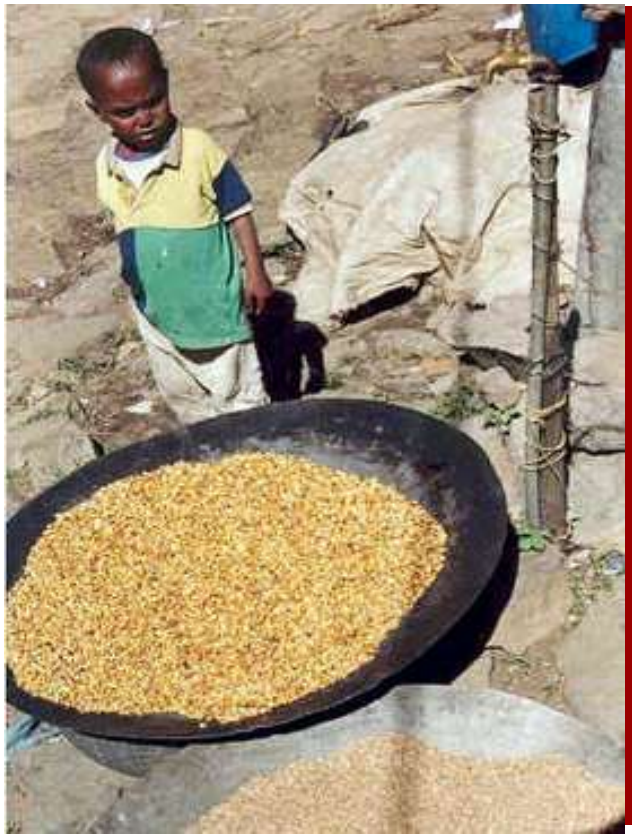


Fortified Blended Foods

Keely Johnston, Bee Ramos, Erika Weissenborn

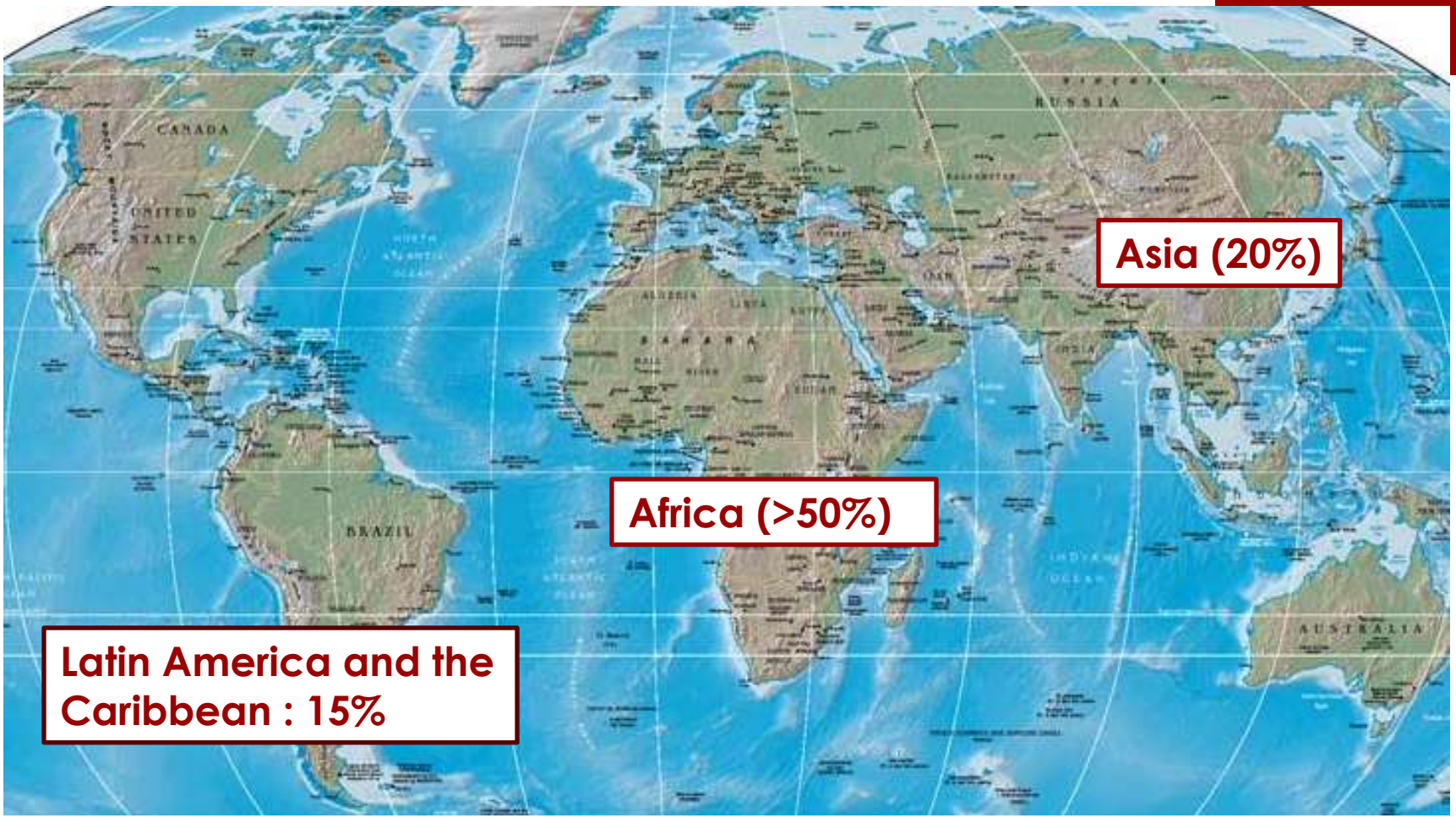
Agenda

- Introduction
- FBF Background
- Cultural Significance
- GAME
- Political, Social & Economic Issues
- Conclusion
- Questions

