Chapter 4

Further Statistical Analysis

The association between domestic abuse and the determinant variables is analysed further in this chapter. After ranking and labelling the abuse outcomes in the order (1) sexual only, (2) sexual and emotional, (3) physical but not severe physical, and (4) severe physical, ordinal logistic regression is used to fit a model and thus to estimate the probabilities of the various outcomes. This model assumes that for a specified adverse outcome labelled k, the odds ratio of an outcome at least as bad as k compared to one less serious is the same for each value of k from 1 to 4 (the proportional odds assumption).

4.1 Comparison of Raw and Adjusted Associations

In Chapter 3 we examined the individual associations between the determinants and the outcome using Pearson's test for independence and odds ratio plots. Using the Mantel-Haenszel method, these crude odds ratios can be adjusted for another determinant, which could be a confounder.

As outlined in Chapter 2, logistic regression analysis is used to fit a model relating the probability of an adverse outcome to several determinants.

Table 4.1 shows the p-values describing the statistical significance of each determinant before and after adjusting for the other determinants.

The odds ratios are obtainable by exponentiation of the coefficients, so that if the coefficient is b, the corresponding odds ratio is $\exp(b)$. The ordinal logistic model gives the odds of an outcome at least as adverse, that is, with label k or greater.

Determinant	unadjusted		adjusted	
	coefficient	p-value	coefficient	p-value
Length of relationship		**0.0166**		0.5430
1 year	0^*		0^*	
2-5 years	0.5527	0.0050	0.2566	0.2736
6+ years	0.4308	0.0275	0.1729	0.5198
Marital status				
married	0^*		0^*	
cohabiting	0.2924	0.0541	-0.0173	0.9202
Number of children		**0.0022**		0.1511
none	0^*		0^*	
1-2	0.5876	0.0005	0.4042	0.0599
3+	0.4647	0.0409	0.4588	0.1171
Age at marriage		**0.0000**		**0.0080**
< 20	0^*		0^*	
20-24	-0.5563	0.0008	-0.4891	0.0053
25+	-0.8708	0.0000	-0.5711	0.0150
Education		**0.0004**		**0.0453**
prim/sec	0^*		0^*	
high school	0.0911	0.5876	0.3228	0.0899
college	-0.0065	0.9786	0.3692	0.2015
university	-1.1496	0.0001	-0.5243	0.1996
Income		**0.0112**		**0.0255**
none	0^*		0^*	
1-4,999	0.0397	0.8090	0.1415	0.4192
5,000-9,999	0.0610	0.7811	0.4060	0.1112
10,000+	-2.0489	0.0012	-1.5434	0.0291
Card-playing habit				
no	0^*		0^*	
yes	0.4349	**0.0374**	0.2997	0.2441
Previous partner				
none	0^*		0^*	
one or more	1.3589	**0.0000**	0.0017	**0.0042**
Partner's education		**0.0052**		0.7072
none/primary	0^*		0^*	
secondary/high	-0.1184	0.4717	-0.0870	0.6341
college/university	-0.6824	0.0013	-0.2307	0.4139
Partner's addiction		**0.0000**		**0.0024**
none	0^*		0^*	
smoking only	-0.4812	0.3487	-0.375	0.4961
betting only	0.6573	0.0765	0.9211	0.0203
drinking only	0.4747	0.2480	0.3646	0.4333
Drinking+betting+drugs	0.3426	0.0731	0.2645	0.1852
everything	1.0126	0.0000	0.8421	0.0003

Deviance: 1607.83 0^* reference group

Table 4.1 Association between determinants and nature of partner abuse

To model the probability of a less adverse outcome, the coefficients in the model should be reversed in sign, and the corresponding odds ratio should be inverted.

For the categorical determinants, p-values obtained for the unadjusted associations are reasonably consistent with those obtained in the preliminary analysis, based on Pearson's independence test.

For the association between the nature of the domestic abuse and length of relationship, the p-value based on the preliminary analysis is 0.0204, whereas the logistic regression p-value is 0.0166.

For marital status, the p-value based on the preliminary analysis is 0.0027, whereas the logistic regression p-value is 0.0541.

For income, the p-value based on the preliminary analysis is 0.0335, whereas the logistic regression p-value is 0.0112.

For card-playing habit, the p-value based on the preliminary analysis is 0.0048, whereas the logistic regression p-value is 0.0374.

With respect the partner's education, the p-value based on the preliminary analysis is 0.0038, whereas the logistic regression p-value is 0.0052.

For partner's addiction, the p-value based on the preliminary analysis is 0.0101, whereas the logistic regression p-value is 0.0000.

