Overlap in conventional indices used for assess undernutrition among young children: Extent and implication for policies

Godefroy Lokanga Djomo[a,b] and Shailen Nandy[c]

[a] *École des Sciences de la Population et du Développement, Université de Kinshasa, Democratic Republic of Congo*
[b] *Université Paris Nanterre, UMR 7217 CRESPA, HED, France*
.[c] *School of Social Sciences, Cardiff University, United Kingdom.*
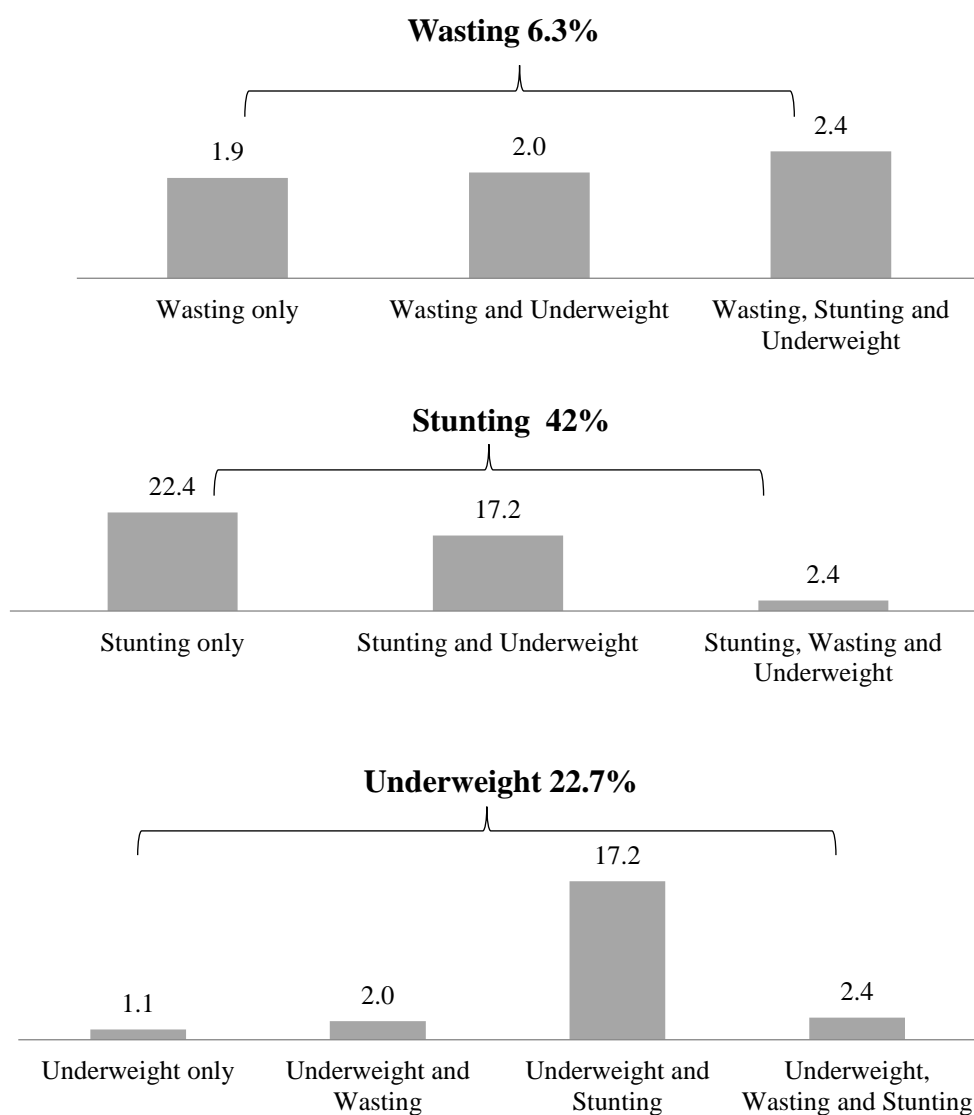
Extended Abstract

Context : The conventional nutritional indices used for assess undernutrition among young children are wasting, which represents acute undernutrition (low weight-for-height ratio) stunting, which represents chronic undernutrition (low height-for-age ratio) and underweight (low weight-for-age ratio). Studies show that these standard indices for assessing child undernutrition overlap and may underestimate the prevalence of undernutrition. The observation is that despite many studies having highlighted the advantages in the use of the disaggregated indices and shown some limitations in the use of conventional indices, the latter remain important indicators used in programs. The use of the disaggregated indices, on the other hand, remains embryonic. We estimate that the low interest shown in taking the disaggregated indices into account and the growing consideration given to conventional indices in studies to assess undernutrition would partly lie in a few lack of clearer evidence on what is being really criticized to these conventional indices. First, although studies argue that conventional indicators overlap and therefore do not fully reflect the burden of undernutrition, studies do not show the extent of these overlaps (is this overlap as important as it is implied?). Second, studies do not show whether these overlaps can have implications in technical recommendations (can these overlaps reduce the fields of vision of decision makers in policy planning?).

