



# FEED THE FUTURE

The U.S. Government's Global Hunger & Food Security Initiative



Collaborative Research  
on Sorghum and Millet

**MCKNIGHT FOUNDATION**

## Entrepreneur-led Food Fortification Experience

**Bruce Hamaker, Moustapha Moussa, Mario Ferruzzi, John Taylor**



**USAID**  
FROM THE AMERICAN PEOPLE



Nutrition  
Center

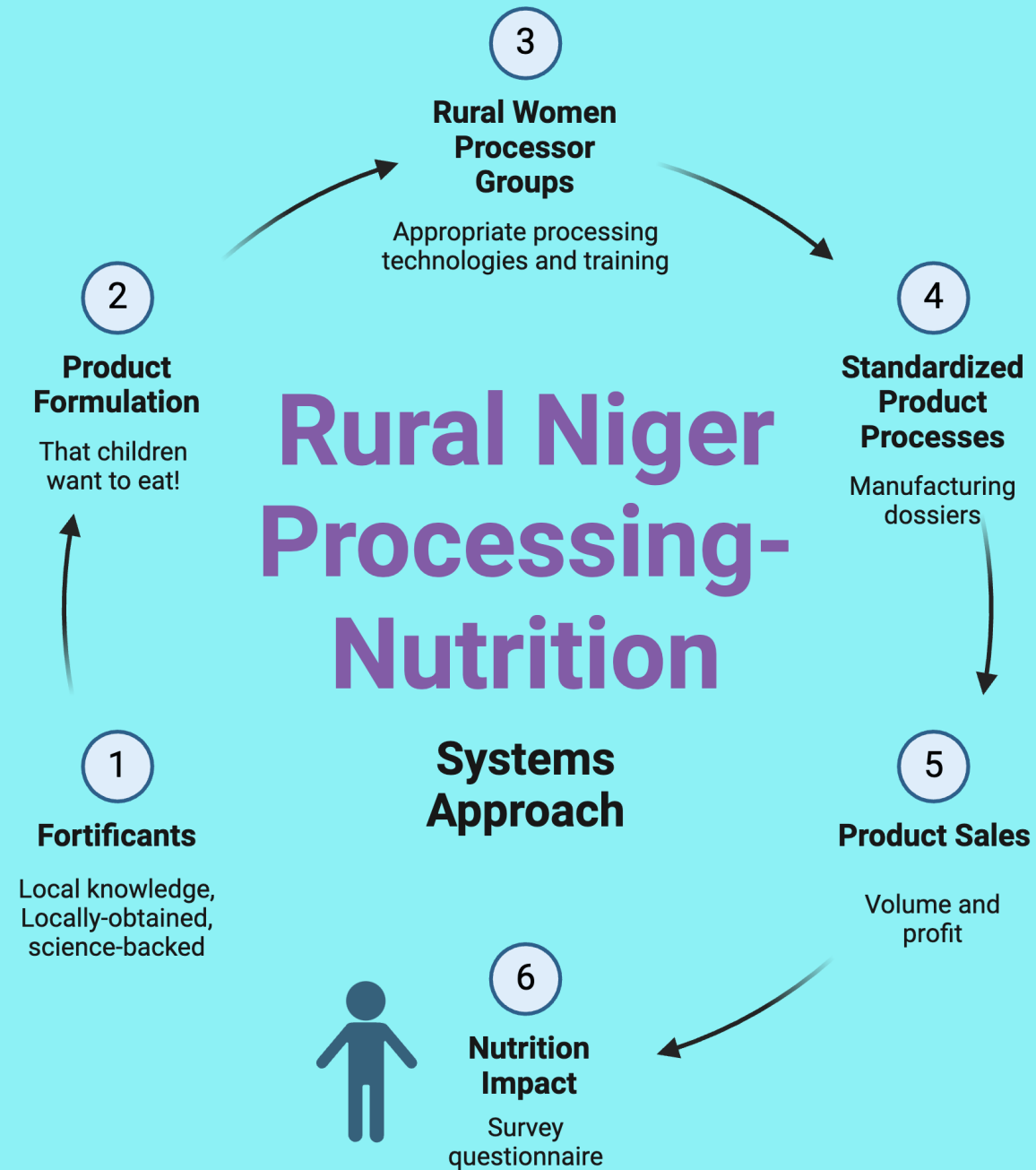
**KANSAS STATE**  
UNIVERSITY

# New way of delivering fortified foods to vulnerable rural populations

- Hub-and-Spoke Food Innovation System – innovates and trains rural women's processor associations
  - Processes shortfall micronutrient- and protein-fortified flour blends made for local tastes and preferences
  - Year-by-year sales and modest, but impactful profits
- Women self-initiated training of women in other rural communities up to 100 km from primary Spoke
- Nutrition/market study (3000 participants) showed increase in dietary quality above and beyond an increase in household income and food expenditures

