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Effectiveness of Multisectoral Programming to Improve Nutrition-Sensitive Agriculture, Nutrition, and Health:

Experiences from Nepal, Bangladesh, and Uganda

May 12, 2021

Dale Davis Nassul Kabunga Neena Joshi Laurie Miller Katie Appel

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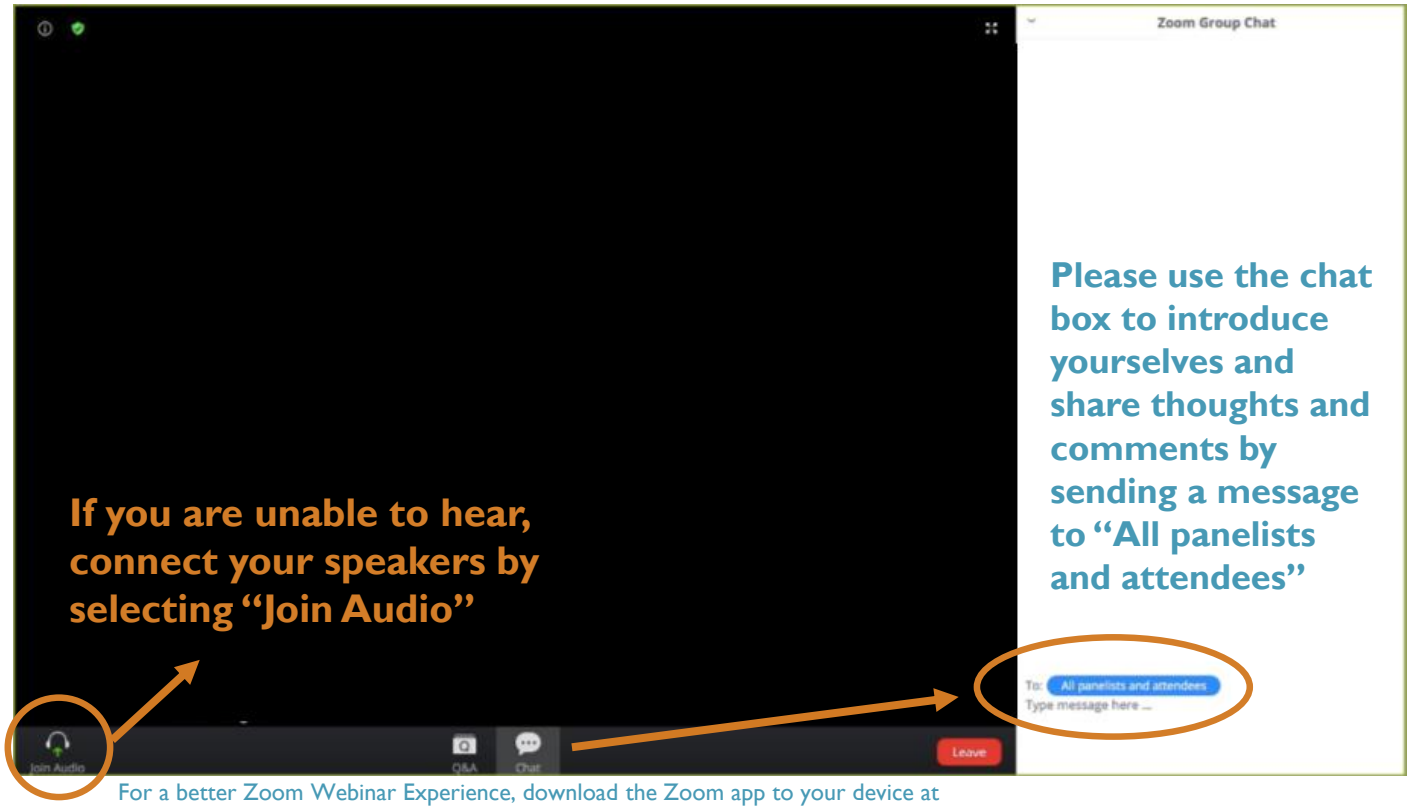

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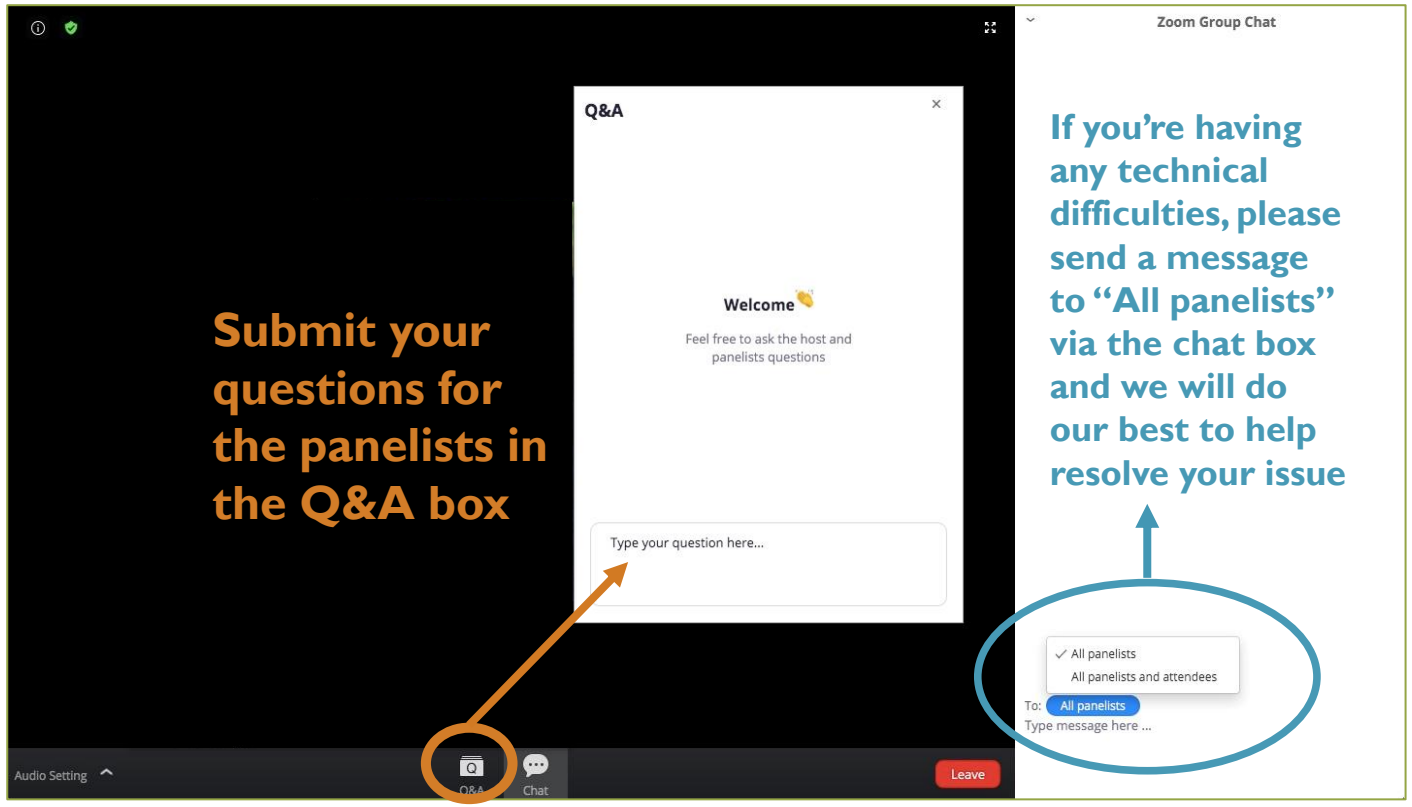
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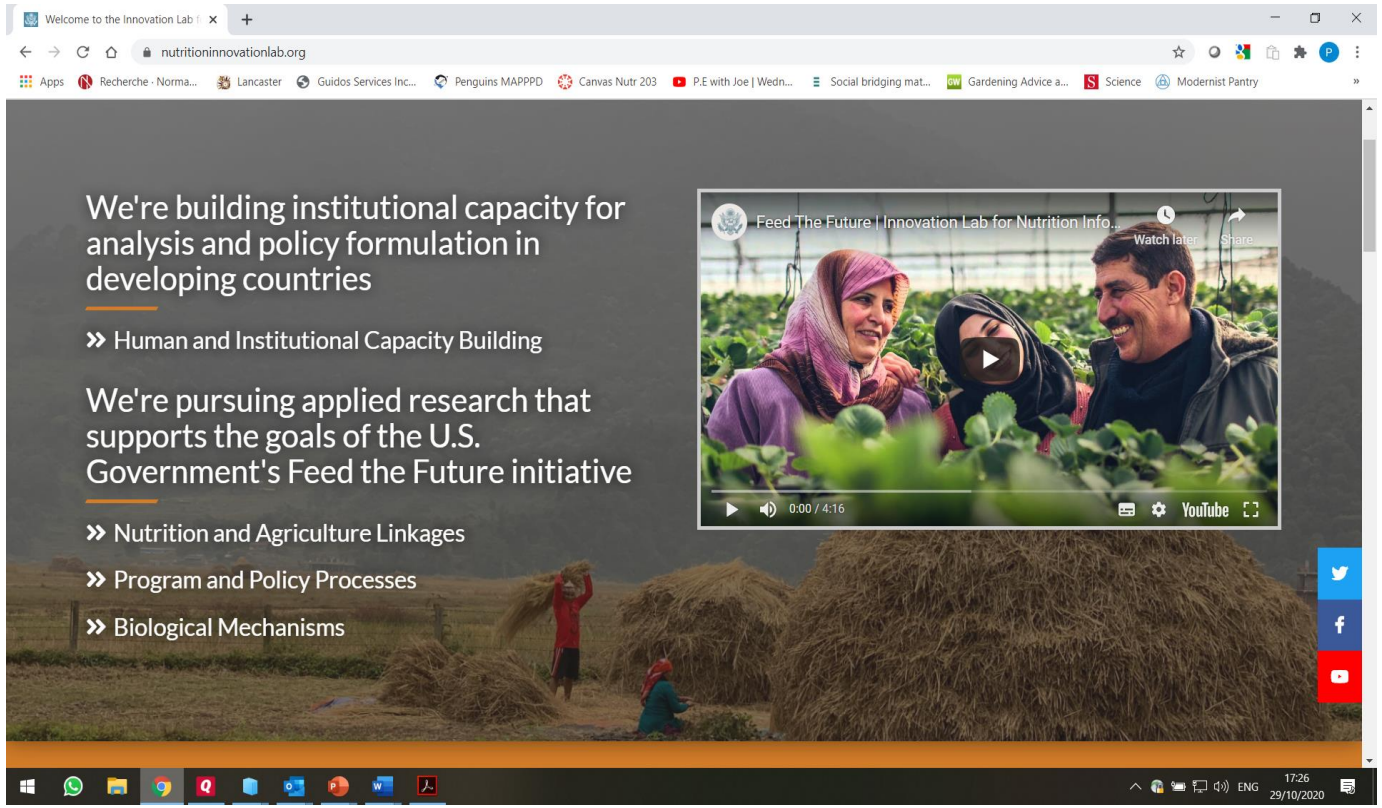

