



## Zero-Inflated Modelling of Overdispersed Food Shortage Data

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**Abstract:** Food shortage and food poverty are major problems of many developing countries which need immediate actions and effective solutions. Food poverty statistics and food shortage models must be generated to implement essential programs to the places where hunger incidence is high. This research focused in Marinduque, one of the poorest provinces in the Philippines, used two hunger indicators, namely: (1) a household was classified as food poor or “hungry” if it has a per capita income (PCI) below the food threshold as set by the National Statistical Coordination Board (NSCB), and (2) whether or not the household had experienced food shortage in the past three months. McNemar test for paired populations showed that there is a significant disagreement between the two hunger status criteria. Multiple linear, Poisson and negative binomial regression models were fitted. Under the PCI criterion, goodness of fit tests showed that multiple linear regression model (MLRM) is the most preferred. The MLRM models suggests households with cell phone, computer, electric fan, and engaged in forestry, mining, crop farming/gardening, fishing, and construction have significant effects to food poverty incidences. However, model fitting of food shortage data encountered difficulties due to excessive zeroes and overdispersion. Hence, zero-inflated Poisson (ZIP) and zero-inflated negative binomial (ZINB) models were applied. Under the food shortage criterion, goodness of fit tests showed that ZINB model is the most preferred. The ZINB model suggests that households who received cure or treatment from sickness, with expected deceased, malnourished, and single parent member/s, households with refrigerator, radio and telephone, engaged in transportation and manufacturing, households with roofs made from makeshift materials, with more than 250 meters distance from the water source, and without sanitary toilet/s, and household size have significant effects to food shortage incidences across all barangays in Marinduque.

**Key Words:** food shortage and poverty; zero-inflated Poisson; zero-inflatednegative binomial; overdispersion