PROMOTING SPIRULINA PRODUCTION
AND
UTILIZATION IN LUAPULA PROVINCE
OF ZAMBIA

NUTRITION SYMPOSIUM
26th - 27th MAY 2016
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Presentation Outline

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7. Effectiveness Test
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1. Acknowledgements

- University of Zambia – School of Agricultural Sciences
- National Food and Nutrition Commission
- Ministries of Agriculture, CDSS, Health- Department of Public Health
- CGPs and Women Groups
- District Nutrition Coordinating Committees
- Chief Kalaba
- CARE – International in Zambia
BRIEF BACKGROUND
2. Brief Background-1/3

- 1\(^{st}\) effectiveness test conducted Kanakantapa - Chongwe
- 9 month study
- Target under 5 malnourished children
- 60 malnourished children participated
- Porridge blend for treatment group was mixed with 10g spirulina per day
2. Brief Background-2/3

- **Results at 3 months:**
  - Increased activity level
  - Increased weight
  - Increased appetite
  - Improved skin colour
  - Reduced malaria burden

- **Results at 9 months:**
  - Improved all indicators: WAZ, HAZ, MUAC
  - However, HAZ was statistically significant
2. Brief Background-3/3

What is Spirulina …

- Green micro algae
- High concentration of nutrients and it has therapeutic properties.
- High in protein and rich in vitamins such as beta carotene, minerals such as iron, and calcium.
- It has been reported effective in fighting malnutrition in infants as well as strengthening the immune system.
- It is popular in many countries including USA and Japan as a dietary supplement to improve health.
3. PSPU – LP-Project

• Promoting Spirulina Production and Utilization (PSPU-LP) project is implemented in Mansa and Samfya districts in one camp per district

• Project is implemented within the framework of Scaling Up Nutrition focusing on children between 6 months – 24 months
4. Project Objective

- **Objective:**
  
  - To increase access and consumption of spirulina to contribute to reduced rate of stunting in children below two years of age.

- **Specific objectives:**
  
  - To promote the use of nutrient rich spirulina in complementary foods of children below the age of two years.
  
  - To strengthen knowledge and skills in spirulina production and marketing to increase access.
5. Project Phase-1/2

- **Adaptation Phase**

  - **Community Workshops on Spirulina**
    - Purpose: To introduce spirulina and assess community interest in consuming the new product

    - CGP & Staff Training: Aiming at increasing understanding of the project, enhancing knowledge and skills in First 1000 MCDP, data collection, infant and young child feeding, and spirulina recipe preparation

- **Effectiveness Test (Phase II)**
  - Purpose: To verify spirulina effectiveness, assess community acceptability
5. Project Phase-2/2

Pilot Production / Sales Phase

Pilot Production
• Purpose: To transfer knowledge and skills in spirulina production in Mansa district
• Purpose: To assess the cost and quality of spirulina grown in Mansa district

Pilot Sales
• Purpose: To establish sales model, make spirulina accessible and affordable, assess business feasibility
PRODUCTION
AFF and PAM have established small scale production model of spirulina in Mанса by technical transfer to local people – Chumfwa women’s group.
6. Production-2/2

- The members of the women’s group have acquired the knowledge of spirulina production now in collaboration with PAM and AFF and they are implementing the production work.
- Currently, we are in the process of analyzing safety of Spirulina.

- Next step is marketing for women’s group to be able to sell the dried spirulina to increase household income and for sustainability of production.
- Increasing production will help parents who participated in Effectiveness test under the SUN project to continue accessing the Spirulina.

Harvesting spirulina

Drying

Dried spirulina
EFFECTIVENESS TEST
PAM and AFF have been conducting the Spirulina Effectiveness Test to validate the following two points.

1. Does Spirulina intake promote child’s growth?
2. Does Spirulina intake prevent child morbidity?

By using the indices below:

1. Child’s Height
   Stunting is an indicator for chronic malnutrition
2. Child’s Weight and Mid-Upper Arm Circumference
3. Malaria infection
4. Measles infection
5. Diarrhea and Fever
Sample Children

- 500 children between the age of 6 months and 24 months in May 2015 were randomly divided into 1) treatment group and 2) control group.
- Live in Mansa (Kalaba) and Samfya (Njipi).

<table>
<thead>
<tr>
<th>Sample Children</th>
<th>Mealie Meal</th>
<th>Sugar</th>
<th>Salt</th>
<th>Soya</th>
<th>Spirulina</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Group</td>
<td>3.75kg</td>
<td>0.8kg</td>
<td>0.1kg</td>
<td>Soya 1.25kg</td>
<td>-</td>
</tr>
<tr>
<td>Treatment Group</td>
<td>3.75kg</td>
<td>0.8kg</td>
<td>0.1kg</td>
<td>Soya 1.25kg</td>
<td>Spirulina 0.3kg</td>
</tr>
</tbody>
</table>

- The amount is for 1 month.
- Soya: mixed at 25%
- Spirulina: 10g/day intake
Data Collection

