

**PREVALENCE OF MALNUTRITION IN HIV/AIDS ORPHANS IN THE NYANZA PROVINCE OF KENYA: A COMPARISON OF CONVENTIONAL INDICES WITH A COMPOSITE INDEX OF ANTHROPOMETRIC FAILURE (CIAF)** Michelle R. Berger, Clarie B Hollenbeck, PhD, and Cade Fields-Gardner, MS, RD, Alison Gigochi San Jose State University, San Jose, CA, World Initiative for Soy in Human Health, St. Louis, MO, CRS-Kenya, Nairobi

**Abstract**

Prevalence of undernutrition in children under the age of five is commonly reported through three conventional categories: stunting, underweight and wasting. In 2005 researchers proposed an alternate Composite Index of Anthropometric Failure (CIAF) method of partitioning undernutrition in children into seven mutually exclusive categories including single (stunting, underweight or wasting) and multiple failures (stunting plus underweight, stunting plus wasting and underweight plus wasting). This project used data gathered as a subset of a feeding program trial targeting orphans and vulnerable children (OVC) impacted by HIV/AIDS in the Nyanza Province in Kenya. All children measured for this project under the age of five years were included in the analysis (n=174). The conventional index suggests that 29.3% were stunted, 13.2% were underweight, and 3.4% were wasted. While this method allows for a differentiation in the types of malnutrition it does not provide the opportunity to determine the general prevalence of malnutrition. Using the mutually exclusive categories in the CIAF methods, the general prevalence of undernutrition in this population can be estimated at 33.5%. In addition, the CIAF method was able to distinguish children with multiple failures who may be at risk for poor health and survival outcomes. For example, of the 29.2% stunted, CIAF identified 18.4% as stunted only, 10.3% who were both stunted and underweight and 0.6% stunted, underweight and wasted. These data suggests that the complexity as



well as the prevalence of undernutrition may be underestimated using conventional categories for children who experience multiple anthropometric failures. The differences between the two categorization strategies could impact programming decisions that are based on prevalence data. Higher risk populations could be prioritized for intervention. The ability to identify children with multiple nutritional failures may have profound implications for prioritizing, designing and targeting nutritional interventions for children under five years old.

Introduction

Undernutrition is a primary cause of childhood morbidity and premature mortality. The prevalence of undernutrition in a population often determines when and what kind of nutrition program is implemented. Accurate prevalence data is essential to improving the success of these programs.

Objectives

The objectives of this project included activities to:

1. Compare the Conventional Index of anthropometric failure to the Composite Index of Anthropometric Failure (CIAF),
2. Determine the overall prevalence of undernutrition in this population, and
3. Assess the potential impact that indices of anthropometric failure may have on nutrition-related programming and reported outcomes

Study Setting, Sites, and Methods

The project utilized centers at four sites in the Nyanza Province of Kenya, including Kisii, Kisumu, and two in Homa Bay. This project used a subset of data gathered as part of a feeding program trial targeting orphans and vulnerable children (OVC) by HIV/AIDS in the Nyanza Province of Kenya. Anthropometric and other data were collected for children from newborn to 5 years of age. Data used in this evaluation included age and date of birth, gender, height (cm), and weight (kg). Height was measured with a height stick and weight was measured with a calibrated (tared) standing scale. Z-scores (standard deviations from mean) were calculated using EpiIno Software Program (CDC) and used to categorize children into the both conventional and CIAF schemes for comparison. A description of the conventional and composite index categories is shown in Figures 1 and 2.

**Figure 1: Conventional Index**

Category	Description	Type of Indicator
Stunting	Low height for age	Indicator of chronic undernutrition, prolonged food deprivation and/or disease
Wasting	Low weight for height	Indicator of acute undernutrition, more recent food deprivation
Under-weight	Low weight for age	Indicates both acute/chronic undernutrition but does not distinguish between them

**Figure 2: Composite Index of Anthropometric Failure**

Category*	Description
A. No failure	Adequate height and weight (above -2 Z scores)
B. Wasting only	Low wt for ht
C. Wasting and underweight	Low wt for age and Low wt for ht
D. Wasting, stunting, and underweight	Low wt for age, Low wt for ht and low ht for age
E. Stunting and underweight	Low ht for age, Low wt for age
F. Stunting only	Low ht for age
Y. Underweight only	Low wt for age



**Results and Discussion**

Information on the children measured is shown in Table 1. Evaluations of undernutrition using conventional and CIAF methods are shown in Tables 2 and 3.

