



An agricultural and finance intervention (*Shamba Maisha*) improved somatic growth of children living with HIV-affected households in western Kenya

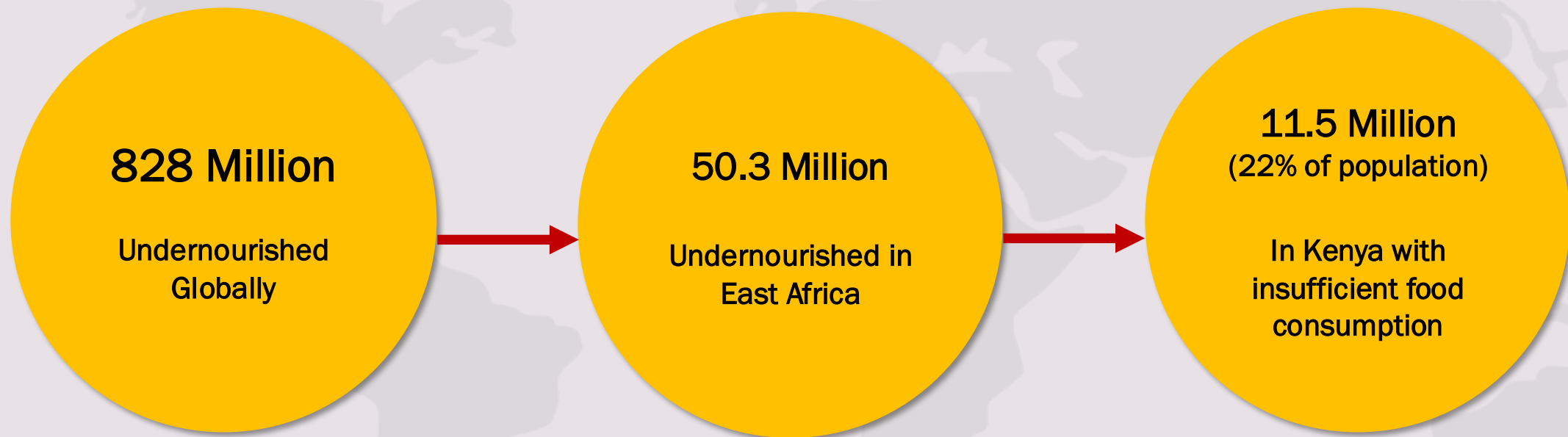
Craig R. Cohen, MD, MPH

Professor, Department of Obstetrics, Gynecology &
Reproductive Sciences

University of California San Francisco



Global Undernutrition



Kenya ranked #3 for
prevalence of
undernourishment in 2021

*Under 5 Child
Undernutrition in
Kenya*

Population: 7,035,351

26% of children are
stunted

11% of children are
underweight

4% of children are
wasted

*Study
Location:
Nyanza
Region*



Design and Methods

	"Parent" Study	Pediatric Study
Design	Cluster-Randomized Controlled Trial (C-RCT)	C-RCT, nested in parent C-RCT
Population	Men & women living with HIV, 18 to 60 years old, receiving antiretroviral therapy Farmland, surface water, food insecurity or malnutrition in the year preceding the study.	Children 6 to 36 months old + primary caregiver age 18+ from households/compounds in which a "parent" study participant resided
Intervention	Multisectoral agricultural intervention	
Control	Treatment as usual	
Primary Outcomes	Viral load suppression	Somatic growth - weight, length/height, head circumference, mid-upper arm circumference
Follow-up	24 months	24 months
Analysis	Intention-to-treat & per-protocol	Intention-to-treat. Analysis stratified by age at enrollment (6-24 months & 24-36 months). Mixed effects models - facilities and children as random effects while study arm and time (visit) as fixed effects. Linear contrast statements were used to estimate the trend across the 24 months (i.e., the whole study period) for intervention and comparison arm & the difference between arms in trend (i.e., change) over 24 months (5 visits)

Research question

Does a multisectoral, climate-adaptive, agricultural livelihood intervention improve growth outcomes for children under 5 living in households affected by HIV and food insecurity?



