Nutritional deficits among schoolchildren in rural Tanzania*

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Background

• Collaboration between University Hospital Essen and Sokoine University of Agriculture (Department of Food Technology, Nutrition and Consumer Sciences), Morogoro, Tanzania

• Embebbed into “PALEP-Study“ focusing on leptin and physical activity among schoolchildren

• Ethical clearance by University Duisburg-Essen & National Institute for Medical Research
• Lack of nutrition data for schoolchildren in low and middle income countries

• Nutritional status in schoolchildren:
  • BMI-for-age z-scores (BAZ) → thinness
  • Height-for-age z-scores → stunting
  • Mid upper arm circumference (MUAC) → moderate or severe acute malnutrition

• Single studies show rates of undernutrition among schoolchildren in Tanzania 11% to 31%
  (Téblick et al., 2017, Comandini et al., 2018, Cordeiro et al., 2012)
Objectives

To assess ...

- Nutritional status
- Dietary diversity
- Meal frequency

... among schoolchildren in rural Tanzania
Methods – Study area
Study population

Inclusion criteria
• Children between 9-12 years of age
• Without chronic or acute disease/infection
• Being able to freely ambulate
• Informed consent form by parents and assent form by children
Data collection (May-September 2019)

Nutritional status
- Body weight
- Body height
- MUAC

Dietary diversity
- 24h dietary recalls
- FAO guidelines for women (10 food groups)
- Individual dietary diversity score (IDDS)
- Minimum dietary diversity (≥ 5 food groups/d)

Meal frequency
- 24h dietary recalls
- Recorded time points
- Main meal occasions and snacks

(FAO & FHI 360 2016)
Results – Study flow

- Pre-screening: N=360
- Screening: N=261
  - Excluded: N=25
  - Included into study: N=236
    - Excluded: N=2
    - Completed study: N=234
      - Excluded: N=3
      - Completed analyses: N=231

Nutrition among schoolchildren in Tanzania
Table 1: Characteristics of schoolchildren in Dodoma Region, n=231

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Overall (n=231)</th>
<th>Girls (n=123)</th>
<th>Boys (n=108)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mother’s education [%]</td>
<td>21 no formal education</td>
<td>56 finished primary school</td>
<td></td>
</tr>
<tr>
<td>Father’s education [%]</td>
<td>11 no formal education</td>
<td>51 finished primary school</td>
<td></td>
</tr>
<tr>
<td>Household size</td>
<td>6.0 (2.0/13.0)</td>
<td>5.0 (2.0/11.0)</td>
<td>6.0 (2.0/13.0)</td>
</tr>
<tr>
<td>Age [years]</td>
<td>11.1 (8.5/12.8)</td>
<td>11.0 (8.8/12.8)</td>
<td>11.1 (8.5/12.6)</td>
</tr>
<tr>
<td>BMI [kg/m²]</td>
<td>14.9 (12.0/18.6)</td>
<td>14.6 (12.0/18.6)*</td>
<td>15.1 (12.8/18.0)*</td>
</tr>
<tr>
<td>BMI-SDS</td>
<td>-1.35 ± 6.82</td>
<td>-1.5 ± 0.8</td>
<td>-1.2 ± 0.8</td>
</tr>
</tbody>
</table>

(Results are presented as median (min/max) or mean ± SD *p=0.003)
Results – Prevalence of thinness – BMI-for-age

Nutritional status of schoolchildren according WHO growth reference 2007

Overall
- Normal: 79%
- Thinness: 18%
- Severe thinness: 3%

Girls
- Normal: 74%
- Thinness: 24%
- Severe thinness: 2%

Boys
- Normal: 85%
- Thinness: 11%
- Severe thinness: 4%

P = 0.044

2/11/2020
Nutrition among schoolchildren in Tanzania
Results – Prevalence of stunting – height-for-age

Nutritional status of schoolchildren according WHO growth reference 2007

Overall, 36% of children were undernourished (38% girls, 33% boys)
## Results – Dietary diversity & meal frequency

### Table 2: Nutrition indicators among schoolchildren in Dodoma Region, n=231

<table>
<thead>
<tr>
<th>Nutrition indicator</th>
<th>Overall (n=231)</th>
<th>Girls (n=123)</th>
<th>Boys (n=108)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dietary diversity score</td>
<td>4.5 (2.0/6.5)</td>
<td>4.5 (2.0/6.5)*</td>
<td>4.0 (2.5/6.0)*</td>
</tr>
<tr>
<td>Main meal frequency</td>
<td>2.5 (1.5/4)</td>
<td>2.8 (1.5/4)</td>
<td>2.5 (1.5/3.5)</td>
</tr>
<tr>
<td>Snack frequency</td>
<td>1.0 (0.0/3.5)</td>
<td>1.0 (0.0/3.5)</td>
<td>1.0 (0.0/3.0)</td>
</tr>
<tr>
<td>Total meal frequency</td>
<td>3.5 (2/6)</td>
<td>3.5 (2.0/6.0)</td>
<td>3.5 (2.0/5.5)</td>
</tr>
</tbody>
</table>

(Results are presented as median (min/max), *p=0.02)
Percentage of schoolchildren achieving various nutrition indicators

- Eating 3 main meals/day
  - Overall: 46%
  - Girls: 50%
  - Boys: 42%

- Having breakfast before school
  - Overall: 14%
  - Girls: 11%
  - Boys: 17%

- Achieving minimum dietary diversity
  - Overall: 26%
  - Girls: 30%
  - Boys: 20%
Associations

- No association between dietary diversity and nutritional status
- Age with BAZ -0.217**
- Sex of child (1=girl, 2=boy) with BAZ 0.161** and IDDS -0.153*
- DDS with main meal 0.283* and total meal frequency 0.409*
- Education of mother with main meal frequency 0.153*

Based on Spearman-Rho; **p=0.01, *p=0.05
Discussion & Outlook

• No association between dietary diversity and nutritional status
  • Low variance
  • Small sample size

• No representative sample

• Rates of undernutrition are comparable to previous studies

• Risk groups for undernutrition

• Next: calculate macro- and micronutrient intakes

• Need to identify drivers for nutrition/food choices of schoolchildren

• Need of a specific dietary diversity score for schoolchildren?
Thank you!

C. Erfle
Prof. Dr. L. Libuda
Prof. Dr. J. Hebebrand
Dr. A. Mwanri
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