World Food Program - FBF

- **FBFs contain adequate calories (400kcal/100g) and protein (15g/100g)**
- **Fortified with essential micronutrients**
  - Usually missing from the diet
- **Pre-cooked and distributed as flour**
  - Easy to prepare, low fuel requirements
- **Easy to digest for young children**
- **Relatively inexpensive**
  - More sustainable
- **Versatile food – can be prepared in a number of ways**

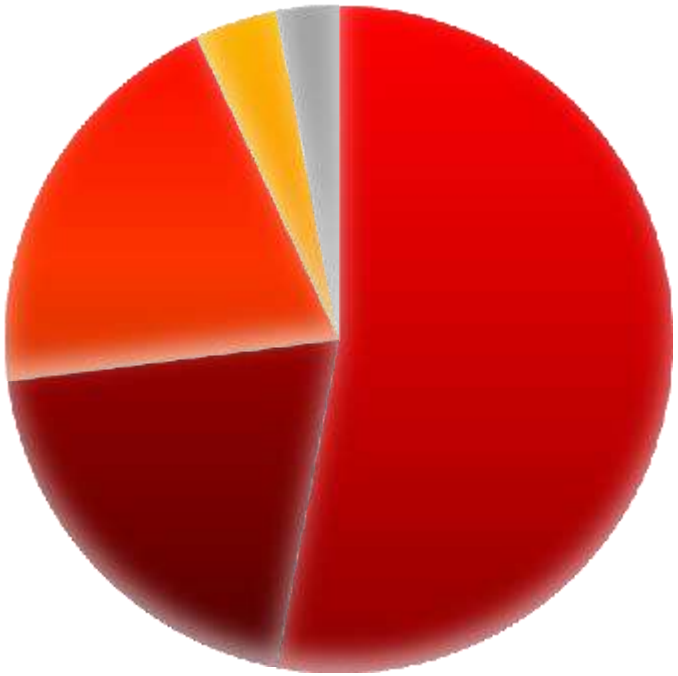
FBF Worldwide Distribution



(Rowe et al., 2008)

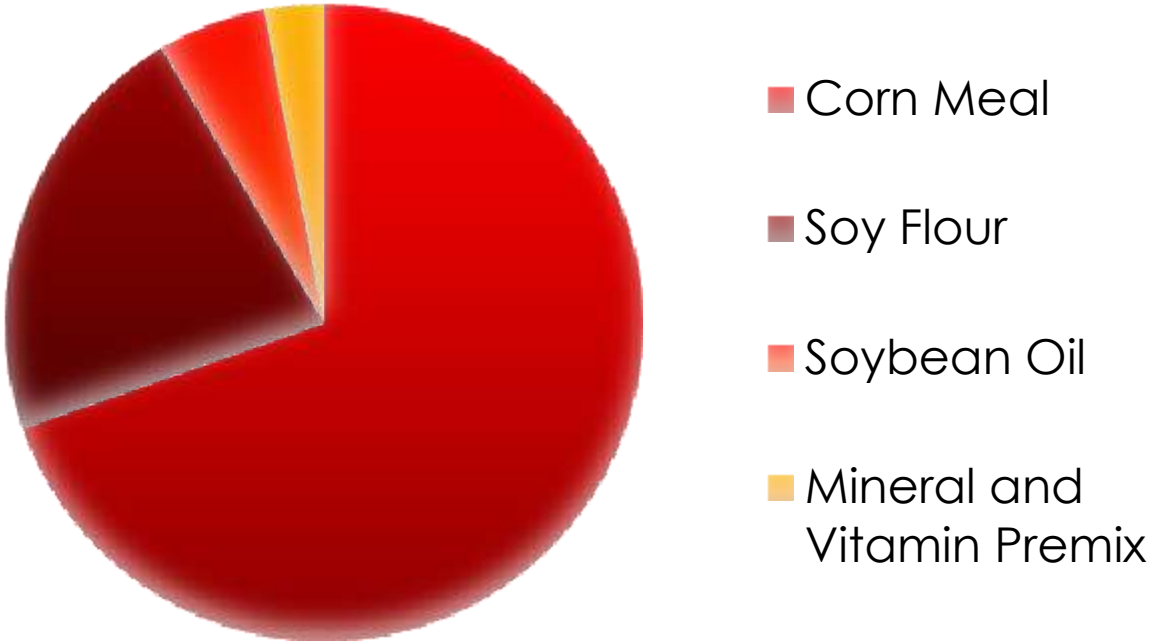
FBF Background

Wheat Soy Blend (WSB)

