Rapid Assessment Method

Development Update : Number 2

Introduction

This document reports on RAM development activities. This update reports on desk-based and field-based work related to:

- Further development and testing of PROBIT estimators for GAM and SAM.
- A simplified “all-sample” IYCN indicator set.

A short note on current and future RAM development activities is also given.

PROBIT for GAM and SAM

The PROBIT estimation approach was described in the first RAM Development Update. Here we report results of testing the PROBIT indicator using two different approaches:

> **Winsorised mean and SD :** This approach involves replacing parts of a sample distribution at the high and low ends of the distribution with the most extreme remaining values. For example, with a sample of ten values (from x_1, the smallest, to x_2 the largest) the 10% Winsorised mean is:
>
> $$\frac{\overbrace{x_2 + x_2}^{x_1 \text{ replaced with } x_2} + x_3 + x_4 + x_5 + x_6 + x_7 + x_8 + \overbrace{x_9 + x_9}^{x_{10} \text{ replaced with } x_9}}{10}$$
>
> The Winsorised mean is a robust estimator because it is less sensitive to outliers than the mean but can still yield a reasonable estimate of location. Winsorising is most commonly used to provide a robust estimate of location but, provided the degree of Winsoring is not large, may also be used to provide a robust estimate of dispersion. Two related approaches were tested:
>
> > **Basic Winsorising :** A fixed degree of Winsorising is applied regardless of the distribution in the sample.
> >
> > **Adaptive Winsorising :** The degree of Winsorising that is applied is defined by the distribution of the sample. This approach to Winsorising moves only observations that are likely to be troublesome. That is, it only moves extreme observations where *extreme* is defined by a specified multiple of the median absolute deviation (MAD) from the sample median. Typically very little or no data will be moved from data drawn from a normally distributed population using a multiple of MAD that is greater than or equal to three.

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Huber's M-estimates of location and scale : This approach is similar to the ordinary least-squares estimation method but with the influence of outliers limited by Winsorising and by replacing the square of the residuals with a less rapidly increasing (loss) function. An iterative approach to the computation of these estimators is used.

Results of testing were:

PERFORMANCE OF RAM/PROBIT CANDIDATE ESTIMATORS FOR GAM PREVALENCE

Method	Location	Dispersion	Error (%)	Rel. Prec. (%)
PROBIT	Mean	SD	0.8667	23.99
	Mean (transformed)	SD (transformed)	0.7321	24.05
	Median	MAD * 1.42860	0.1852	24.58
	Median	IQR / 1.34898	0.0670	24.66
	Tukey's Trimean	IQR / 1.34898	0.1059	24.62
	Mid-hinge	IQR / 1.34898	0.1947	24.58
	Winsor BASIC (2%)	**Winsor BASIC (2%)**	**0.0383**	**24.65**
	Winsor ADAPT 2.25	**Winsor ADAPT 2.25**	**-0.0043**	**24.61**
	Huber M	**Huber S (k = 1.5)**	**-0.4404**	**24.30**
CLASSIC	NA	NA	-0.0006	27.22

PERFORMANCE OF RAM/PROBIT CANDIDATE ESTIMATORS FOR SAM PREVALENCE

Method	Location	Dispersion	Error (%)	Rel. Prec. (%)
PROBIT	Mean	SD	0.1225	33.62
	Mean (transformed)	SD (transformed)	0.0438	33.47
	Median	MAD	0.4484	34.61
	Median	IQR / 1.34898	0.3735	34.72
	Tukey's Trimean	IQR / 1.34898	0.4366	34.68
	Mid-hinge	IQR / 1.34898	0.4079	34.65
	Winsor BASIC (1%)	**Winsor BASIC (1%)**	**0.2586**	**33.92**
	Winsor ADAPT 6.00	**Winsor ADAPT 6.00**	**0.1365**	**33.64**
	Huber M	**Huber S (k = 1.5)**	**0.3344**	**34.13**
CLASSIC	NA	NA	0.0022	65.03

Results are from 224,000 simulates surveys with n = 192 (PROBIT) and n = 544 (CLASSIC).

The results of this desk-based testing of PROBIT methods with robust estimators indicates:

The PROBIT method used with n = 192 perform **at least as well** (in terms of precision) as the CLASSIC method with n = 544 for estimating the prevalence of GAM. Levels of bias are small and correctable.

The PROBIT method used with n = 192 perform **very much better** (in terms of precision) than the CLASSIC method with n = 544 for estimating the prevalence of SAM. Levels of bias are small and correctable.

This concludes the desk-based testing of PROBIT estimators for RAM.