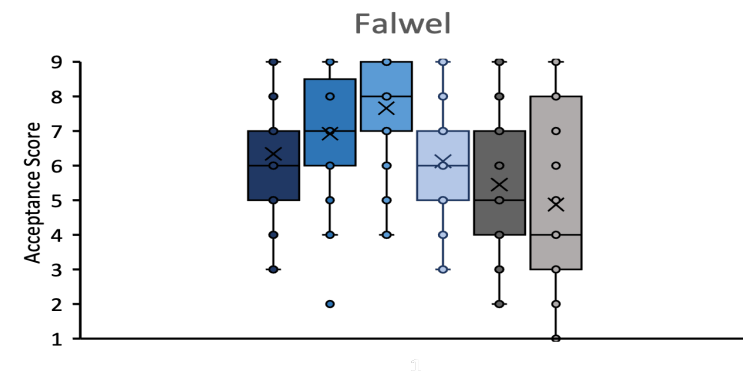
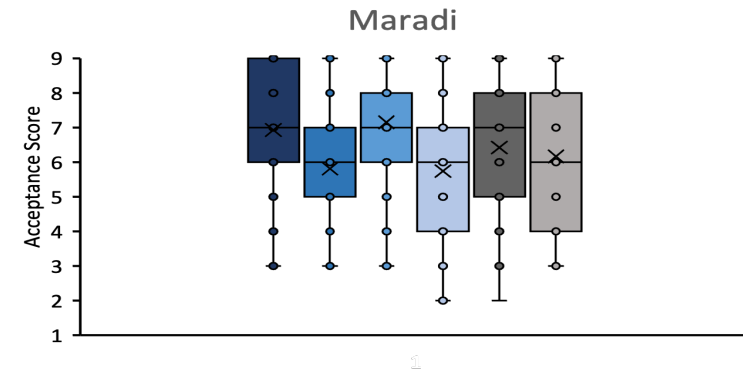
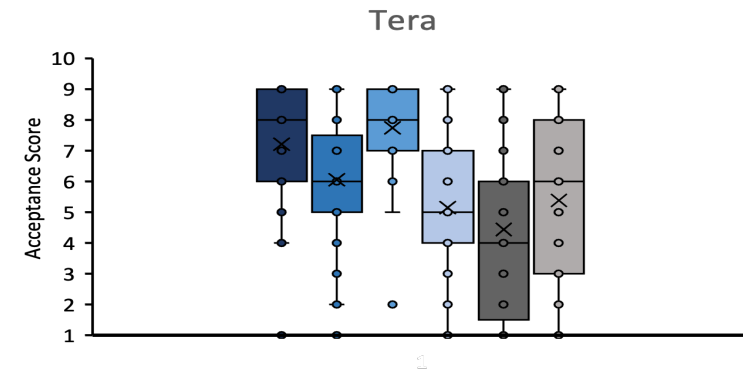
# HUB-and-SPOKE FOOD INNOVATION SYSTEM



