15.02)		153 (85.00)		27 (35.00)		Total (%)
6.34		(1.67)		1.25		(0.59)		63.83		(11.28)		12.78		(2.26)		% compare With all respon-ders
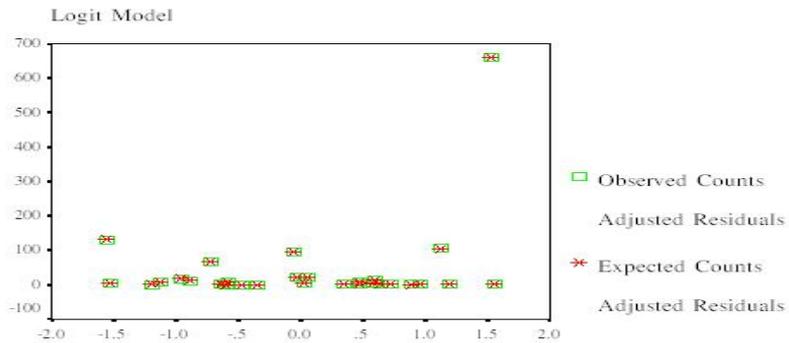
Figure 5. Adjusted residuals of Multinomial Logit Model

From Figure 5 shows graph of adjusted residuals & observed counts and adjusted residuals & expected counts in the same graph. Adjusted residuals are between -1.5 and 1.5. Observed and expected counts of each residual are almost equal . The greatest number of the elderly people who stay with family, without debt, never self-abuse, and get normal depressive problem are 661 (99.40%) with adjusted residuals 1.5.

4. Conclusion

This study showed that with the problems of depression and/or self-abuse from 1,200 samples of the elderly in Chiang Mai, the conclusion is as follows:

4.1 Most elderly people had no health problems, had under primary school or primary school education, were without debt, were agriculturists and hired labors. The income and expenses of our study participants were less than 5,000 baht per month , they stay with a family of 2 – 4 members, and the relationship is warm. The elderly do not smoke, drink, take relaxation drugs, or gamble, and most of them have no depressive problems.

4.2 Most elderly people, 84.1% have never abused themselves; 15.8% committed self-abuse once in which case, the most common method was using sharp or solid object, the second one was by hanging. 93.3% of the elderly have never thought of committing self-abuse at present, and 85.2% have never attempted to commit suicide.

4.3 At a significant level of 5 %, the municipal elderly had a higher level of attitude towards general problems and the factor affecting depressive state than for the non-municipal elderly.

4.4 Analyze the factors affecting the depressive problems and/ or self-abuse of the elderly, we divided them into 4 parts.

4.4.1 The factors affecting depressive problems and/or self-abuse in the elderly of Chiang Mai are the relationship in family, health problems, educational level, marital status, last occupation before retirement, living place, drinking behavior, general attitude, the attitude about stimulus, having known the news of self-abuse, the idea of committing self-abuse, thoughts to commit suicide , and the depressive state. These factors can be grouped into 2 factors: one is the self-abuse factor and the other is the general factor. The relation between variables which affected the depressive problems and/or self-abuse in the elderly of Chiang Mai is 0.862.

4.4.2 The data are grouped into 4 sets: the first is general information of the elderly (Set1), the second is general attitude (Set 2), the third is the attitude with regard to depressive problems (Set 3), and the last is the problem of depression or self-abuse in the elderly of Chiang Mai (Set 4). The relation between all 4 sets is 0.781. The variables in set 4, the problem of depression or self-abuse in the elderly of Chiang Mai, are and the used to abuse themselves, and the idea to commit suicide. The variables in set 1, general information, are the educational level and living boundary which have a close relation. The municipal elderly who had under a primary school   or primary school education, or bachelor's degree have never thought to commit suicide or abuse themselves; while some non-municipal elderly people who had a secondary school education, associate's degree or higher than a bachelor's degree have thought of suicide at times, others have often thought to commit suicide, and still others used to commit self-abuse sometimes.

4.4.3 Study the relation between factors with regard to the attitude of depressive problem of the elderly. At a significant level of 5 %, we found that

          - The factors affecting the used to abuse themselves in the past of the elderly are the idea of committing suicide is the most effective factor of all variables at 85.7%. The second factor is the point of   depressive state which includes the variables of have thought about suicide, self-abuse, depression, and of the relationship in the family are related in the same direction, that is, if the elderly have thought about suicide, had

higher depression, and did not experience warmth in family, they will have abused themselves .

      - The factors affecting the idea of abusing themselves at present in the elderly are the variable about the idea to commit suicide is the most affecting factor of all at 98.9% importance. That is, the elderly have attempted suicide, have much higher debt, had a lower education level, and have thought about self-abuse at present, which means that they are thinking of committing self-abuse at present.

      - The factors affecting attempts to commit suicide by the elderly are used to abuse themselves in the past is the most important variable which got 67.9% importance. The second variables are the depressive state at 20.3% and the idea to commit self-abuse at 9.1 % . These variables related in the same direction.

4.4.4 Find the relation between factors which cause depression and/or self-abuse in the elderly.

      At a significant level of 5 %, the variables affecting the depression problem and used to abuse themselves in the elderly of Chiang Mai are the idea to commit self-abuse, depressive state and marital status with a corrected classification result of 98.3% .

4.5 Predict the number of the elderly who used to abuse themselves

 4.5.1   Predict from Multinomial Model

$$\ln(m_{ijk}) \;=\; \mu + \alpha_i + \beta_j + \gamma_k + (\alpha\beta)_{ij} + (\beta\gamma)_{jk}$$

      0.60% of the elderly people who never abused themselves in the past, at times tend to abuse themselves at present. 5.02% of the elderly who had self-abusive behavior still think to commit self-abuse sometimes, and 1.02% of them always think about abusing themselves.

 4.5.2   Predict from Multinomial Logit Model

$$\ln(m_{ijkl}) \;=\; \mu + \alpha_i + (\alpha\beta)_{ij} + (\alpha\gamma)_{ik} + (\alpha T)_{il}$$

      15.8% is the elderly who used to abuse themselves. The percent of the elderly who had debt and those who used to commit self-abuse who had no debt both

living in old people's home or with family is more than 30%. The moderate depressive participants who used to commit self-abuse are the largest percent at 11.86%.

5. Suggestion

The behaviors and desires of the elderly can change owing to their social situation and time. This is one reason why these problems should be studied continuously. Thus, to know the exact behaviors and desires of the elderly , here are some suggestions. First of all, there should be more specific study of the elderly population in each district. Moreover, to get a more accurate answer, the questions in the questionnaire should be easy to understand and suitable for the participants who are villagers. Eventually, the pursuant study and long term evaluation, especially in the group of depressive elderly people, will be useful to reduce social problems and requite a kindness of the elderly according to Thai fine traditional culture.

The reflection of depressive and/or self-abuse problems in the elderly of Chiang Mai in this study may be useful to determine both management administrations and procedure policy of the related official business. This will serve the public advantage with regard to the problems of depression and/or self-abuse of the people at various ages.

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