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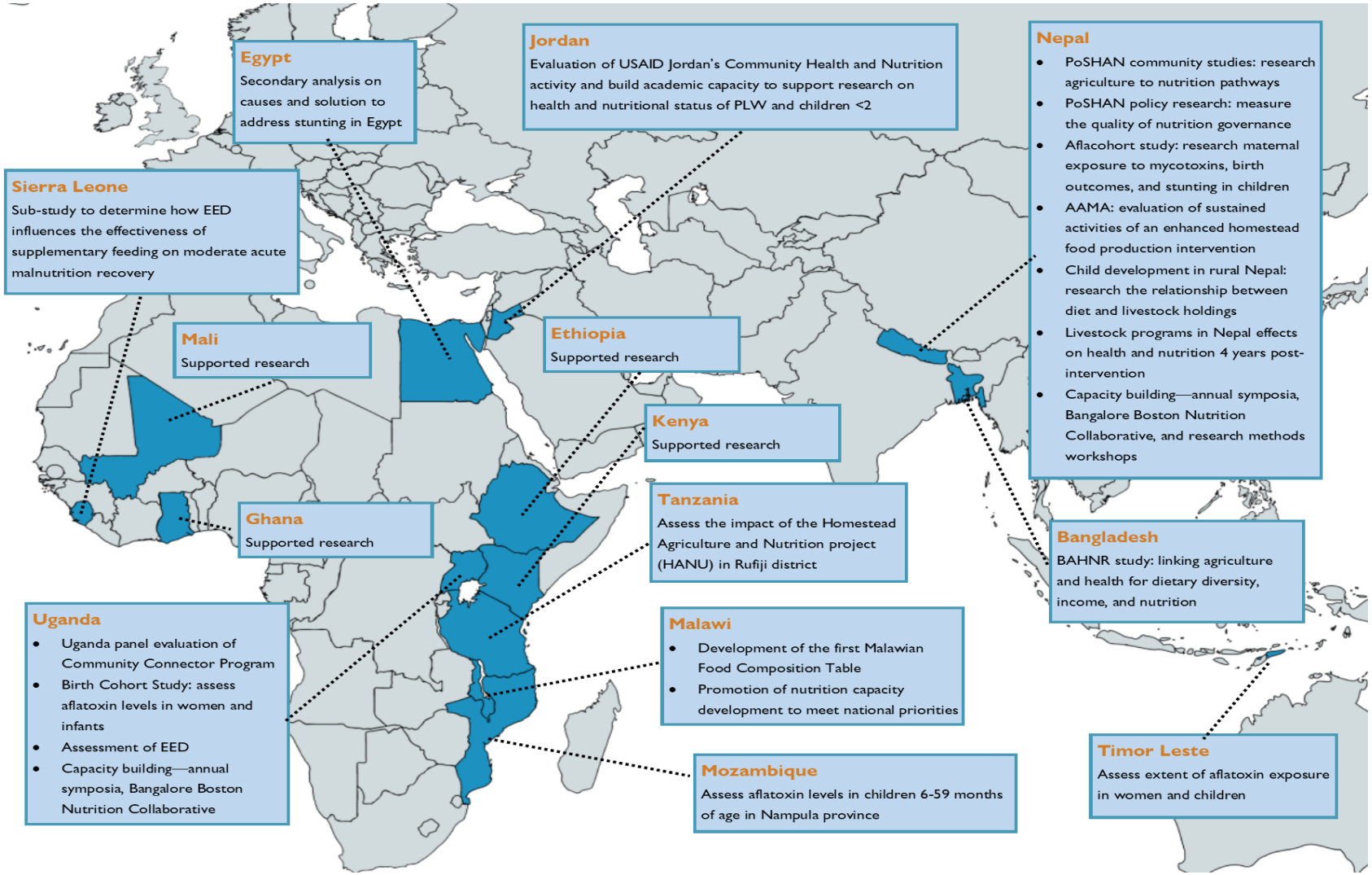

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WEBINAR SERIES

Effectiveness of Multisectoral Programming to Improve Nutrition-Sensitive Agriculture, Nutrition and Health:
Experiences from Nepal, Bangladesh and Uganda

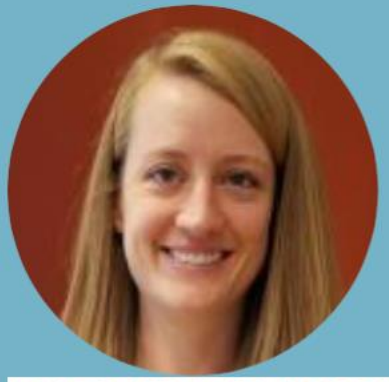
WEDNESDAY, MAY 12TH
9:00AM - 10:30AM (ET)

DALE DAVIS
Helen Keller International

NASSUL KABUNGA
Tufts University

LAURIE MILLER
Tufts University

NEENA JOSHI
Heifer International



KATHERINE APPEL
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Evaluation of the USAID Community Connector Program in Uganda

Nassul Kabunga, PhD, Tufts University

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BACKGROUND

- Showing evidence on the interlinkages between agriculture, nutrition and health is key to inform policy and programming.
    - Integrating nutritional concerns in agricultural policies and ensuring proper allocation of resources can increase access to diverse nutrient-dense diets in rural agrarian settings.
- This study assessed the impact of the Community Connector (CC) Program implemented by FHI360 in 15 Ugandan districts
    - Specifically, we wanted to establish if selected CC interventions had impacted on intermediary/pathway outcomes as well as maternal and child nutrition and health outcomes

CONTEXT: THE CC PROGRAM

Some details on the CC interventions:

- **Funding:** USAID for a 5-year period (2012-2016) and implemented by FHI360 in collaboration with local governments and CBOs
- **Goal:** To reduce malnutrition among the most vulnerable populations (women of reproductive age and children <5years) in rural areas, using the integrated agriculture-nutrition approach
- **Point of intervention:** Community (parish) level using existing (and new) community groups, e.g. women groups, youth groups, etc.
- **Choice of interventions**: Based on the gaps identified at the needs assessment exercise conducted by CC prior to implementation in agriculture, nutrition and health. (extension messages, seedlings, inputs, behavior change communication, financial services, dietary practices, etc.)

CONTEXT: THE COMPLEX "CC-SEE 10"

Specifically, CC aimed to promote 10 outputs or the "CC See-10":

1. Women/family are saving (Saving with a Purpose)
2. WaSH facilities (toilets, garbage pits, utensil drying racks, hand washing)
3. Homestead compound is clean and neat
4. Pumpkin, amaranth and other vegetables are planted
5. At least 4 papaya trees, 1 avocado tree or other fruit trees are planted
6. Family have chickens, goats or an apiary
7. At least one agricultural income generation activity
8. Acquisition of production assets (e.g. hoes, pangas, spray pumps, ox plough)
9. Enough food stocks to last three months (in garden or store)
10. Signs that family members support each other in decision making

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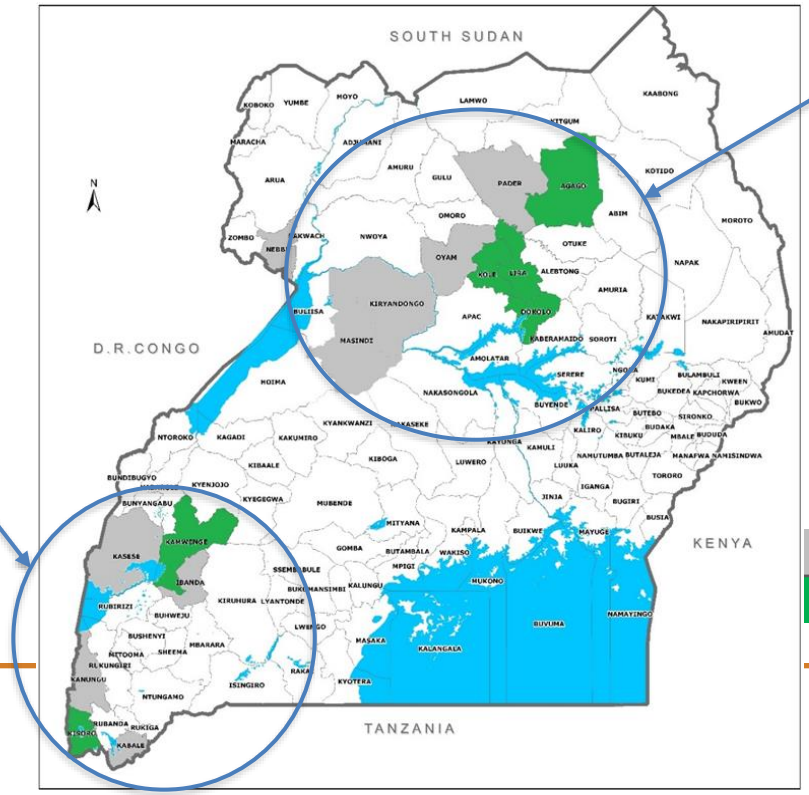
THE CC PROGRAM/ EVALUATION DESIGN

Regional focus: 15 districts in Northern Uganda and South/SW Uganda, with high prevalence rates of poverty and malnutrition in 2012 (UDHS 2012)

Map of Uganda

South/S-Western
1. Ibanda
2. Kabale
3. Kamwenge
4. Kanungu
5. Kasese
6. Kiryandongo
7. Kisoro
8. Masindi



Northern
1. Agago
2. Dokolo
3. Kole
4. Lira
5. Nebbi
6. Oyam
7. Pader

Key to Map

- CC intervention districts
- CC districts sampled for impact study

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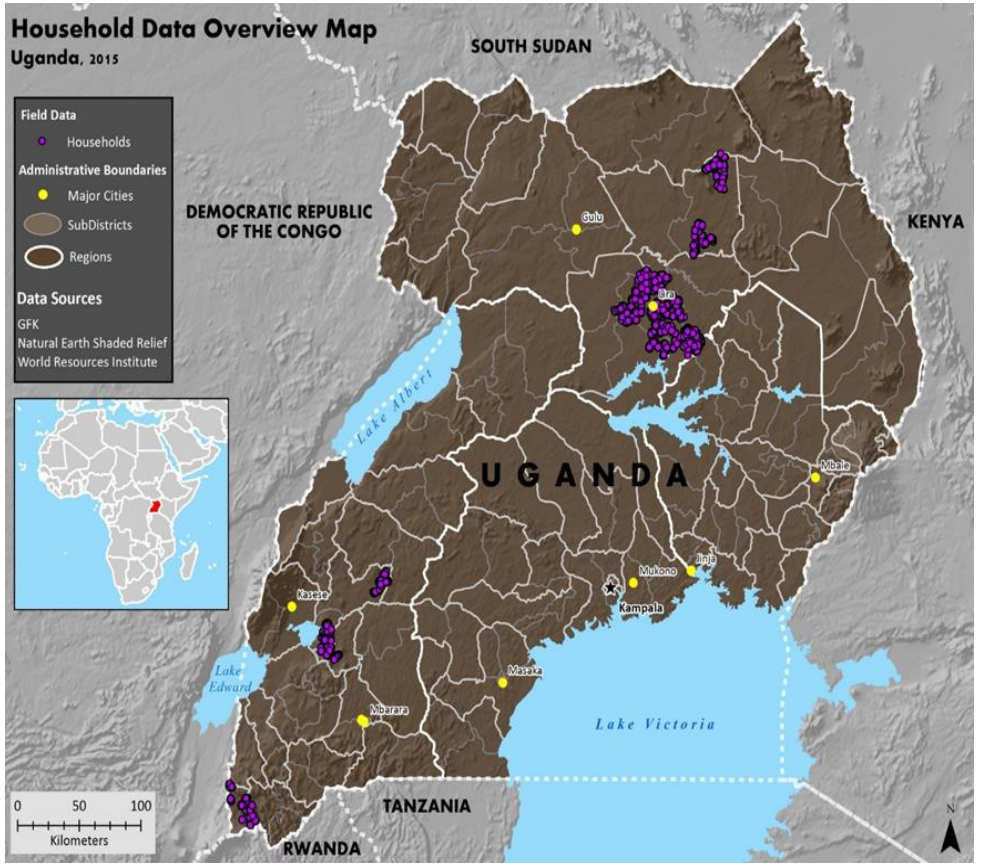
THE EVALUATION DESIGN

