Comparing Household Food Security Indicators to Inform IPC Acute Food Insecurity Phase Classification

Bapu Vaitla, Jennifer Coates, Laura Glaeser, Christopher Hillbruner, Daniel Maxwell

1. Penesten International Center, Tufts University; 2. Friedman School of Nutrition Science and Policy, Tufts University; 3. Food and Nutrition Technical Assistance III Project, FHI 360; 4. Famine Early Warning Systems Network

INTRODUCTION

The Integrated Food Security Phase Classification (IPC) is a widely used set of tools and procedures for classifying the severity of chronic and acute food insecurity across geography and time using a convergence of available data and information. One of the strengths of the IPC is that it provides a framework, in the form of reference tables and guidance materials, for incorporating a wide range of data from different sources into food security analyses. However, to date, little analysis has explored how well the indicators used to proxy household food insecurity in the IPC’s Acute Food Insecurity Reference Table and their chosen thresholds:

- Align with one another
- Accurately reflect the phase descriptions provided in that table
- Capture the full range of food insecurity severity the acute IPC measures.

The Household Food Consumption Indicators Study (HFCIS) utilized over 65,000 observations from 21 secondary datasets spanning 10 countries in Africa, Asia, and the Caribbean and applied a range of analytical methods—including descriptive statistics, correlations and cross-tabulations, network modularity and principle component analyses, and broad and restricted sensitivity analyses—to examine these questions for a subset of food security indicators used in the acute IPC. These indicators are: household dietary diversity score (HDDS), food consumption score (FCS), household hunger score (HHS), and coping strategies index/reduced coping strategies index (CSI/rCSI). [“Though the acute IPC does not currently apply rCSI, it was considered in this analysis given its strong correlation with CSI and its comparability across contexts.”]

ANALYSES

CORRELATIONS & CROSS-TABULATIONS

The HFCIS explored the relationships between the selected indicators through correlations and cross-tabulations. These analyses identified strong correlations between two pairs of indicators—rCSI/HHS (p = 0.494) and FCS/HDDS (p = 0.592). The remaining indicator pairs were less strongly correlated (p < 0.3) and the consistency of indicator relationships varied among datasets. This suggests that these indicators are reasonably well correlated, but when and where data are collected matters in determining relationships between variables.

The cross-tabulation of indicators, divided into food secure, moderately food insecure, and severely food insecure categories, showed a great deal of variability in how well indicators agreed across datasets. These results indicated that the continuous forms of the selected indicators correlated reasonably well, but that their categorical forms had a higher degree of correlation variability. The authors hypothesized that the limited correlation among the categorical forms of the indicators may be influenced by two key factors: the dimension(s) of food security the indicator(s) captures and the current categorical thresholds. The HFCIS explored each of these in turn.

DIMENSIONALITY

To examine the food security dimensions the indicators captured, the HFCIS applied two different methodologies—network modularity analysis (NMA) and principal components analysis (PCA)—to analyze the extent to which the constituent items of the indicators cluster together. Both approaches rely on the variable covariance matrix to obtain results.

The NMA and PCA returned similar results in that they both identified a cluster/component comprised largely of rCSI and HHS items—a dimension that the authors interpreted to represent food consumption quantity. The two analyses differed in that the pooled dataset-based network algorithm showed a clustering of FCS and HDDS (a dimension that the authors interpreted to represent food consumption quality), but the more fine-grained PCA suggested that context mattered in determining whether diet diversity items grouped together. Beyond the first component, (comprised mostly of “quantity” of consumption items), the subsequent PCA components weakly captured the observed covariance between items.

CONCORDANCE & ALIGNMENT

To investigate the possibility that the limited categorical concordance between indicators stems from ‘misalignment’ of the categorical thresholds across indicators and to improve any observed misalignment, the HFCIS took three steps:

- First, the authors evaluated the categorical concordance value of every possible combination of whole number thresholds for each pair of indicators.
- Second, the authors determined the expected (i.e., mean and median) continuous value of each indicator given every possible whole number value of the other indicator, and examined the data for natural cut points.
- Third, based on a practical need to have at least three categories per indicator to facilitate acute IPC analysis, and an assumption that an HHS of 5 or 6 indicates a severity of acute food insecurity equivalent to Phase 5 on the acute IPC household reference table, the authors determined all possible sets of thresholds that would result in each pair of indicators agreeing on categorical classification for at least half of observations. From that set of thresholds, the authors identified those that maximized average pairwise concordance.

Based on this analyses, the authors recommended the following for the acute IPC:

- Revision of the categorical cutoffs for the selected indicators in the household reference table to improve concordance
- Inclusion of a combination of diet diversity and experiential indicators in all acute IPC analyses
- Consideration of the range of severity the selected indicators appear to capture more and less well when converging evidence.

KEY FINDINGS

- Diet diversity (FCS, HDDS) and experiential (rCSI, HHS) indicators are reasonably well correlated but likely measure different dimensions of food security. This suggests that these indicators are complementary, but not interchangeable, and that at least one type of each indicator should be applied for acute IPC analyses.
- None of the selected indicators performs well across the full range of food insecurity severity the acute IPC measures. This suggests that attention to how indicators perform best across severity ranges is necessary when converging these indicators with other available evidence in acute IPC analyses.
- Using current acute IPC thresholds, concordance among the selected indicators is relatively weak (42.7%). By adjusting indicator thresholds, concordance can be substantially improved (49.4%) but ensuring concordance greater than 61.4% is not possible without creating thresholds that are conceptually illogical or reducing the number of indicator categories to a level that is impractical for acute IPC analyses. This suggests that the selected indicators are not perfectly comparable across contexts and that the dimensions of food security the indicators capture and the broad context in which they are collected must be considered during the acute IPC convergence of evidence process.

The green cells summarize cases in which both indicators place the household in the same food security category. The yellow cells summarize where the indicators are discordant by one category (one indicator classifies a household as food secure while the other shows moderate food insecurity, or one shows moderate food insecurity while the other shows severe food insecurity). The red cells summarize where the indicators are discordant by two categories (one indicator indicates food security while the other indicates severe food insecurity).