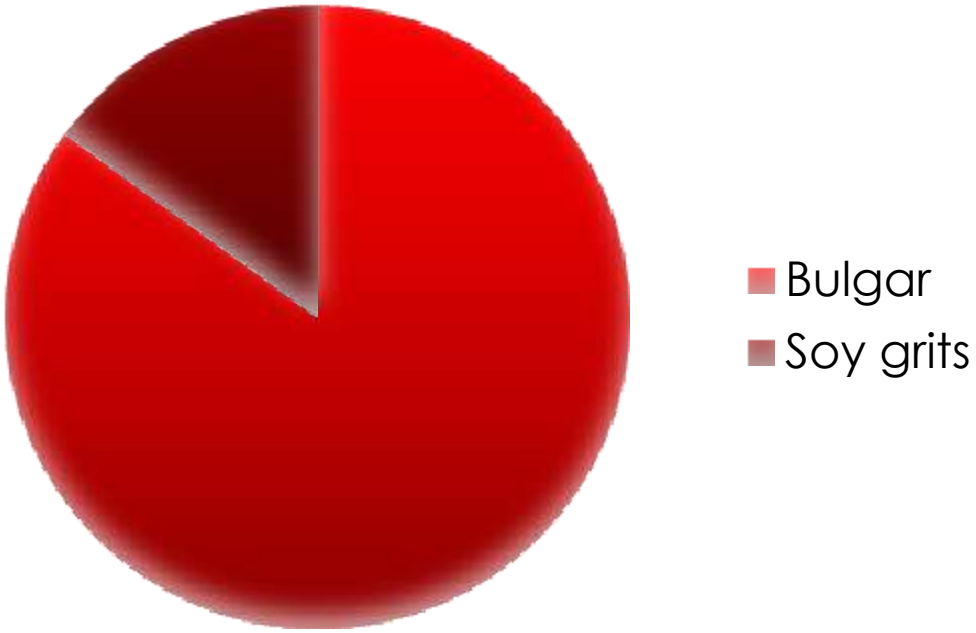


- Bulgar Flour
- Wheat Protein Concentrate
- Soy Flour
- Soybean oil
- Vitamin and Mineral Premix

Corn Soy Blend (CSB)



Soy Fortified Bulgur



Vitamin/Mineral Premix

Vitamin/Mineral	Target	Chemical Form
Vitamin A	1664 IU	Dry vitamin A palmitate
Thiamine	0.128 mg	Thiamine mononitrate
Riboflavin	0.448 mg	Riboflavin
Niacin	4.8 mg	Nicotinamide
Pantothenic acid	6.7 mg	Calcium d-pantothenate
Vitamin B6	1.7 mg	Pyridoxine hydochloride
Folate	60 mcg	Folic acid
Vitamin B12	2 mcg	Vitamin B12
Vitamin C	100 mg	Ascorbic acid
Vitamin D	4 mcg	Dry vitamin D3 100 CWS
Vitamin E	8.3 mg	Vitamin E 50% CWS
Vitamin K	100 mcg	Vitamin K1 5% CWS
Iron (a)	4 mg	Ferrous fumarate
Iron (b)	2.5 mg	Iron-sodium EDTA
Zinc	5 mg	Zinc oxide
Iodine	40 mcg	Potassium iodate
Potassium	400 mg	Potassium chloride
Phosphorus	200 mg	Monocalcium phosphate
Calcium	130 mg	

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FBF Standards

- Federal Food, Drug, and Cosmetic Act (USAID)
- Codex Alimentarius (WFP)

FBF Safety

HACCP

- Hazard Analysis and Critical Control Points

GMP

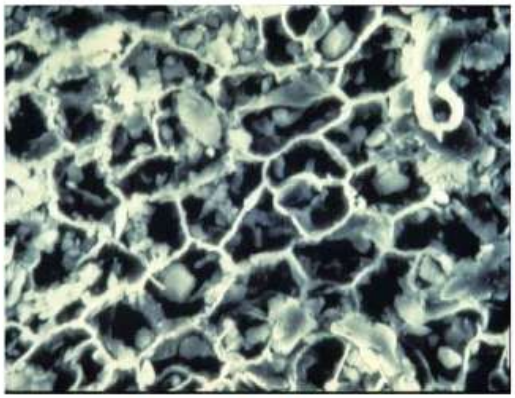
- Good Manufacturing Practices

Processing

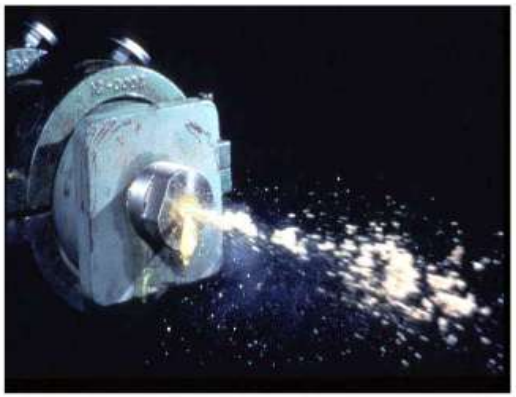
- Methods of processing:
  - Extrusion (wet or dry)
  - Roasting