- A random sample of households was selected from study parishes from the 6 districts
- At baseline (in 2012), ~3,600 households were interviewed; (~600 per district)
- ~3,200 households were followed in each survey round in 2014 and 2016; covered over 12,000 children (0-5 years)
- Collected a range of data on socio-economics, agriculture, nutrition, health, endowments, gender, etc.
- Blood samples to test for Malaria and Hemoglobin
- Anthropometry (body measurements) on over 12,000 children (0-5 years) were done for all rounds

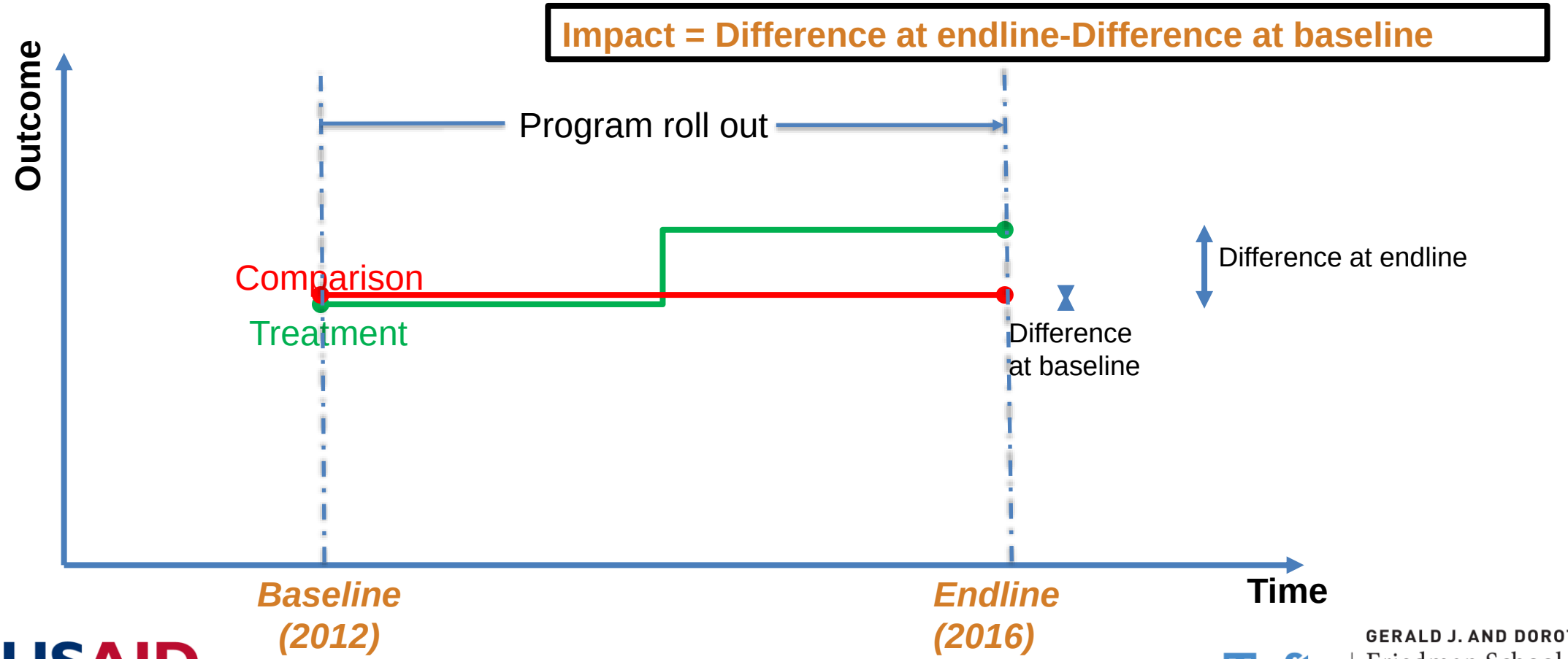


ANALYTICAL STRATEGY

Difference-in difference:

- Difference-in-Difference approaches were used on 2 sets of household panel datasets:
  - at baseline in 2012 (prior to CC rollout), and at endline in 2016 (after CC closure)
- We compare outcomes for households/individuals in CC parishes vs. non-CC parishes ("treatment" vs. "control")
- Based on the FGDs, a parish is classified as:
  - "CC treated" if a substantial level of activity took place there
  - "Control" if none or minimal/superficial level of intervention occurred
- All households in a CC parish were considered beneficiaries of the "treatment" (and vice-versa).

ANALYTICAL STRATEGY



IMPACT RESULTS: KEY NUTRITIONAL OUTCOMES

Child and Maternal Nutrition Outcomes:

- CC did not significantly improve a range of child and maternal nutrition outcome indicators except for **maternal anemia**, which reduced by **8%** due to CC multi-sectoral interventions.

Indicator	Effect	Interpretation
Maternal anemia	**Negative (8%)**	**Reduced** ✓
Maternal underweight	0	None
Child stunting	0	None
Child underweight	0	None
Child anemia	0	None

IMPACT RESULTS: INTERMEDIARY OUTCOMES

Agricultural technologies:

- CC only improved the use of **inorganic fertilizers** by **3%.** No other targeted indicators improved during the study period.

Indicator	Effect	Interpretation
Use of inorganic fertilizers	**Positive (3%)**	**Increased** ✓
Use of organic fertilizers	0	None
Use of improved seed	0	None
Use of agro-chemicals	0	None
Poultry vaccinations	0	None

IMPACT RESULTS: INTERMEDIARY OUTCOMES

Food production diversity:

- CC significantly increased the number of food species grown by households based on various production indices.

Indicator	Effect	Interpretation
Total species	**Positive**	**Increased** ✓
Crop species	**Positive**	**Increased** ✓
Livestock species	**Positive**	**Increased** ✓
Crop groups	**Positive**	**Increased** ✓
FAO food groups	**Positive**	**Increased** ✓
Cereals and Tubers + vegetables	**Positive**	**Increased** ✓
Legumes, Fruits and Cash crops	0	None

IMPACT RESULTS: INTERMEDIARY OUTCOMES

Maternal dietary diversity:

- A number of nutrient dense foods (meat and vegetables) were significant contributors to women's dietary patterns.

Indicator	Effect	Interpretation
Cereals and Tubers	0	None
Legumes	**Negative**	**Reduced** ✗
Oilseeds	0	None
Vegetables	**Positive**	**Increased** ✓
Fruits	0	None
Meats	**Positive**	**Increased** ✓
Fats and Oils	**Positive**	**Increased** ✓

IMPACT RESULTS: INTERMEDIARY OUTCOMES

WaSH habits:

- CC significantly improved the households' ownership of drying racks for utensils by ~13% of households
- CC programs did not seem to impact other WasH indicators in meaningful ways

Indicator	Effect	Interpretation
HH drinks boiled water	0	None
Handwashing habits #	0	None
Toilet facility	0	None
Drying rack for utensils	**Positive**	**Increased** ✓

IMPACT RESULTS: INTERMEDIARY OUTCOMES

Financial services and affiliation to social groups:

- CC increased the share of households saving and receiving money from social groups by **5%** and **7%**, respectively

Indicator	Effect	Interpretation
HH received credit	0	None
HH saved money in social group	**Positive**	**Increased** ✓
HH received credit from social group	**Positive**	**Increased** ✓

IMPACT RESULTS: INTERMEDIARY OUTCOMES

ANC and maternal health seeking behaviors:

- CC did not seem to affect disease incidences or ANC visits during last pregnancy
- However, CC significantly improved health center treatments and child deliveries by 8% and 5%, respectively.

Indicator	Effect	Interpretation
Maternal sickness	0	None
Hospital treatment in case of illness	**Positive (8%)**	**Improved** ✓
Use of insecticide-treated nets	0	None
4+ recommended ANC visits	0	None
Last birth delivered at health facility	**Positive (5%)**	**Improved** ✓

TAKE-HOME MESSAGES

- Using a case of the USAID-funded Uganda CC program, implemented for ~5 years, we showed that multi-sectoral programs can potentially improve health and nutrition outcomes of vulnerable populations
- There were substantial improvements in food production diversity leading to some level of improved dietary quality, positive health seeking behaviors and rural financial (credit and saving) services
    - ➔ Points to the positive changes in the intermediary indicators necessary to influence better health and nutrition outcomes
- Unfortunately, there was no convincing evidence of improved maternal and child nutrition outcomes for the choice of CC interventions implemented, save for maternal anemia that reduced by 8%.
    - ➔Perhaps, 5 years of implementation were not sufficient to cause the desired long-term changes in the nutrition outcomes
- Long-term interventions with much more intensified and wider coverage of key packages (the Agric-WaSH-Nutrition combinations) may lead to more consistent results

TAKE-HOME MESSAGES

- Implementing multi-sectoral programs is difficult but doable, requiring multi-sectoral personnel with a broad range of technical knowledge and the willingness to adjust for individuals and systems
- But measuring impact can be enormous, quite complex and very challenging. For Uganda CC, not all interventions were implemented true to the original design/plan:
  - Some parishes, received a completely different package of interventions than planned;
  - Some parishes only received partial interventions (initial outreach with little follow-up);
  - Other parishes within CC intervention sub counties received no interventions at all
- The analysts should have a range of technical skills and knowledge of the intervention packages and the plausible indicators to be focus on in the evaluation including:
  - The intervention package combinations that will likely yield optimal and measureable indicators;
  - What to consider as a proper "control" or counterfactual for each of the treatments;
  - The analytical tools (statistical methods, software, etc.) among others.

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Multisectoral Community Development in Rural Nepal

Neena Joshi, Heifer International Nepal

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FOR MORE THAN

75

YEARS

we have partnered with and helped communities.

WE WORK IN

21

COUNTRIES

to attain sustainable livelihoods through community-owned interventions.

WE'VE PROVIDED

35+

MILLION

families the tools and training to lift themselves from poverty.

NEARLY

1

BILLION

people around the world still live in poverty.