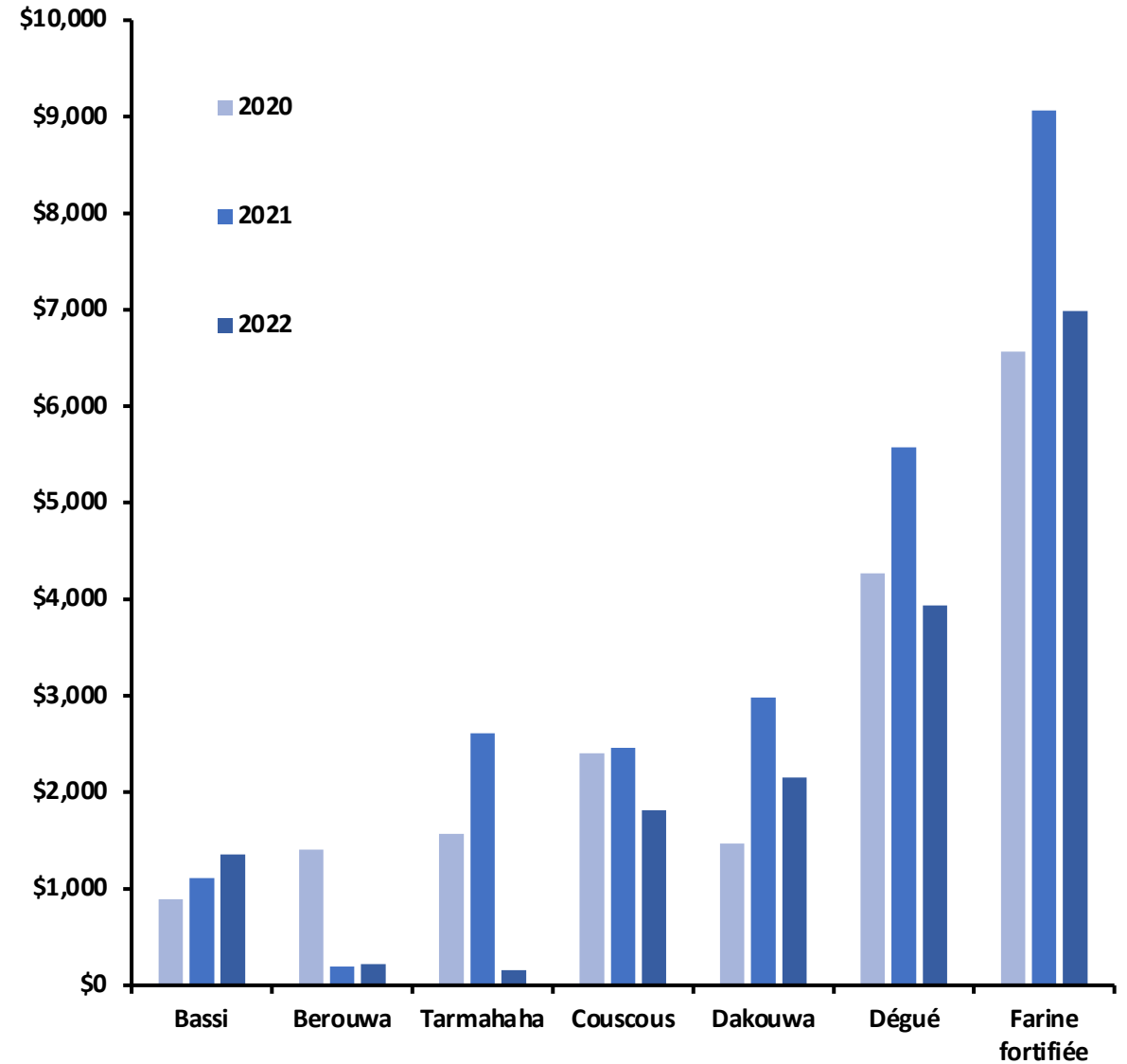


# Fortified flour formulations

- Food-to-food fortification (FtFF) – locally sourced micronutrient/protein rich plant foods
- Formulated with similar shortfall micronutrient and protein targets to food aid flour blends (CSB+, Misola)
- Made to local tastes and preferences
- Consumer preference testing (320 mothers of children 2-5 years)
  - In two sites, 1 or 2 products were preferred to food aid fortified flours
- Work closely with health centers to get to undernourished children

