Association of double burden malnutrition with physical fitness among small holder farmers in Malawi and Kenya

Authors: Johanna L. Piotrowski1, M. Gracia Glas1 3, Lydiah Maruti Waswa2, Paul Falakeza Fatch3, Gabriella Chiutsi Phiri3, Thomas Hilger4, Sahrah Fischer4, Elizabeth Kamau3, Michael B. Krawinkel6, Ernst-August Nuppenau6, Irmgard Jordan1

1Justus-Liebig University Giessen, Center for International Development and Environmental Research, Germany; 2Egerton University, Dept. of Human Nutrition, Kenya; 3Lilongwe University of Agriculture and Natural Resources, Extension Department, Malawi; 4University of Hohenheim, Hans-Ruthenberg-Institute, Germany; 5Justus-Liebig University Giessen, Inst. of Nutritional Sciences, Germany; 6Justus-Liebig University Giessen, Inst. of Agric. Policy and Market Research, Germany

Background:
• In Malawi and Kenya, rural farmer households are affected by double burden of malnutrition defined as (1):
  • coexistence of undernutrition along with overweight and obesity, or diet-related noncommunicable diseases, within individuals, households and populations, and across the lifecourse;
  • affects households predominantly in low- and middle-income countries, resulting in health consequences (2).

Objective:
To investigate whether double burden of malnutrition affects field work capacity of small holder farmers.

Methods:
• 2017 Cross-sectional agriculture and nutrition survey
  • Teso-South, Kenya (n = 257)
  • Anthropometric measurements from mother-child pairs (Body Mass Index (BMI) and children’s growth Z-scores, according to WHO standard)
  • to assess malnutrition and
  • to identify households (HH) affected by double burden of malnutrition
  • Hand-grip-strengths (HGS) to assess physical fitness (Fig 2)
  • Comparisons of HGS of mothers living in households affected by double burden with HGS of mothers of other households, i.e. no malnutrition and/ or single burden of malnutrition.

Results:

<table>
<thead>
<tr>
<th>Prevalence of Malnutrition</th>
<th>Malawi</th>
<th>Kenya</th>
</tr>
</thead>
<tbody>
<tr>
<td>18% Double burden HH</td>
<td>6%</td>
<td>24%</td>
</tr>
<tr>
<td>23% Overweight HH</td>
<td>23%</td>
<td></td>
</tr>
<tr>
<td>29% Underweight HH</td>
<td>47%</td>
<td></td>
</tr>
<tr>
<td>30% no double burden HH</td>
<td>31%</td>
<td>34.43</td>
</tr>
</tbody>
</table>

Hand grip strength (HGS) of women (kg) per household (HH) group

<table>
<thead>
<tr>
<th>HGS in kg</th>
<th>no double burden HH (control)</th>
<th>Double burden HH (case)</th>
<th>Underweight HH</th>
<th>Overweight HH</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>31.16</td>
<td>27.31</td>
<td>28.94</td>
<td>33.36</td>
</tr>
<tr>
<td>27</td>
<td>33</td>
<td>32.66</td>
<td>31.67</td>
<td>33.11</td>
</tr>
<tr>
<td>29</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

MALAWI
• Body Mass Index BMI and HGS significantly correlated (p < 0.05)
• significant differences (p<0.001) between the HGS in
  • Double burden households and overweight households
  • Underweight households and overweight households

KENYA
• weak non-linear correlation between HGS and BMI (p < 0.05)
• no differences between female handgrips in double burden households and households with no double burden of malnutrition

Individual or household undernourishment can be linked with less handgrip strength ➔ less physical strength

Conclusions:
Double Burden not correlated with handgrip strength, but
• Handgrip strength in underweight households was significantly low (Malawi)
• Underweight individuals ➔ lower physical strength
  • underweight often associated with anemia
  • e.g. iron anemia limits physical capacity

➔ Underweight and double burden households are likely to be affected by lower physical strength which may impact field work capacity.