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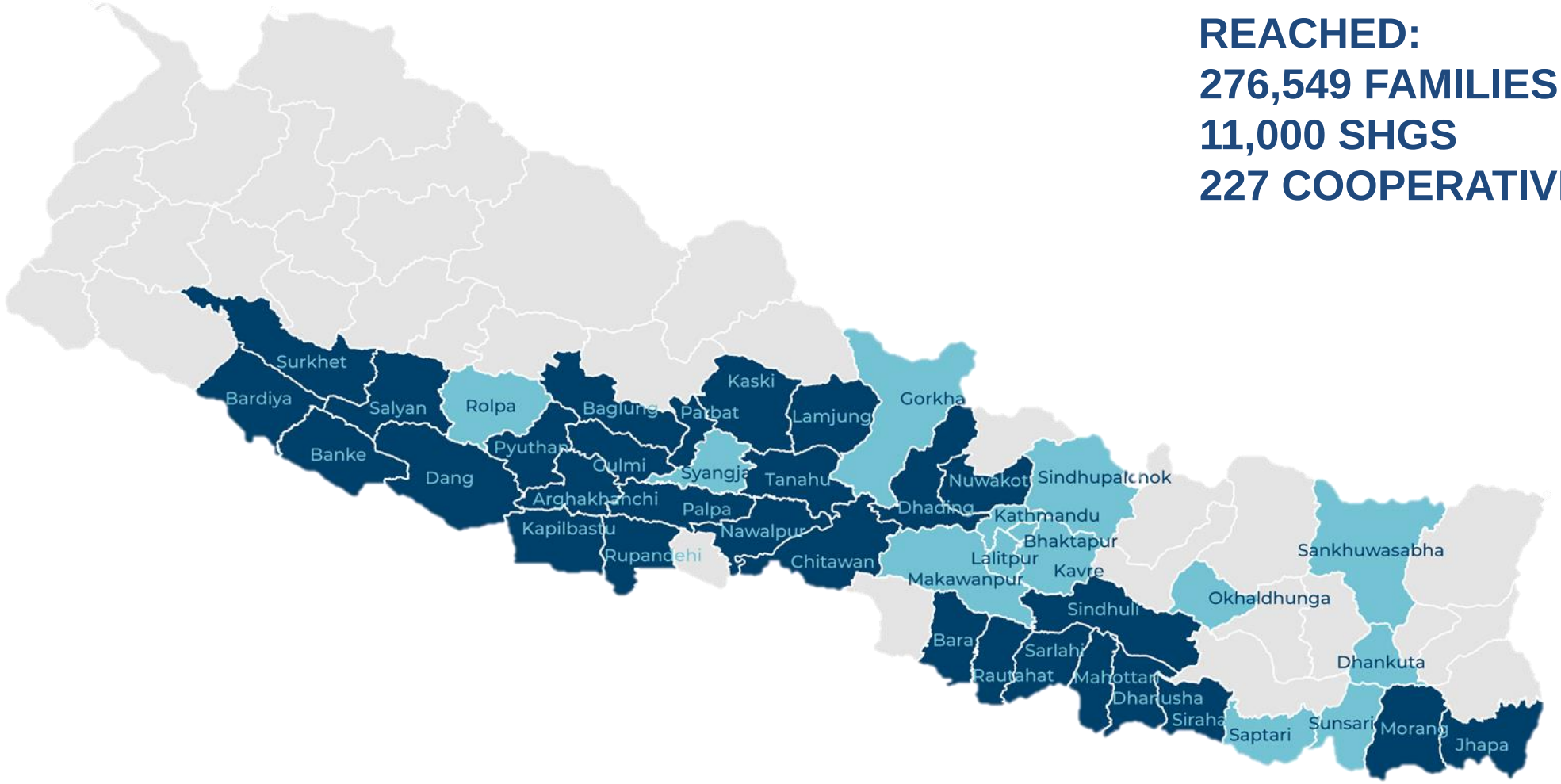

REACHED:
276,549 FAMILIES
11,000 SHGS
227 COOPERATIVES

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WHERE WE FOCUS OUR WORK

( +  + ) × ( + )

Increase Income & Assets

Food Security

Environment

Women's Empowerment

Social Capital

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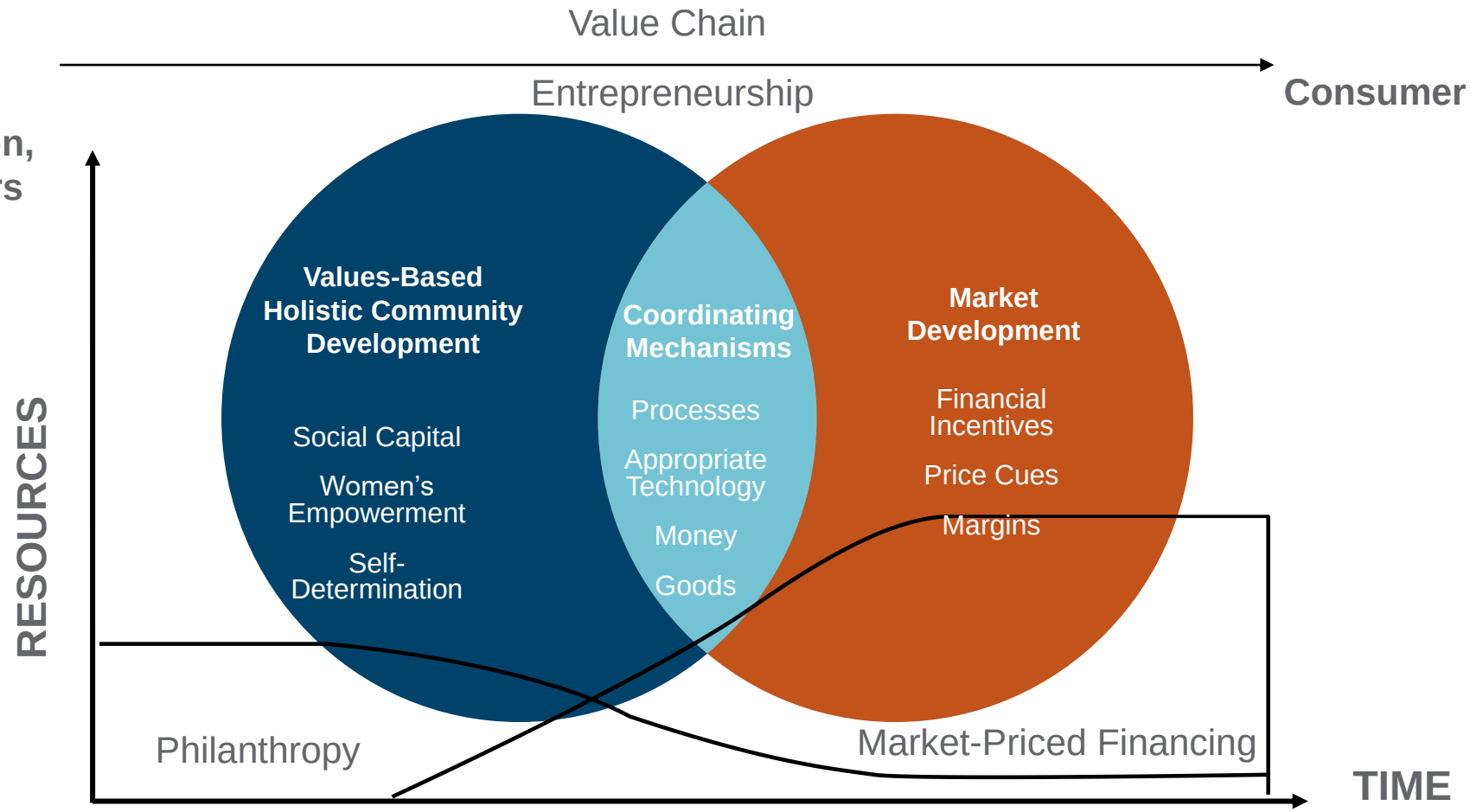
Value Chain
Inputs, Production, Producers
Entrepreneurship
Consumer
RESOURCES
Values-Based Holistic Community Development
Social Capital
Women's Empowerment
Self-Determination
Coordinating Mechanisms
Processes
Appropriate Technology
Money
Goods
Market Development
Financial Incentives
Price Cues
Margins
Philanthropy
Market-Priced Financing
TIME

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Multisectoral Community Development in Rural Nepal

Laurie C. Miller, MD, Tufts University

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Livelihoods

Social capital development

Livestock and resource management

Accountability

Sustainability and self-reliance

1: What happens to child growth and diet in a multisectoral program that *doesn't* address these areas?

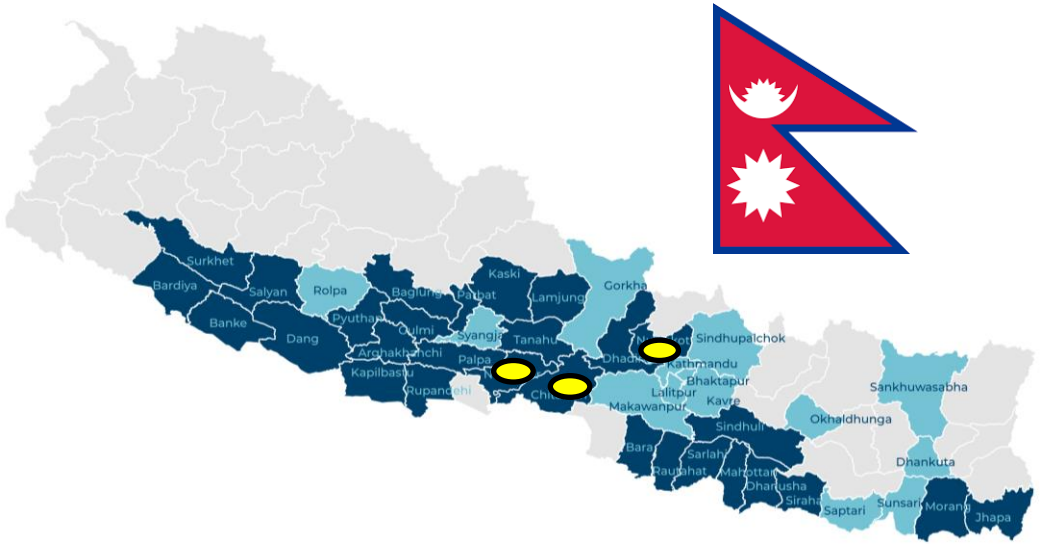
2: Is it the training and livestock donation? Or the community development? What part of the Heifer program is most important to child outcomes?

- Unintended consequences
- Lessons learned

1: What happens to child growth and diet in a multisectoral program that *doesn't* address these areas?

- Does Heifer's program improve livelihoods as it's designed to do?

