Evaluating the use of a novel wallchart tool to identify stunted adolescents in Malawi.

Pannapat Amy Chanyarungrojn1, Natasha Lelijveld1, Amelia Crampin2,3, Steffen Geis2,3, Moffat Nyirenda1,3, Marko Kerac1.

1. London School of Hygiene and Tropical Medicine, Department of Population Health, London, United Kingdom.
2. London School of Hygiene and Tropical Medicine, Department of Infectious Disease Epidemiology, London, United Kingdom.
3. Malawi Epidemiology and Intervention Research Unit, Lilongwe, Malawi.

Background
Stunting is a form of chronic malnutrition defined by low height-for-age that affects 159 million children worldwide.1 Gold standard stunting assessment uses height-for-age Z-score (HAZ) calculation.2 Accurate HAZ is time-intensive and challenging in resource-limited settings.

We developed the MEIRU wallchart – a novel, life-size wallchart to rapidly identify stunted adolescents (Fig. 1). Each bar on the wallchart represents normal, stunted, and severely stunted categories. We evaluated the wallchart’s performance against standard HAZ assessment and methods currently used in clinical practice – WHO lookup tables and WHO growth charts.

Methods
- Non-interventional diagnostic accuracy study undertaken in Lilongwe, Malawi.
- Recruited adolescents aged 8-19 years.
- Each adolescent’s stunting status determined separately using MEIRU wallchart (Fig. 2.3), WHO lookup tables, and WHO growth charts.
  - Each method was compared against standard HAZ calculated using AnthroPlus WHO software.3
  - We also measured time taken using each method.

Results
We recruited 244 adolescents.

MEIRU wallchart:
- Overall accuracy of 95.5% (kappa=0.91) (Fig. 4)
- At the stunting cut-off (HAZ<-2), sensitivity of 97.6% (95%CI: 91.5-99.7) and specificity of 96.3% (95%CI: 92.1-98.6).
- On average, faster than lookup tables by 62.5% (41.4sec; p<0.001) per measurement.

The WHO lookup tables and growth charts had overall agreements of 59.4% (kappa=0.36) and 61.9% (kappa=0.31) respectively.

Fig. 2: Field-testing of the MEIRU wallchart in Area 25, Lilongwe, Malawi.

Fig. 3: A book was used as a carpenter’s square to ensure accuracy of readings

Fig. 4: Percentage agreement and kappa statistic of each test method, compared to gold standard HAZ.

Conclusions
The MEIRU wallchart is an accurate and efficient method for identification of stunted adolescents by minimally trained health workers. The WHO lookup tables and growth charts performed poorly in comparison. The wallchart may be used to improve stunting assessment in resource-limited settings.

Acknowledgements
The development of this project was made possible by the financial support of the Wellcome Trust.

References

Fig. 1: Boys MEIRU wallchart used for field testing.