Effects of Processing on FBF

- Improved digestibility of starches and proteins
- Inactivates anti-nutritional factors
- Maillard Browning



Raw Soybean

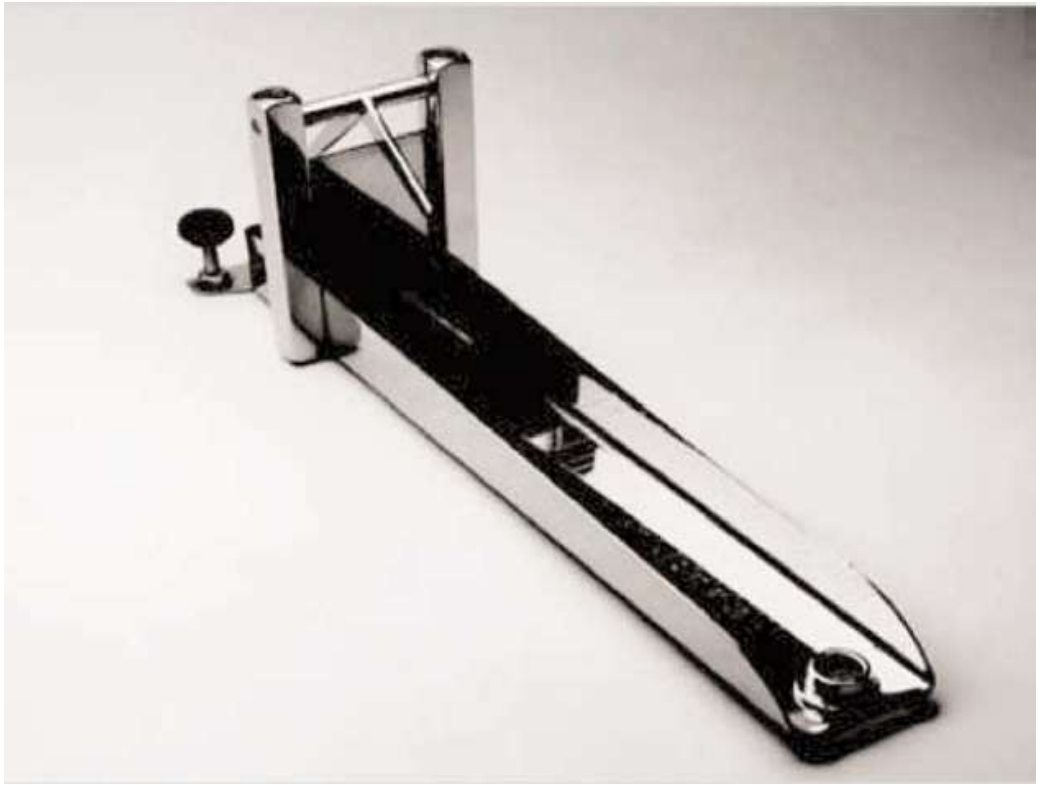


Extrusion

Extruded Soy

Final Product Specifications

- Urease Test
- Nutrient values
- Flour size
- Microbiology
- Aflatoxins
- Peroxide value
- Dispersiveness
- Bostwick test



Packaging and Storage

- 25 kg bags
  - Polypropylene
    - Rip-proof
    - Moisture barrier
    - Sealing
- Shelf life
  - Minimum **one year** when stored at ambient temperatures prevalent in country of destination

Culturally Appropriate FBF

To ensure FBF meet the cultural and nutritional needs of a community an organization must:

- Identify traditional recipes and ingredients
  - Fortified blended food recipes (WFP)*
- Understand food preparation customs
  - Are they consumed immediately after prepared?
  - Cooking time and temperature
    - Do traditional cooking methods reduce micronutrient content of food?
  - Typical times for meals and number of meals per day

(Rowe, *et al.*, 2008)

Culturally Appropriate FBF

- Define how the product will reach target populations
  - Wet feeding sites?
  - Local programs, distribution centers, door-to- door delivery
  - Average household size?
    - Ration size- per household or per person

- Evaluate resources available in a community
  - Is fuel for cooking available?
  - Where does food preparation take place?
  - Cooking equipment: cast iron or clay pots?
  - Water – is clean water available or boiled before use?
    - Objective measurements to determine water quality
      - pH, microbial counts, turbidity

(Rowe, *et al.*, 2008)