- 415 HHs, 607 children 6-60 months

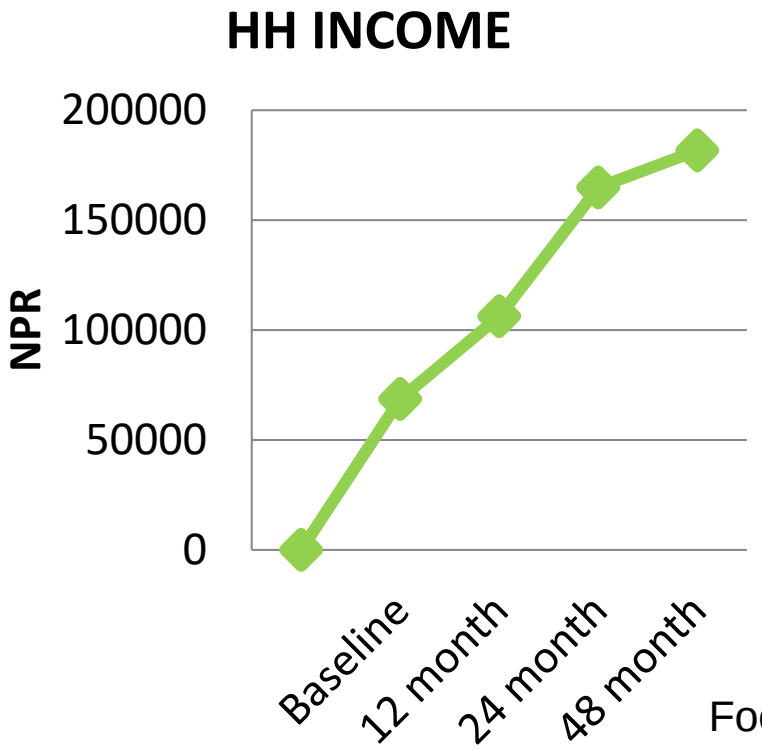


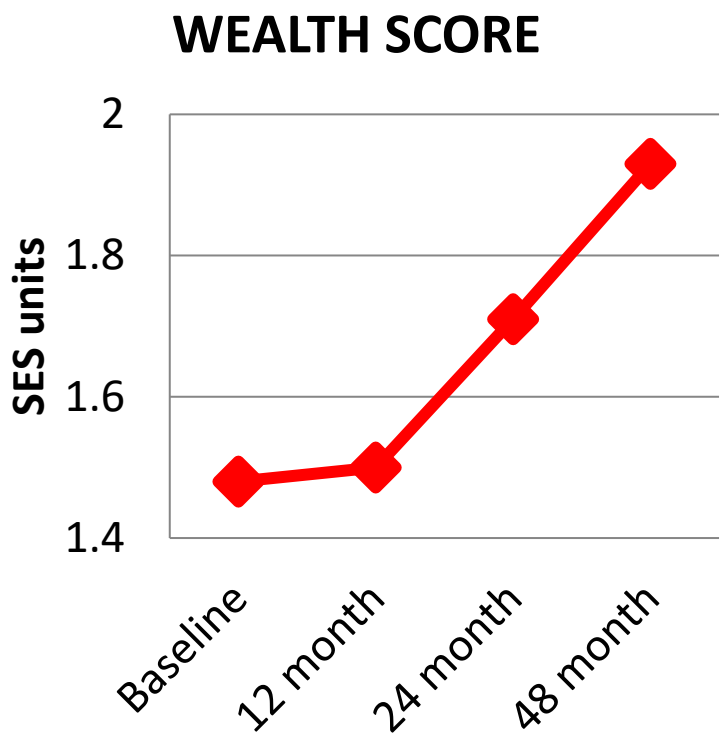
- Staggered introduction design

Intervention	Heifer Program					
Control	No inputs		Heifer Program			
Baseline	6	12	18	24		48

The intervention works…

household income and wealth

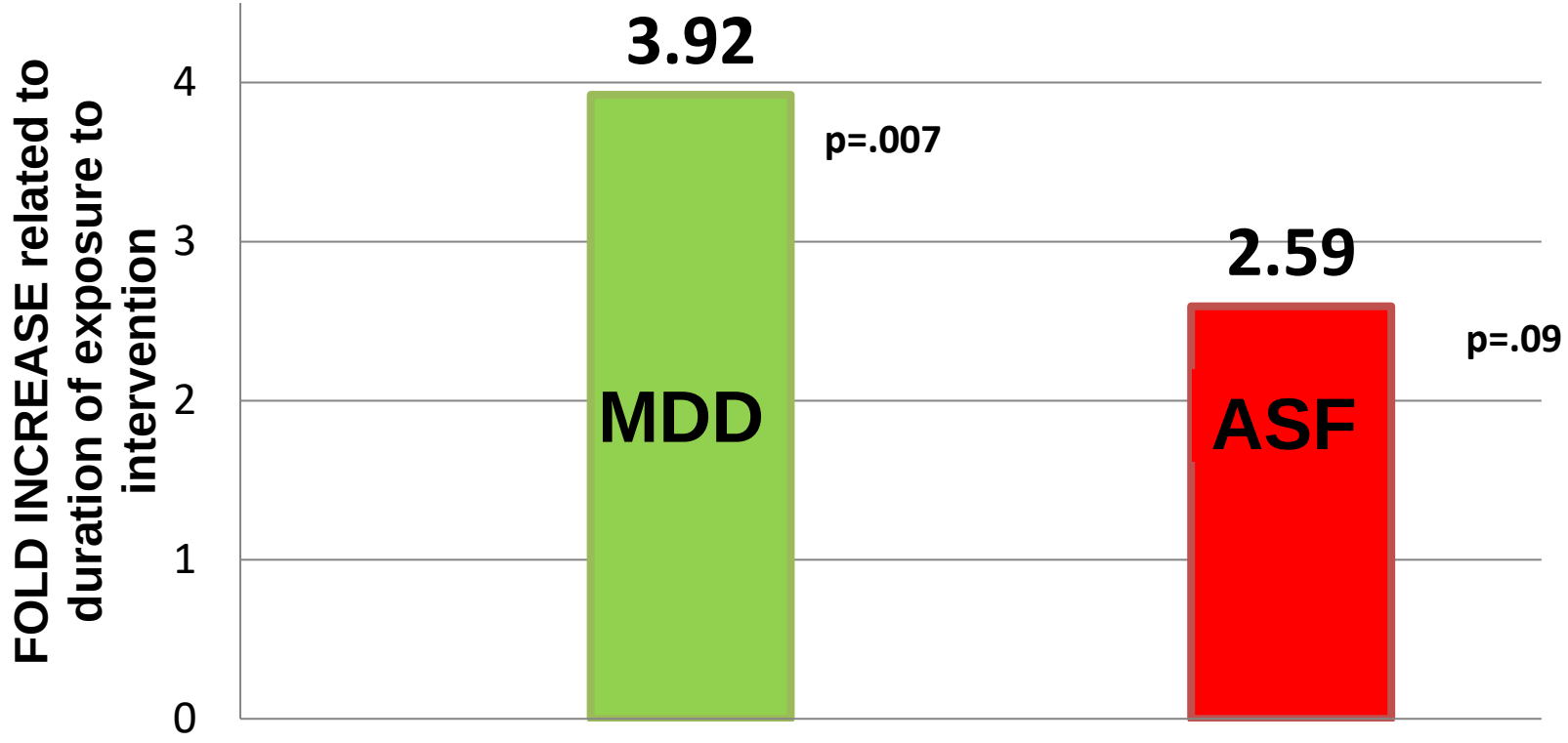




Food Nutr Bull 2014 35:312

The intervention works…

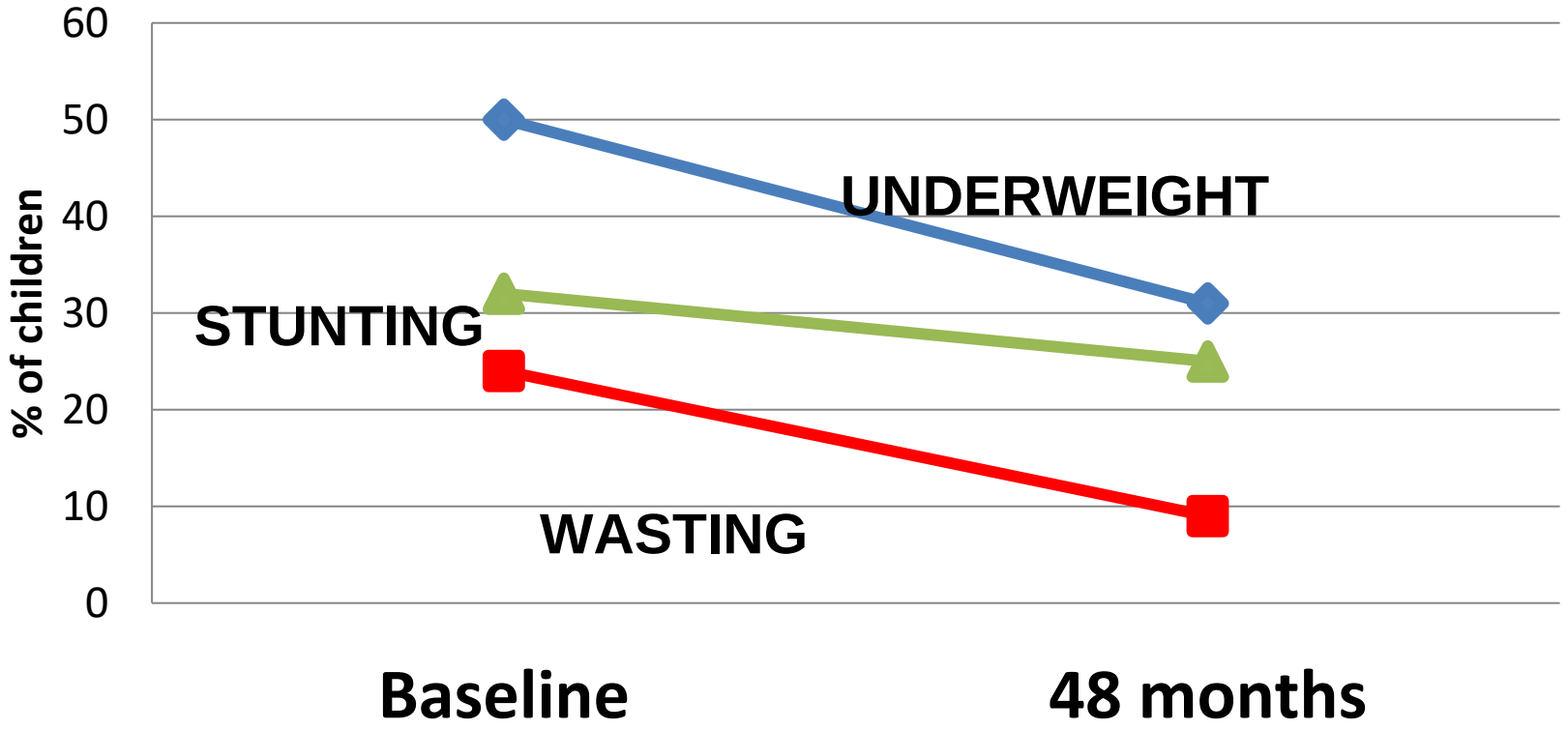
child minimal dietary diversity and ASF consumption



