RECENT EXPERIENCES IN THE DEVELOPMENT OF LOCALLY-PRODUCED READY-TO-USE FOODS

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RECENT EXPERIENCES IN THE DEVELOPMENT AND OPERATIONAL USE OF LOCALLY-PRODUCED READY-TO-USE FOODS

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Local Foods for Moderate Acute Malnutrition (MAM)

- Corn-soy blends (CSB)

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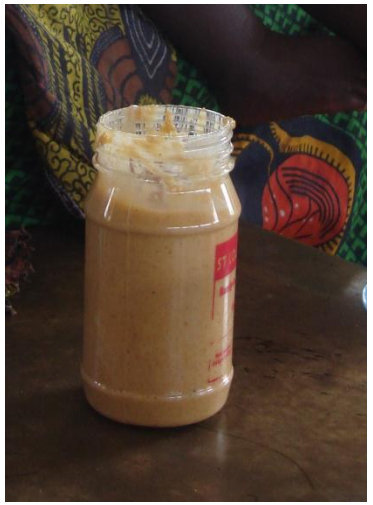
- Ready-to-eat foods
  - Ready-to-use Supplementary Food (RUSF)
  - Fortified spreads (FS)
  - Lipid Nutrient Supplement (LNS)



Local

- What is local?
  - Local ingredients
    - Locally grown
    - Locally available
  - Local production
- Why is local important?
  - Acceptability
  - Supports community
  - Lower cost?

Objectives

- Develop cost-effective foods that children will eat and that treat moderate malnutrition
  - Nutrient composition
  - Acceptability
  - Shelf-stability

- Operational program logistics important

Clinical Trials

- CSB++ vs. RUSF
- Effectiveness of a novel RUSF with whey permeate
- Integrated treatment of SAM and MAM
- Use of Linear Programming for local, low cost ready-to-use foods

Locally produced and imported RUSF are effective treatments for MAM

Food	Production	Cost (/1000 kJ)	Ingredients
CSB++	Local	**$0.07**	• Corn • Soybeans • Soy Oil • Nonfat dry milk • Micronutrients
Soy RUSF	Local	**$0.10**	• Peanuts • Extruded soybeans • Soy oil • Sugar • Micronutrients • + Calcium
Soy/Whey RUSF	Imported	**$0.17**	• Peanut • Whey • Soy protein isolate • Vegetable fat • Sugar • Maltodextrin • Cocoa • Micronutrients

LaGrone et al., 2012, AJCN 95:212-9

Locally produced and imported RUSF are effective treatments for MAM

Clinical Outcome	CSB++ (n= 888)	Soy RUSF (n = 906)	Soy/whey RUSF (n = 918)
Recovered, n (%)	763 (85.9)	795 (87.7)	807 (87.9)
Developed SAM (Severe Wasting), n (%)	59 (6.6)[a]	47 (5.2)	39 (4.2)
Developed SAM (Kwashiorkor), n (%)	38 (4.3)	35 (3.9)	47 (5.1)
Continued MAM, n (%)	8 (0.9)	5 (0.6)	8 (0.9)
Died, n (%)	8 (0.9)	10 (1.1)	8 (0.9)
Dafaulted , n (%)	12 (1.4)	14 (1.5)	8 (0.9)
Transferred to inpatient therapy , n (%)	0 (0)	0 (0)	1 (0.1)
Weight gain ($g \cdot kg^{-1} \cdot d^{-1}$)	3.1 ± 2.45[b]	3.4 ± 2.6	3.6 ± 2.8
Length gain (mm/d)	0.13 ± 0.46	0.13 ± 0.44	0.15 ± 0.47
MUAC gain (mm/d)	0.13 ± 0.40[b]	0.13 ± 0.435[b]	0.21 ± 0.44
Time to recovery (d)	24.9 ± 17.5[c,d]	22.5 ± 14.2	22.6 ± 15.0

[a] Significantly different (P<0.03) than soy/whey RUSF
[b] Significantly different from soy/whey RUSF (P<0.001)
[c] Significantly different from soy/whey RUSF (P<0.006)
[d] Significantly different from soy RUTS (P<0.003)