Case Study: Guatemala

- Foods Consumed in Guatemala that can be prepared with FBF

Cookies
Galletas

Vegetable Stew
Guiso

Food Drink
Atole

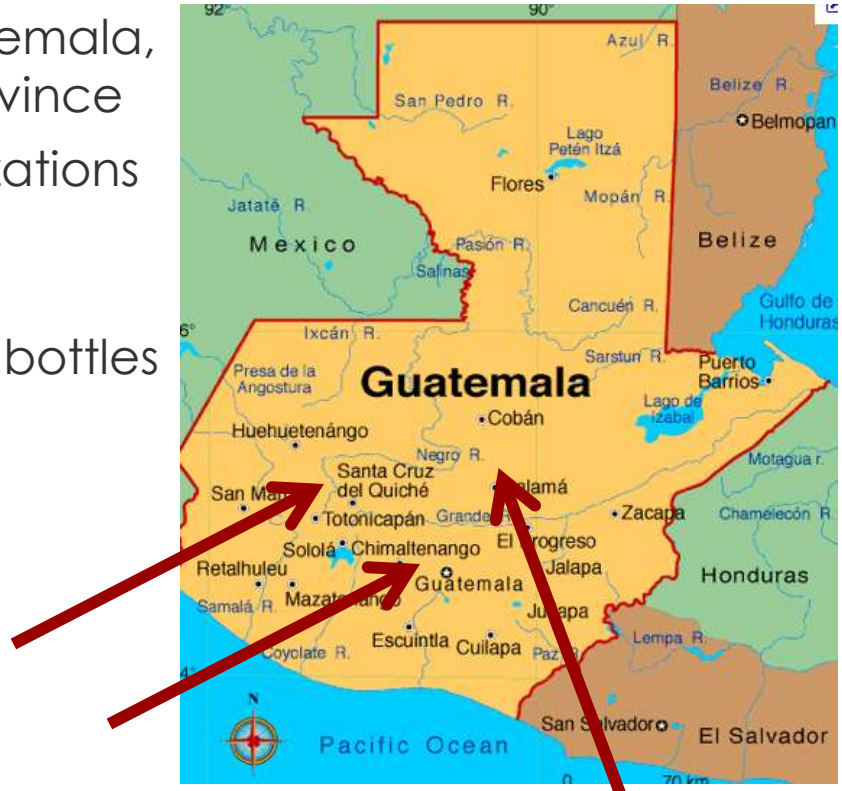
Tortillas

- FBF distributed in Guatemala: Soy fortified bulgur not corn soy blend (CSB)
- FBF - mixed with oil (fortified), sugar, water, vegetables

(Rowe, *et al.*, 2008)

Case Study: Guatemala cont'd

- Product distributed to
  - Households participating in **maternal and child health programs** in Central Guatemala, province of Baja Verapaz, Quiche province
  - Guatemalan private voluntary organizations distributed vegetable oil fortified with Vitamin A
    - Recipients transferred oil into plastic bottles at distribution sites



(Rowe, *et al.*, 2008)

Case Study: Guatemala cont'd

- Food preparation
  - 98% of Guatemalan beneficiaries followed WFP recipes
  - Often included herbs, bananas and cinnamon in meals
  - Location: covered areas away from sunlight
  - Tortillas and cookies: baked for 15-20 minutes
  - Vegetable stew and thin porridge: boiled

Case Study: Malawi

Thin Porridge
Phala

Food Cake
Chikondamoyo

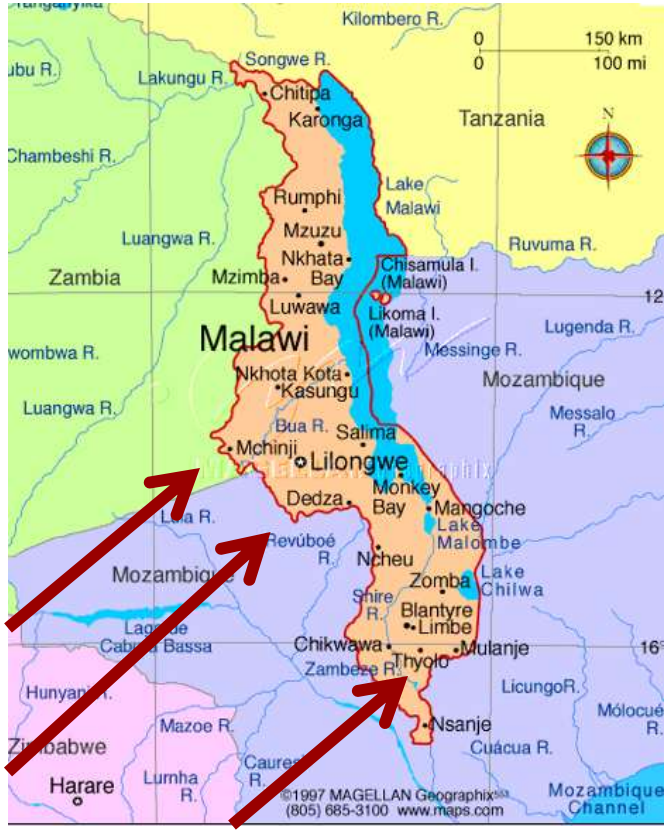
Banana Leaf Rolls
Mkate

Thick Porridge
Nisma

(Rowe, *et al.*, 2008)