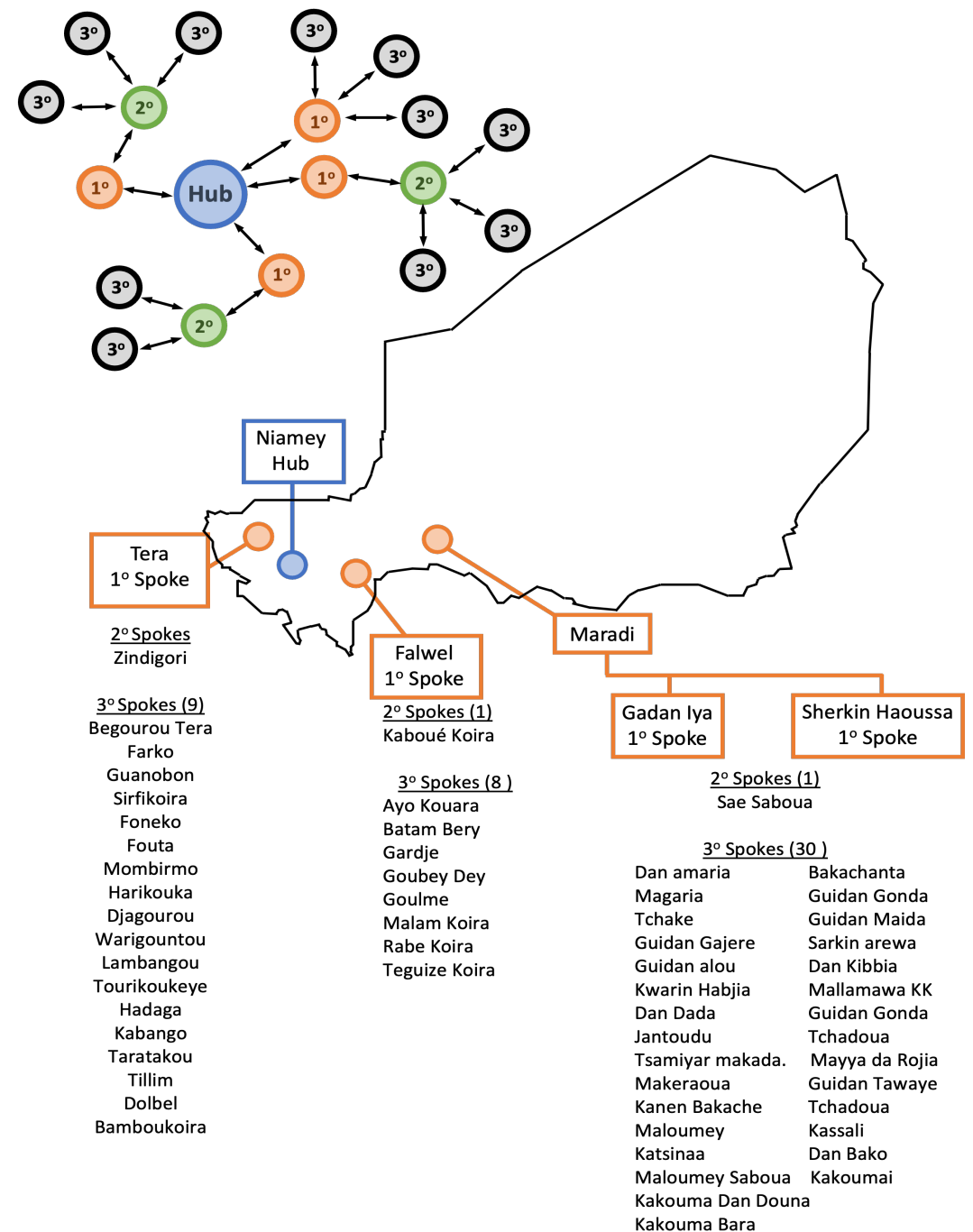


- Sales by product type in 4 primary processing Spokes (2020-2022)
- Fortified flours highest sales volume
  - ~\$25,000 total in 3-year period, ~40,000 packets (500 g), ~20 MT product



# Self-scaling aspect

- Women processor association at four 1° Spoke sites trained and initiated other processing sites for fortified flours
- Over 500 women processors
- Disseminate fortified flours through markets to undernourished children
- Geographical expansion of enterprises generate income



