Missing Data

The number of multiple imputations was conservatively set to 50, guided by the percentage of missing data as recommended by Bodner 2008.[1] Imputation was done using Stata command *mi impute chained* using predictive mean matching with 5 cases in each match set. Stunting at 6/8 weeks and 6 months were not used in the univariate imputation models, instead the respective length-for-age z-scores were included. All continuous variables in the model were assumed to have a linear association with the imputed variable. Stunting at 3 years was derived post imputation from the height-for-age z-scores (method 2 only). Convergence was reached for every model, perfect prediction was handled via augmented regression, misspecification was evaluated via residual versus fitted value plots, and interactions were explored between the infant's sex and infant's weight and length collected between birth and 6 months post-birth which resulted in including their multiplicative terms (sex with weight at birth, sex with length at 6/8 weeks, sex with weight at 6 months, sex with length at 6 months).

Statistical Analysis Methods

To construct a wealth index for the infant's household, principal component analysis[2] was used from the items belonging to the following four component indices: housing quality (three items: average number of rooms per person [number], floor [four responses], roof [three responses]), consumer durables (five items [yes/no]: fridge, bicycle, television, motorbike, phone), services (four items: drinking water [four responses], cooking energy [four responses], toilet [three responses]) for both the development and validation cohort. The wealth index score was grouped into quintiles from quintile 1 (poorest) to quintile 5 (richest).

Selection of candidate predictors

All continuous variables were visually inspected for skewness using kernel density plots to explore if a transformation was needed. For the continuous candidate predictors, the possible non-linearity of the relationship between each continuous candidate predictor and the logit of stunting at 3 years of age was visually explored using lowess plots, focusing on the area between the 5^{th} and 95^{th} percentile. In addition, a range of possible non-linear forms using degree-1 and degree-2 fractional polynomials were considered in each univariable model. Linearity was replaced by a degree-1 or degree-2 fractional polynomial only if the linear model was rejected ($p < 0{\cdot}05$) in favor of the lowest deviance model. Extreme values were checked for data

errors. After visual exploration of the scatter plot of each set of continuous variables for presence of a linear relationship and absence of significant outlying values, a Pearson's product moment correlation between all continuous candidate predictors was obtained based on complete cases of each pair of variables to explore collinearity. Candidate predicators with a high (range 0·7 to 0·9) or very high (range 0·9 to 1) Pearson correlation coefficient were considered for potential removal from further consideration for the model building.

1. Bodner T.E. What Improves with Increased Missing Data Imputations? . *Structural Equation Modeling* 2008; **15**(4): 651-75.
2. World Bank. Living Standards Measurement Study of the World Bank. http://web.worldbank.org/archive/website00002/WEB/INDEX-5.HTM (accessed Nov 2018).