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*Animal Production Science*

**Supplementary Material**

# Improving the market for household livestock production to alleviate food insecurity in the Philippines

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# Supplementary

## Convergence diagnoses of Models 2 and 3

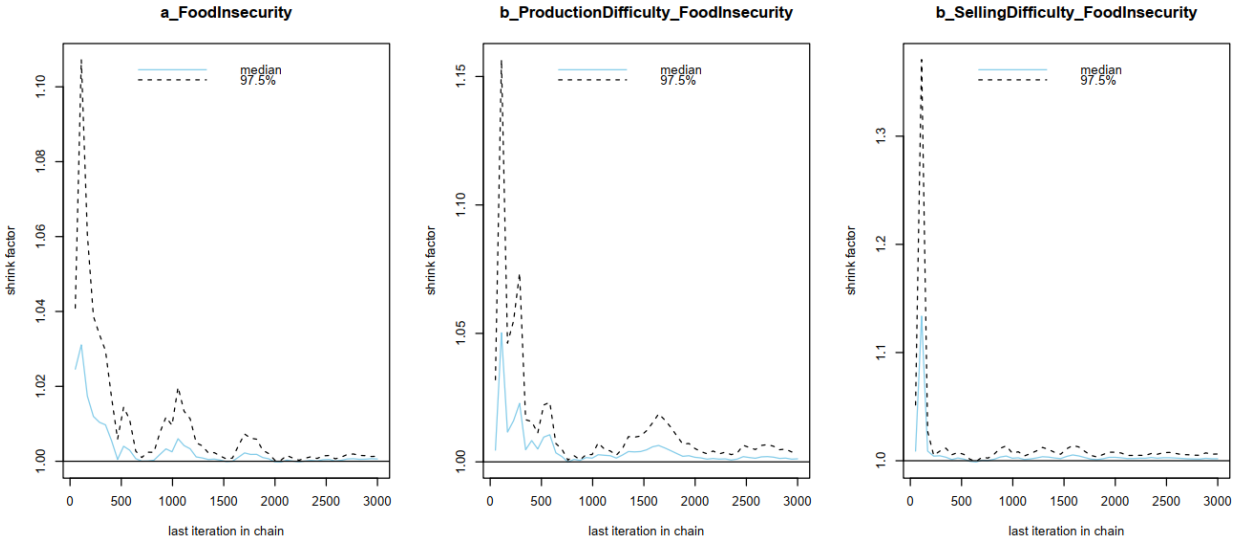


Figure S1: Model 2's Gelman-Rubin-Brooks plots

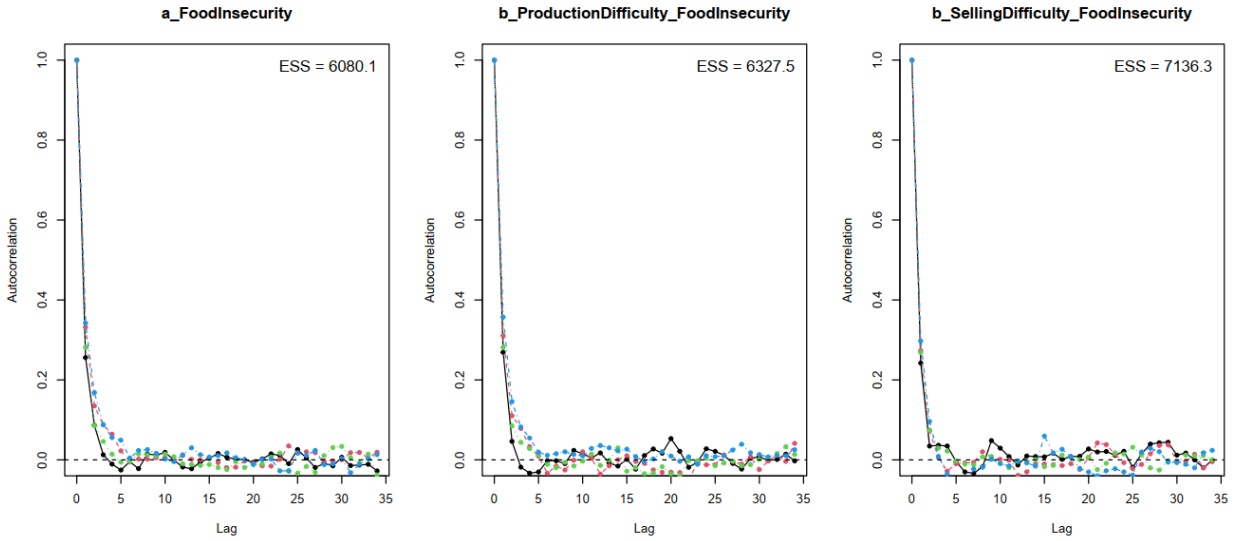


Figure S2: Model 2's autocorrelation plots

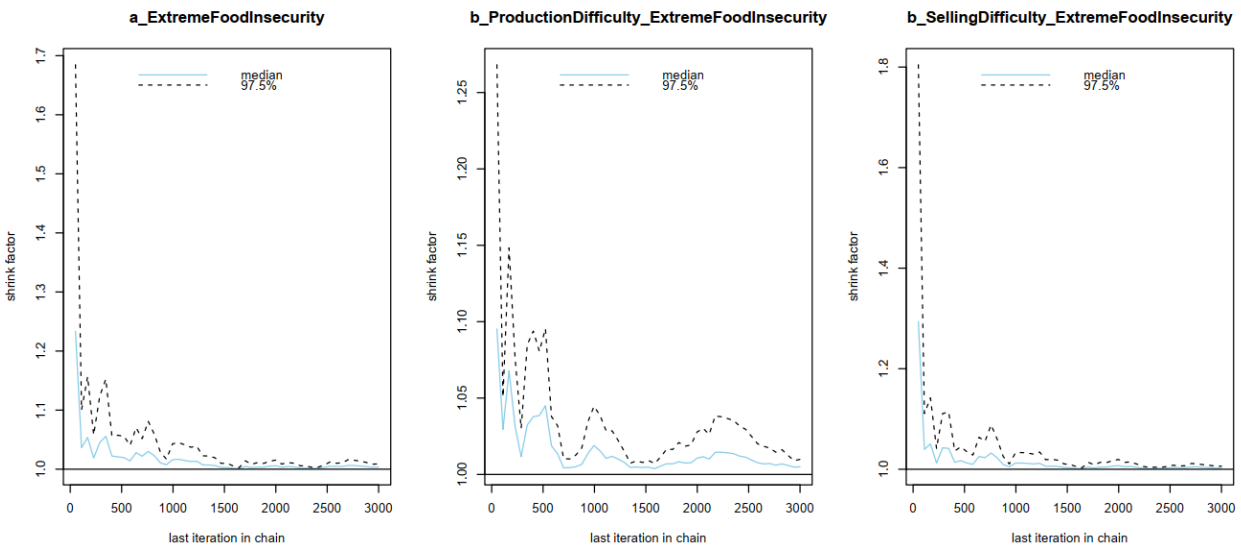


Figure S3: Model 3's Gelman-Rubin-Brooks plots

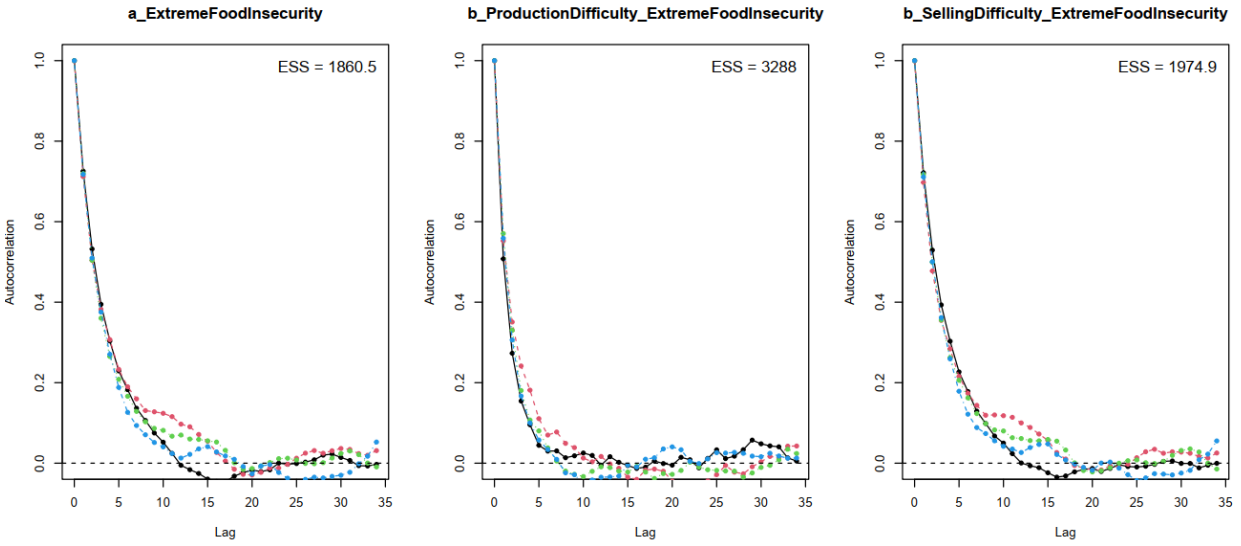


Figure S4: Model 3's autocorrelation plots

## Robustness check

**Table S1:** The simulated posterior coefficients of Model 1 with and without control variables.

| Parameter | Without control variables | | | | With control variables | | | |
|---|---|---|---|---|---|---|---|---|
| | M | S | n_eff | Rhat | M | S | n_eff | Rhat |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Constant* | -1.38 | 0.35 | 6057 | 1 | 1.78 | 1.13 | 3789 | 1 |
| *b_ProductionDifficulty_LessNutrition* | 1.03 | 0.46 | 6577 | 1 | 1.22 | 0.52 | 5275 | 1 |
| *b_SellingDifficulty_LessNutrition* | 1.10 | 0.46 | 7154 | 1 | 1.34 | 0.51 | 5029 | 1 |
| *b_resp_age_rng2_LessNutrition* (Age of the respondent) | | | | | -0.18 | 0.13 | 4830 | 1 |
| *b_hh_education_LessNutrition* (Educational level of the head of the household) | | | | | -0.86 | 0.34 | 3782 | 1 |
| *b_resp_gender2_LessNutrition* (Gender of the respondent) | | | | | -0.19 | 0.52 | 5747 | 1 |
| *b_tot_income_LessNutrition* (Total income of the respondent) | | | | | 0.00 | 0.00 | 7668 | 1 |

