Technical Note
Age-adjustment of child anthropometry estimates

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Background

The standard age group for reporting prevalence estimates of child nutritional status is 0 – 59 months (children under five years of age). However, many national household surveys, including Demographic and Health Surveys (DHS) in the earlier 1990s, only collected anthropometry information for children under three years of age or under four years of age, thus making the reported estimates non-standard and incomparable with estimates of children under five years of age. Such estimates are included in UNICEF global database of child anthropometry and reported as is in the annual State of World's Children (SOWC) publications. In addition, these estimates are age-adjusted to represent children under five so that they are comparable and included in any country and regional trend analysis.

Why is age-adjustment necessary

Child nutritional status estimates vary across different age groups. For example, the 2005-2006 National Family Health Survey (NFHS) in India reported undernutrition prevalence by the following age groups:

Table 10.1 Nutritional status of children

Percentage of children under age five years classified as malnourished according to three anthropometric indices of nutritional status: height-for-age, weight-for-height, and weight-for-age, by background characteristics, India, 2005-06

| | Height-for-age | | | Weight-for-height | | | | Weight-for-age | | | | |
Background characteristic	Percent-age below -3 SD	Percent-age below -2 SD[1]	Mean Z-score (SD)	Percent-age below -3 SD	Percent-age below -2 SD[1]	Percent-age above +2 SD	Mean Z-score (SD)	Percent-age below -3 SD	Percent-age below -2 SD[1]	Percent-age above +2 SD	Mean Z-score (SD)	Number of children
Age in months												
<6	8.4	20.4	-0.6	13.1	30.3	4.1	-1.2	10.9	29.5	1.0	-1.4	3,845
6-8	10.8	25.9	-1.0	10.1	29.3	3.1	-1.1	13.7	34.7	0.6	-1.5	2,570
9-11	12.8	32.0	-1.2	10.9	28.9	1.6	-1.2	14.1	36.7	0.2	-1.6	2,086
12-17	21.7	46.9	-1.8	7.3	23.3	1.7	-1.1	14.2	40.2	0.3	-1.7	4,642
18-23	30.4	57.8	-2.2	7.6	22.2	1.1	-1.1	19.5	45.9	0.2	-1.9	4,636
24-35	28.9	55.9	-2.2	5.0	16.7	0.9	-1.0	17.7	44.9	0.4	-1.9	9,335
36-47	27.8	54.3	-2.1	4.7	15.5	1.0	-0.9	16.6	45.6	0.2	-1.9	9,780
48-59	23.9	50.3	-2.0	4.1	15.7	1.3	-1.0	15.3	44.8	0.3	-1.9	9,762

Stunting and underweight prevalence tend to be higher among children of older age groups than younger groups. The aggregated prevalence estimates for 0 – 35 months and 0 – 59 months are as follows

Age group	Underweight (%)	Stunting (%)	Wasting (%)
0-35 months	40.5	45.0	22.8
0-59 months	42.5	48.0	19.8

Note: Estimates are according to WHO Child Growth Standards.

The difference between estimates for these two age groups is non-negligible. As previous NFHS reported prevalence estimates for non-standard age groups (0 – 47 months in 1992 – 1993, 0 – 35 months in 1998 – 1999), it is important to make sure that when conducting

trend analysis, estimates from the three rounds of NFHS refer to the same age group so that they are comparable and the resulting reduction or increase (if any) in prevalence is free of bias from comparing estimates from different age groups.

How to age-adjust estimates

To age-adjust the estimates for a non-standard age group from one survey, we need information from another survey with estimates for the standard 0 – 59 months group and estimates for the age group that is the same as the one being adjusted. The adjustment can be illustrated by the following.

The India NFHS 1998 – 1999 reported nutritional status estimates for children 0 – 35 months old. We need to age-adjust these estimates to represent age group 0 – 59 months so that they are comparable to estimates from NFHS 2005 – 2006.

First, aggregate the age groups using estimates from the result table in the report of 2005 – 2006 NFHS. This is done by sample-size-weighted average across various age groups.

NFHS 2005 - 2006	Age group	Underweight (%)	Stunting (%)	Wasting (%)
Reported	0-35 months	40.5	45.0	22.8
Reported	0-59 months	42.5	48.0	19.8

Note: Estimates are according to WHO Child Growth Standards.

Assuming the ratios of estimates for age group 0 – 59 months to 0 – 35 months remain the same for estimates from the NFHS 1998 – 1999 had it collected information up to children under five years, apply the ratios to the estimates for 0 – 35 months. This gives the age-adjusted estimates for age group 0 – 59 months, as in the following table.

NFHS 1998 – 1999	Age group	Underweight (%)	Stunting (%)	Wasting (%)
Reported[1]	0-35 months	42.7	51.0	19.7
Age-adjusted	0-59 months	44.8	54.5	17.1

Note: Estimates are according to WHO Child Growth Standards.

Limitations

This age adjust approach is only approximate. The underlying assumption is that the relationship between estimates for 0 – 35 months and 0 – 59 months in one survey holds for estimates from another survey. As we see in the result table pasted from the 2005 – 2006 NFHS report, nutritional status estimates are very sensitive to age and the aggregated prevalence very much depends on the distribution of age groups, which doesn't necessarily stay the same from one survey to another. In spite of its weaknesses, we believe the age-adjustment is necessary for comparing prevalence estimates over time.

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[1] The official NFHS 1998 – 1999 report has estimates according to NCHS reference. The NFHS 2005 – 2006 report has estimates from the previous round converted to WHO Standards.