

**Abstract Title:** Seasonal differences in the affordability of nutritious diets in Tanzania

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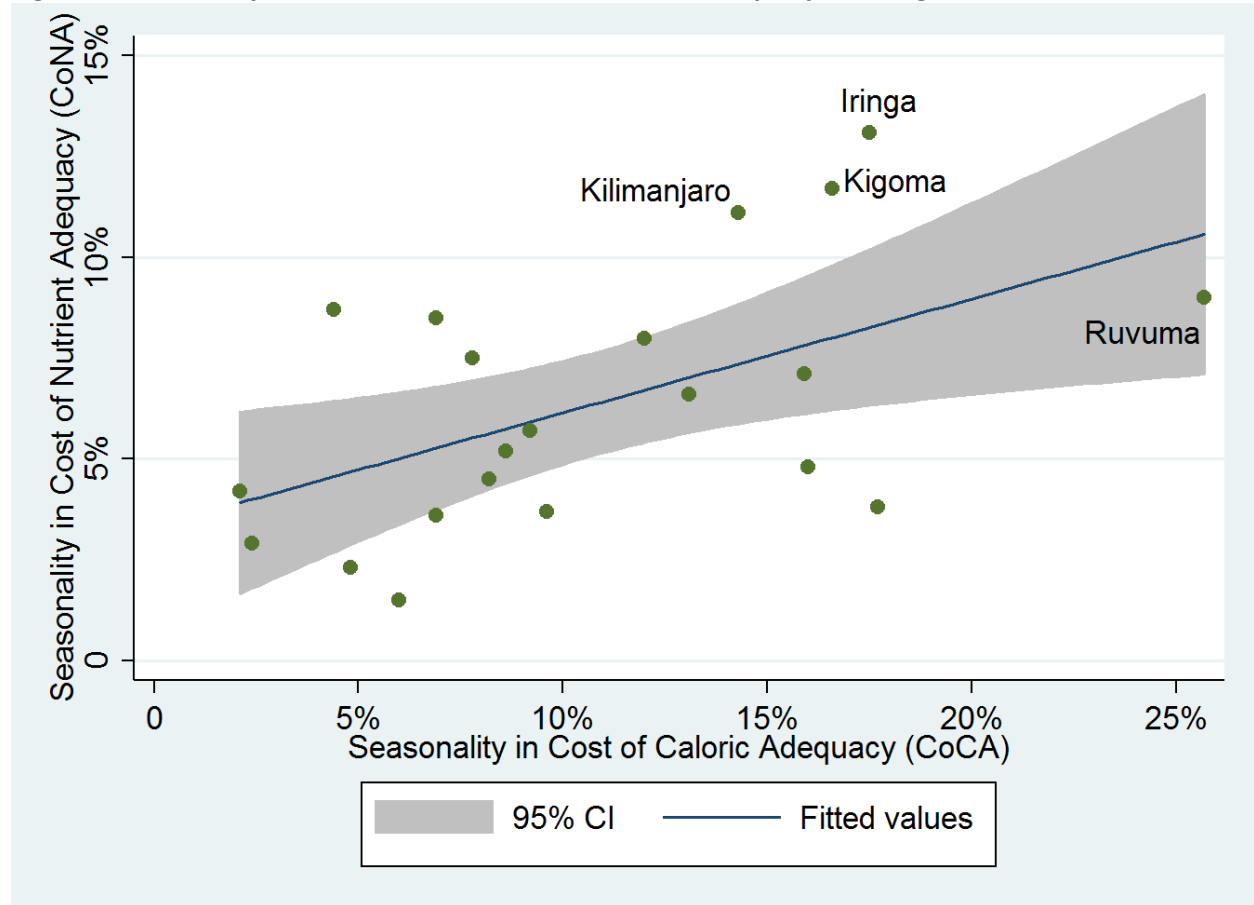
**Objective:** This paper tests for differences in the magnitude of seasonal variation in Tanzanians' daily cost of meeting estimated average requirements for 17 essential nutrients, relative to the daily cost of dietary energy. Our aim is to distinguish nutrition security from food security, identifying which nutrients and foods contribute the most to the (un)affordability of a healthy diet during the pre-harvest hungry season when prices are highest.

**Methods:** Using FAO and USDA food composition data, US IOM estimated average requirements for nutrients, and Tanzania government file data on monthly prices for 49 foods at 21 market towns over 5 years (2011- 2015), we compute the minimum cost of meeting nutrient needs (a 'least-cost' diet), for comparison with the cost of just energy needs, and the cost of individual foods. We then isolate seasonality from other price variation changes using harmonic (trigonometric) regression, and compute results below.

**Results:** Figure 1 reveals that seasonality in the cost of nutrient adequacy (CoNA) is positively correlated with the cost of caloric adequacy (CoCA) [ $p=0.013$ ], but CoNA is significantly above zero even when CoCA is not. Tests within each region show statistically significant [ $p>.05$ ] seasonality for CoNA in 15 of 21 markets, and for CoCA in 11 of 21 markets. Seasonality of both is larger in more remote locations such as the far west (Kigoma) and north (Kilimanjaro), but also in southern "breadbasket" areas such as Iringa and Ruvuma.

**Conclusions:** Novel techniques allow us to distinguish nutrition security from food security, using standard data sources. Results point to the need for more targeted investments in nutrient-dense foods to lower and smooth the cost of healthier diets, alongside continued investment to meet daily energy needs in places with high food insecurity.

Figure 1. Seasonality in cost of nutritious diets vs calorie adequacy in 21 regions of Tanzania, 2011-15



Note: Data shown are the seasonal amplitudes of variation at 21 market locations across Tanzania in the daily cost of a diet that meets nutrient needs (vertical axis) or energy needs (horizontal axis). Amplitude is shown as the average seasonal rise from lowest- to highest-cost month, estimated using harmonic regression with data on 49 foods from January 2011 through December 2015.