From Benchside to Community Research: Development of Affordable and Accessible Probiotic Foods in East Africa

Toby Le
Kathy Yu
Megha Shetty
Iman Ahmed
Yaoshen Fang

See next page for additional authors

Follow this and additional works at: https://ir.lib.uwo.ca/wheussoc
Authors
Toby Le, Kathy Yu, Megha Shetty, Iman Ahmed, Yaoshen Fang, Naressa Karmali, Wenjing Liu, Arnold N. Onyango, Maimuna Kanyamala, Judith Okoth, and Sharareh Hekmat
Background

- Probiotics are live microorganisms that, when ingested in adequate amounts, confer health benefits.
- In 2004, Western Heads East brought Fiti to East Africa and trained women how to produce Fiti probiotic yogurt.
- Fiti is composed of a probiotic culture, Lactobacillus rhamnosus GR-1, and a starter strain, Streptococcus thermophillus C106.

Methods

- Sample Preparation
  - Fruits, millet porridge, and milk were purchased from local markets in Kenya and Tanzania.
  - Food samples were prepared according to published methods and fermented with Fiti sachets to produce probiotic mango juice, pineapple juice, orange juice, millet porridge, and yogurt.

- Sample Execution
  - Participants rated each probiotic sample based on smell, colour, texture, appearance, taste, and overall acceptability using a 9-point hedonic scale.
  - Next, participants were asked to respond to qualitative questions related to their knowledge on probiotics and sample preferences.
  - Study assessments were facilitated by community members.

Enrollment

- Adult aged >18 years
- Study sites:
  - St. Augustine University of Tanzania
  - Jomo Kenyatta University of Agriculture and Technology
  - Tanzania University

Research Questions

1. How do individuals in Tanzania and Kenya rate different non-dairy probiotic foods?
2. How do these ratings compare to probiotic yoghurt?
3. How do these ratings correlate with the willingness of individuals to consume non-dairy probiotic products?

Table 1. Characteristics, purchasing preferences and existing knowledge of probiotics of participants stratified by setting.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Everyone (n = 280)</th>
<th>Tanzanian community (n = 157)</th>
<th>Tanzanian university (n = 64)</th>
<th>Kenyan community (n = 124)</th>
<th>Kenyan university (n = 56)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>98 (35.0)</td>
<td>60 (38.1)</td>
<td>25 (39.0)</td>
<td>33 (26.8)</td>
<td>20 (35.7)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Female</td>
<td>181 (65.0)</td>
<td>97 (61.9)</td>
<td>39 (61.0)</td>
<td>91 (73.2)</td>
<td>36 (64.3)</td>
<td></td>
</tr>
<tr>
<td>Would purchase Fiti orange juice</td>
<td>Yes</td>
<td>28 (9.3)</td>
<td>15 (9.6)</td>
<td>13 (20.3)</td>
<td>8 (6.5)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>No</td>
<td>254 (90.7)</td>
<td>131 (90.4)</td>
<td>24 (79.7)</td>
<td>106 (93.5)</td>
<td>148 (93.5)</td>
<td></td>
</tr>
<tr>
<td>Would purchase Fiti pineapple juice</td>
<td>Yes</td>
<td>21 (7.5)</td>
<td>14 (9.0)</td>
<td>7 (11.2)</td>
<td>7 (5.7)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>No</td>
<td>259 (92.5)</td>
<td>146 (91.0)</td>
<td>27 (88.8)</td>
<td>117 (94.3)</td>
<td>191 (94.3)</td>
<td></td>
</tr>
<tr>
<td>Would purchase Fiti millet porridge</td>
<td>Yes</td>
<td>23 (8.2)</td>
<td>18 (11.5)</td>
<td>5 (8.1)</td>
<td>18 (14.5)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>No</td>
<td>257 (91.8)</td>
<td>139 (88.5)</td>
<td>59 (91.9)</td>
<td>106 (85.5)</td>
<td>138 (85.5)</td>
<td></td>
</tr>
<tr>
<td>Would purchase Fiti mango juice</td>
<td>Yes</td>
<td>134 (47.8)</td>
<td>85 (54.3)</td>
<td>49 (76.5)</td>
<td>45 (36.3)</td>
<td>0.28</td>
</tr>
<tr>
<td>No</td>
<td>146 (52.2)</td>
<td>81 (45.7)</td>
<td>35 (23.5)</td>
<td>79 (63.7)</td>
<td>91 (63.7)</td>
<td></td>
</tr>
<tr>
<td>Knowledge of probiotics</td>
<td>Yes</td>
<td>169 (59.6)</td>
<td>107 (69.0)</td>
<td>62 (95.3)</td>
<td>62 (50.0)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>No</td>
<td>101 (40.4)</td>
<td>44 (31.0)</td>
<td>3 (4.7)</td>
<td>62 (50.0)</td>
<td>44 (50.0)</td>
<td></td>
</tr>
<tr>
<td>Awareness of Fiti health benefits</td>
<td>Yes</td>
<td>149 (53.9)</td>
<td>97 (62.3)</td>
<td>52 (81.2)</td>
<td>52 (41.9)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>No</td>
<td>122 (46.1)</td>
<td>61 (37.7)</td>
<td>15 (18.8)</td>
<td>72 (58.1)</td>
<td>71 (58.1)</td>
<td></td>
</tr>
</tbody>
</table>

Figure 1. Hedonic scale ratings for taste of probiotic orange juice, pineapple juice, millet porridge, yogurt, and mango juice across all settings. Pairwise comparisons are indicated by brackets and asterisks with *** indicating p < 0.01, ** indicating p < 0.05, * indicating p < 0.1.

Discussion

1. Probiotic mango and pineapple juice were very well received within each setting (consistently rated the best on each measure of food quality).
2. Probiotic orange juice and millet porridge are consistently rated the poorest across all settings.
3. Kenyan community is an area of growth for probiotic products (more efforts can be used to educate the community about probiotics and their benefits, as well as introduction of products).
4. Local community members tend to have less knowledge about probiotics and its health benefits compared to university students.
  - This may be due to the exposure of university students to health knowledge and students tend to come from backgrounds with more opportunities.
5. Since Tanzania is the birthplace of Fiti probiotics, it is expected that there is generally a preference for probiotic products and that there is more awareness of the health benefits of probiotics.
6. Recommendations:
   - Use mango and pineapple juice as a viable product within these contexts
   - More educational efforts in communities about the health benefits of probiotic products.

Significance

1. This was the first study to measure and understand the acceptability of non-dairy probiotic products in both Kenya and Tanzania.
2. Results from this study will help Fiti social enterprises expand their probiotic menus and provide more probiotic options.
3. As a result, this is not a replacement of the nutritious probiotic yogurt, but rather a probiotic alternative that is accessible and affordable to vulnerable populations.
4. The differences between community settings and university settings in Tanzania and Kenya (e.g. students having greater knowledge about probiotic products compared to community members) can be used to tailor health promotion efforts.

Acknowledgement

- Participants: Toby Le, Kathry Yu, Megha Shetty, Iman Ahmed, Yaoshen Fang, Nareesa Kamali, Wenjing Liu, Arnold N. Onyango, Maimuna Kanyamala, Judith Okoth, Sharareh Hekmat
- Western Heads East: Mikono Yetu
- Brescia University: Jomo Kenyatta University of Agriculture and Technology, Juja, Kenya, Mikono Yetu, Mwanza, Tanzania
- Western: Choose to Eat
- Schuchl: Dimaan: Jomo Kenyatta University of Agriculture and Technology, Juja, Kenya

References