Food Policy 61 (2016) 185–197

The intervention works…

decrease in undernutrition

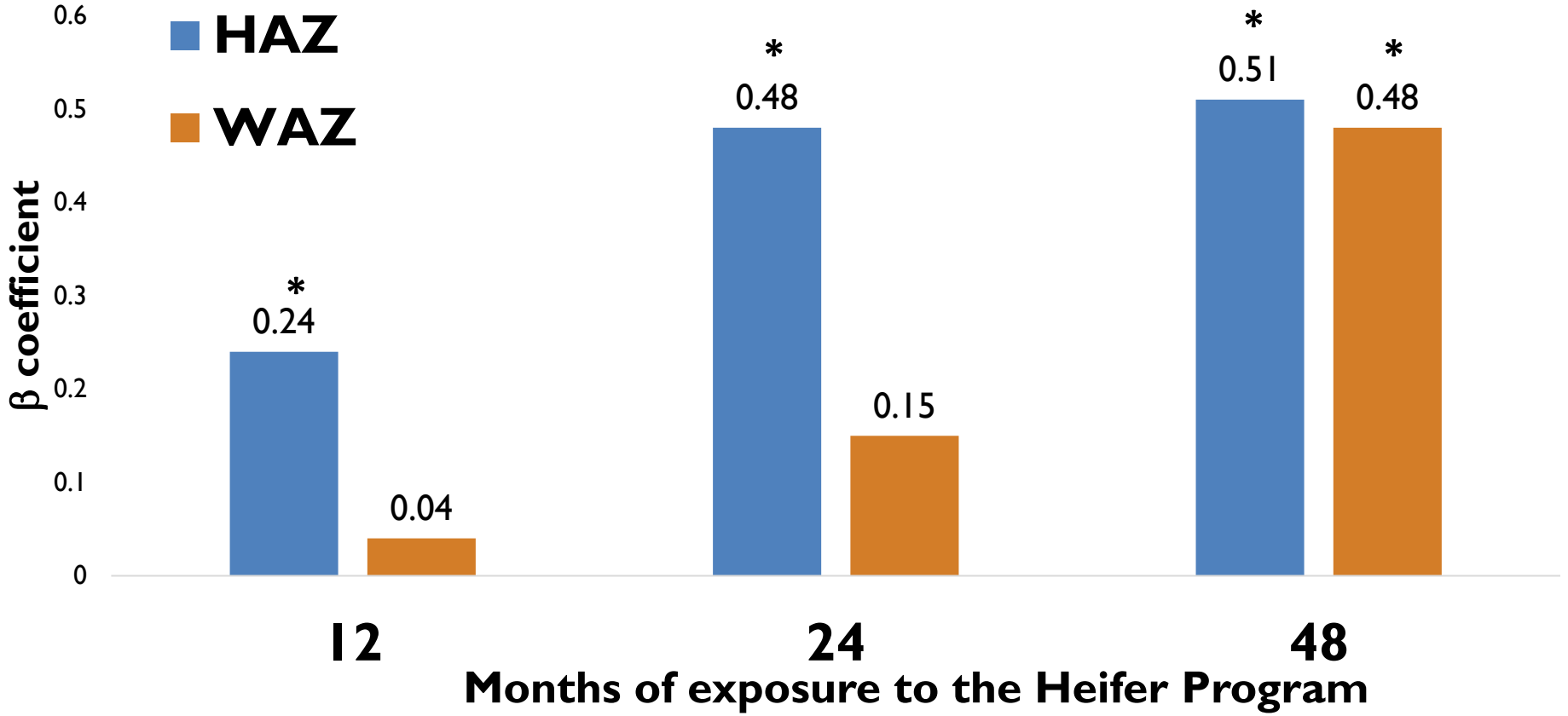


all p<.0001

J Devel Effectiveness, 2017, 9:101

But…it takes time…

Impact of intervention on growth takes time

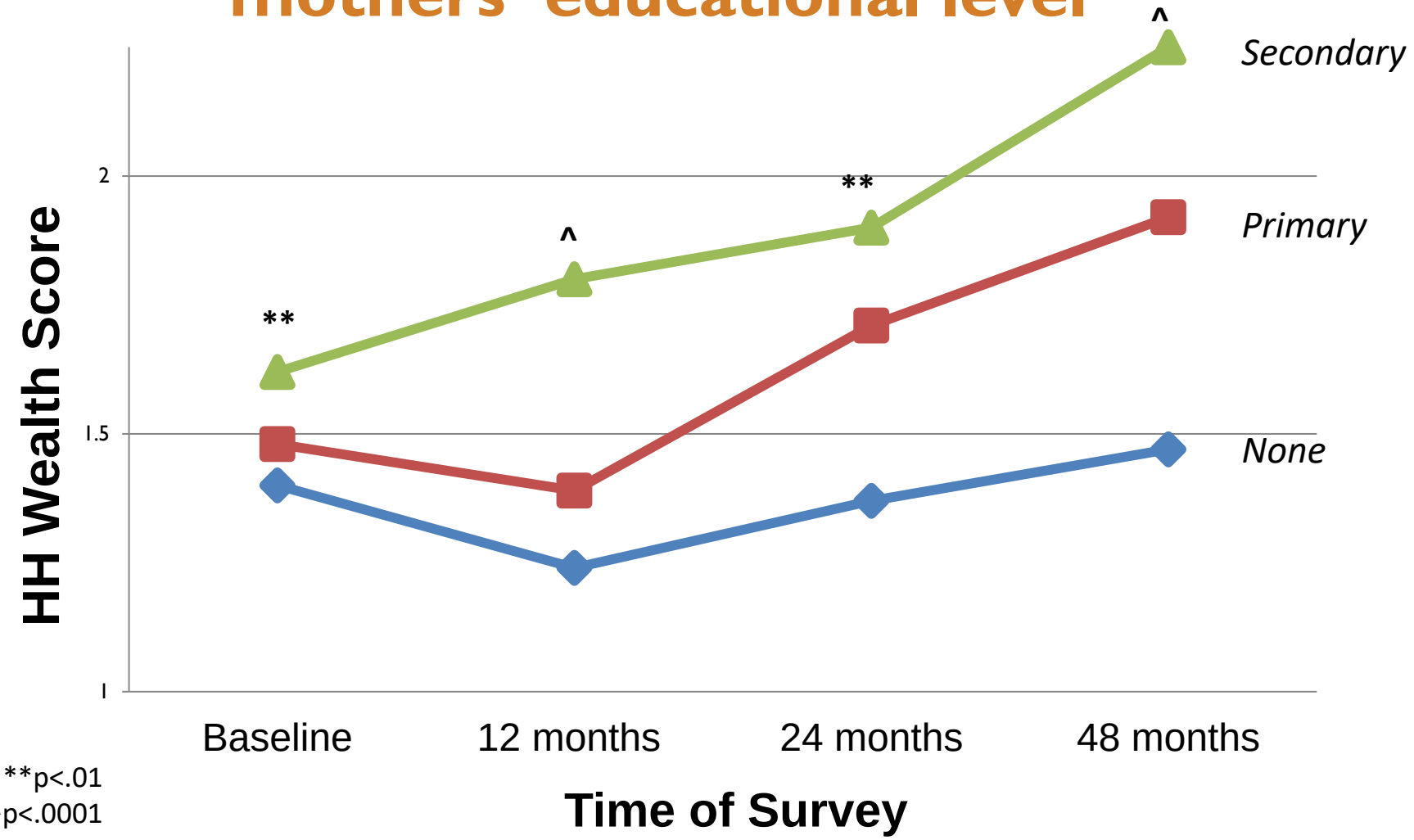


J Devel Effectiveness, 2017, 9:101

Adjusted for gender, age, Terai, baseline HH status
[land and animal ownership, SES, income, sanitation]


inputs
outputs

HH wealth over time relates to mothers' educational level



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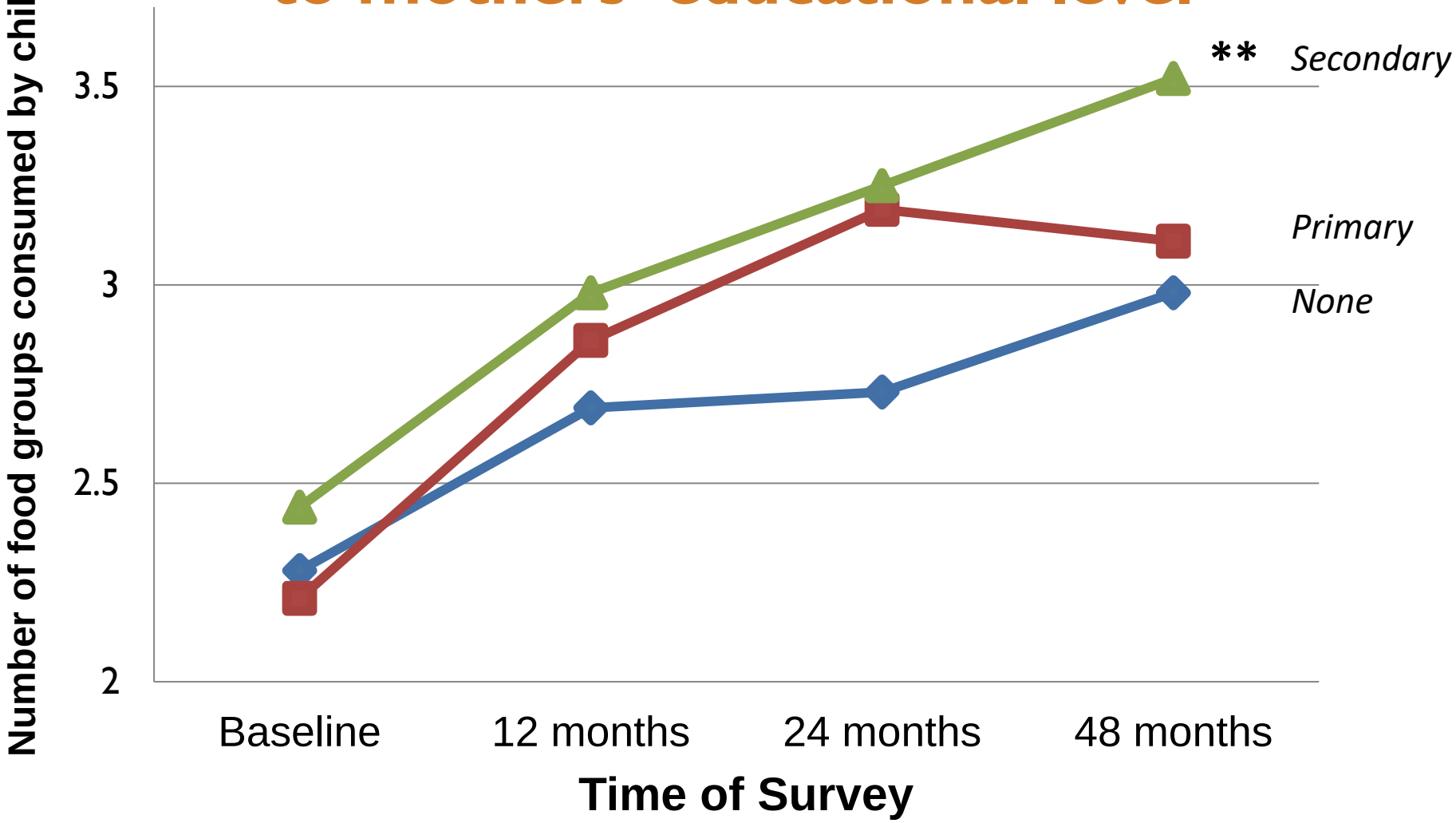
Child diet diversity over time relates to mothers' educational level