# Niger Nutrition Study – Capstone for Niger Rural Joint Project

Measuring nutritional impact from introduction of Food-to-Food fortified flours

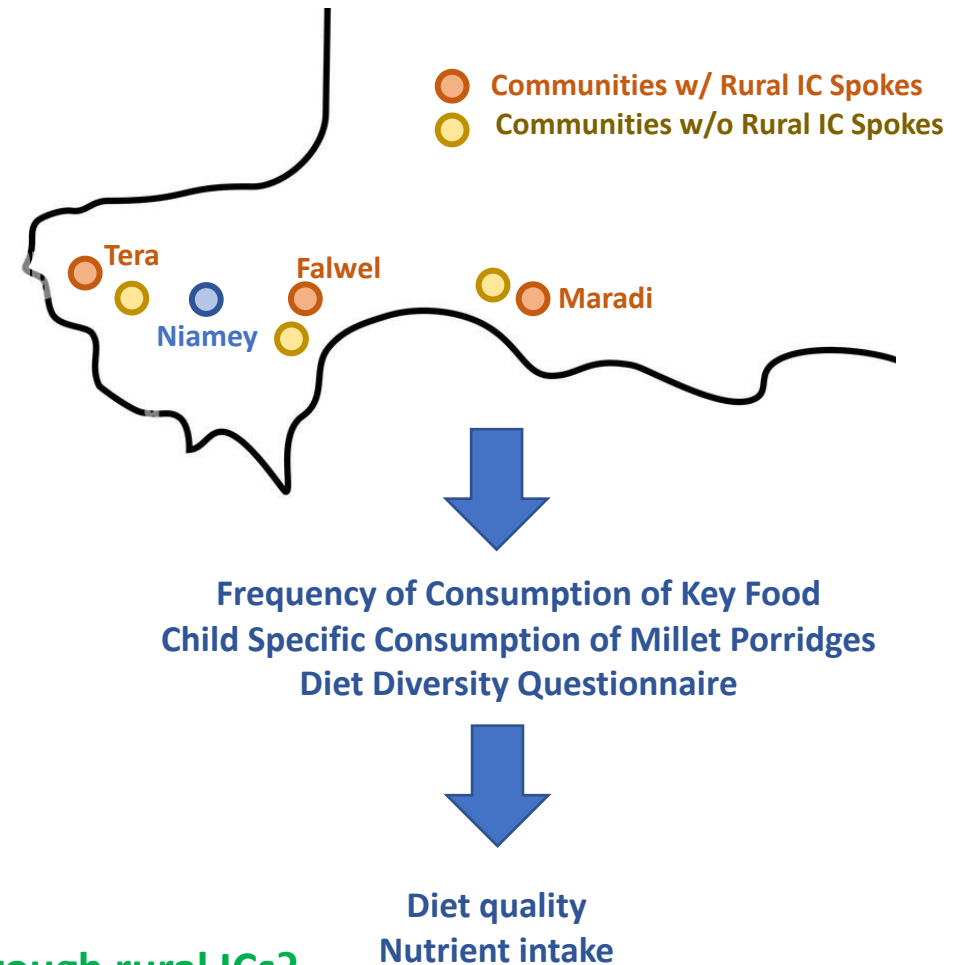
**Study Duration: ~8 weeks (March – June 2023)**

**Objective 1:** Compare diet intake, diet diversity and nutrient intake in rural communities with active Primary IC and fortified product introduction (past 3 years) compared with control rural communities.

- 2400 participants in total (FFQ)
  - 800 consumers of FtFF products in villages w/ IC
  - 800 non-consumers of FtFF in villages w/ IC
