Impact on Vitamin A Intake and Young Child Nutritional Status through the Introduction of a Food-based Approach using Orange-fleshed Sweetpotato in Rural Mozambique

By Jan Low, Mary Arimond, Nadia Osman, Benedito Cunguara, Felipe Zano, and David Tschirley

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Visão Mundial OVATA

SARRNET/INIA

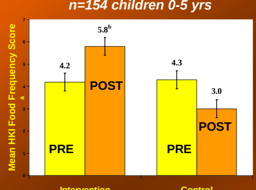
HELEN KELLLER INT'L

REPARTIÇÃO DE NUTRIÇÃO

MICHIGAN STATE UNIVERSITY

Objective: Assess the Effectiveness of Orange-fleshed Sweetpotato (OFSP) in an Integrated Agriculture-Nutrition Intervention Aimed at Increasing Vitamin A Intake & Serum Retinol Concentrations

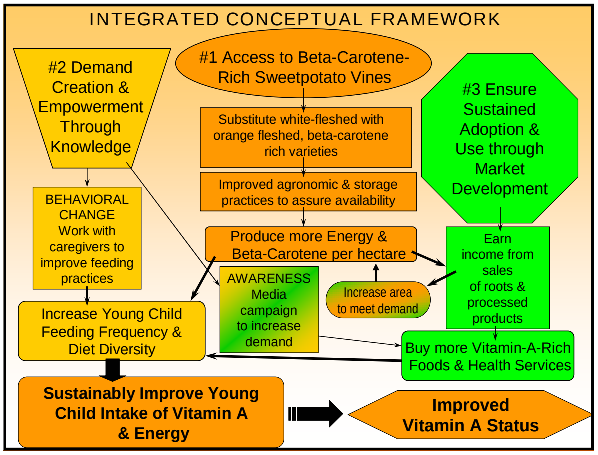
Pilot in Western Kenya
n=154 children 0-5 yrs



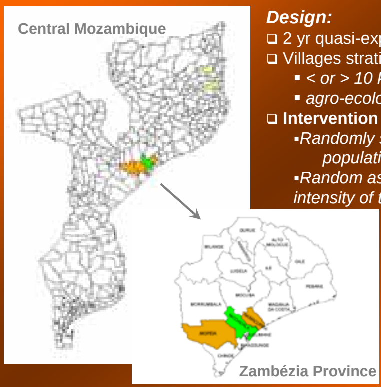
[b] The increase from pre- to post-intervention period was significantly greater in the intervention group (+1.6) than the decrease in the control group (-1.3). (ANOVA, p=0.0015)

- Food-based approaches
  - Complementary to supplementation
  - May be more sustainable
  - Few studies exist
    - Complex to design
    - Expensive, multi-sectoral
- Builds on pilot experience in Western Kenya
- TSNI: First food-based community-level intervention study in Africa that has followed the same intervention and control households and children throughout the initial adoption period

INTEGRATED CONCEPTUAL FRAMEWORK



Study Area & Design



Design:

- 2 yr quasi-experimental design
- Villages stratified within districts
  - *< or > 10 kms to markets*
  - *agro-ecological conditions*
- **Intervention villages**
  - *Randomly selected proportional to population*
  - *Random assignment of high or low intensity of the nutrition intervention*

90% completed:
2 Intervention Groups
-- 498 households
1 Control Group
-- 243 households

Data Collection:
Jan 2003-
March 2005

Understanding the Target Communities: Baseline Status

High Levels of malnutrition among reference children (mean age 13 months):

- **71% low serum retinol (<0.70 µmol/l)**
- **25% severely anemic (<7 g/dl)**
- **54% stunted (<-2 Z-scores ht/age)**
- **Wasting > control than intervention area (10.7 % vs 6.2 %)**

Extremely resource poor:

- **Low productivity, drought-prone**
- **Principle staple: cassava**
- **68% HHs growing sweetpotato**
- **Animal ownership low**
- **61% mothers never went to school**
- **Poor quality health services**

CHALLENGE: SCHEDULING & ETHICAL CONCERNS

2003 [------------------- Main OFSP harvest ---------------------] 2004
January February March April May June July August September October November December January
---------- Survey 1 ----------- ------ Survey 2 ------ ----------- Survey 3 ----------- ------------- Survey 4 -------------
Socio-economic/ demographic* **Blood samples** *24-hour recall of dietary intake* **Blood samples**
Agricultural production Morbidity/Anthropometry Household expenditures Morbidity/Anthropometry
Nutrition knowledge Reproductive History Area of OFSP fields Food frequency
Food frequency Food frequency

-- Vitamin A capsules -- ------- Vitamin A capsules -------

--- Farmer Group Vine Multiplication-------
--- Distribution of OFSP vines to households -

2004 [------------------- Main OFSP harvest --------------------] 2005
January February March April May June July August September October November December January February
--- Survey 5 --- ------- Survey 6 ------ ---------- Survey 7 ----------- ------------- Survey 8 -----------
Agricultural production **Blood samples** *24-hour recall of dietary intake* **Blood samples** ------- Survey 9 -----
Food frequency Morbidity/Anthropometry Household expenditures Morbidity/Anthropometry Agricultural production
Food frequency Food frequency Food frequency Nutrition knowledge
Area of OFSP fields Socio-Economic
Intervention area only Intervention area only ------ Vitamin A capsules ------