LaGrone et al., 2012, AJCN 95:212-9

Whey Permeate RUSF for treatment of MAM

- Whey permeate can replace a small amount of minerals in the RUSF
- Meet protein recommendations with addition of <5% whey protein concentrate (WPC)

- Acceptability trial showed equal liking between the Whey Permeate RUSF and control Soy RUSF

	Whey (n=30)	Soy (n=29)
Average Time to Eat ± SD (min:s)	7:14 ± 3:34 (n=17)	7:17 ± 3:50 (n=18)
Day 1 Child Liking	4.57 ± 0.73	4.59 ± 0.82
Day 1 Caregiver Liking	4.87 ± 0.43	4.72 ± 0.65
Day 4 Child Liking	4.97 ± 0.18	5.00 ± 0.00
No difficulty consuming over 4 days	28 Y / 2 N	26 Y / 3 N

Whey Permeate RUSF

- Primary outcome measures:
  - Recovery from MAM (achieving MUAC ≥ 12.5 cm by 12 weeks)
- 1584 completed study
- 1800 subjects anticipated to complete within a few months

Photo Credit: Julie Kennedy

Integrated treatment of SAM and MAM in Humanitarian Emergencies

With the International Medical Corps

- Hypothesis: An integrated management protocol for MAM and SAM will achieve greater community coverage and a greater individual recovery rate than standard care.
  - Same food (RUTF)
    - Step from SAM to MAM rations
  - Same measurements (MUAC)
  - Same treatment site
  - Potential for better efficiency and cost effectiveness
  - Medical interventions at discharge
    - LNS
    - Oral rehydration solution
    - Malaria prophylaxis
    - WHO immunizations

Integrated treatment of SAM and MAM in Humanitarian Emergencies

Located in Port Loko District in central Sierra Leone

International Medical Corp collaborated with Project Peanut Butter Sierra Leone to conduct the study

- A cluster randomized operational trial – 5 intervention sites and 5 control sites
- Primary outcomes: recovery rate, nutritional status 6 mo after successful treatment, program coverage
- Enrollment criteria MUAC < 12.5 and able to consume RUTF during feeding of test dose of 30g RUTF on enrollment
- Fed until MUAC > 12.4 cm
- Mothers participated in ‘mother care groups’ to promote continued breastfeeding during MAM treatment

Foods

- CSB vs. RUTF: Quite varied in macro- and micronutrient composition
- LNS:
  - Meets RDA for most micronutrients
  - 217 kcal
  - 5.3 g protein
  - 15.2 g fat
  - 40 g

Preliminary Results

- Enrollment was completed in November, 2013
- Integrated – 1187 subjects
  - 829 MAM
  - 358 SAM
- Standard – 909 subjects
  - 347 SFP
  - 562 OTP
- Finishing 6-month follow-ups (June, 2014)