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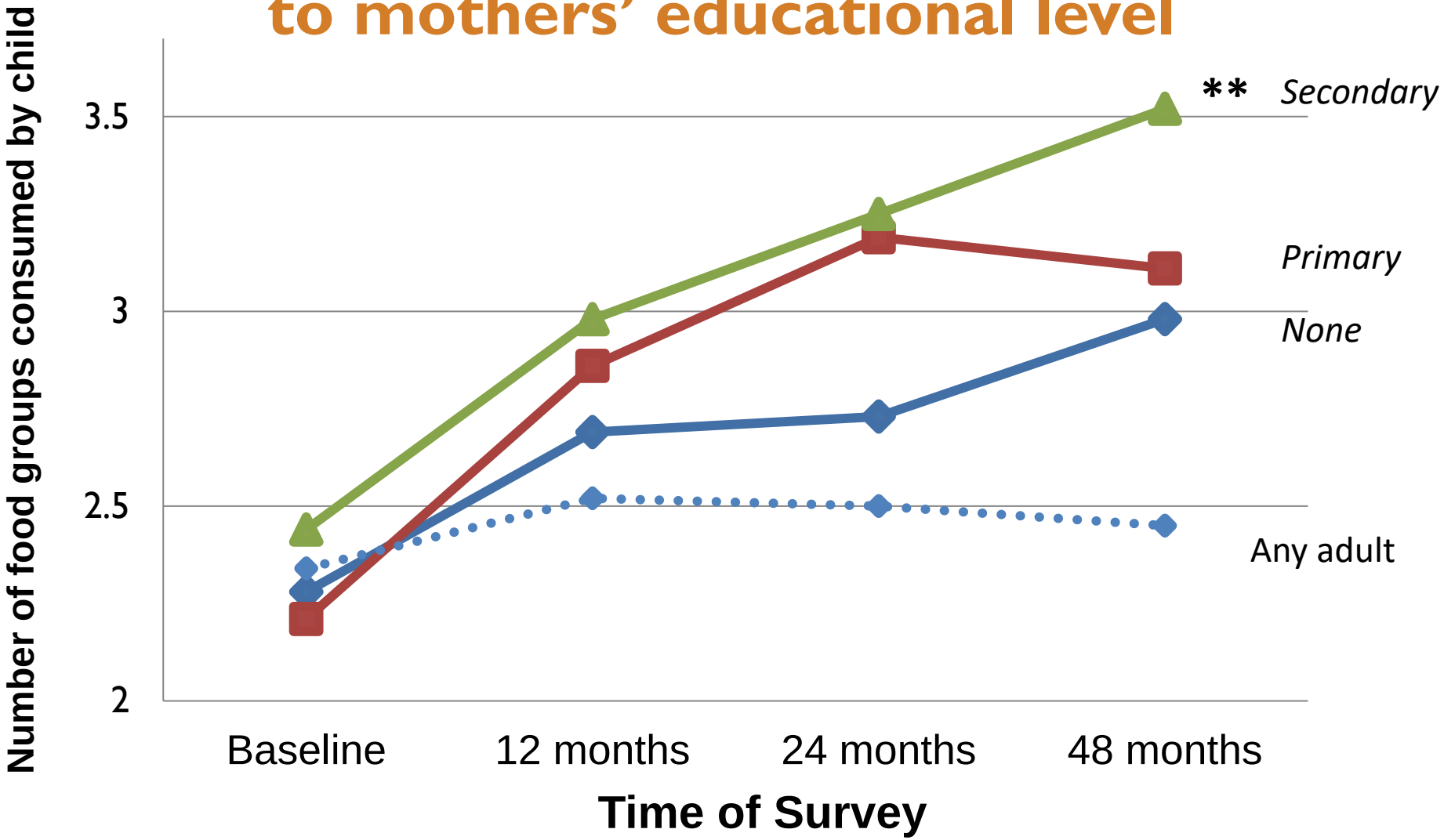
Child diet diversity over time relates to mothers' educational level

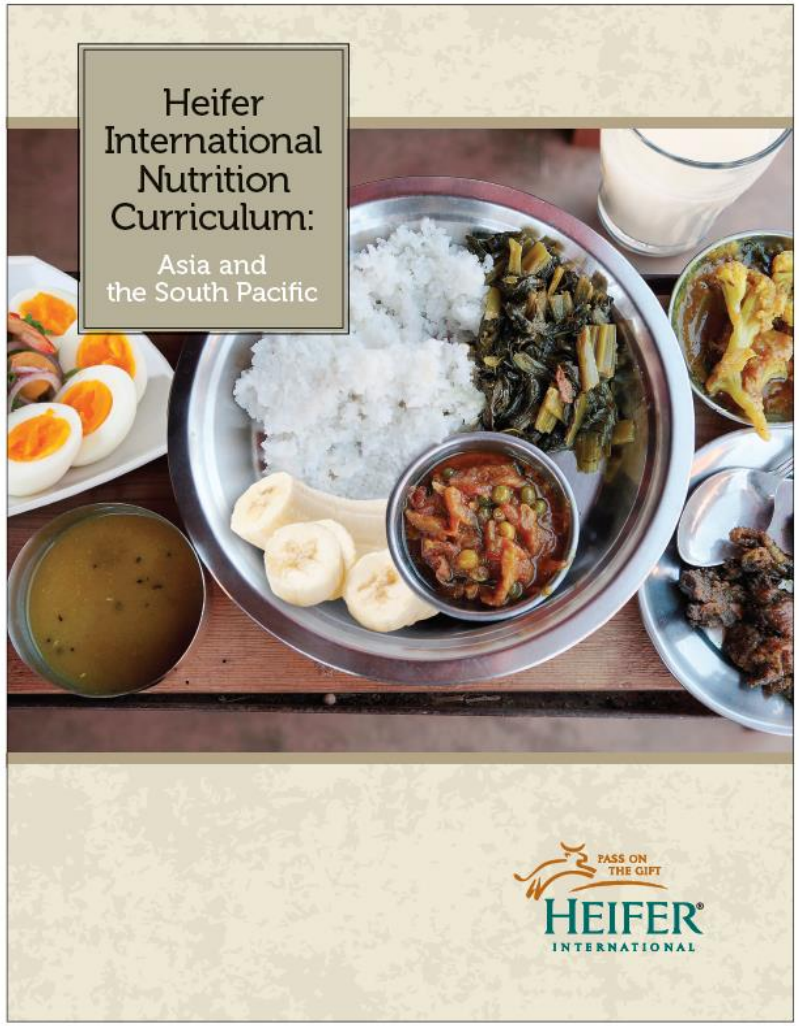


**p<.01

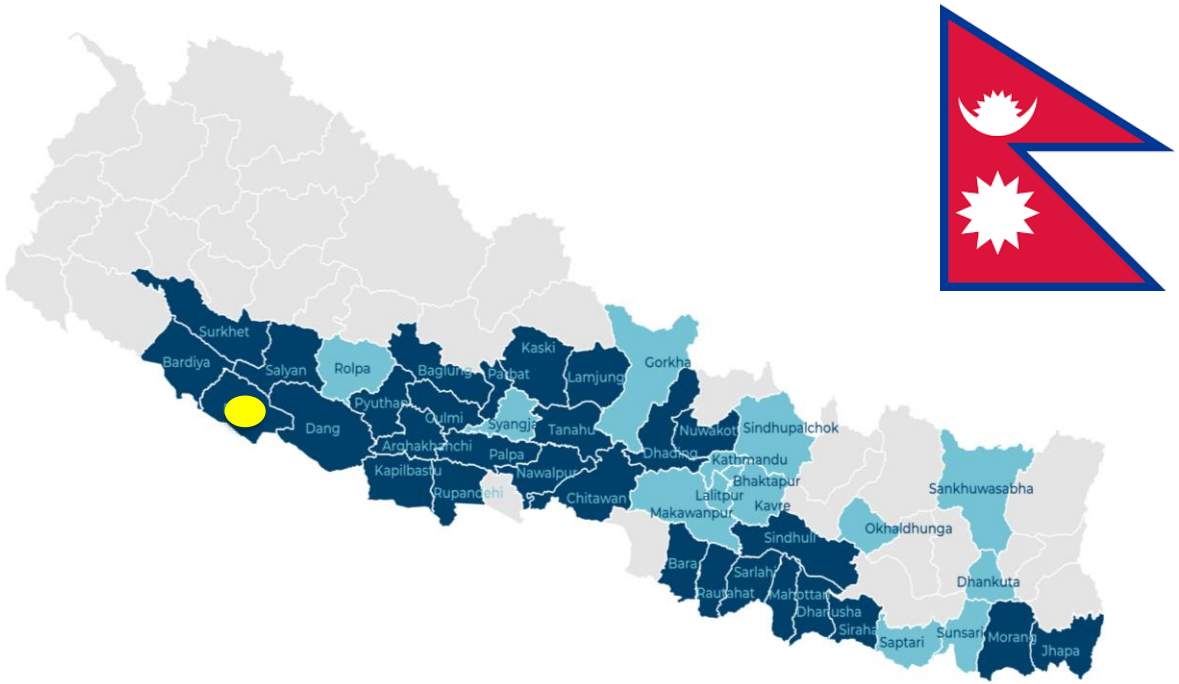
Why – and how - does a livestock/livelihoods intervention affect child growth and diet?

2: Is it the training and livestock donation? Or the community development? What part of the Heifer program is most important to child outcomes?