Shamba Maisha Intervention Components

1. Human powered irrigation Pump
2. Farming commodity loan (~\$175) to acquire micro-irrigation pump, seeds, and fertilizer
3. Structured training in sustainable agricultural practices and financial literacy



Cohen CR, Weke E, Frongillo EA, Sheira LA, Burger R, Mocello AR, Wekesa P, Fisher M, Scow K, Thirumurthy H, Dworkin SL, Shade SB, Butler LM, Bukusi EA, Weiser SD. *Effect of a multisectoral agricultural intervention on HIV health outcomes among adults in Kenya: A cluster randomized clinical trial.* JAMA Netw Open. 2022; 5(12):e2246158



Results

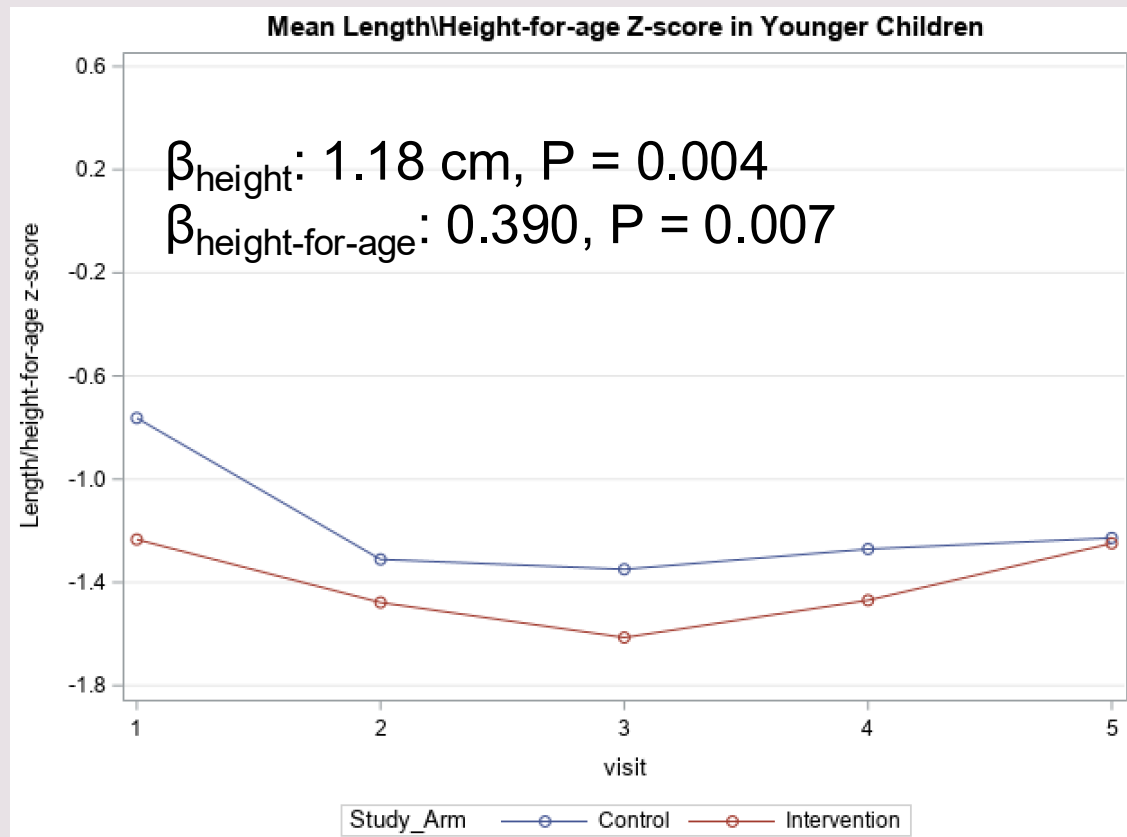
Participant Characteristics

	Intervention (n=173)	Control (n=186)
Age in months - mean (SD)	21.5 (9.7)	20.5 (9.0)
Sex (Female) – n (%)	94 (54.6)	91 (51.1)
Household food insecurity and access – n (%)		
Mildly food insecure	3 (1.8)	3 (1.7)
Moderately food insecure	44 (26.0)	46 (26.0)
Severely food insecure	122 (72.2)	128 (72.3)
Water insecurity score - mean (SD)	10.2 (9.3)	7.5 (8.5)