A new IYCN indicator set

The WHO (2008) IYCF indicators are designed for use in large sample surveys. This means that some of the WHO indicators cannot be estimated with useful precision with currently typical sample sizes. This is recognised in the WHO (2008) manual:

> *... inasmuch as the sample sizes used in monitoring and evaluation of smaller scale programs may be quite small, some of the recommended indicators may be too imprecise to be of use in assessment or in monitoring change for these programs. This is particularly likely for indicators with narrow age ranges in the numerator and the denominator.*

For example, in a SMART survey with n = 544 (i.e. the largest sample size mentioned SMART manual) the approximate sample size available for estimating the proportion of children breastfed at one year will be about n = 40. A sample of this size will yield a 95% CI on a proportion of 50% of about ± 16%. This is too wide for monitoring and evaluation of district-level programs. For this indicator, the WHO manual states:

> *Because the indicator has a relatively narrow age range of 4 months, estimates from surveys with small sample sizes are likely to have wide confidence intervals.*

It is proposed that RAM surveys will use much smaller sample sizes (e.g. n = 192) than are used by SMART surveys. This means that alternative indicators must be used. Here we report on a method that has been piloted in Sierra Leone (RAM type sample), Niger (S3M type sample), Sudan (RAM and S3M type samples), and Ethiopia (RAM type sample).

The approach used is to produce a single indicator:

> *Percentage of children aged 0 – 24 months receiving good infant and young child feeding*

with *good infant and young child feeding* defined as exclusive breastfeeding in children aged under six months and as age-appropriate feeding practices (defined in terms of continued breastfeeding, dietary diversity, and meal frequency) in older children.

Age-appropriate feeding practice is measured using an *infant and child feeding index* (ICFI) that is based on an index developed and tested by Mary Arimond and Marie Ruel of the International Food Policy Research Institute for the 2000 DHS survey of Ethiopia and developed by FANTA as a KPC2000+ indicator:

	Age-group (months)					
	6 - 8		9 - 11		12 - 24	
	Value	Score	Value	Score	Value	Score
Breastfed (24 Hours)	Yes	+ 2	Yes	+ 2	Yes	+ 1
Food groups (24 Hours)	1 ≥ 2	+ 1 + 2	1 or 2 ≥ 3	+ 1 + 2	2 or 3 ≥ 4	+ 1 + 2
Meal frequency (24 Hours)	1 ≥ 2	+ 1 + 2	1 or 2 ≥ 3	+ 1 + 2	2 3 ≥ 4	+ 1 + 2 + 3

The ICFI score is a measure of appropriate child feeding practices:

$$ICFI = Breastfeeding + Dietary\ Diversity + Meal\ Frequency$$

using age-specific weighting for each item. Children receive a score between zero and six.

Children receiving a score of six are classified a receiving good infant and young child feeding.

The indicator can be calculated from the counts of children found in the cells of a 2-by-2 table:

		Classification	
		Good	Not good
Age	< 6 months	Exclusively breastfed	Not exclusively breastfed
	6 – 24 months	ICFI = 6	ICFI < 6

as:

$$\%\,GOOD = \frac{Number\ classified\ as\ good}{total\ number\ of\ records} \times 100$$

This is the primary indicator for monitoring and evaluating IYCN programs.

