An agricultural livelihood intervention during pregnancy is feasible and reduces food insecurity

Pamela M. Murnane[1], Phelgona Otieno[2], Edward A. Frongillo[3], Sheri D. Weiser[1], Elly Weke[2], Pauline Wekesa[2], Lisa M. Butler[4], Elizabeth A, Bukusi[2], Craig R. Cohen[1]

1. University of California San Francisco, USA; 2.Kenya Medical Research Institute, Kenya; 3. University of South Carolina, USA; 4. University of Connecticut, USAs

BACKGROUND

Food insecurity is a critical driver of maternal and infant health and nutrition, including:
• adverse birth outcomes
• poor maternal mental health
• poor child growth and development.

Western Kenya is heavily dependent on an unstable agricultural sector with unreliable rainfall patterns, yet few income generating alternatives to agriculture exist. Entrenched poverty and limited access to financial services mean that few farmers can obtain quality agricultural inputs. Moreover, HIV ranges from 15-22% among women in the region.

We developed a multisectoral intervention called *Shamba Maisha* [farm-life in Kiswahili] to address the root causes of food insecurity and poor health.

In a **recently completed randomized trial** (NCT02815579) among adults with HIV, **we demonstrated that *Shamba Maisha* improved food security and mental health and reduced HIV stigma[1]**

Here, we sought to determine:
<u>Objective 1</u>. Did the effect of the intervention on food insecurity differ for pregnant vs non-pregnant women?

<u>Objective 2</u>. Did the intervention alleviate any potential negative effect of pregnancy on food insecurity?

[1]Cohen et al. JAMA Network Open. 2022; 5 (12): e2246158. doi:10.1001/jamanetworkopen.2022.46158
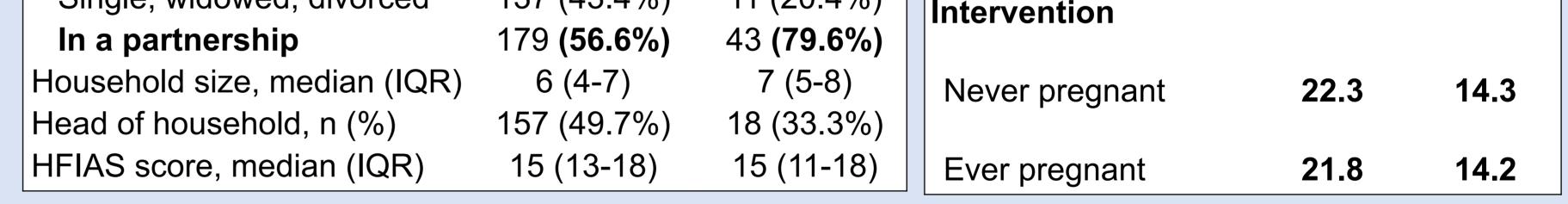
METHODS: The intervention

Shamba Maisha included:
a) **Market-interest loan** (~$175 USD)

b) **Agricultural implements**
(purchased with loan): a human-powered water pump (Super MoneyMaker®, KickStart International), seeds, fertilizers, and pesticides;

c) **Group-based training** in financial management and sustainable farming practices
• Conducted in first 3 months of follow up
• Didactics, discussions, hands-on skills learning at participant farms

METHODS: Study design and analysis

Study design
• Cluster RCT, Clusters were HIV treatment facilities (8 intervention, 8 control)

• Conducted in Kisumu, Homa Bay, and Migori counties in Kenya

• Adults eligible if:
  • received HIV treatment at enrolled facility
  • age ≥18 years old
  • moderately to severely food insecure
  • had access to arable land and surface water and/or shallow aquifers.

• Participants followed for 24 months.

• Ethical review and approval:
  • Kenya Medical Research Institute
  • University of California San Francisco

Study measures
• **"Ever vs. never" pregnant** in follow-up was based on self report. At endline, women were asked if they ever became pregnant during follow-up.
• **Change in food insecurity** was assessed via the Household Food Insecurity Access Scale (HFIAS) and modeled as the difference between endline and baseline HFIAS scores.

Analysis
• <u>Objective 1</u>:
We compared the change in food insecurity between the intervention and control groups
  • stratified by ever versus never pregnant.
• <u>Objective 2</u>:
We compared the change in food insecurity between those who ever and never became pregnant
  • stratified by randomization group
  • unadjusted and adjusted analyses (covariates: age, marital status, education, household size)
• We used linear regression models accounting for clustering at the facility level using the sandwich estimator of variance.

FINDINGS & INTERPRETATIONS

Among the 396 women enrolled in the trial
• 370 (93%) completed the final visit; 54 (14%) women reported an incident pregnancy

Table 1. Baseline characteristics of 370 women who completed the 24-month visit, stratified by ever/never becoming pregnant

	Never pregnant N=316	Ever pregnant N=54
Study Arm, n (%)		
Control	159 (50.3%)	20 (37.0%)
Intervention	157 (49.7%)	34 (63.0%)
Age, median (IQR)	**39 (33-47)**	**31 (28-34)**
Education, n (%)		
Primary or less	256 (81.0%)	42 (77.8%)
Some secondary or more	60 (19.0%)	12 (22.2%)
Marital status, n (%)		
Single, widowed, divorced	137 (43.4%)	11 (20.4%)
In a partnership	179 **(56.6%)**	43 **(79.6%)**
Household size, median (IQR)	6 (4-7)	7 (5-8)
Head of household, n (%)	157 (49.7%)	18 (33.3%)
HFIAS score, median (IQR)	15 (13-18)	15 (11-18)

Table 2. Mean HFIAS scores at baseline and endline among women in *Shamba Maisha*, stratified by intervention arm and pregnancy status.

	Baseline Mean	Endline Mean
Controls		
Never pregnant	**21.2**	**15.9**
Ever pregnant	**20.8**	**16.1**
Intervention		
Never pregnant	**22.3**	**14.3**
Ever pregnant	**21.8**	**14.2**

Objective 1: Shamba Maisha decreased food insecurity to a comparable degree in both "ever" and "never" pregnant women. (Table 3)

Table 3. Difference in the change in HFIAS between intervention and control arms stratified by pregnancy status.

	β	95% CI	
Ever pregnant	-2.84	-5.14	-0.53
Never pregnant	-3.00	-5.40	-0.61

Objective 2: Pregnancy was not associated with food insecurity in either group (Table 4)

Table 4. Difference in the change in HFIAS between ever and never pregnant women stratified by pregnancy status.

	β	95% CI	
Intervention arm			
Unadjusted	0.44	-1.12	2.00
Adjusted*	-0.06	-1.71	1.56
Control arm			
Unadjusted	0.28	-1.10	1.67
Adjusted*	0.82	-0.44	2.09

* Adusted for age, marital status, education, household size

CONCLUSIONS

In a cluster randomized trial in rural western Kenya, we found that an agricultural livelihood intervention reduced food insecurity among pregnant women living with HIV.

Despite the increased nutritional demands and potentially limited physical ability to engage in farming during pregnancy, the effects of the intervention were similar to those observed in non-pregnant women.

These findings support the potential for agricultural and livelihood interventions to address important underlying determinants of poor physical and mental health outcomes among pregnant women living with HIV.

ANH2023
Agriculture, Nutrition and Health Academy Week

National Institute of Mental Health