----- Planting of OFSP vines -------------- --------------------
------------------------------- Group nutrition education sessions -------------------------------

Was the Orange-Fleshed Sweetpotato (OFSP) Liked and Adopted? (End of 2nd year)

	INTER-VENTION (n=498)	CONTROL (n-243)
Grew any kind of SP	94%	56%
Sold any kind of SP	31%	21%
Grew OFSP	91%	15% (29 cases)
TOTAL SP:		
Mean kgs	371	159
Median kgs	189	91
OFSP:		86% OFSP higher yielding
Mean kgs	276	
Median kgs	127	

Resisto was the most popular of the 5 successful OFSP introductions

Did the Intervention Impact the Young Child Diet?

- Median intake vitamin A almost 8 times higher
- OFSP contributed 35% vitamin A intake; 90% when consumed
- Pattern different then expected: OFSP eaten 2-3 times per week
- When consume, eat LOTS: mean 314 gms daily
- ➢ Children above 1 year tend to eat sweetpotato when their caregivers eat it

Median nutrient intakes yesterday for non-breastfed reference children during main sweet potato harvest season, year 2

	Intervention (n = 465)	Control (n = 234)	p-value
Energy (kcal)	1414	1226	0.00
Vitamin A (µg RAE)	426	56	0.00
Protein (g)	34	30	0.04
Fat (g)	17	15	0.13
(% of kcal)	11	11	0.86
Vitamin B6 (mg)	0.85	0.67	0.00

Did Improved Intake Translate Into Improved Serum Retinol Concentrations?

ACUTE PHASE PROTEINS SUCH AS C-REACTIVE PROTEIN CAN HELP US REMOVE THE EFFECT OF TRANSIENT SERUM RETINOL DEPRESSION DUE TO SUB-CLINICAL INFECTION

MEAN AND MEDIUM SERUM RETINOL VALUES IN ROUND 4 BY C-REACTIVE PROTEIN (CRP) AND BY AREA

	AREA					
	INTERVENTION			CONTROL		
	Mean	Std Deviation	Median	Mean	Std Deviation	Median
NO INFECTION (CRP<5.01 g/L)	.800	.262	.784	.708	.259	.671
C-REACTIVE PROTEIN LEVEL >5 & <10 mg/L	.677	.222	.695	.617	.197	.589
C-REACTIVE PROTEIN ABOVE 10 mg/L	.579	.237	.532	.563	.191	.544

SAMPLE SIZE: 733 TOTAL SAMPLE EXCLUDES 8 INTERVENTION CHILDREN RECEIVING VITAMIN A CAPSULES BETWEEN ROUND 2 & ROUND 4. 490 INTERVENTION CHILDREN; 243 CONTROL CHILDREN INCLUDE 24 RECEIVING CAPSULES FROM HEALTH FACILITIES BETWEEN ROUND 2 & ROUND 4.

Effect of the Intervention on Serum Retinol: Between-group Differences, Within Group Changes, and Double Difference

		Mean (µmol/L)	SEM	P-value
Mean difference between groups (Intervention - Control) within round				
	Baseline	-0.002	(0.017)	0.88
	End of Study	0.072	(0.020)	0.00
Mean within-group difference between rounds (End of Study - Baseline)				
	Intervention	.098	(0.023)	0.00
	Control	.020	(0.031)	0.53
Mean difference between groups in change in serum retinol		.078	(0.024)	0.00

Controlling for age, infection, weight-for-height, and estimated income by source

Prevalence of Vitamin A Deficiency Significantly Less in Intervention (I) than Control Children (C) at End of Study

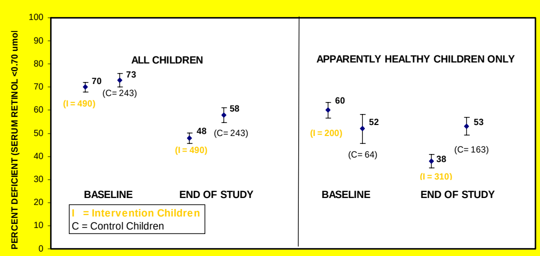


FIGURE 3 Percentage of children deficient in serum retinol at baseline and at the end of the study. Error bars represent standard errors of mean. All children (n=733) consist of all reference children excluding the 8 intervention children who received vitamin A capsules between rounds 6 & 8 (end of study). The apparently healthy children sample excludes in addition all children with C-reactive protein levels >5 mg/L.

Conclusions

- ✓If we get OFSP into the young child diet, it makes an impact
- ✓Orange color great promotional tool
- ✓Focus needs to shift to increasing use in household diet
- ✓Explore combining with health interventions

Challenge remains to ensure sustained adoption and have impact at scale using an integrated approach:

- ❑ Cost-effectiveness of scaling-out
- ❑ Re-thinking seed systems in drought-prone areas
- ❑ Developing more drought resistant OFSP by crossing with best local varieties