

what R-squared tells us in ordinary least-squares regression, that of the proportion of variance accounted for in the dependent variable based on the predictive power of the explanatory variables in the model [19].

Test for Goodness of fit of Model

Table 4.17: Hosmer and Lemeshow Test

Step	Chi-square	Df	Sig.
1	17.685	8	.485

The "Hosmer and Lemeshow Test" is a measure of fit which evaluates the goodness of fit between predicted and observed probabilities in classifying the response variable. Similar to the -2-log likelihood test, we want this chi-squared value ($\chi^2_{(8,0.005)} = 7.489$) to be low and non-statistically significant (p-value=.485) if the predicted and observed probabilities match up nicely. In this case, we see that the test is statistically insignificant ($p > .05$), suggesting that the probabilities of predicted versus observed values of the response variable match up as nicely as we would like. Therefore, our fitted logistic regression model is a good fit.

Table 4.18 below contains the estimated coefficients (under the column heading β) and related estimated values of statistics from the logistic regression model that predict the graduation status of households. The standard error of the estimates will help in computing the Wald statistics. The Wald statistic (z), which is the square of the ratio of the coefficient to its standard error, has a chi-square distribution with a single degree of freedom. The significance of the Wald statistic (under the column labeled $P > z$) tells the importance of the predictor variable in the model. The last column of the table, Marginal Effects (dy/dx), is the effect by which the likelihood of graduation status change when the i^{th} independent variable changes by one unit. If β_i is positive, dy/dx will be positive, which means the likelihood of graduation increases. If β_i is negative, dy/dx will be negative, which means the likelihood of graduation decreases.

Interpretation of Marginal Effect²

The estimated coefficient results of table 4.18 below show that of 13 explanatory variables (sex, education level, marital status, family size, dependency ratio, agro-ecology, farm size, nonfarm income, access to credit service, access to fertilizer, followed by DAs, and improved seed, agricultural extension service) six of them affect households' PSNP graduation from food insecurity. Sex, education level, nonfarm income, access to credit service, and agricultural extension service were positively and significantly influenced household's graduation from PSNP while dependency ratio was found to have a significant and negative influence on households' graduation from the program at 10%, 5%, and 1% level of significance.

Sex of the household head: The sex of the household head has a strong positive relationship with the graduation status of the household with a p-value of 0.033 which is significant at a 5% probability level. Thus, Being other variables remains constant being male-headed increases the likelihood of graduation by 0.162 marginal effects.

Education Level: The model result shows that education level factors in determining household graduation from PSNP. A unit class increase in education level increases the likelihood of graduating from the safety net program by 0.436. This result is statistically significant with a p-value of 0.005 at a 1% level of significance. The sign of the coefficient of this value showed a positive relationship with graduation. The positive relationship implies that households with higher education have high chance to graduate than the households that have less education level. Households with higher education levels have a 43.6% more likelihood of being food self-sufficient.

² Models of binary dependent variables often are estimated using logistic regression, but the coefficients expressed as odds ratios are often difficult to interpret. Empirical economic research often reports 'Marginal effects', which are more intuitive, simpler to interpret and understand, and are not affected by extreme values (<http://econometricsense.blogspot.com/>).

