



Could dietary diversity be a proxy indicator for 2-5 years old children nutrients adequacy?

The case of selected woredas, Sidama region, Ethiopia

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Rationale

Micronutrient deficiency ("hidden hunger") remains critical in rural Ethiopia.

Comprehensive dietary assessments are expensive, time-consuming, and difficult to conduct in resource-poor settings.

There is no validated Diet Diversity tool to use for children aged 2–5 years.

Objective

To evaluate dietary diversity and nutrient adequacy among children aged 2–5 years in the Sidama Region, and analyze the validity of dietary diversity scores as a proxy indicator for overall nutrient adequacy.

Methodology

Study Area: Hula (Highland), Dale (Midland), and Loka Abaya (Lowland) woredas, Sidama Region.

Study Design: Community-based cross-sectional study (Data collected July–August 2024).

Sample Size & Sampling: $n=415$ children aged 2–5 years selected using multi-stage stratified sampling.

Data Collection: 24-hour dietary recall administered via KoboToolbox.

Data Analysis: NutriSurvey 2007 and SPSS v25.

- Evaluated 11 micronutrients: Vitamin A, B2, Niacin, B6, Folate, B12, C, D, Calcium, Zinc, Iron.
- Calculated Nutrient Adequacy Ratio (NAR), Mean Adequacy Ratio (MAR) (capped at 1.0), and DDS across cut-off thresholds (Any gram, $\geq 5\text{g}$, $\geq 10\text{g}$ and $\geq 15\text{g}$).

Results

- Correlations:
 - MAR-11 vs. Food Variety Consumption Score (FVCS): $r=0.400$ ($p=0.05$)
 - MAR-11 vs. Food Group Consumption Score (FGCS): $r=0.360$ ($p=0.03$)

Table 2: Dietary nutrient inadequacy and NAR

Nutrient	Inadequate Intake (<66% RNI)	Mean NAR ($\pm$ SD)
Vitamin D	100.00%	0.23 $\pm$ 2.56
Vitamin B12	99.80%	0.52 $\pm$ 5.99
Zinc	99.50%	25.49 $\pm$ 27.20
Calcium	98.80%	16.80 $\pm$ 15.80
Folic Acid	91.80%	32.30 $\pm$ 45.50
Vitamin C	89.90%	31.87 $\pm$ 22.36
Vitamin B2	84.70%	40.60 $\pm$ 31.90
Iron	69.70%	64.50 $\pm$ 48.65
Vitamin A	67.50%	51.50 $\pm$ 66.30
Overall Mean Adequacy Ratio (MAR-11)	49.3% $\pm$ 59.8%	—

