Chapter 4

Statistical Modeling

The associations between CKD and the determinant variables were analyzed further in this chapter. Logistic regression was used to assess the effects of the determinants on CKD using a backward stepwise method to eliminated variables from the model.

4.1 Logistic regression model

Since CKD is binary variable, logistic regression is an appropriate method for assessing factors of the determinants on CKD. This modeling strategy involved initially including all determinants as factors and subsequently omitting in turn determinants with overall *p-value* greater than 0.05 (based on the reduction in residual deviance using the chi-squared test). Adjusted odds ratios (aOR) and the 95% confidence intervals (CI) of the aOR were estimated from the main effects logistic models. The odds ratios are obtained by exponentiation of the coefficients, so that if the coefficient is *b*, the corresponding odds ratio is exp (*b*). In the first step, we fit a model with all variables of interest are shown in Table 4.1.

Table 4.1 shows model of association between determinants and CKD. The model initially fitted contained additive effects of BMI, present HT, present DM, present dyslipidemia, thiazide use, aspirin use, anti-gout agent and serum uric acid. The results showed BMI, DM, thiazide use and anti-gout agent were not statistically significant associated with CKD. This model provided a residual deviance of 203.2 with 159 degrees of freedom.

Table 4.1: Model of association between determinants and CKD

Determinants	aOR	(95% CI)	p-value
BMI (ref=≥ 23.0 kg/m^2)			0.927
< 23.0 kg/m^2	1.03	(0.51-2.11)	
HT (ref=absent)			0.004
present	3.38	(1.47-7.74)	
DM (ref=absent)			0.084
present	0.44	(0.18,1.11)	
Dyslipidemia (ref=absent)			0.006
present	2.79	(1.35-5.79)	
Thiazide use (ref=not use)			0.258
use	0.52	(0.16-1.62)	
Anti-gout agent (ref=colchicine)			0.534
allopurinol & colchicine	1.25	(0.62-2.55)	
Serum uric acid (ref=< 8 mg/dl)			0.043
≥ 8 mg/dl	2.06	(1.02-4.15)	

4.2 Reduced Model

Table 4.2 gives the results of the logistic regression analysis after omitting the determinants with overall *p-value* greater than 0.05, using backward elimination.

Table 4.2: Reduced model of association between determinants and CKD

Determinants	aOR	(95% CI)	p-value
HT (ref=absent)			0.007
present	3.02	(1.35-6.77)	
Dyslipidemia (ref=absent)			0.020
present	2.21	(1.13-4.29)	
Serum uric acid (ref=< 8 mg/dl)			0.017
≥ 8 mg/dl	2.30	(1.16-4.56)	

Since we refitted a model contain HT, dyslipidemia and serum uric acid, giving a residual deviance of 207.7 with 163 degrees of freedom. When comparing the values of the deviance from the models reported in Table 4.1 and reduced model in Table 4.2, it was found that the difference between the deviances is 4.5, and the number of parameters omitted was 4, corresponding to the *p-value* 0.348.

We choose this model because all variables are statistically significant. The final model, reported in Table 4.2 shows that three variables, HT, dyslipidemia and serum uric acid were associated with CKD among gout patients in Nongjik Hospital, after adjustment for the other determinants.

The gout patients who present HT had a 3.02-fold risk of CKD compared with absent HT (95% CI 1.35-6.77). Also, the subjects who present dyslipidemia had a 2.21-fold risk of CKD compared to those without dyslipidemia (95% CI 1.13-4.29). The gout patients who had serum uric acid level ≥ 8 mg/dl had a 2.30-fold risk of CKD compared with controlled serum uric acid (95% CI 1.16-4.56).