*Comparison and Prevalence Reporting*

Overall prevalence of under-nutrition as indicated by anthropometric failure can be estimated using CIAF, but not conventional indices. Prevalence of undernutrition was underestimated using conventional index. CIAF illustrates that many children experience multiple anthropometric failures. CIAF may be a useful tool to identify the prevalence of under-nutrition for children 0 to 5 years of age. CIAF is able to identify children with single and multiple anthropometric failures, and highlights the complexity involved with malnutrition. Conventional indices may underestimate the overall prevalence of anthropometric failure/undernutrition. Limited resources for programming food and nutrition assistance may be best served by the CIAF method that identifies children who are at highest risk for adverse health and survival outcomes. Multiple failures that include underweight problems (shaded boxes) may show that 14.8% of this population requires intervention to prevent adverse outcomes, while the conventional index does not adequately differentiate the prevalence of weight-related risk. Thus, CIAF can allow more specific targeting for nutrition and food programming and can better determine if the prevalence of higher risk undernutrition warrants individualized or blanket feeding

interventions.

*Impact on Programming Decisions*

The number of children in anthropometric failure according to each index influences the timing and the type of feeding program to be implemented. According to the World Health Organization schematic, this population would be categorized as medium severity (20-29% stunted or 10-19% underweight) and low severity if represented by the percent of children who are wasted (<5%) by the numbers given in the conventional index. However, if the total % of undernourished children was used from CIAF, this population would likely shift to high severity (>30%). Some planning and response decisions also depend on the percentage of malnutrition in a population. For instance, 10-19% malnutrition rates trigger targeted responses only to those most at risk, while >20% results in feeding program assistance. Using these

guidelines, the conventional index would result in a targeted response using prevalence for underweight, no response using wasting, and blanket feeding using stunting. CIAF categories would all result in no or targeted response depending on the category used, but blanketed response if the total prevalence of malnutrition was used. These criteria illustrate the potential impact that each of these indices may have on criteria for nutrition related programming.

**Summary and Conclusions**

The use of CIAF may have profound implications on prevalence reporting, nutrition programming and outcomes. Prevalence of undernutrition may be underestimated using conventional indices. Reporting of accurate prevalence data and targeting highest risk populations for appropriate interventions using CIAF may help to improve the quality and outcomes of global nutrition efforts.

**Future Research**

Additional research should include investigation of the relationship between anthropometric failure and disease symptoms, such as upper respiratory infections and diarrheal diseases. New WHO growth standards should be employed in future research for developing countries where breastfeeding is the most common practice in infant feeding. Additional categories to include overnutrition counterparts, such as obesity, in the schematic may also be appropriate to evaluate prevalence and programming outcomes of these malnutrition issues. population would likely shift to high severity (>30%). Some planning and response decisions also depend on the percentage of malnutrition in a population. For instance, 10-19% malnutrition rates trigger targeted responses only to those most at risk, while >20% results in feeding program assistance. Using these guidelines, the conventional index would result in a targeted response using prevalence for underweight, no response using wasting, and blanket feeding using stunting. CIAF categories would all result in no or targeted response depending on the category used, but blanketed response if the total prevalence of malnutrition was used. These criteria illustrate the potential impact that each of these indices may have on criteria for nutrition related programming.



**Table 2. Prevalence Using Conventional Index**

Conventional	Frequency	% of Population
Stunted	51	29.3
Underweight	23	13.2
Wasted	6	3.4
Total	Unavailable	Unavailable

**Table 3. Prevalence Using CIAF**

CIAF Category	Frequency	% of Population
A-no failure	116	66.7
B-wasted only	3	1.7
C-wasted and underweight	2	1.1
D-wasted, stunted and underweight	1	0.6
E-stunted and underweight	18	10.3
F-stunted only	32	18.4
Y-underweight only	2	1.1
Total in Failure	58	33.3
Total	174	100