For the number of children, age at marriage, education, and previous partner, the p-values given by the two methods are less than 0.005 in each case.

Table 4.1 also shows that after adjusting for the effects of the other determinants, all of the associations are reduced in strength: the p-values are correspondingly increased.

As a result, for some determinants that show associations with the outcome in the univariate analysis, the evidence for the association disappears when the effects of the other determinants are considered.

Marital status is not found to have an association with the outcome, with or without adjusting for the other determinants.

Four other determinants, length of relationship, number of children, card-playing habit, and partner's education, are found to be associated with the abuse outcome in the univariate analysis, but these associations disappear in the multivariate analysis.

The effects of education and income, though statistically significant in the univariate analysis, become only marginally statistically significant (p-values 0.0453 and 0.0255, respectively) in the multivariate analysis.

The effects of education and income are also substantially reduced after adjustment. In particular, the odds ratio for the university educational level is found to be $\exp(-1.1496) = 0.3168$ in the univariate analysis and $\exp(-0.5243) = 0.5920$ in the multivariate analysis. Similarly, if the income is more than 10,000 baht per month, the odds ratio changes from $\exp(-2.0489) = 0.1289$ before adjustment to $\exp(-1.5434) = 0.2137$ after adjustment.

The effects of age at marriage was also substantially reduced after adjusting for the other determinants, the odds ratio for women aged more than 25 is found to be $\exp(-0.8708) = 0.4186$ in the univariate analysis and $e(-0.5711) = 0.5649$ in the multivariate analysis.

With respect to the previous partner, for women living with more than one partner, the odds ratio changes from $\exp(1.3589) = 3.8919$ before adjustment to $\exp(0.0017) =$

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1.0017 after adjustment. Finally, the effect of partner's addiction is also substantially

reduced after adjusting for the other determinants, from an odds ratio for the partner

with every addiction (smoking, drinking, betting, and drug-taking) of exp(1.0126) =

2.7527 to exp(−0.8421) = 2.3212.

4.2 Reduced Model

Table 4.2 gives the results of the logistic regression analysis after omitting determinants

with p-values more than 0.05 using backward elimination.

factors	Coefficient	St. Error	Odds Ratio	p-value
Nature of domestic abuse				
Sexual only/none	0.006	0.2125	0.0061	0.9773
Sexual + emot. / sexual only	-0.2275	0.2127	0.7965	0.2848
Phys-notSev / sexual+ emot.	-1.1775	0.2184	0.3094	**0.0000**
Phys-severe / phys-notSev	-2.3876	0.2390	0.0919	**0.0000**
Age at marriage				**0.0056**
< 20	0*			
20-24	-0.4884	0.1740	0.6136	**0.0050**
25+	-0.6057	0.2317	0.5457	**0.0090**
Education				**0.0425**
prim/sec	0*			
high school	0.1709	0.1722	1.1855	0.3209
college	0.1552	0.2586	1.6637	0.5484
university	-0.8263	0.3666	0.2664	**0.0242**
Income				**0.0188**
none	0*			
1-4,999	0.1702	0.1703	1.1855	0.3177
5,000-9,999	0.5091	0.2504	1.6637	**0.0420**
10,000+	-1.3227	0.6846	0.2664	0.0533
Previous partner				
none	0*			
one or more	1.0444	0.2985	2.8417	**0.0005**
Partner's addiction				**0.0002**
none	0*			
smoke only	0.2246	0.1967	1.2518	0.2535
betting only	-0.2745	0.5281	1.7600	0.6032
drink only	0.9091	0.3912	4.4820	**0.0201**
drink+bet+drug	0.5782	0.4323	1.7829	0.1810
every thing	0.9181	0.2148	2.5046	**0.0000**

Deviance: 1620.31   0* referent group

Table 4.2: Reduced model of association between determinants and partner abuse

In this reduced model the five factors least statistically associated with the nature of domestic abuse are omitted.

The smallest p-values indicate the factors most strongly associated with the nature of domestic abuse. These include partner's addiction and previous partner experience. When comparing the values of the deviance from the models reported in Tables 4.1 and 4.2, it is found that the difference between the deviances is 12.48, and the number of parameters omitted is 8, corresponding to the p-value 0.131.

We choose this model because all variables are statistically significant. The final model, reported in Table 4.2 shows that five variables, namely, age at marriage, education, income, previous partner, and partner's addiction, are all associated with the nature of domestic abuse in Pattani province. This model could be used to assess the probability that a woman in the study population will suffer a specified type of domestic abuse, given her characteristics with respect to these risk factors.