Case Study: Malawi cont'd

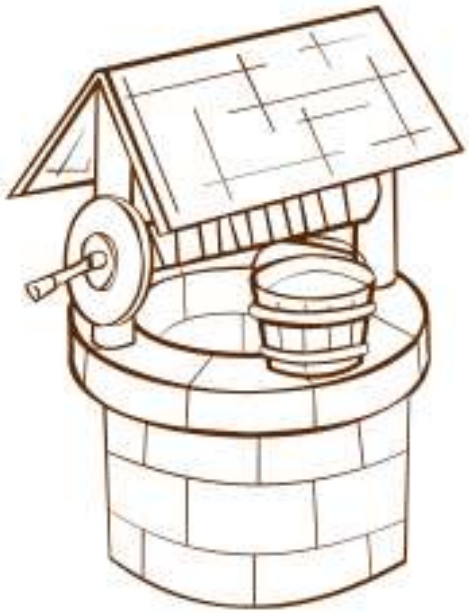
- Product distributed to
  - Households participating in **food for work, chronically ill and orphan household programs in** Dedza District, Mchinji District and Thyolo District
- At least 75% of daily diet in Malawi derived from food aid
- Vegetable oil fortified with vitamin A used as an ingredient to prepare FBF



(Rowe, *et al.*, 2008)

Resources

- Wood fueled fire
- Aluminum or clay pots
- Water
  - Boreholes or open wells
    - pH range: 4.7 to 7.7
  - Water boiled



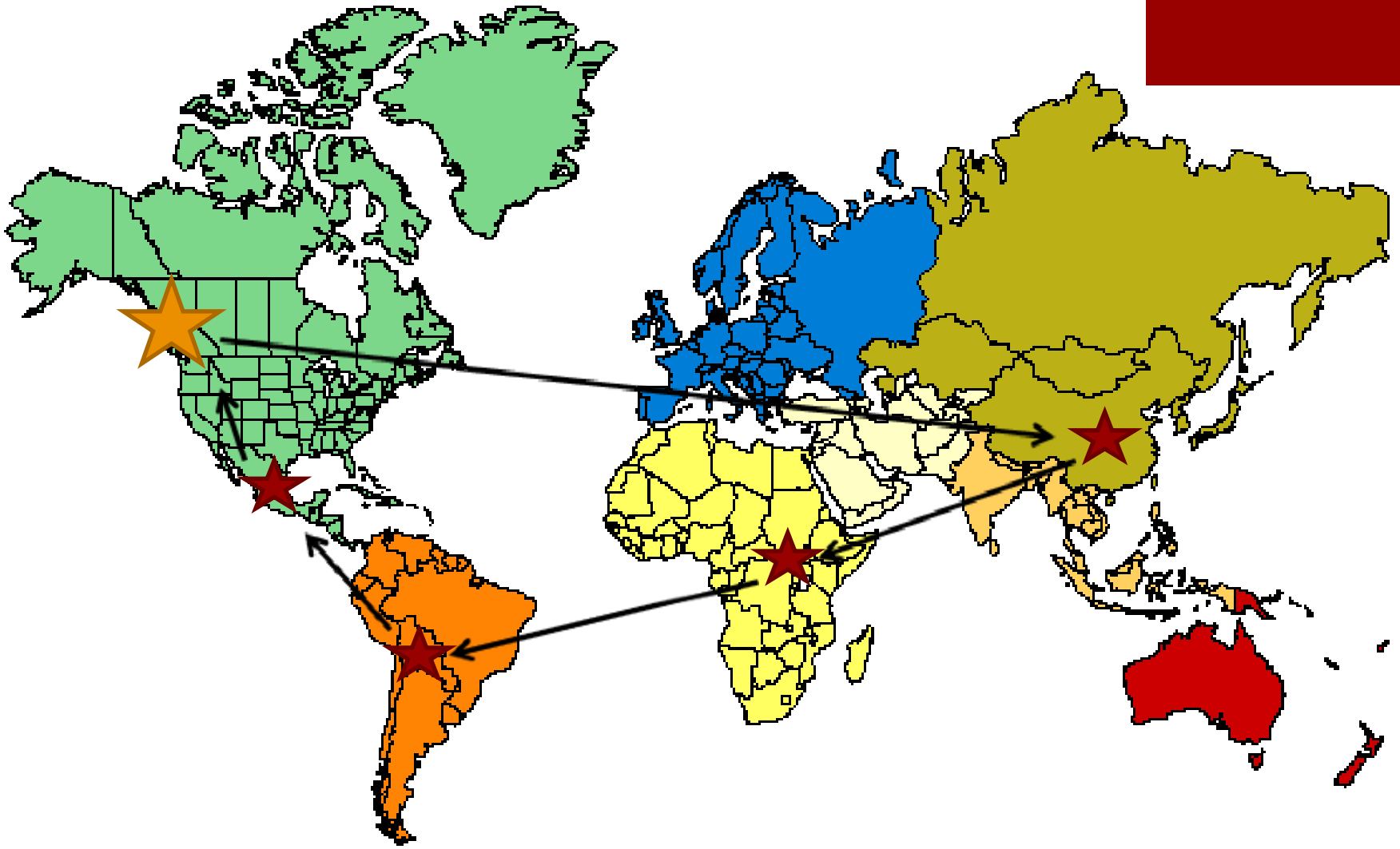
Country	No. of households	% of households				
		Borehole	Municipal	River	Spring	Well
Uganda	21	42.9	14.3	4.8	4.8	33.3
Malawi	41	34.1	0.0	0.0	0.0	65.9
Guatemala	35	0.0	0.0	0.0	0.0	100.0
Total	97	23.5	3.1	1.0	1.0	71.4

(Rowe, et al., 2008)

Haiti

- **Haiti: Quake Kids Get Nutritious Breakfast**
- http://www.wfp.org/countries/Haiti/Media/Haiti--Starting-Over-From-School

GAME: HELP DELIVER FBFs AROUND THE WORLD!