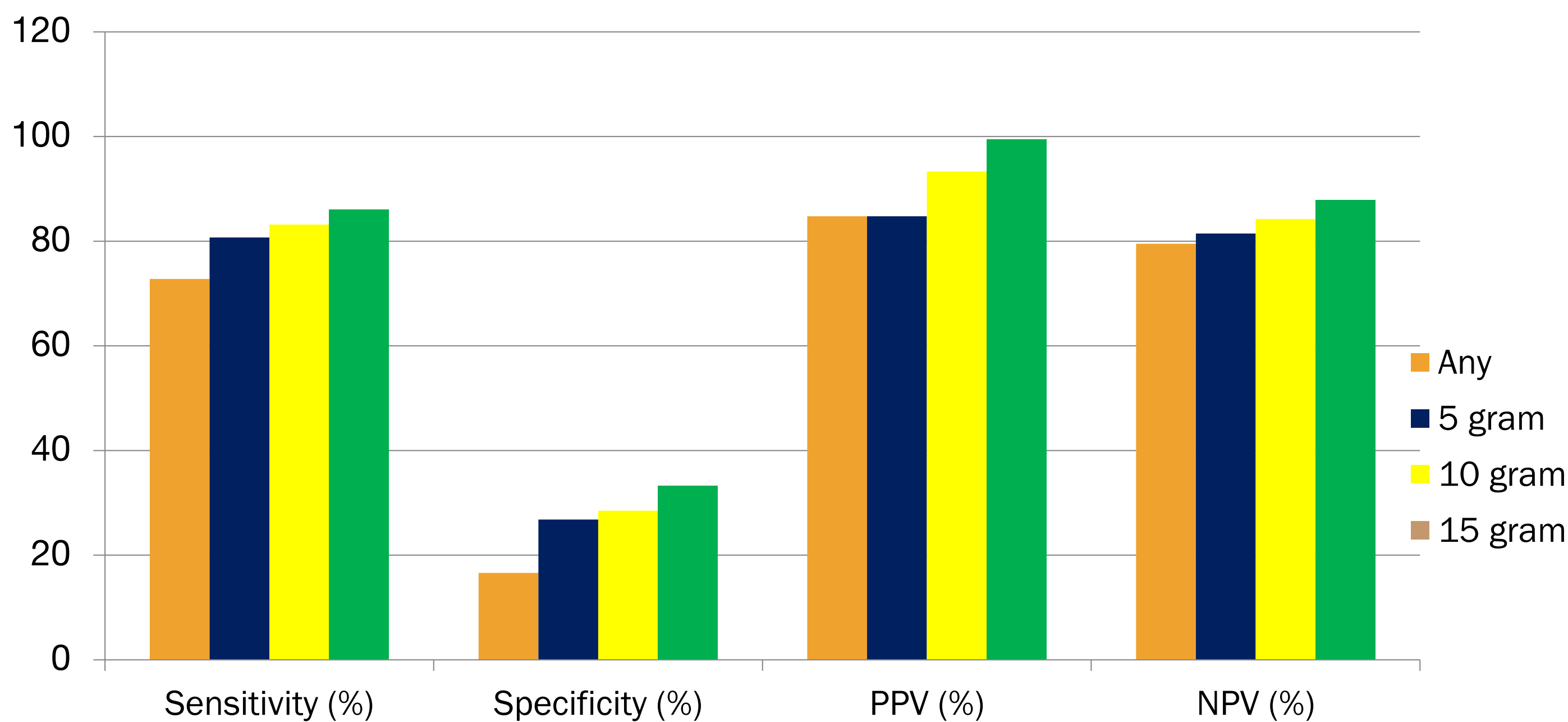


Figure 1: Sensitivity, specificity, and predictive values

Results

Sociodemographic characteristics

- Household Head Education: 68.9% illiterate.
- Child Age: 64.8% aged 2–3 years; 35.2% aged 4–5 years.
- Child Sex: 46.5% Male, 53.5% Female.

Table 1: Dietary diversity score (DDS) at different consumption thresholds (n 415)

Food Group	Any gram	5 gram	10 gram	≥ 15 gram
Grains, roots, tubers	96.4	96.4	96.4	96.1
Legumes and nuts	5.3	5.1	4.8	4.3
Dairy products	10.4	10.1	9.9	9.4
Flesh foods	0	0	0	0
Egg	1	0.7	0.5	0.2
Vit. A-rich F&V	17.1	16.9	16.6	15.7
Other fruits & vegetables	33.5	33.5	17.8	1
Mean DDS (SD)	1.65 (0.76)	1.63 (0.74)	1.50 (0.63)	1.30 (0.50)

Conclusions

Children's diets in the Sidama Region are heavily dominant in starchy staples with near-zero intake of animal-source foods and legumes.

Micronutrient adequacy is severely low ("MAR"=49.3%) with critical gaps in Vitamins D, B12, B9, Calcium, and Zinc.

Dietary diversity shows a moderate positive correlation with nutrient adequacy.

While its high sensitivity and PPV make it a useful preliminary screening tool, low specificity prevents it from fully replacing detailed assessments in monotonous diet contexts.

Acknowledgments

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