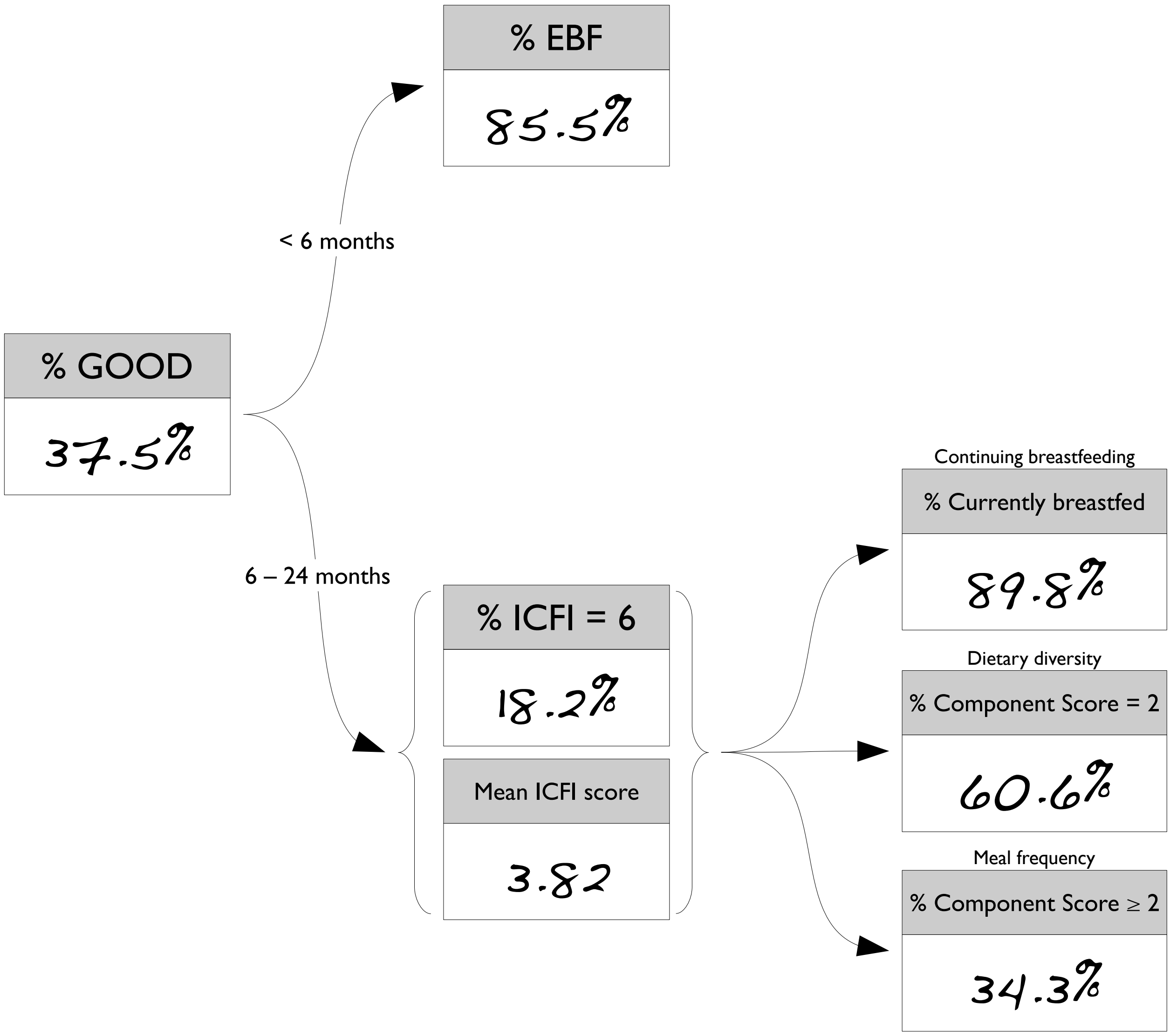
A set of diagnostic indicators are also calculated. These indicators show the contribution of exclusive breastfeeding, continuing breastfeeding, dietary diversity, and meal frequency to the calculated value of the primary indicator.

Figure 1 shows an example (from Sierra Leone) of how results can be presented. In this example, poor performance is predominantly due to poor feeding practices in older children in terms of meal frequency and (to a lesser extent) dietary diversity. It would be sensible for the IYCF program being monitored in this example to focus their attention on improving complementary feeding practices.

This approach can be seen as a *single indicator approach* or as a *hierarchical indicator approach*. Such an approach may be simpler and more useful than the multiple indicator approach that is used in (e.g.) MICS and DHS surveys.

Experiences with this method have been promising. It is important to note that field-testing has been limited to samples of children aged between 0 and 24 months (Sierra Leone, Sudan) or children aged between 0 and 36 months (Niger, Ethiopia). It may prove useful (e.g.) to extend the ICFI table to cover children aged up to three years (this was done in Niger) and to redefine GAM to cover children aged between 6 and 36 months in order to simplify sampling (it is also sensible given the association between age and wasting).

Figure 1 : Presentation of results for the IYCN single indicator



A short note one future development activities

The following activities are currently being tested:

> The use of RAM in urban settings with sampling informed by satellite imagery. This work is being carried out in Sudan as (1) part of the community nutrition surveillance (CNS) program and (2) as part of S3M piloting activities.
>
> Development and testing of further small-sample / all-sample indicators for use in RAM and S3M surveys. This work is being carried out in Sudan and Ethiopia.

The following activities are proposed:

> Expert review of the new IYCN indicator.
>
> A test of RAM alongside a SMART survey.
>
> Development and testing of RAM specific data-analysis procedures for estimating any statistic from RAM type samples. Work on this has already started in collaboration with CDC and HelpAge. A blocked and weighted bootstrap estimation approach is being developed.

These activities will be reported in the next RAM Development Update.