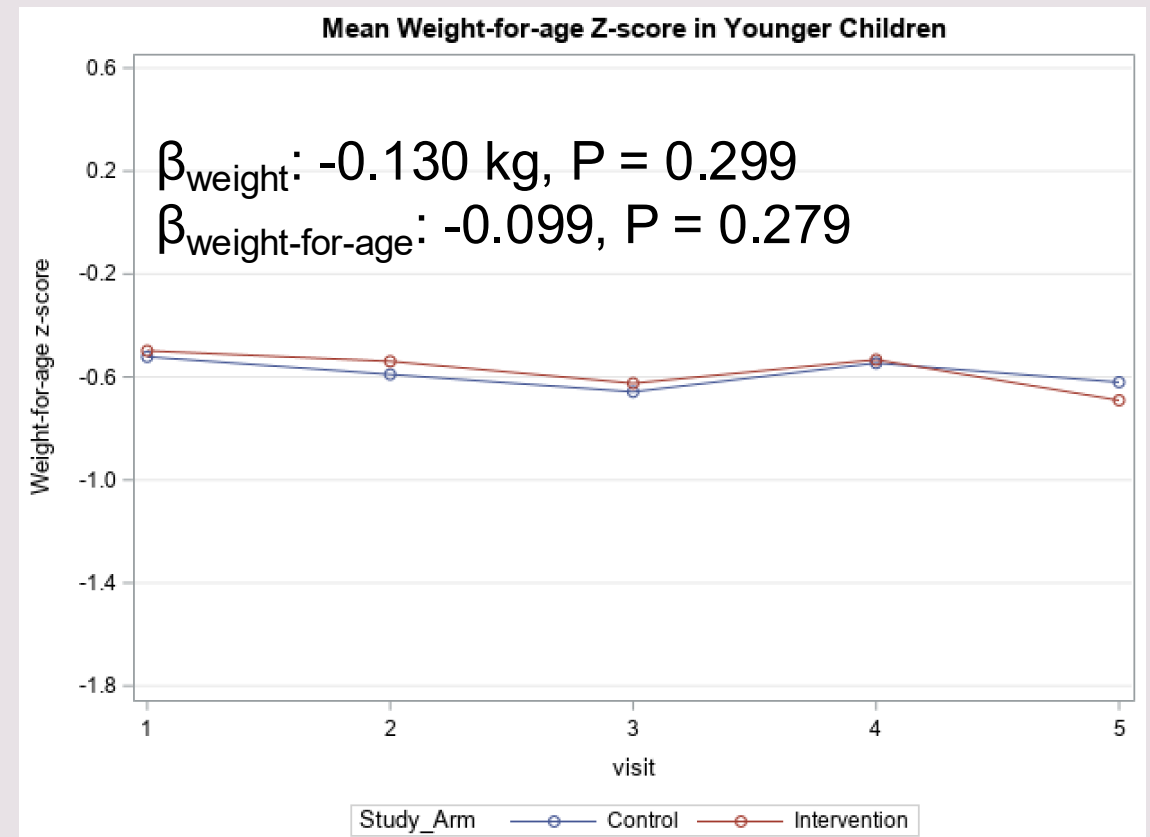
Length and Weight for Age Z-scores

Younger Children (enrolled at 6-24 months)

