Supplemental file S2.

We employed the technical error measurement (TEM), which is an indicator of measurement of quality. We verified the accuracy of height measurement of research assistant through repeating height measurements (intra evaluator) and comparing measurements of a research assistant with measurement from other research assistants (inter-evaluator). We calculated inter TEM, intra TEM, Total TEM and coefficient of reliability (R).

**1) Intra observer TEM:**

Intra-observer TEM for k observers is calculated by:



where Mij1 and Mij2 are the duplicate readings recorded by observer j for the ith child, Nj is the number of children measured by observer j , and K is the number of observers taking the measurements

Table S1: Results of height/length measurement performed by ten research assistants on 5 volunteers for the intra-evaluator TEM calculation

|  |  |  |
| --- | --- | --- |
| Team ID | Relative TEM % |  |
| 1 | 0.82 | 4.44 |
| 2 | 0.63 | 2.48 |
| 3 | 0.78 | 3.96 |
| 4 | 0.37 | 0.92 |
| 5 | 2.8 | 47.44 |
| 6 | 0.14 | 0.12 |
| 7 | 0.32 | 0.66 |
| 8 | 0.21 | 0.28 |
| 9 | 0.17 | 0.18 |
| 10 | 0.25 | 0.39 |

 = 4.44+2.48+3.96+0.92+47.44+0.12+0.66+0.28+0.18+0.39=61.15

 = 2\*5\*10=100

****

 **= 0.78**

**2) Inter observer TEM:**

Inter-observer TEM for k observers is calculated by:

****

where Yij is one of the duplicate measurements taken by observer j for child I, Ki is the number of observers that measured child i, and N is the number of children involved.

Table S2: Results of inter-evaluator TEM calculation from repeated measurement of height/length performed by ten research assistants on 5 subjects

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Height (cm) as determined by measurer/team |  |  |  |
| Subject no |  1 |  2 | 3 |  4 |  5 |  6 |  7 |  8 |  9 | 10 |

|  |
| --- |
| **(A)** |

 |

|  |  |
| --- | --- |
|  **(B)**

|  |
| --- |
|  |

 |

 | **B-A** |
| 1 | 72.3 | 70.6 | 70.2 | 71.2 | 71.6 | 72.2 | 72.1 | 72 | 69.7 | 72.3 | 51016.32 | 51008.16 | 8.156 |
| 2 | 75.7 | 74.9 | 75.5 | 75.6 | 76.8 | 77.3 | 76.1 | 77.7 | 75.5 | 72 | 57342.39 | 57320.04 | 22.349 |
| 3 | 86.6 | 86.5 | 87.5 | 87.7 | 87.6 | 87.5 | 86.5 | 86.8 | 86.5 | 86.2 | 75588.54 | 75585.64 | 2.904 |
| 4 | 86.8 | 86.2 | 87.6 | 87.1 | 86.6 | 88 | 86.1 | 88 | 87 | 86.7 | 75711.51 | 75707.4 | 4.109 |
| 5 | 82.6 | 81.1 | 82.8 | 82.8 | 82.6 | 82.5 | 81.8 | 82.8 | 72.9 | 69.8 | 64474.19 | 64272.29 | 201.901 |
|  |  |  |  |  |  |  |  |  |  |  |  |  | 239.419 |

Inter-observer TEM=/(N(K-1))==2.30cm

**3) Coefficient of reliability (R)**

Estimates the proportion of the inter-subject variance (total measurement variance) that is not due to measurement error [[1]](#footnote-1)

R= 1- ( (total TEM)2 )

 SD2

where SD is the total inter-subject variance,

Total TEM is calculated as follows:

Total TEM= (((Intra TEM1)2+ (Intra TEM2)2 + (Intra TEM3)2+ (Intra TEM4)2+ (Intra TEM5)2+ (Intra TEM6)2+ (Intra TEM7)2+ (IntraTEM8)2+ (Intra TEM9)2+ (Intra TEM10)2)/2) + (Inter TEM)2)

=0.018+0.039+0.396+0.444+0.092+0.066+0.012+0.028+0.246+4.774)/2+5.29)

=2.429

R= 1- ( (total TEM)2 )

 SD2

R= 1- ( (2.42)2 ) =0.86 = 86%

 (6.59)2

Interpretation: 86% of the total variability is true variation, and 14 % is attributable to measurement error.

1. Stanley J. Ulijaszek1\* and Deborah A. Kerr. Anthropometric measurement error and the assessment of nutritional status. *British Journal of Nutrition* (1999), 82, 165–177. [↑](#footnote-ref-1)