  - 800 non-consumers in villages w/out IC
- 270 participants for dietary recalls (only at Falwel)
  - 90 consumers of FtFF products in villages w/ IC
  - 90 non-consumers of FtFF in villages w/ IC
  - 90 non-consumers in villages w/out IC

## Outcomes:

- **Is Diet Quality impacted by introduction of fortified flours through rural ICs?**
- **How do increased sales impact nutrient availability/intake in children?**



# Niger Nutrition Study

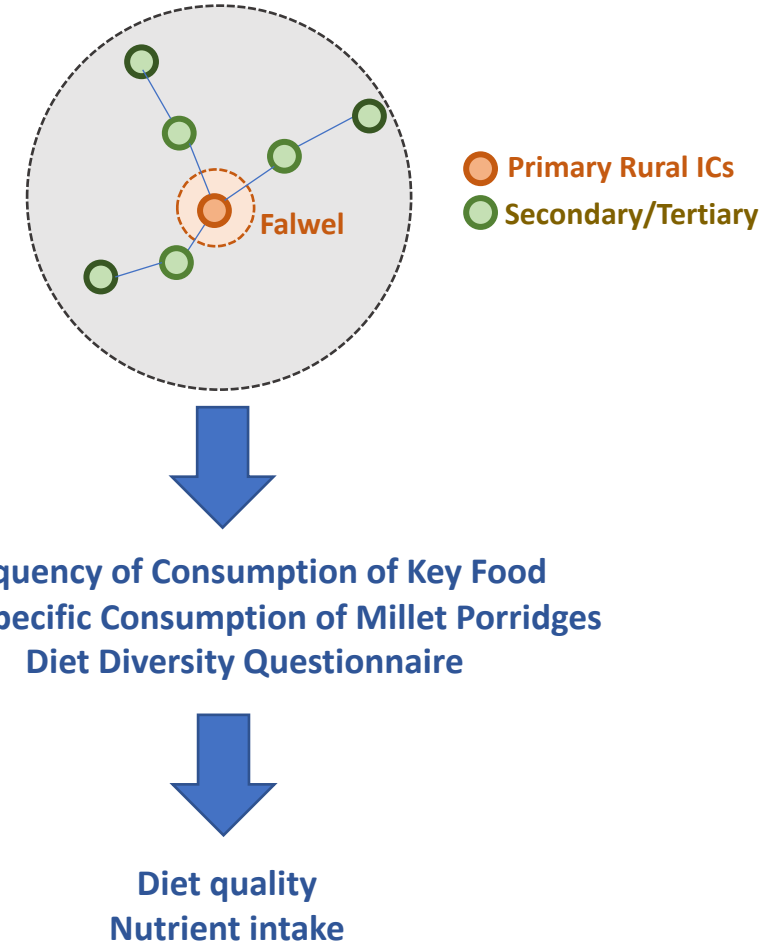
## Estimating geographical range of impact driven from Primary rural Food Innovation Centers