Length For Age Z-score – Graph



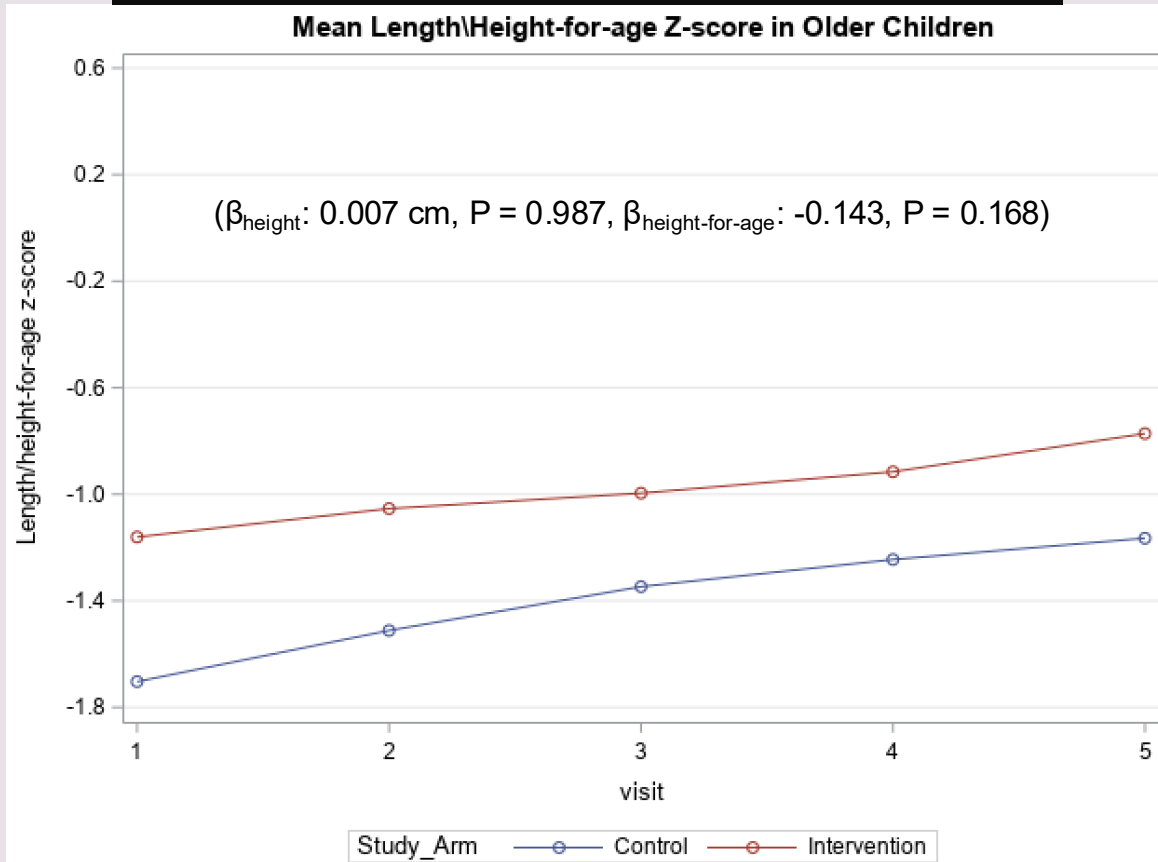
Weight for Age Z-score



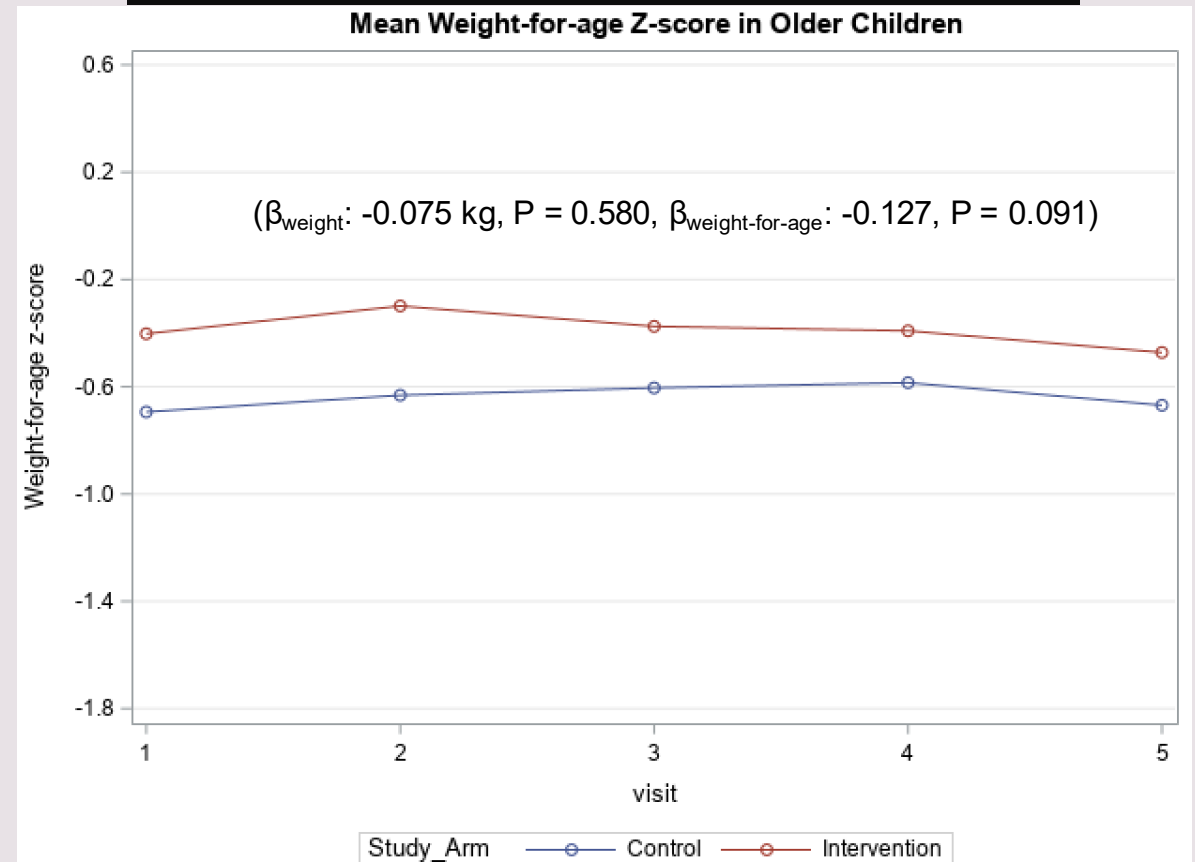
Length and Weight for Age Z-scores

Older Children (enrolled at 24-36 months)

Length For Age Z-score – Graph



Weight for Age Z-score



Summary – Somatic Outcomes



In Younger Children (6-24 months)

- The intervention had a **positive effect** on **length\height**
- **No effect** was observed on **weight**
- The intervention's strong effect on length\height but not on weight explains the lower gain in BMI and weight-for-length\height z-scores

In Older Children (24-36 months)

- **No effect** was observed on weight or length\height

Effects of Improved Nutrition in Childhood

REDUCED
VULNERABILITY
TO DISEASE

IMPROVED
COGNITIVE
DEVELOPMENT

REDUCED
STUNTED
GROWTH



Improved effects across lifespan, including, health
school performance & future productivity

Acknowledgements: Pediatric Shamba Maisha Team

Lisa M. Butler | Queen's University

Phelgona Otieno | KEMRI

Kate Powis | Massachusetts General Hospital

Betsy Kammerer | Boston Children's Hospital

Gloria Ger | KEMRI

Elly Weke | KEMRI

Amarachukwu F. Orji | George Mason University

Sheri Weiser | University of California, San Francisco

Craig Cohen | University of California, San Francisco

Bezawit Kase | University of South Carolina

Edward Frongillo | University of South Carolina

Martin Fisher | KickStart International



Where the world comes for answers

We are grateful for the work and care of KEMRI/Shamba Maisha staff, the many families who participated in the *Shamba Maisha* studies, and funding support from the National Institutes of Mental Health: NIMH R01MH109506 (L Butler) & NIMH R01MH107330 (C Cohen & S Weiser)

A photograph showing two individuals in a rural agricultural setting. One person, wearing a patterned shirt and a headwrap, is operating a manual pump. Another person is assisting. Water is being sprayed from the pump onto a field of young green plants. The background is filled with lush greenery, including banana trees and tall corn stalks. The sky is bright and slightly cloudy.

For more information

<https://shambamaisha.ucsf.edu/>