- **Growth**: Height, Weight, and MUAC of children were measured at baseline (at 0 month), midline (at 6 months), and endline (at 12 months)
- **Morbidity**: Morbidity record of children and mothers were taken every month
- **Dietary Diversity**: Dietary intake of the children was taken every three months
- **Socio-Economic Survey**: Socio-economic data of the household, mothers, and children were taken at baseline (at 0 month), midline (at 6 months), and endline (at 12 months)
Control Group

Treatment Group

Growth even taller

May have better immune system

Growth taller

May suffer from diseases

After 12 Months….
7. Effectiveness Test – 5/7 (Result of Baseline)
## 7. Effectiveness Test – 6/7 (Midline Result – Growth)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>T/C</th>
<th>April</th>
<th>October</th>
<th>Change</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HAZ</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>T</td>
<td>-1.59</td>
<td>-1.58</td>
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<td>0.45</td>
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<tr>
<td></td>
<td>C</td>
<td>-1.76</td>
<td>-1.61</td>
<td>0.15</td>
<td>0.09</td>
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<tr>
<td><strong>WAZ</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>T</td>
<td>-1</td>
<td>-1.01</td>
<td>-0.01</td>
<td>0.56</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>-1.13</td>
<td>-0.97</td>
<td>0.16</td>
<td>0.067</td>
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<tr>
<td><strong>Stunting (Z&lt;-2s.d.)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>T</td>
<td>0.39</td>
<td>0.37</td>
<td>-0.02</td>
<td>0.29</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>0.41</td>
<td>0.39</td>
<td>-0.02</td>
<td>0.4</td>
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<tr>
<td><strong>Under-weight (Z&lt;-2s.d.)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>T</td>
<td>0.19</td>
<td>0.17</td>
<td>-0.02</td>
<td>0.31</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>0.23</td>
<td>0.14</td>
<td>-0.09</td>
<td>0.007</td>
</tr>
</tbody>
</table>

Table shows change in the mean outcomes between Baseline and Midline
Morbidity (Probability of suffering from "X" last 4weeks)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>T/C</th>
<th>April</th>
<th>October</th>
<th>Change</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malaria</td>
<td>T</td>
<td>0.25</td>
<td>0.17</td>
<td>-0.08</td>
<td>0.015</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>0.27</td>
<td>0.13</td>
<td>-0.14</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Pneumonia</td>
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<td>0.15</td>
<td>-0.18</td>
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<tr>
<td></td>
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<td>0.12</td>
<td>-0.21</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Measles</td>
<td>T</td>
<td>0.17</td>
<td>0.1</td>
<td>-0.07</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>0.15</td>
<td>0.05</td>
<td>-0.1</td>
<td>&lt;0.0001</td>
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<tr>
<td>Diarrhoea</td>
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<td>0.42</td>
<td>0.42</td>
<td>0.0</td>
<td>0.46</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>0.42</td>
<td>0.36</td>
<td>-0.06</td>
<td>0.08</td>
</tr>
<tr>
<td>Fever</td>
<td>T</td>
<td>0.74</td>
<td>0.5</td>
<td>-0.24</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>0.75</td>
<td>0.42</td>
<td>-0.33</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Cough</td>
<td>T</td>
<td>0.77</td>
<td>0.49</td>
<td>-0.28</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>0.72</td>
<td>0.41</td>
<td>-0.31</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Dietary Diversity Score</td>
<td>T</td>
<td>3.85</td>
<td>4.83</td>
<td>0.98</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>3.83</td>
<td>4.82</td>
<td>0.99</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

Table shows change in the mean outcomes between Baseline and Midline
CHALLENGES AND OPPORTUNITIES
9. Challenges

• Fear of Satanism
• Withdrawal: frustration only one member of household benefitting
• Compliance: sharing and using blend to treat malaria and diarrhea
• High demand: it led to theft at production site
• Food insecurity: Nov /Dec increased possibility of intra-household sharing of blends
10. Opportunities

- High acceptance among beneficiaries
- High support from political, government and traditional leadership
- Suitable production conditions
- High possibility for scaling up
- It is product of interest to MoH
11. Conclusion

• The positive impact to date albeit qualitative, the results correlate with studies which show that spirulina consumption at 10g per day can reduce malnutrition within 8 weeks (Simpore et al, 2005).

• Mothers have been testifying of the improvement in their children’s health: increased weight, appetite, activity level and reduced morbidity.

• Reduced burden of malaria has clearly attracted many households to spirulina which is used to treat malaria.

• Once spirulina production increases, Chumfwa women will begin to earn income which will contribute to improved family welfare.

• Spirulina’s contribution to reducing stunting is indicated in the 1\textsuperscript{st} effectiveness test conducted in Kanakantapa, Chongwe District and it is expected that the findings will be the same or better after the one year study.
12. Way forward

- Project implementation has thus far been very successful.
- Improvement in the health and nutritional status of children has been very evident.
- Spirulina complements other strategies for combating malnutrition such as nutrition education, dietary advice, and enriched flours – HEPS.
- Chumfwa members have acquired the skills of spirulina production and are actively involved in production activities.
- Way forward - scale up production and provision of spirulina while research direction will be determined after presentation of end line results.

Stirring spirulina in one of the small ponds

Assessing rate of growth under a microscope
Thank You for Your Attention