Amanda Maust

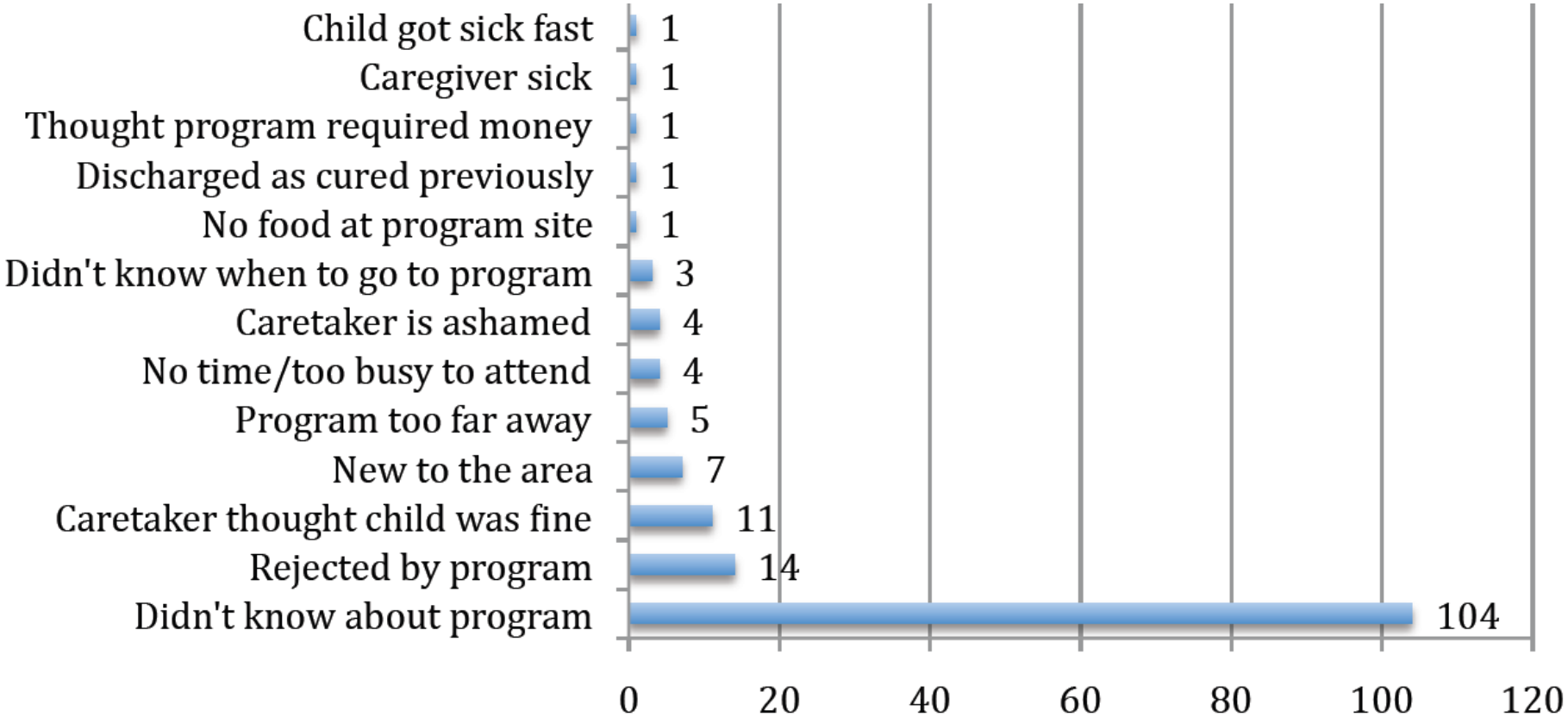
- Coverage
  - SLEAC (Simplified LQAS Evaluation of Access and Coverage) Sampling Design
  - Method of surveying that helps to classify service coverage in large areas

	Site	GAM*	GAM covered	% Coverage	Coverage Classification	
Integrated	1	61	35	57%	High	Avg. = 73%
	2	37	25	68%	High	
	3	53	51	96%	High	
	4	34	33	97%	High	
	5	53	25	47%	Moderate	
Standard	1	33	19	58%	High	Avg. = 63%
	2	25	22	88%	High	
	3	36	24	67%	High	
	4	34	28	82%	High	
	5	64	14	22%	Moderate	