Methodology : Using anthropometrics data for 21,453 children under 5 from MICS 2017-2018 conducted in Democratic republic of Congo (DRC), this paper examines the extent of the overlap of these conventional indices. The study subsequently shows the implication of this overlap in policies by analyzing the association between under 5 undernutrition, household poverty and morbidity (diarrhea and acute respiratory infections). The nutritional indices used is the Composite index of anthropometric failure (CIAF), which is a measure that is able show children suffering only from one form of undernutrition and as well as those presenting several combinations of forms of undernutrition. In its aggregated form, the CIAF groups together children not suffering from any form of undernutrition in one modality and those suffering from one or more forms of undernutrition in another. Thus, the CIAF is the nutrition index exempt from overlaps and can provide more complete information on total undernutrition within a population, which was not the case with conventional indicators that presents the nutritional status of children through three distinct nutritional indices (wasting, stunting and underweight). And for draw the misclassified nutritional profiles and thus show the extent of the overlap in the conventional indicators, we identified among the children presenting each of three forms of undernutrition, those who are classified in one or the other group that presents the CIAF. A descriptive analysis was performed to explore the distribution of each of the nutritional indicators as well as the overlaps found in them. A Kruskal-Wallis test was used to examine the relationship between subgroups of nutritional indicators and the standard of living. And an age-adjusted logistic regression with complex sampling design is used to explain the relationship between nutritional indicator subgroups and morbidity.

Results : The results show that the overlap of conventional indicators varies according to the indicators taken into account (Figure 1). The extent of the percentage of children misclassified in each of these three indicators show that among children classified as wasting, 71.5% have multiple undernutrition and are therefore misclassified. Among children classed as stunting, 45.9% present with multiple undernutrition. And for those children considered underweight, the extent of the overlap is greatest where 95.8% of children are misclassified. And the standard of living of children suffering from several forms of undernutrition based on conventional indices does not differ much between them, but differs a little more with that of children presenting only one form of undernutrition (Figure 2).

Fig.1. Extent of overlap in conventional indices

Wasting 6.3%

1.9	2.0	2.4
Wasting only	Wasting and Underweight	Wasting, Stunting and Underweight

Stunting 42%

22.4	17.2	2.4
Stunting only	Stunting and Underweight	Stunting, Wasting and Underweight

Underweight 22.7%

1.1	2.0	17.2	2.4
Underweight only	Underweight and Wasting	Underweight and Stunting	Underweight, Wasting and Stunting

Calculated from MICS-DRC 2017-2018 data.

Fig.2. Mean standard of living score (with 95% confidence interval) by type of indices[*]

Wasting

Stunting

Underweight
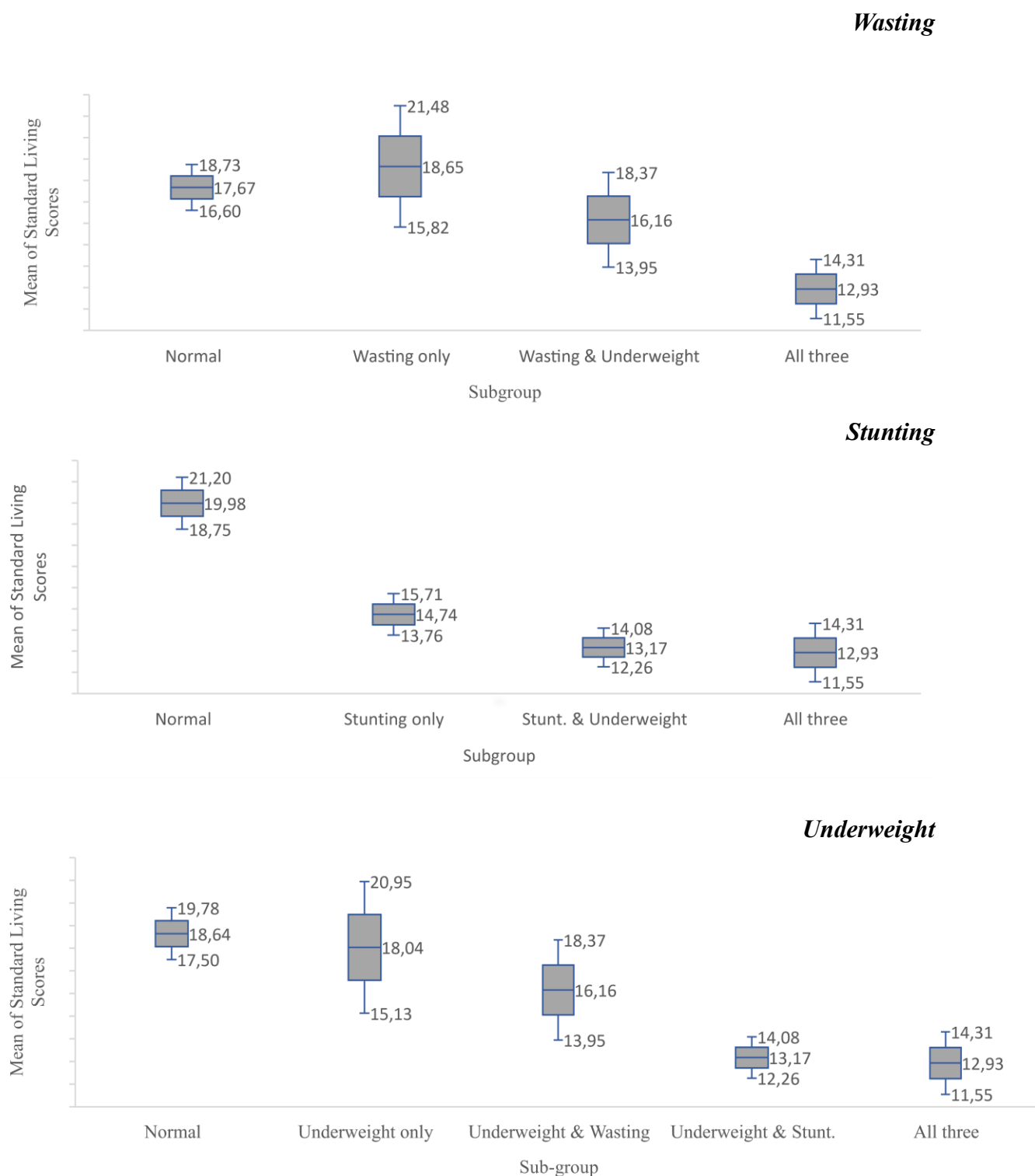
* Scores calculated from MICS-DRC 2017-2018 data.