**Objective 2:** Assess the ability of Primary rural ICs to drive improvement in the local food environment through Secondary and Tertiary ICs in peripheral communities

- 600 participants in Secondary/Tertiary Spokes
  - 200 consumers in villages w/ Secondary/Tertiary IC Spoke
  - 200 non-consumers in villages w/ Secondary IC Spoke
- 200 participants from villages peripheral (secondary sites) in control village without IC control

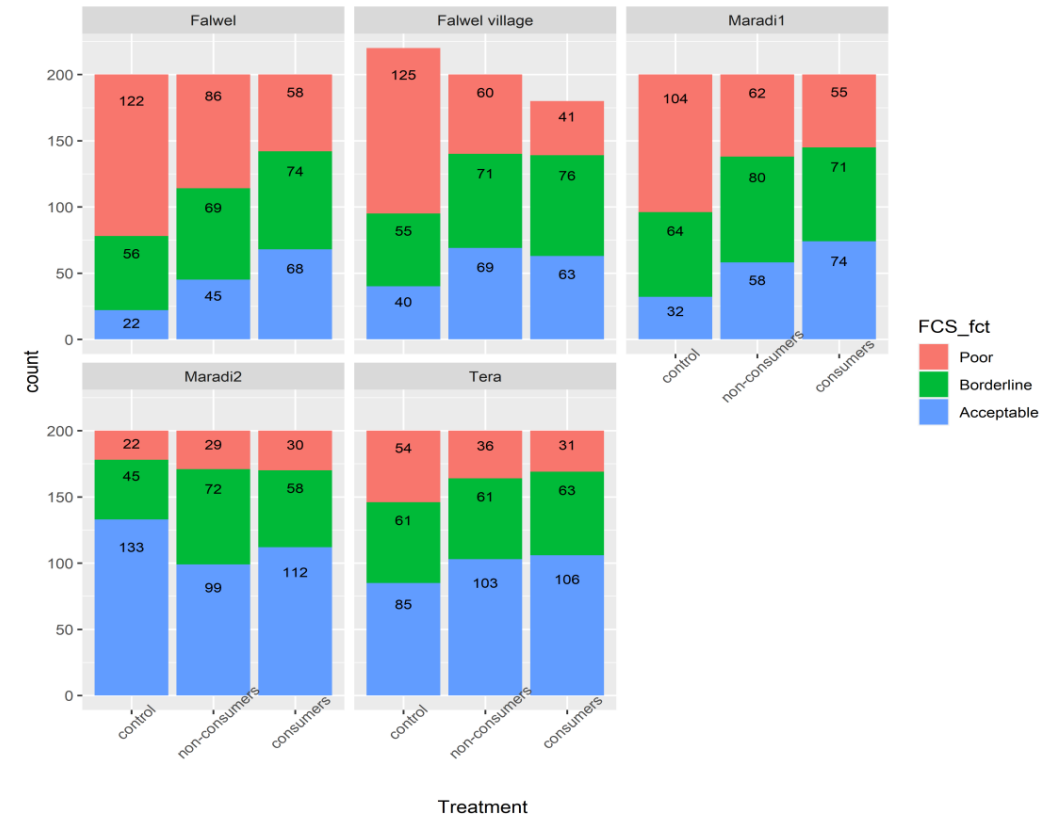
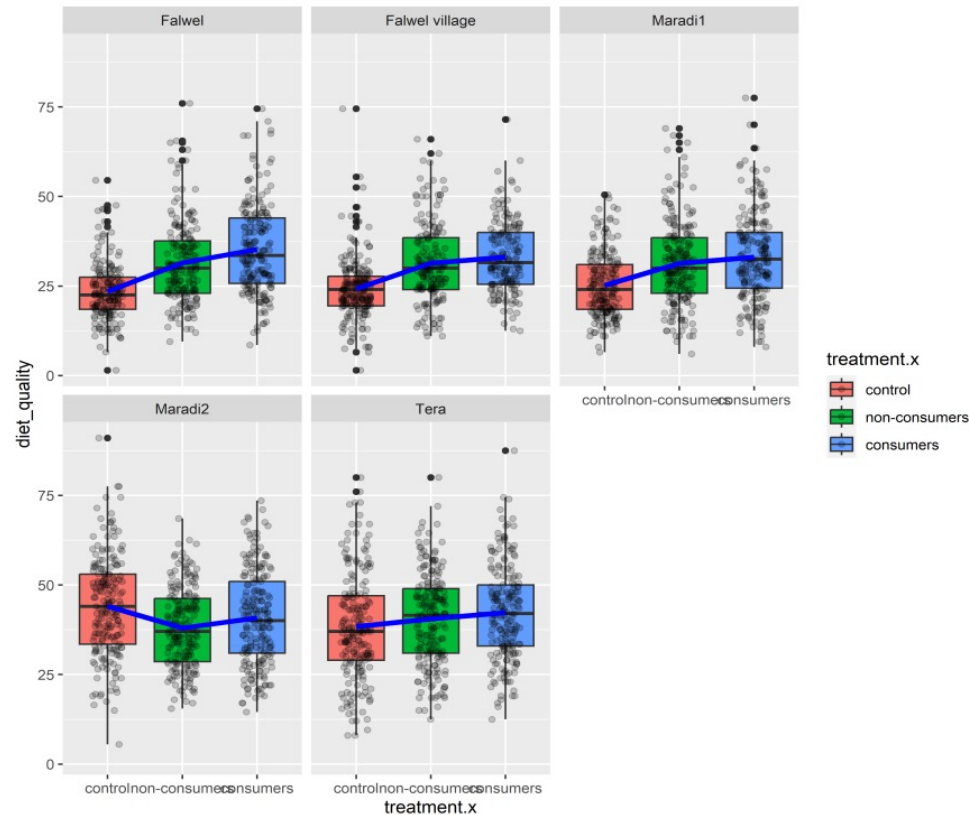
**Outcomes to address:**

