Identifying underweight infants and children using a novel 'MAMI' slide chart

This is a summary of the following article: *Monga M, Sikorski C, de Silva H et al. (2023) Identifying underweight in infants and children using growth charts, lookup tables and a novel "MAMI" slide chart: A cross-over diagnostic and acceptability study. PLOS Global Public Health, 3, 8, e0002303.*
https://journals.plos.org/globalpublichealth/article?id=10.1371/journal.pgph.0002303

Using weight-for-age (WFA) as a malnutrition indicator offers several advantages compared to other methods and it is the best indicator of mortality risk for infants aged under six months. However, this method is prone to errors in practice. Building on previous work, the researchers developed a low-cost tool – the "MAMI chart" – which was designed to improve the accessibility and accuracy of WFA assessment (Figure 1).

This study measured how accurately 62 public health/nutrition workers and students could classify 25 hypothetical scenarios where a child's sex, weight, and age were presented – determining whether they were normal weight, moderately underweight, or severely underweight under timed conditions. Participants acted as their own controls by testing the "MAMI chart", then World Health Organization growth charts and lookup tables in a random order.

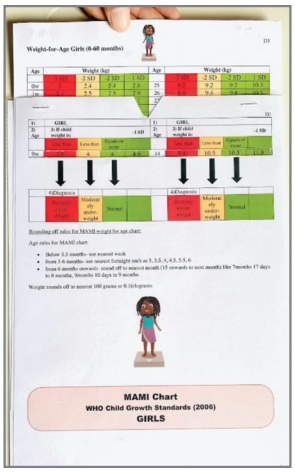
The "MAMI chart" had the highest diagnostic accuracy of the three assessments (79%), with lookup tables (70%) and growth charts (61%) performing worse ($p<0.01$). This difference in accuracy was clinically as well as statistically significant in terms of numbers of infants being correctly identified to receive appropriate treatment. Moreover, most participants reported that they preferred using the "MAMI chart" as it was easier than traditional methods.

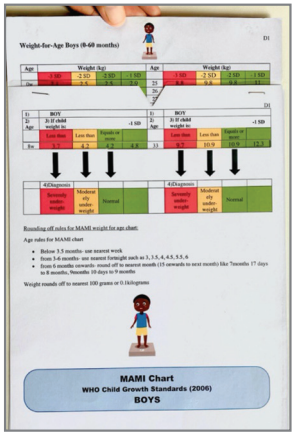
The study featured an appropriate sample size calculation based on previous, comparable studies, but the sample size was smaller than the ideal target due to logistical constraints. This may have left this study underpowered, based on the anticipated effect size, but this issue was negated given that the overall effect size was larger than expected.

The study utilised a robust cross-over study design that eliminated many confounding variables. The sample was comprised mostly of students (45%) and doctors (39%), with 77% of participants having 0–5 years of experience in nutrition or public health. Although the results were comparable across different experience levels, the use of early-career professionals makes it difficult to extrapolate these findings to a broader population. It was also not possible to blind the study participants, which may have introduced bias into the findings.

Although the hypothetical, time-pressured research setting simulated real-world conditions – where clinicians often face large caseloads – the diagnostic accuracies observed are likely to differ from a more natural setting. The values themselves may therefore be of limited use, but the percentage difference between these assessments is important to consider. In this case, the findings indicate that this novel slide chart makes WFA assessment quicker and easier for a relatively inexperienced group of public health professionals. More work is needed to test this tool in different settings, but these findings are promising. The relative inaccuracy of the two existing assessment methods highlights the need for improved training and supervision.

Figure 1
The "MAMI chart" front and reverse sides





Kenya and Malawi: Intestinal disturbances and mortality in complex malnutrition cases

This is a summary of the following paper: *Wen B, Farooqui A, Bourden C et al. (2023) Intestinal disturbances associated with mortality of children with complicated severe malnutrition. Communications Medicine, 3, 128.*
https://link.springer.com/article/10.1038/s43856-023-00355-0

Children with 'complicated'[1] severe malnutrition have particularly high mortality rates. Some evidence points to a relationship between intestinal dysfunction and these poor outcomes, but this has yet to be tested. This nested case-control study sought to evaluate this relationship by testing faecal samples[2] from participants at study admissions (before treatment), then sorting participants by non-survivors (cases) and survivors (matched controls) for analysis.

Subjects were enrolled from an existing randomised controlled trial in Kenya and Malawi (Bandsma et al., 2019) and defined as children (aged 6 months to 13 years), with Mid Upper Arm Circumference (MUAC) <11.5cm, or weight-for-height z-score <-3 (aged 6–59 months) or body mass index-for-age z-score <-3 (age ≥60 months), and/or oedematous malnutrition at any age, and having medical complications or a failed appetite test according to WHO guidelines. Due to the stringent enrolment criteria, the sample size (n=68) was limited by sample availability. The study was randomised at a 1:1 ratio.

Non-survivors had a significantly higher prevalence of nutritional oedema (43%) than survivors (24%, $p=0.02$), with nutritional oedema increasing the odds of mortality by 140% (OR 2.4, 95% CI 1.2–5.1). The proportion of children with diarrhoea was slightly higher in the non-survivor group (54% vs 40%), but there was no significant difference in the odds ratio for mortality (OR 1.8, 95% CI 0.9–3.6). The median time to death for non-survivors was six days (IQR: 4–10). The median time to discharge for survivors was eight days (IQR: 7–11).

There were specific reductions in certain amino acids, monosaccharides, and microbial fermentation products in the non-survivor group. Although short chain fatty acid production – the main fermentation products of the gut microbiome – did not differ between groups, there was a difference in the overall faecal metabolomic signature between survivors and non-survivors. Overall, enteropathy markers did not differ between groups.

This is a small subgroup of particularly sick children, as evidenced by this sample comprising 54% of the mortality cases in the larger parent study, so these findings cannot be generalised to all cases of child malnutrition. The case-control design prevents us from determining the temporal relationship between a cause and an effect, so further studies are needed to validate these findings. The authors also note that the high variability of faecal data may have introduced confounding, although they did take steps to address this. Nevertheless, these findings indicate that intestinal disturbances may have an indirect association with acute mortality.

[1] Complicated malnutrition refers to severely malnourished children who require hospital based management, due to concurrent illnesses or complications.
[2] Faecal metabolomic profiling was performed using nuclear magnetic resonance spectroscopy, targeting 68 commonly measured water-soluble faecal metabolites. A separate portion of the sample was used to measure faecal enteropathy markers.

References

Bandsma R, Voskuijl W, Chimwezi E et al. (2019) A reduced-carbohydrate and lactose-free formulation for stabilization among hospitalized children with severe acute malnutrition: A double-blind, randomized controlled trial. PLoS Med, 16, 2.