Displacement of household foods by fortified blended flours versus a lipid-based supplement in complementary feeding of children 6-23 months in Burkina Faso

Presented by: Ilana Cliffer
Tufts University
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Faculty Disclosure

No conflicts to disclose.
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Why this study? (Motivation)

• Supplementary feeding often used to prevent malnutrition

• Displacement of breastfeeding or other foods may impact net diet quality

• Previous studies measured only displacement of total energy (Maleta, 2004; Lin, 2008; Thakwalalaka 2015)

• This study asks which food groups are displaced
Data source

• Food Aid Quality Review study comparing four supplementary foods in Burkina Faso

• Embedded in existing blanket feeding program serving all pregnant and lactating mothers and children 6-23 months in Sanmatenga Province

• Each food assigned to geographically separate regions and distributed at 48 sites; study enrolled a total of n=6,117 children
## Supplementary feeding products

<table>
<thead>
<tr>
<th>Study Food</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSB Plus + Oil* (CSB+)</td>
<td>Corn-soy flour, with micronutrient premix</td>
</tr>
<tr>
<td>Corn Soy Whey Blend + Oil* (CSWB)</td>
<td>Corn-soy flour, with <strong>whey protein</strong> and micronutrient premix</td>
</tr>
<tr>
<td>Super Cereal Plus (SC+)</td>
<td>Corn-soy flour, with <strong>skim milk powder</strong> and micronutrient premix</td>
</tr>
<tr>
<td>Ready-to-Use Supplementary Food (RUSF)</td>
<td>Nut butters, with sugar, dairy protein, micronutrients and other fortificants</td>
</tr>
</tbody>
</table>

Monthly ration ~500 kcal/day (as delivered)
Methods | Dietary Data Collection

• Dietary data collected once per child between 6-24 months
• In-depth interviews about complementary feeding
  • 24-hour recall to list all foods consumed by child
  • Enumerator coded reported foods into grid of 30 categories
  • Study foods coded as a separate category
• In-home observations
  • Direct observations of breastfeeding time over a four-day period
Methods | Infant and Young Child Minimum Diet Diversity

- Grains
- Legumes and nuts
- Dairy
- Flesh foods
- Vitamin A rich foods
- Fruits and vegetables
- Eggs
Methods | Data analyses

• Two types of models:
  • Intention to treat, among entire population as randomized
  • Average treatment effect, among children who actually consumed the ration

• Nine outcomes:
  • Logistic regression models on dichotomous outcomes for consumption of each food group (7 models)
  • Poisson regression for diet diversity score count
  • Linear regression for average breastfeeding time

• Three explanatory variables:
  • Study arm (Reference = RUSF)
  • FBF vs LNS (Reference = LNS)
  • Pooled (Reference = no ration consumed in last 24 hrs)
Results | Sample characteristics

• Overall sample, N=1,654
  • FBF, n = 1,232
  • LNS, n = 420
• Consumed supplement, N = 942 (57% of sample)
  • FBF, n = 654
  • LNS, n = 288
• Child age (months)
  • 7-9, 14%
  • 10-13, 25%
  • 14-17, 25%
  • 18-21, 25%
  • 22+, 14%
• Mean diet diversity score = 2.9
• Mean breastfeeding time = 52.9 min
Results | Caregiver report of household food group consumption by FBF vs LNS

Food consumption (% of sample)

- Eggs
- Dairy
- Legumes and Nuts
- Fruits and Vegetables
- Flesh Foods
- Vitamin A rich foods
- Grains

FBF vs LNS
Results | Odds ratios and 95% confidence intervals for consumption of household food groups by consumption of FBFs compared to LNS
Results | Grain consumption by supplementary food type

<table>
<thead>
<tr>
<th>Grain Consumption</th>
<th>Adjusted(^a) OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average treatment effect by study arm (n=942)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Study arm (Ref = RUSF)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSB+</td>
<td>0.48*</td>
<td>0.28, 0.83</td>
</tr>
<tr>
<td>CSWB</td>
<td>0.36*</td>
<td>0.20, 0.64</td>
</tr>
<tr>
<td>SC+</td>
<td>0.54*</td>
<td>0.30, 0.95</td>
</tr>
</tbody>
</table>

\(^a\)Adjusted models control for:
Child characteristics; sex, age (months), age\(^2\), ethnicity, total illnesses reported over study period, twin
Household factors; food security, wealth, number children < 5
Environmental factors; season
*p<0.05
### Results | Selected regression results

<table>
<thead>
<tr>
<th>Study</th>
<th>Effect</th>
<th>OR (95% CI)</th>
<th>Adjusted models control for:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pooled average treatment effect for GRAINS, (n=1,614)</strong></td>
<td>OR</td>
<td>95% CI</td>
<td>Child characteristics; sex, age (months), age^2, ethnicity, total illnesses reported over study period, twin</td>
</tr>
<tr>
<td>Any ration consumed in last 24 hrs (Ref=No)</td>
<td>0.42*</td>
<td>0.30, 0.60</td>
<td>Household factors; food security, wealth, number children &lt; 5</td>
</tr>
<tr>
<td><strong>Pooled average treatment effect for Vitamin A Rich Foods (n=1,614)</strong></td>
<td>OR</td>
<td>95% CI</td>
<td>Environmental factors; season</td>
</tr>
<tr>
<td>Any ration consumed in last 24 hrs (Ref=No)</td>
<td>0.74*</td>
<td>0.60, 0.92</td>
<td>*p&lt;0.05</td>
</tr>
<tr>
<td><strong>Average Breastfeeding Time in Minutes (n=91)</strong></td>
<td>β</td>
<td>95% CI</td>
<td></td>
</tr>
<tr>
<td>Consumed FBF vs LNS (Ref=LNS)</td>
<td>-6.09</td>
<td>-17.78, 5.60</td>
<td></td>
</tr>
<tr>
<td><strong>Diet diversity score (0-7) (n=942)</strong></td>
<td>IRR</td>
<td>95% CI</td>
<td></td>
</tr>
<tr>
<td>Consumed FBF vs LNS (Ref=LNS)</td>
<td>0.95</td>
<td>0.88, 1.01</td>
<td></td>
</tr>
</tbody>
</table>
Conclusions

1. Consumption of either FBFs or LNS does not appear to displace household complementary foods other than grains and vitamin A rich foods

2. FBFs are more likely to displace grains and to a lesser extent, vitamin A rich foods than LNS products

3. Consumption of either FBFs or LNS products does not seem to impact diet diversity or breastfeeding time

4. Further studies are needed to elucidate consequences of grain and vitamin A food displacement
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