The logistic regression show that children without anthropometric failure and those with one form of undernutrition were at lower risk of morbidity (diarrhea and acute respiratory infections) than children classified in the overlapping groups with multiple undernutrition. We can see that according to the results of our analyses, if it is established that stunting increases the susceptibility of children under 5 to have diarrhea, eradicating this form of undernutrition would only have an effect on 22.4% of children instead of 42% as the height−for−weight index

would suggest. Or, if acute respiratory infections is not associated with being underweight as indicated by the conventional indicator, this effect only concerns 1.1% of children instead of 22.7% as the prevalence of underweight.

Table 3. Age-adjusted binary logistic regressions for undernutrition indices, diarrhoea, and acute respiratory infection among children under-5 in DRC

Undernutrition Indices	Diarrhoea		Acute respiratory infection	
	Odds ratio	95% CI[a]	Odds ratio	95% CI
Wasting				
Normal	1.00		1.00	
Undernourished	1.32[c]	1.02−1.72	0.96	0.63−1.47
Stunting				
Normal	1.00		1.00	
Undernourished	1.27[b]	1.01−1.48	0.98	0.70−1.39
Underweight				
Normal	1.00		1.00	
Undernourished	1.52[b]	1.31−1.76	1.33	0.97−1.81
Wasting disaggregated				
Normal	1.00		1.00	
Wasting only	0.96	0.57−1.61	1.17	0.46−2.96
Wasting and Underweight	1.45	0.93−2.25	0.52	0.20−1.33
Wasting, Stunting and Underweight	1.56[c]	1.14−2.14	1.19	0.65−2.18
Stunting disaggregated				
Normal	1.00		1.00	
Stunting only	1.04	0.86−1.24	0.85	0.58−1.24
Stunting and Underweight	1.56[b]	1.30−1.88	1.17	0.79−1.73
Stunting, Wasting and Underweight	1.69[b]	1.24−2.32	1.19	0.64−2.23
Underweight disaggregated				
Normal	1.00		1.00	
Underweight only	0.86	0.50−1.45	2.70[d]	1.27−5.73
Underweight and Wasting	1.56[c]	1.01−2.43	0.55	0.21−1.41
Underweight and Stunting	1.56[b]	1.31−1.87	1.23	0.86−1.75
Underweight, Wasting and Stunting	1.70[b]	1.24−2.32	1.26	1.69−2.30

[a] Confidence Interval ; [b] $P < 0.001$; [c] $P < 0.05$; [d] $P < 0.10$

Conclusion : The study demonstrated that in the MICS-DRC 2017-18 samples, the nutritional status of more than half of the children in all indicators was misclassified. Clinical nutritional profiles should be reviewed, as children with multiple forms of undernutrition should be grouped into their own categories as they constitute the groups of children most vulnerable to morbidity and mortality. And also, according to the number of children under 5 years old in the DRC, these overlaps expressed as a percentage in the sample of this study are equivalent to millions of children likely to constitute a bias in targeting and prioritization of programs of the most vulnerable children. These misclassified children may not be considered in targeted policies and interventions aimed at addressing acute (wasting) or chronic (stunting) malnutrition, given existing knowledge on the differential vulnerabilities associated with stunting to wasting in children. The separate use of wasting, stunting and underweight to plan targeted policies can therefore reduce the effectiveness and efficiency of programs. The indicators to be used should be disaggregated, as CIAF suggests, for a more comprehensive analysis of undernutrition. In the context of the DRC (and many other developing countries), the budgetary allocation for health policies and for children's nutritional program remains low and insufficient; the CIAF provides a tool to target the most vulnerable children and to tackle undernutrition more strategically.