Frontiers in Pulses Fortification:Knowns and Unknowns

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Critical Case for Food Fortification

• Food insecurity has been rising since 2014
• >1.5b people can’t afford diet that meets required levels of essential nutrients
• Alarming levels of hunger in 11 countries and serious levels in another 40
• COVID-19 expected to worsen the trend
• Nutrition must be ensured for all, including the most vulnerable
• Food fortification presents an opportunity

Sources: The State of Food Security and Nutrition in the World (SOFI) 2020; Global Hunger Index 2020
Food Fortification: Unfinished Agenda

• Endorsed as a sustainable and cost-effective intervention
• Potential to reach populations at large with essential micronutrients
• With proven public health, human capital and economic impacts
• Fortification regulations/guidance in majority of the countries globally
• Still far from meeting its potential for impact at a global scale
• Need for innovations to maximize the impact
• Exploring the potential for pulses fortification
Potential of Pulses as a Vehicle for Fortification

**Strengths:**
- Powerhouse of nutrients:
  - Important sources of protein and energy - plant-based foods
  - High in dietary fiber
  - Low Glycemic Index - helpful in addressing overweight/obesity, NCDs
- Global availability increasing since 2000, largest increases in LMICs
- Low-cost (comparatively), important part of healthy diet
- Benefits from longer shelf life
- Often grown by local farmers - help to keep food systems secure and empower women in the process – and mainly milled commercially
- Climate-smart source of protein / an ally against climate change

**Challenges:**
- Pulses are rich in anti nutrients
- Methods of preparation, processing and heat applications increase the glycemic index of pulses
What makes Pulses different from Cereal Grains?

- Pulses are especially rich in select essential amino acids, often low in cereal grains
- Pulse provide two to three times more dietary fiber (per 100g edible portion) than whole grain cereal products
- Pulses are slowly digested - lower on glycemic index (GI) scale
- Average (global) per capita consumption of pulses* is low

* FAO Food Balance Sheet 2019
Understanding Pulses Fortification Program Design

Important to design program framework while:

- Answering critical questions (5Ws and 1H)
  
  - Why
  - When
  - What
  - Where
  - How

- Assessing the components along the program impact pathway

## Pulses Fortification Scope: 5Ws and 1H Questions

<table>
<thead>
<tr>
<th><strong>Why</strong></th>
<th>Why (need) micronutrient intervention in general and food fortification in specific?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>What</strong></td>
<td>What could be the potential of pulses fortification?</td>
</tr>
<tr>
<td><strong>Who</strong></td>
<td>Who do we intend to reach with fortified pulses?</td>
</tr>
<tr>
<td><strong>When</strong></td>
<td>When do we consider ourselves ready?</td>
</tr>
<tr>
<td><strong>Where</strong></td>
<td>Where does the intervention make sense?</td>
</tr>
<tr>
<td><strong>How</strong></td>
<td>How best to reach the intended groups?</td>
</tr>
</tbody>
</table>
# Exploring Pulses Fortification Program Design

**Not exhaustive**

## Micronutrient deficiencies in countries

## Enabling environment

## Availability and supply chain (domestic production; imports, exports; global trade)

## Industrial milling infrastructure/capacity/processes – global/country specific

## Potential delivery platforms

## Consumption of (diff) pulses

## Washing/cooking/purchasing behaviors

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### Potential to benefit
- Presence of micronutrient deficiencies

### Fortification policy created and legislation passed

### Bioavailable fortificant is mandated for food(s) that are consumed by the nutritionally needy

### Foods are fortified at mandated levels and compliance is monitored and enforced

### Fortified foods are consumed in adequate amounts (meaningful contribution to requirements)

### Public health impact (reduction in micronutrient deficiencies)

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**Comprehensive public health, human capital, economic estimates**
Pulses Fortification Global Scoping

Factors
- Prevalence of micronutrient deficiencies
- Availability and supply chain (domestic production; imports, exports; global trade)
- Industrial milling infrastructure/capacity/processes – global/country specific
- Enabling environment for fortification
- Potential delivery platforms
- Consumption of (diff) pulses
- Consumer behaviors, perceptions

Critical Decision Points
- Shortlisted Country-Pulse combination
- Optimal Operational (business) Models
- Platforms
- Optimal Technology
- Relevant Studies/Trials
- Partnerships

Global – (more) Quantitative Assessment

Country Specific - (more) Qualitative Assessment
Thanks a lot!