- **What is geographical range of impact from Primary IC Spokes?**

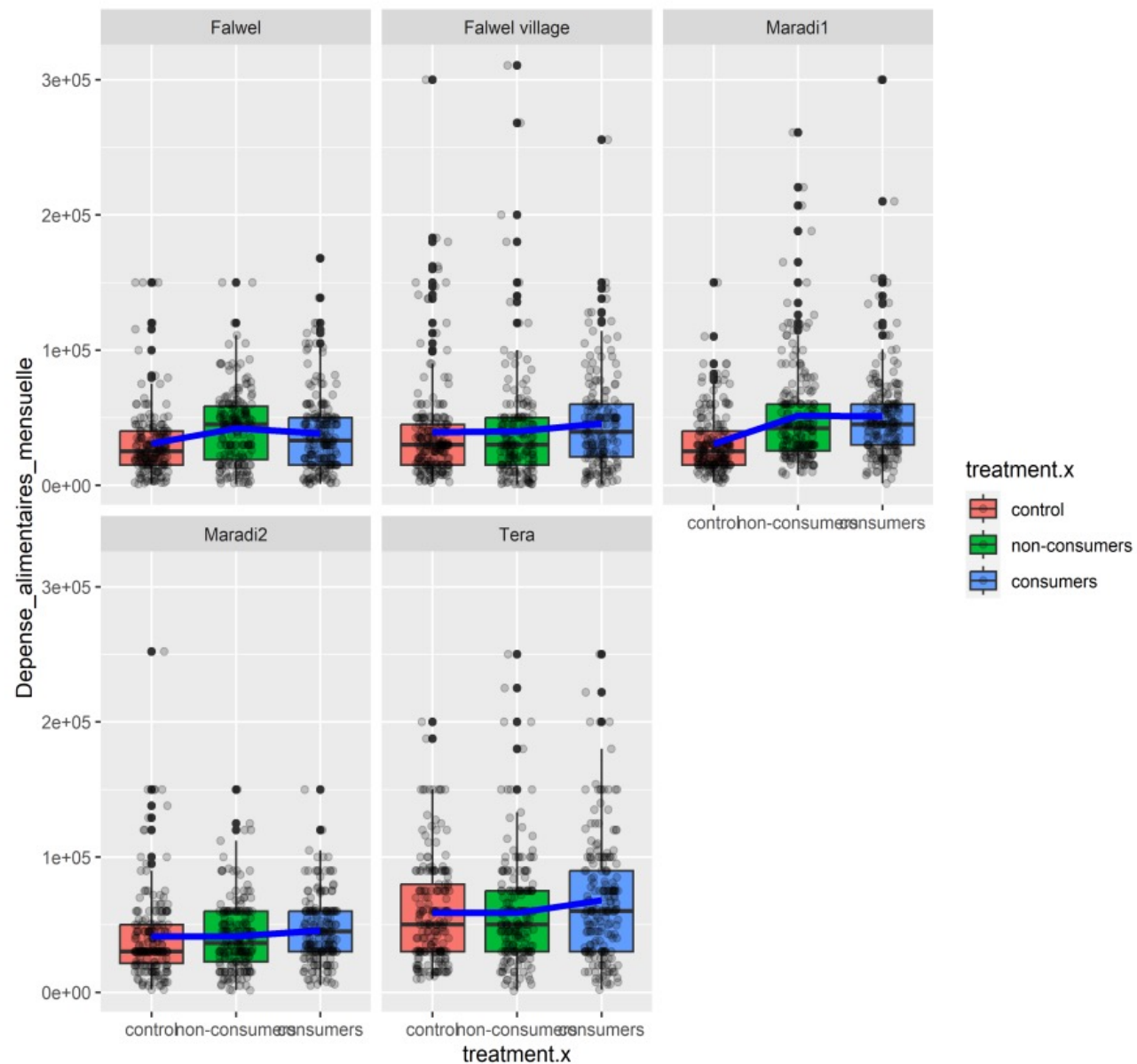


# Nutrition Survey Data – WFP food consumption score (FCS)

- “food consumption score is a proxy
- indicator of household caloric availability”
- **Villages (3 sites) with food innovation**
- **Centers (FIC) had higher FCS scores**



# Survey Data – household food expenditure



# Presence of Food Innovation Centers is important

- Increased FCSs compared to control communities, whether consumers or non-consumers
- Strengthen the women's sense of community
- Locally directed, fortified foods meet local preferences
- People see malnourished children improve, health centers are partners giving referrals (even providing fortified products)
- Villages without Food Innovation Centers are asking for them
- Enumerators noticed that participants in Control villages were not as knowledgeable on nutrition matters
- Women say that they didn't know that the malnutrition solution is in their village
- Rural Food Innovation Centers are all functioning at 10+ years of the project (with or without funding – e.g., tertiary centers)

# Processing system is a tool for development

- Could be used to disseminate other fortificants or agents for health through rural processed product markets
- Examples
  - Designed prebiotic fiber blends to improve gut health
  - Introduction of new probiotic *Prevotella copri* with matched prebiotic to fight malnutrition (Gordon Lab, Washington University)
  - Other?

## A novel model for delivering fortified food products in rural African Sahel

- **Sustainability** - natural expansion through women (market-driven)
  - Increase in secondary and tertiary processors in rural areas – scaling
- **Income-generation** (entrepreneurism)
  - Increased sales and profits – modest, but impactful
- **Nutrition** – science-based naturally-fortified blends to local preferences
  - System could potentially deliver other types of nutrition – fibers to lower gut pH for increased iron absorption, matched prebiotic fibers to promote anti-malnutrition bacteria, etc.
- **Gender** – rural women and youth empowerment



# FEED<sup>THE</sup>FUTURE

The U.S. Government's Global Hunger & Food Security Initiative

# QUESTIONS?



**USAID**  
FROM THE AMERICAN PEOPLE



Collaborative Research  
on Sorghum and Millet

**KANSAS STATE**  
**UNIVERSITY**