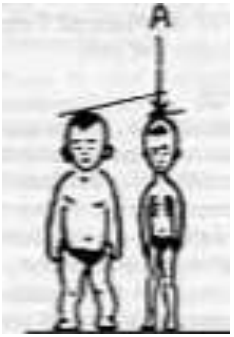
Political, Social & Economic Issues

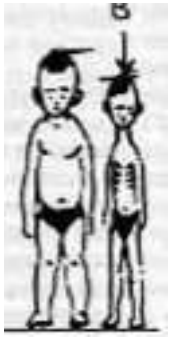
Target Population

- Children suffering moderate malnutrition
  - Due to constraints including poverty, political instability and food insecurity.
- Vulnerable Groups
  - Pregnant and lactating women
  - Chronically ill-HIV/AIDS and TB
- People affected by disaster-related emergencies
  - Refugees, natural disaster
- Populations requiring food assistance
  - Drought, lean/bad harvest periods
- Populations who consume monotonous diets
  - Root vegetables

(De Pee & Bloem, 2009)

Malnutrition





Stunted Growth

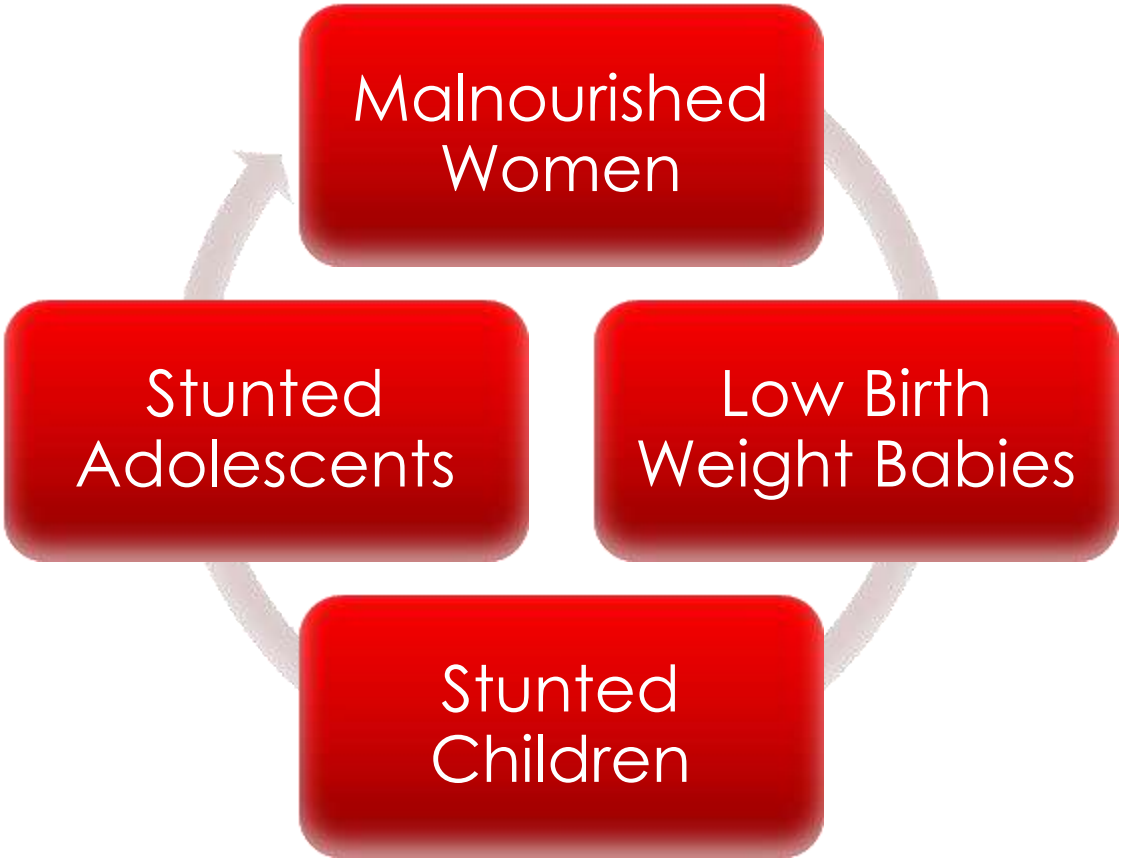
- Low Height for Age
- Signs of Chronic Malnutrition
- Irreversible
- Linked to premature death

Wasting

- Low Weight for Height
- Acute Malnutrition
- Starvation/Disease
- Can be reversed

The Intergenerational Cycle of Malnutrition

World Food Program



Question:

How does the intergenerational cycle of Malnutrition affect a Country's economy?