The effects of *ProductionDifficulty* and *SellingDifficulty* on *LessNutrition* are almost unchanged when other variables are added in the models, suggesting that their effects in the parsimonious model are robust. In addition to that, the existence of older people (i.e., the respondent) in the household and the educational level of the head of the household are also found to negatively predict the likelihood of consuming food with lower nutritional value. These predictions are highly reliable as the absolute values of the mean are much higher than the values of the standard deviation.

**Table S2:** The simulated posterior coefficients of Model 2 with and without control variables.

| Parameter | Without control variables | With control variables |
|---|---|---|

| | M | S | n_eff | Rhat | M | S | n_eff | Rhat |
|---|---|---|---|---|---|---|---|---|
| *Constant* | -1.49 | 0.37 | 6307 | 1 | 0.63 | 1.09 | 2118 | 1 |
| *b_ProductionDifficulty_FoodInsercurity* | 0.85 | 0.47 | 6431 | 1 | 0.90 | 0.51 | 2902 | 1 |
| *b_SellingDifficulty_FoodInsercurity* | 1.45 | 0.46 | 6643 | 1 | 1.64 | 0.51 | 2982 | 1 |
| *b_resp_age_rng2_FoodInsercurity* (Age of the respondent) | | | | | -0.12 | 0.13 | 2713 | 1 |
| *b_hh_education_FoodInsercurity* (Educational level of the head of the household) | | | | | -0.49 | 0.33 | 2452 | 1 |
| *b_resp_gender2_FoodInsercurity* (Gender of the respondent) | | | | | 0.47 | 0.53 | 2348 | 1 |
| *b_tot_income_FoodInsercurity* (Total income of the respondent) | | | | | 0.00 | 0.00 | 3955 | 1 |

The effects of *ProductionDifficulty* and *SellingDifficulty* on *FoodInsercurity* in the model with control variables are not dissimilar to those in the original model. This similarity indicates a good robustness of the estimated results. In addition to that, the existence of older people (i.e., the respondent) in the household and the educational level of the head of the household are also found to negatively predict the likelihood of skipping a meal because of a lack of money or other resources to get food during the last 30 