



Anthropometric Data- Comparing ERSS and DHS

In 2011/2012, Ethiopia's Central Statistical Agency, in collaboration with the World Bank, conducted the first wave of the Ethiopia Rural Socioeconomic Survey (ERSS), which collects detailed data on household welfare and income-generating activity. The ERSS' sample includes 4,000 households that are representative of small towns and rural areas; wave 2 will be expanded to include urban areas and will run from 2013 to 2014. This note evaluates the performance of the ERSS-wave 1 anthropometric indicators through a series of data checks and comparisons.

ERSS and Child Anthropometric Indicators

The three anthropometric indicators most often referenced for monitoring malnutrition in children are: stunting, or low height-for-age; underweight, low weight-for-age; and wasting, low weight-for-height. More specifically, these figures represent children whose height-for-age, weight-for-age, and weight-for-height fall more than two standard deviations below the median of internationally accepted growth standards. Thus, a child is labeled *stunted* if he or she has a height-for-age z-score that is less than -2.

The ERSS sample included 2,516 children aged 6-59 months. After excluding children missing height and weight measurements (1 percent), the sample size drops to 2,495 children. Of this sample, 187 children live in small towns and 2,308 reside in rural areas. The WHO recommends trimming z-scores to reduce the impact of outliers resulting from unlikely weight, height, and age combinations. The WHO's exclusion criteria, also followed by Ethiopia's DHS, are: height-for-age z-scores (HAZ) <-6 or >6; weight-for-age z-scores (WAZ) <-6 or >5; and weight-for-height (WHZ) z-scores <-5 or >5.³ Approximately 300 children (13 percent) had at least one malnutrition estimate excluded from the analysis based on these trimming rules.

Table 1 shows the stunting, underweight, and wasting, prevalence estimates for rural areas. In rural Ethiopia, 48 percent, 27 percent, and 11 percent of children 6-59

months old, are stunted, underweight, and wasted, respectively. Additionally, note the difference in prevalence estimates before and after outlier trimming; stunting drops from 52 to 48 percent after trimming the z-scores.

Table 1: Rural ERSS, pre- and post- trimming

	Prevalence (Std. Error)	
	Pre-trimming	Post-trimming
Stunted	52% (.02)	48% (.02)
Underweight	27% (.02)	27% (.02)
Wasted	11% (.01)	11% (.01)

Comparison with DHS

The Demographic Health Survey (DHS) focuses on population and health and follows a rigorous methodology for anthropometric data collection. Drawing comparisons between 2011 DHS data and recent ERSS results can help identify potential gaps in ERSS' methodology as well as help data users assess data quality. One notable difference between the ERSS and DHS is the criterion for age eligibility; Ethiopia's DHS collects weight and height measurements for all children less than 5 years old (including 0-6 months). To maximize the validity of the comparisons, we restricted the DHS sample to children 6-59 months only. This results in a final sample size of 7,209 children. However, note that the official figures released by the DHS reflect a slightly larger sample containing all children under 5.

Table 2 shows the nutrition indicators for rural children only, as calculated from the ERSS and DHS data. As compared to the ERSS, the DHS reports slightly higher figures for stunting and underweight (50 and 33 percent, respectively), though only the underweight estimates are statistically different.

Table 2: ERSS- DHS Comparisons, Rural Only

	Prevalence (Std. Error)	
	ERSS	DHS
Stunted	48 (.02)	50 (.01)
Underweight***	27 (.02)	33 (.02)
Wasted	11 (.01)	10 (.01)

***Difference between means is statistically significant at p<0.01

We find that the medians for all three indicators are statistically different between surveys. While stunting prevalence estimates are similar between ERSS and

DHS, the left-hand tail of the HAZ distribution (those with height-for-age z-scores more than 4 deviations from the median) is much thicker for the ERSS sample (see Figure 1). Post-collection analysis of these cases revealed a combination of data measurement and entry error for height values. Comparing the two WAZ distributions can help shed light on the difference in underweight prevalence estimates of 6 percentage points; the ERSS distribution is centered a bit to the left of the DHS distribution (see Figure 2). As seen in Figure 3, the overall shapes of the WHZ distributions looks very similar, though we note the DHS distribution is much tighter (i.e., more concentrated at the median).