Breaking the cycle of malnutrition

One of WFP's main goals with Fortified Blended Foods is to try to diminish the devastating cycle of intergeneration malnutrition

Distributors

- Main Distributor: World Food Program
- Secondary Distributors: Various NGOs
- World Food Program receives the bulk of the Fortified Blended Food products from the US.

How is this affecting the beneficiary's economy?

Fortified Blended Foods and Genetically Modified Organisms: Case Study

Can beggars be choosers?

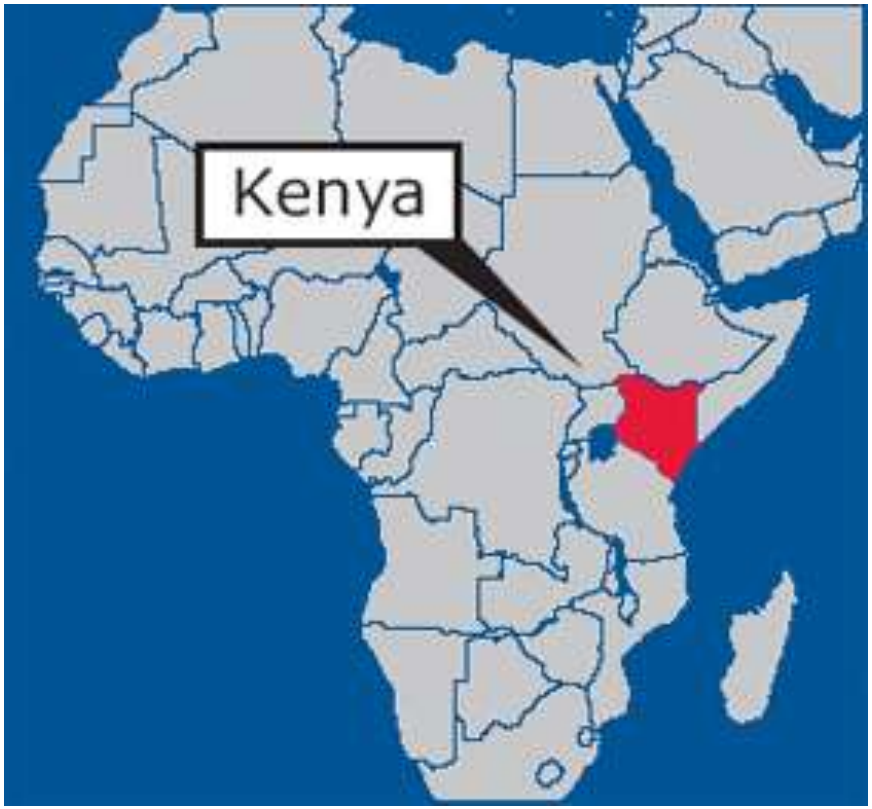
- South African 2002 food crisis
  - 26% of the population had critical food shortages
  - USA responded with food aid
- Malawi, Mozambique, Zambia, Zimbabwe rejected US food aid because it contained GMOs
- Concern of health consequences, agricultural biodiversity, future exports
- USA says “a crime against humanity!” “Beggars can't be choosers!”

Local Economies and WFP

- WFP does receive the bulk of funding and supplies through the US (excess?)
- The WFP is making initiatives to produce Fortified Blended Foods locally
  - Helping local economies

2 examples: Kenya and Liberia

Local Production of FBFs
A success story: Kenya



Economic Hardships and FBF

- Barrier between iron/zinc requirements of infants/children and what FBFs can provide
- This gap can easily be filled by
  - consuming animal sourced foods
  - further fortification

Do you have any ideas of how to overcome the barrier between FBFs and children's need for iron and zinc?

Product improvement needed

- FBF do not meet the nutritional needs of moderately malnourished children
  - Inadequate micronutrient content
    - Insufficient iron, no vitamin C
    - Low content of essential fatty acids and fats
  - High anti-nutrients and fiber content
    - Non-dehulled soy,
    - Non-degermed maize and wheat: higher fiber content
  - Insufficient energy per serving
    - High bulk and viscosity
  - Does not provide a source of animal protein
    - Powdered Milk

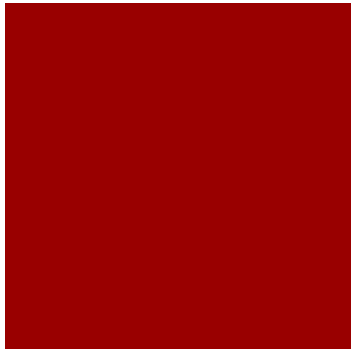
(De Pee & Bloem, 2009)

Improvements and recommendations

- **Improve nutritional content and absorption**
  - Changing the micronutrient premix
    - Increase content and bioavailability of nutrients
  - Adding milk powder
  - Increasing oil content
  - De-germing maize and de-hulling soy
  - Reducing phytate content with the addition of phytase enzyme
    - Phytase not GRAS
- **Improve Product Quality**
  - Include specifications for maximum content of heavy metals.
  - Reduce content of toxins and contaminants
    - lower maximum level for aflatoxins (5 instead of 20ppb)
    - Enforce tighter specifications for microbiological content

(De Pee & Bloem, 2009)

Questions?



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