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Triple Burden Index of Malnutrition

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ABSTRACT

Malnutrition is a global public health priority. While described traditionally as undernutrition (with stunting, wasting, underweight); obesity & micronutrient deficiencyadd to the burden. While measuring this burden, a child may have more than one deficit and may get counted more than once thereby giving numbers greater than actual numbers. This fallacy is seen in many nutritional surveys giving incorrect estimates and results. We have devised a model, triple burden index which when used will give accurate estimates of all forms of malnutrition.

METHODS

In spite of tremendous advances in health care, malnutrition in children and adolescents is a global threat. Conventionally, undernutrition as one facet of malnutrition was considered important especially in low to middle income countries with poverty, food insecurity and ignorance prevailing. This was the first burden However; recent years have shown alarming rise in obesity which is considered as the double burden. The concept of triple burden as envisaged by UNICEF describes simultaneous existence of three forms of malnutrition i.e. undernutrition (stunting, wasting, underweight), obesity and micronutrient deficiencies occurring in the same individual; family, community or country.[1, 2]

Latest global estimates show that around 150.2 million (23.2%) children under 5 are stunted, 42.8 million (6.6%) are wasted and 35.5 million (5.5%) are overwt.[2, 3] Prevalence of anemia in women and children (micronutrient deficiency is estimated to be 30.7% to 39.8%[3, 4.]

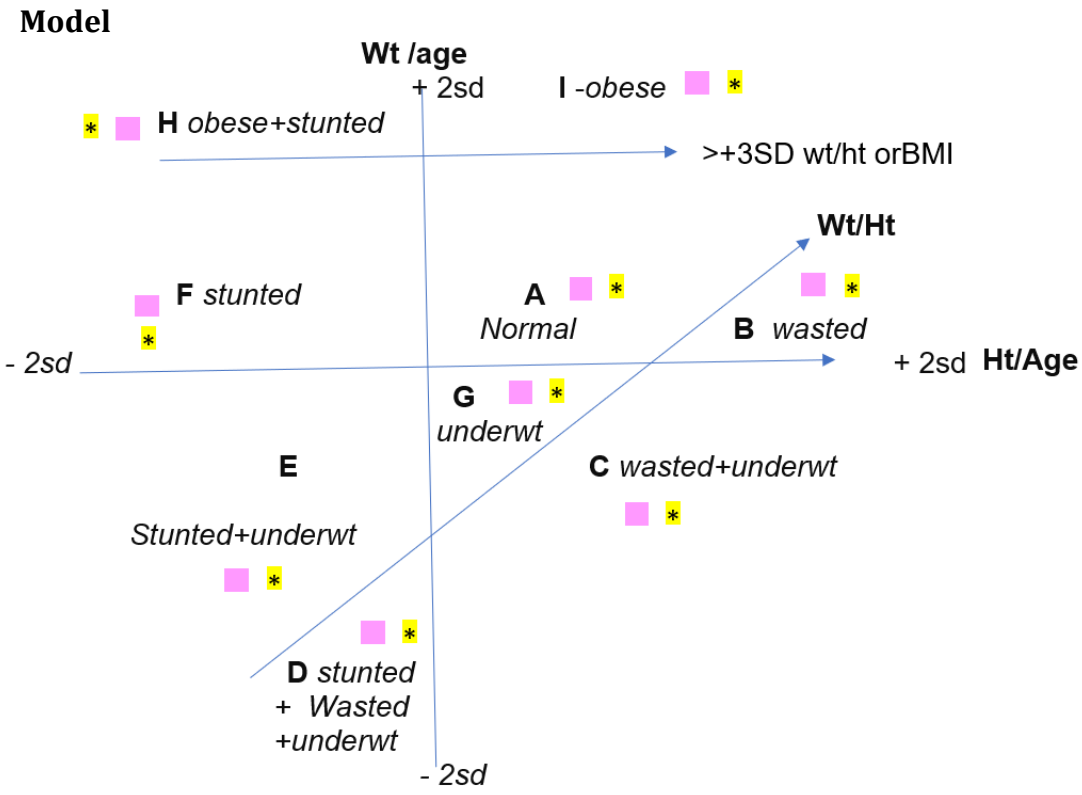
Most anthropometric measurements are undertaken to detect Wt. for ht (wasting), Wt for age (underwt), and Ht for age (stunting) using WHO growth standards[4 ,5]. However, while calculating these, one child may have all 3 subsets of undernutrition; may get counted thrice, thus giving figures more than actual. One child can thus get calculated as wasted, may have stunting and underwt thereby getting included thrice. For this, one needs to find out exact no. of children with specific deficits. Svedberg[6, 7] had devised an index called as composite index of anthropometric failure (CIAF). It identified no. of normal children and children with different deficits. However, it did not include obesity, Phadke et.al[8] improvised on it including overwt/obesity and stunting with obesity/ overwt.

Our model considers all three components of triple burden i.e underwt, overwt and micronutrient deficiency counted individually. Two main deficiencies like anemia and vitamin D deficiency prevalent in LMICs are included. They can be detected clinically and by simple laboratory or radiological tests.

Model is shown as below in a diagrammatic form. Percentages give an exact idea of a particular deficiency. It is pertinent to note that all three forms of malnutrition can exist in an individual, in a family and even in a community. Our model will help in depicting all these 3 forms.

DISCUSSION

Figure 1 is a diagrammatic representation of TBI.



(Modified from original Svedberg, Nandy)[6,7]

Figure 1 shows Wt /age- vertical line, Ht /age- horizontal line, Wt/ht -oblique line

(a) Normal children.
(b) Wasted (wt for ht < -2 sd)
(c) Underwt +Wasted (wt for age < -2 sd and wt for ht < -2 sd)
(d) Stunted+wasted+underwt (ht for age < -2 sd, wt for ht < -2 sd and wt for age < -2 sd)
(e) Stunted+ underwt (ht for age < -2 sd and wt for age < -2 sd)
(f) Stunted (ht for age < -2 sd)
(g) Underwt (wt for age < -2 sd)
(h) Obese+stunted (wt for ht or BMI > +3 sd and ht for age < -2sd)
(i) Obese (wt for ht or BMI > +3 sd)

- Clinical or laboratory evidence of anemia (to be expressed as %, the size of the square will be proportional to the % of affected individuals)
- * Clinical, laboratory or radiological evidence of Vitamin D deficiency (to be expressed as %, the size of the square will be proportional to the % of affected individuals)

We would urge scientists to use this model to get an idea of triple burden of malnutrition in the individual and in the community. It separates each of the categories as shown in the diagram above. Thus, it separates normal individuals first which is **A.** The remaining comprise the double burden (**B to I).** It can be calculated by taking simple measurements like wt & height, plot them on WHO growth charts (2SD) and derive individual subgroups. If a society or a child is in **D** group- i.e. stunting+ wasting+ underweight or has **H**- stunting and obesity, it needs urgent attention. The third burden (micronutrient deficiency) is exhibited by colour coding and asterisks to show presence of anemia and Vitamin D deficiency respectively.

TBI can be used to get the total picture and then management as per diagnosis. It is a composite and comprehensive index. We posit that the new index **TBI – Triple burden index** will enable better assessment of malnutrition in both children and adults.

We declare no conflict of interest.

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