days. Meanwhile, the head of the household being male positively predicts the likelihood. Comparison between the absolute values of the mean and standard deviation suggest that the effect of the head of the household's educational level is highly reliable, while other effects are only moderately reliable (i.e., the absolute values of the mean are almost equal to those of standard deviation).

**Table S3:** The simulated posterior coefficients of Model 3 with and without control variables.

| Parameter | Without control variables | | | | With control variables | | | |
|---|---|---|---|---|---|---|---|---|
| | M | S | n_eff | Rhat | M | S | n_eff | Rhat |
| *Constant* | -12.45 | 5.68 | 1666 | 1 | -9.95 | 6.00 | 2023 | 1 |
| *b_ProductionDifficulty_ExtremeFoodInsercurity* | 1.18 | 1.45 | 2678 | 1 | 0.91 | 1.62 | 3202 | 1 |
| *b_SellingDifficulty_ExtremeFoodInsercurity* | 9.56 | 5.73 | 1649 | 1 | 9.82 | 5.41 | 2101 | 1 |
| *b_resp_age_rng2_ExtremeFoodInsecurity* (Age of the respondent) | | | | | -0.61 | 0.32 | 4196 | 1 |
| *b_hh_education_ExtremeFoodInsecurity* (Educational level of the head of the household) | | | | | 0.24 | 0.88 | 3646 | 1 |
| *b_resp_gender2_ExtremeFoodInsecurity* (Gender of the respondent) | | | | | 0.77 | 1.43 | 4482 | 1 |
| *b_tot_income_ExtremeFoodInsecurity* (Total income of the respondent) | | | | | 0.00 | 0.00 | 5983 | 1 |

The effects *ProductionDifficulty* and *SellingDifficulty* on *ExtremeFoodInsercurity* are almost identical when new variables are inserted into the model. This implies that the estimated results using the parsimonious model are robust. In addition, only the existence of older people (i.e., the respondent) in the household negatively predicts the household's probability of not eating for a whole day because of a lack of money or other resources to get food during the last 30 days (high reliability).