*GAM: Global Acute Malnutrition
Low = <20%
Moderate = 20-50%
High = >50%

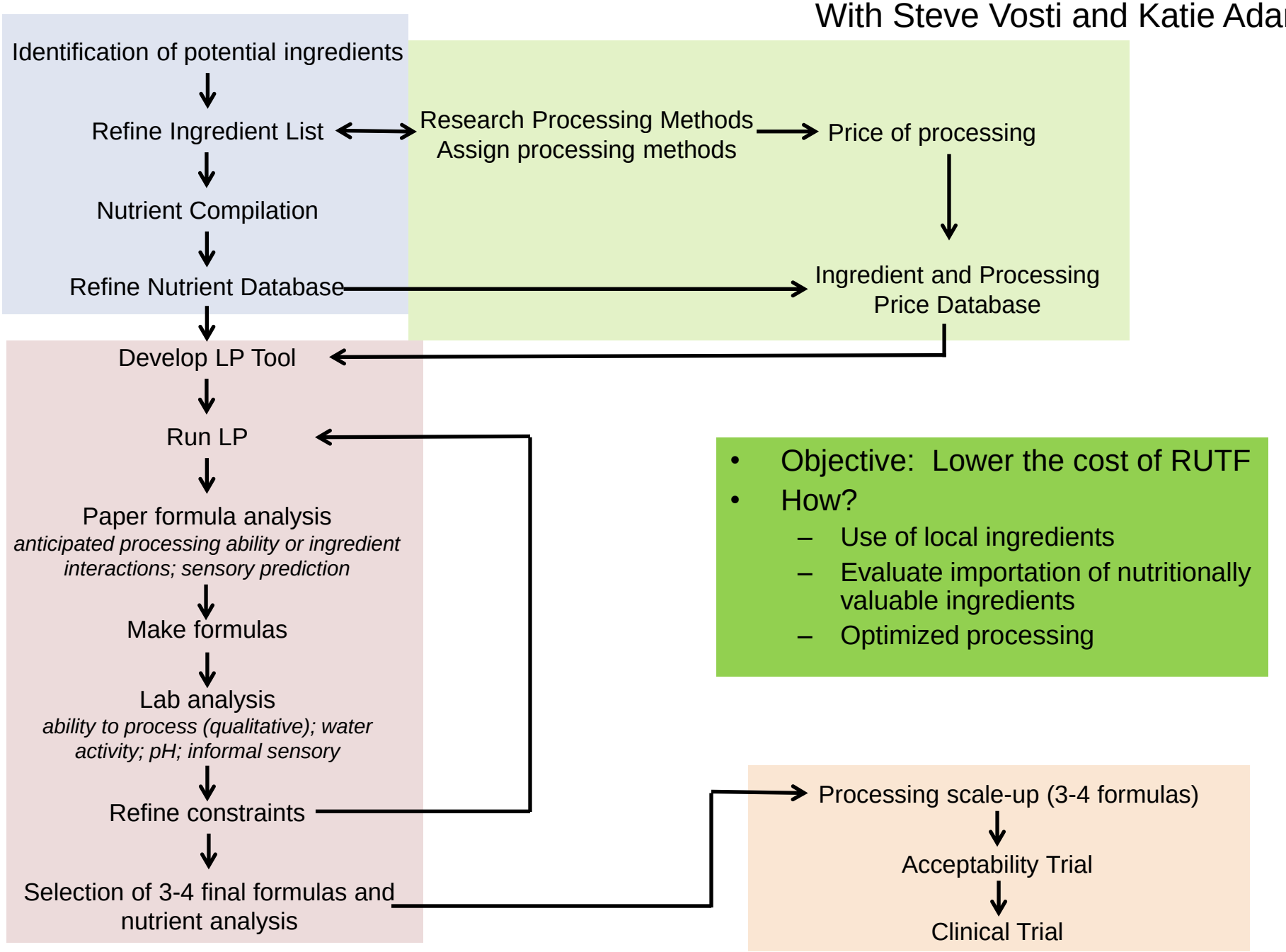
Coverage Results

- Barriers to seeking services



Linear programming and local ingredients

With Steve Vosti and Katie Adams

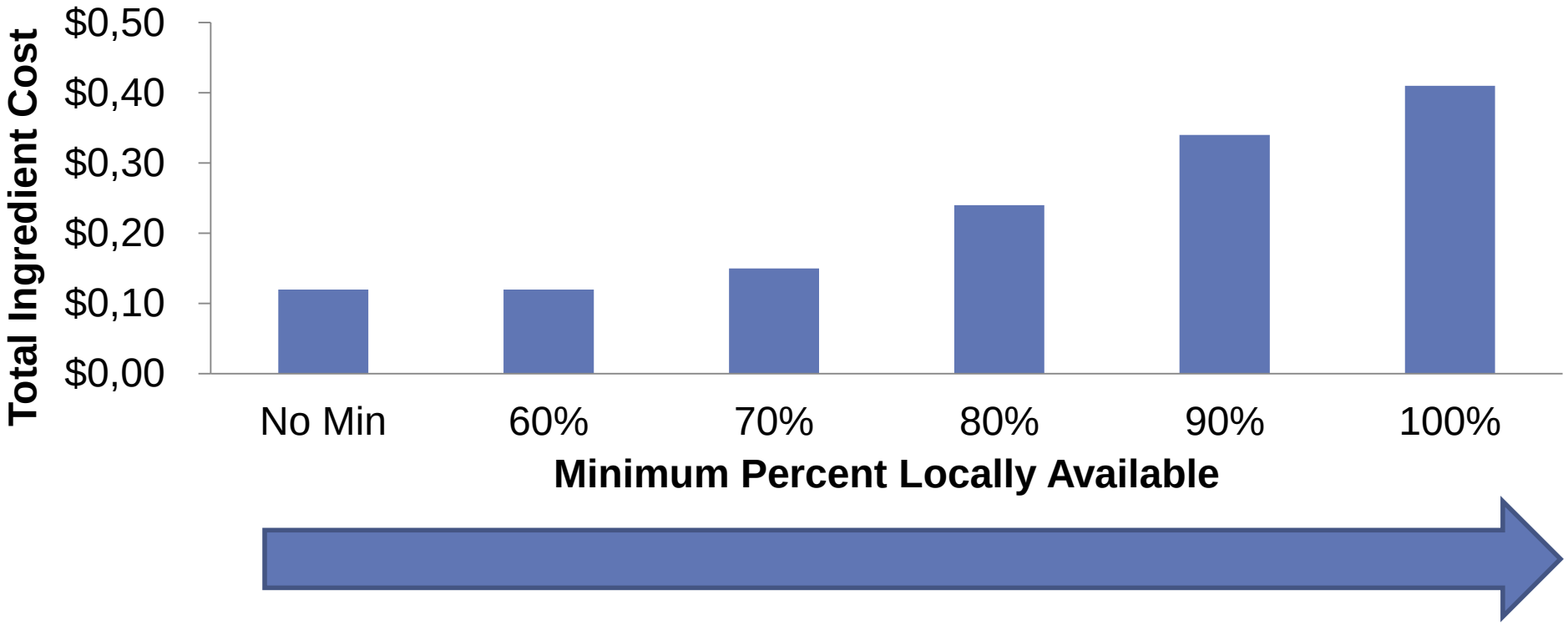


- Objective: Lower the cost of RUTF
- How?
  - Use of local ingredients
  - Evaluate importation of nutritionally valuable ingredients
  - Optimized processing

What is local?

- For Linear Programming Research Project:
  - Having 500 mt or more of a given ingredient available, whether nationally produced or imported, in the locale of RUTF production

