



## **Joint Regression and Association Modelling of Under-nutrition Outcomes among Children**

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The presence of under-nutrition in children is usually assessed using three anthropometric parameters (weight-for-age, height-for-age and weight-for-height) and particularly by comparing them with internationally accepted reference standards. Undernourished children are then categorized as "stunted", "underweight", or "wasted". Studies to identify determinants of under-nutrition have to decide which of the three measures to use, and usually carry out separate analyses for the three indicators of under-nutrition, or choose only one of them. Such methods make the implicit assumption that the three indicators of under-nutrition are independent variables, which is quite implausible. Such a problem can be avoided if a multivariate regression approach is considered. Multivariate regression models consist of two parts: (i) a regression model for each marginal response, and (ii) an association structure to account for correlation between multiple response variables. In this paper we illustrate the application of such joint regression and association modelling for the three measures of under-nutrition using Uganda Demographic and Health Survey (UDHS) data. In short, we consider under-nutrition as a trivariate binary outcome and carry out a multivariate regression for binary responses.

**Keywords:** Nutritional anthropology; General Estimating Equations; Dependence ratio.