Figure 1: Height-for-age z-score distributions

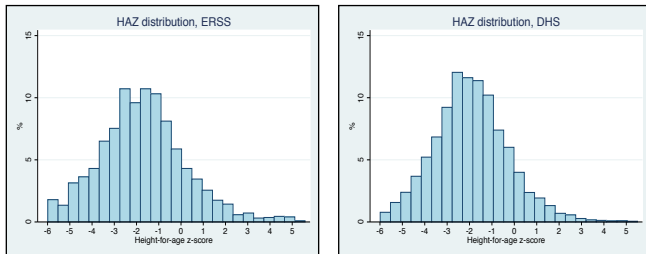


Figure 2: Weight-for-age z-score distributions

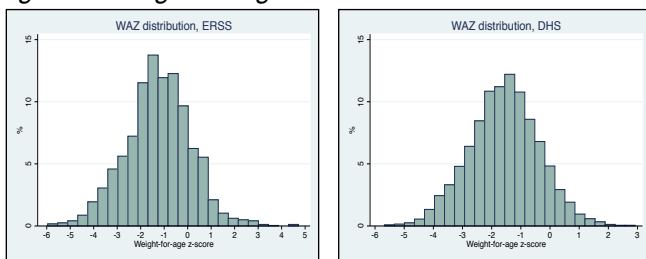
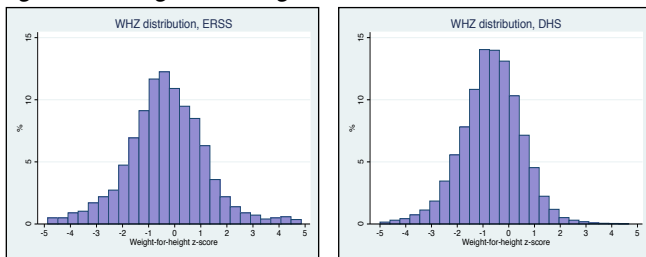


Figure 3: Weight-for-height z-score distributions



The two sets of data are comparable at the national level, but we find greater differences at the regional level. The ERSS was stratified regionally and has five domains of analysis. These domains include the four largest regions, Tigray, Amhara, Oromia, and the Southern Nations, Nationalities, and Peoples (SNNP), as well as one domain representing all other regions. Table 3 provides the breakdown of stunting and wasting prevalence for these four regions, as calculated from ERSS and DHS data. While the ERSS data reports 14 percent of children from SNNP are wasted, the DHS indicates only 8 percent of children meet the wasting criteria in the region. DHS also reports stunting

prevalence points for Tigray and Oromia that are five percentage points higher than ERSS' respective estimates. Chi-squared tests of independence confirm that the regional distributions for ERSS and DHS are similar for stunting and wasting prevalence estimates¹.

Table 3: ERSS vs. DHS, by region

Region	Stunted (%) (Std. Error)		Wasted (%) (Std. Error)	
	ERSS	DHS	ERSS	DHS
Tigray	53 (.05)	58 (.02)	7 (.03)	11 (.01)
Amhara	52 (.04)	55 (.02)	10 (.02)	11 (.01)
Oromia	43 (.03)	48 (.02)	10 (.02)	10 (.01)
SNNP	53 (.04)	49 (.02)	14 (.02)	8 (.01)
All other regions	39 (.04)	47 (.02)	10 (.02)	18 (.02)

Summary

Relative to DHS, the ERSS data appear to underperform slightly in terms of outliers (2 percent for DHS and 13 percent for ERSS). However, this evidence is somewhat tempered by differences in data preparation processes. DHS data fields can be overwritten at the CSA offices if values are deemed non-credible, while ERSS data errors are fixed in the field. Comparisons of ERSS and DHS anthropometric data reveal similar prevalence estimates, z-score distributions, and regional patterns between the two surveys. Mild evidence indicates that, at the national level, there is a difference between the two underweight indicators, though the overall WAZ distribution patterns are comparable. Formally, we find no statistically significant difference in regional distributions of stunting and wasting; however, the patterns may lend themselves to varying policy interpretations.

This brief is based on data collected by the Central Statistical Agency as part of the Living Standards Measurement Study – Integrated Surveys on Agriculture (LSMS-ISA) project. The full dataset is available for download at CSA via <http://www.csa.gov.et>.

The findings outlined in this brief are drawn from...
Revisiting z-scores: A review of LSMS-ISA Anthropometric Data, The World Bank, as presented at the LSMS-ISA Annual Workshop 2013, Addis Ababa, Ethiopia



¹ Chi-squared test of independence uses $X^2=(O-E)^2/E$, where O and E are the observed and expected number of observations, respectively. "Expected" refers to the number of observations (from the ERSS sample) meeting some criteria one would expect to see, treating the DHS as reflective of the population distribution.