Cost of ingredients as “percent local” increases



- Millet
- Dried egg yolks
- Soybeans
- Pumpkin seed
- Imported dairy*

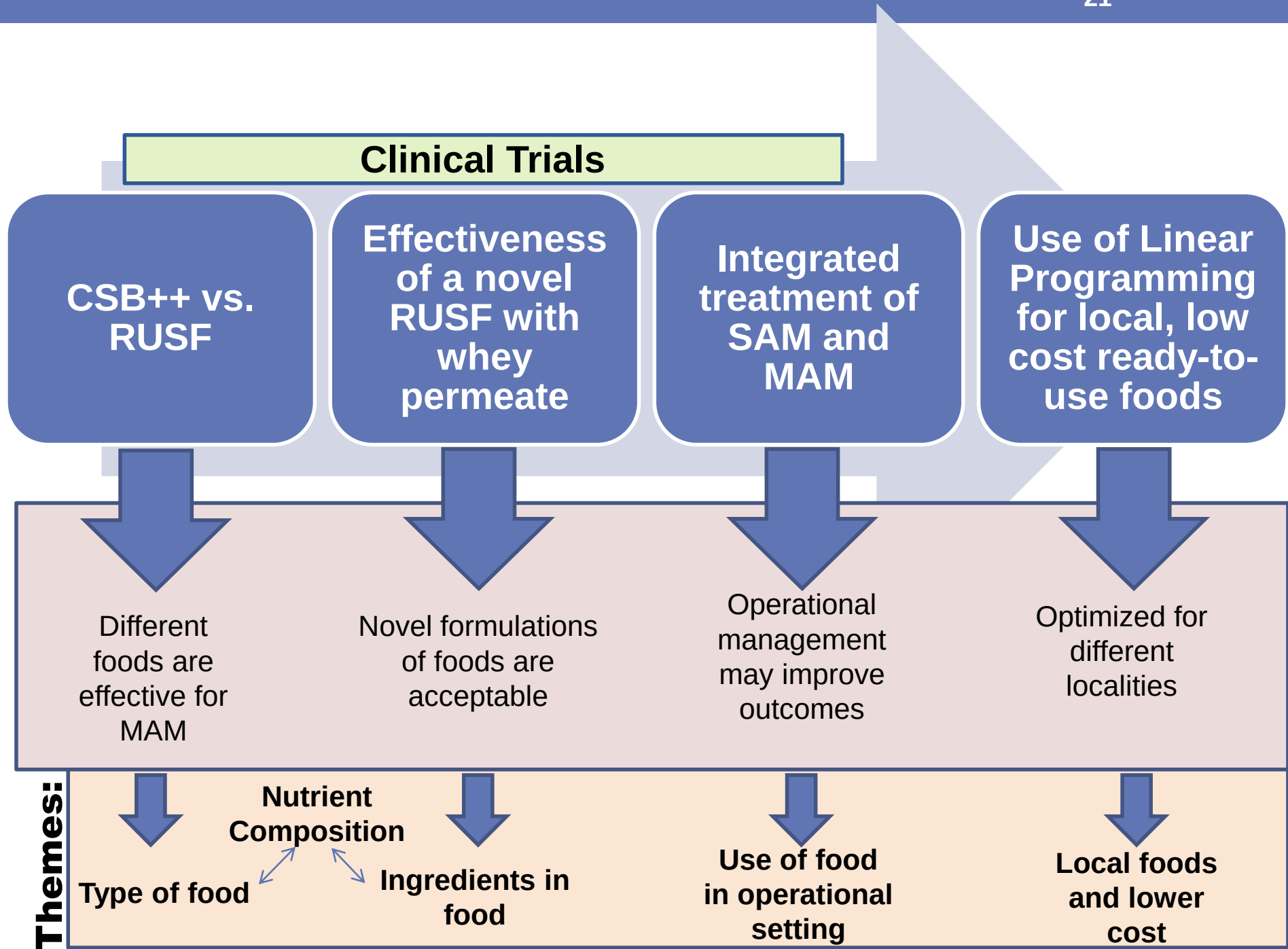
- Fish
- Pumpkin seed
- Sunflower seed
- Imported*, protein-concentrated dairy

- Fish
- Pumpkin seeds
- Sunflower seeds
- Local dried milk

*e.g., whey powder, WPC

Other issues and findings

- Optimization of extrusion process different for every blend of ingredients
  - Anti-nutrients (e.g., trypsin inhibitor inactivation)
  - Cooking
    - Protein and starch digestibility
- Optimization of taste, texture, and viscosity
  - Micronutrient premix
  - Dairy powders
  - Solid vs. liquid oils
- Animal source foods and PDCAAS/DIAAS
- Cost-effectiveness
- Optimized RUTF composition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CSB++ vs. RUSF
Effectiveness of a novel RUSF with whey permeate
Integrated treatment of SAM and MAM
Use of Linear Programming for local, low cost ready-to-use foods
Different foods are effective for MAM
Novel formulations of foods are acceptable
Operational management may improve outcomes
Optimized for different localities
Themes:
Type of food
Nutrient Composition
Ingredients in food
Use of food in operational setting
Local foods and lower cost

Conclusions

- Local foods can be formulated and effectively used for treatment of MAM
- Logistics of operational programs is just as important as the food itself
- A new linear programming tool can be used to design new, local, ready-to-use supplementary and therapeutic foods

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