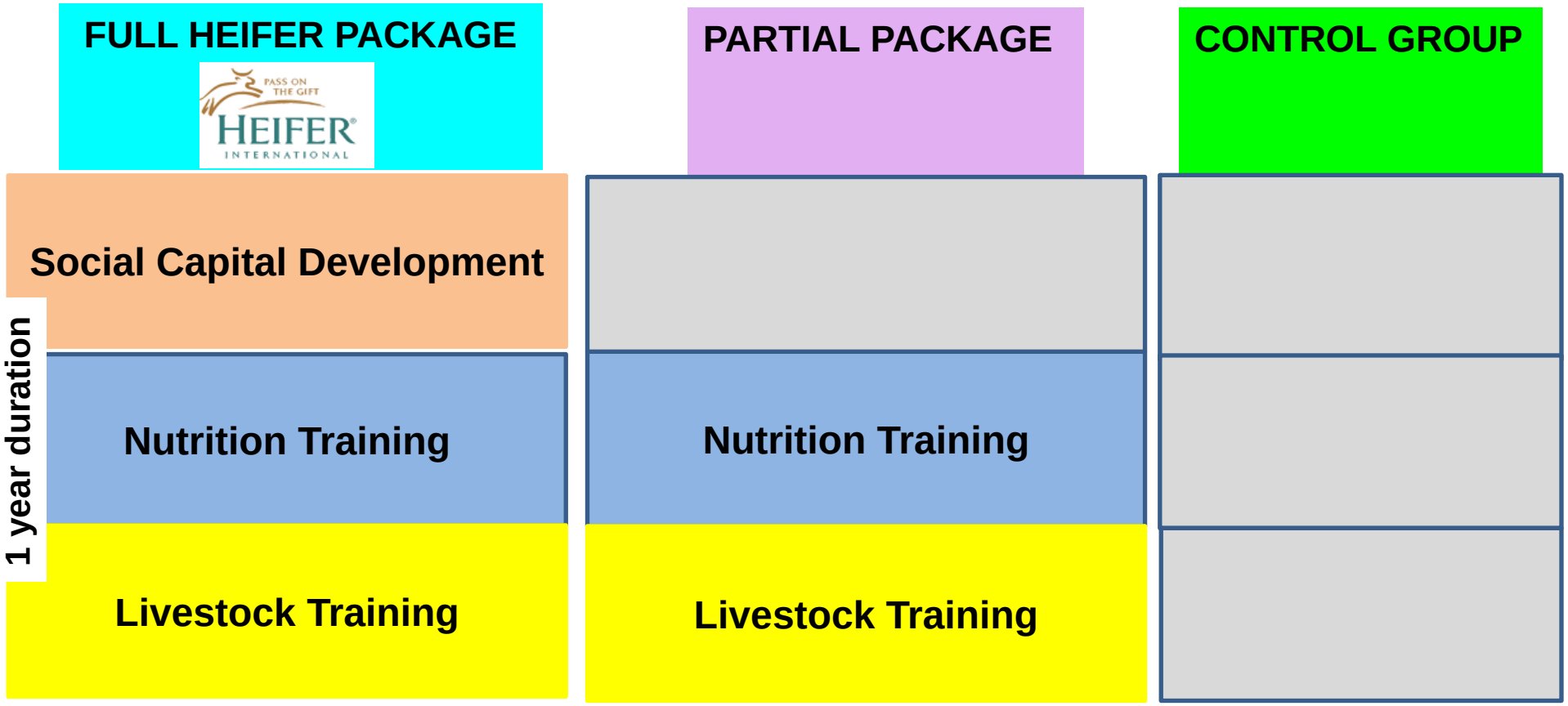
- Developed after completion of first project



974 HHs, 1333 children 1-60 months



Randomized → 3 community clusters


FULL HEIFER PACKAGE
PASS ON THE GIFT
HEIFER INTERNATIONAL
PARTIAL PACKAGE
CONTROL GROUP
Social Capital Development
Nutrition Training
Livestock Training
Nutrition Training
Livestock Training
1 year duration

METHODS

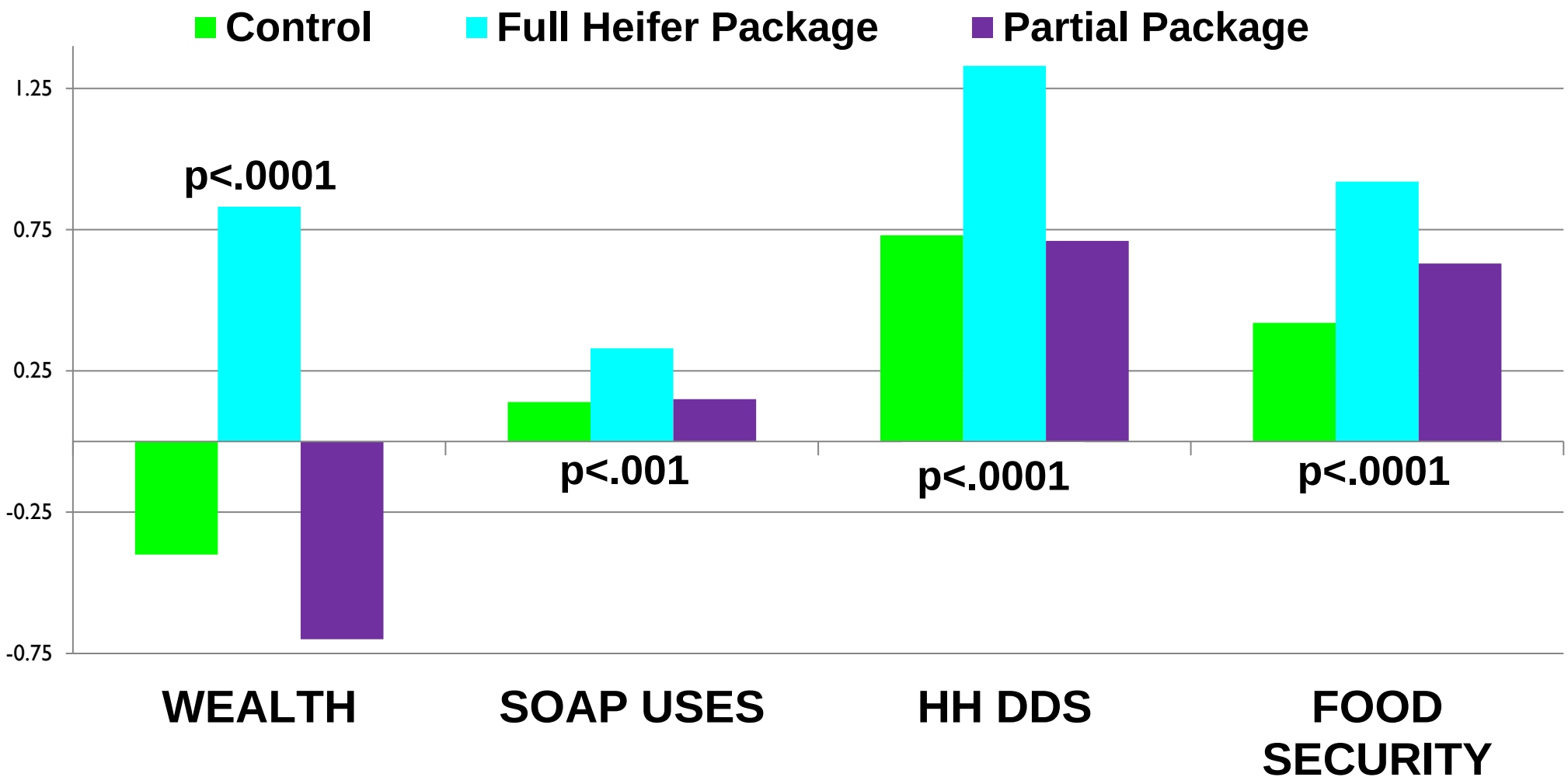
5 HH surveys over ~33 months (independent research organization)

HH INDICATORS
- Land
- Animals
- Wealth
- Income
- Hygiene
- Food Security

CHILD INDICATORS
- Anthropometry
- Health
- Diet quality (ASF, DDS)
- School attendance

HHs included only if ≥75% participation in training

HH INDICATORS: Δ baseline to 33 months



Mixed effects model adjusted for child and HH factors

- Animal ownership
- Land ownership
- Wealth
- Women's education

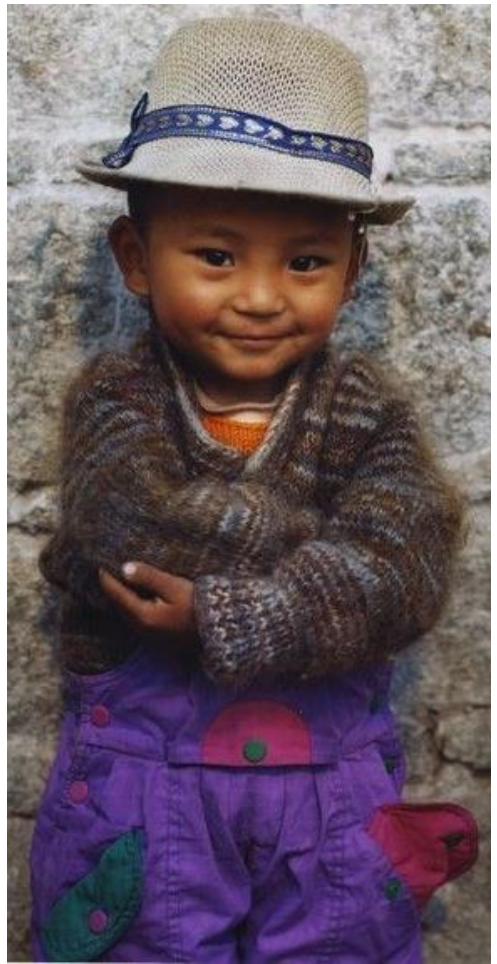
- Age
- Gender
- Baseline anthropometry

Fixed effects: Group assignment
Random effects: clustering at HH level

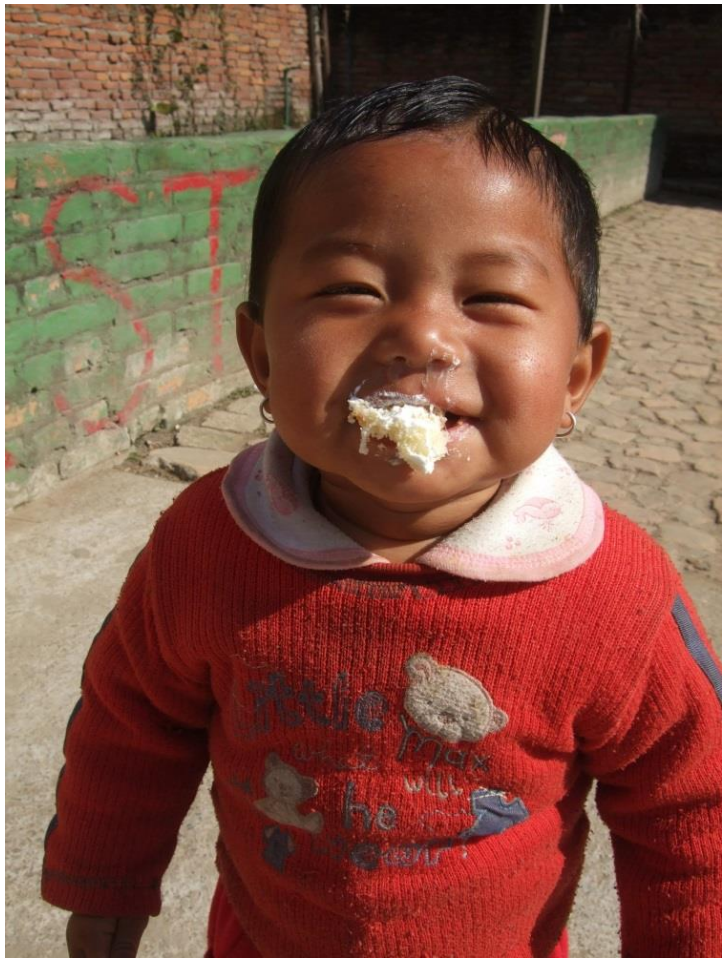
Being in the Heifer Full Package predicted better growth outcomes

- WAZ
- HAZ
- WHZ

Pub Health Nut (2020) 23:146



Being in the Heifer Full Package predicted greater improvement in child diet quality



- Diet diversity
- ASF consumption

Pub Health Nut (2020) 23:146

Being in the Heifer Full Package predicted greater improvement in child health

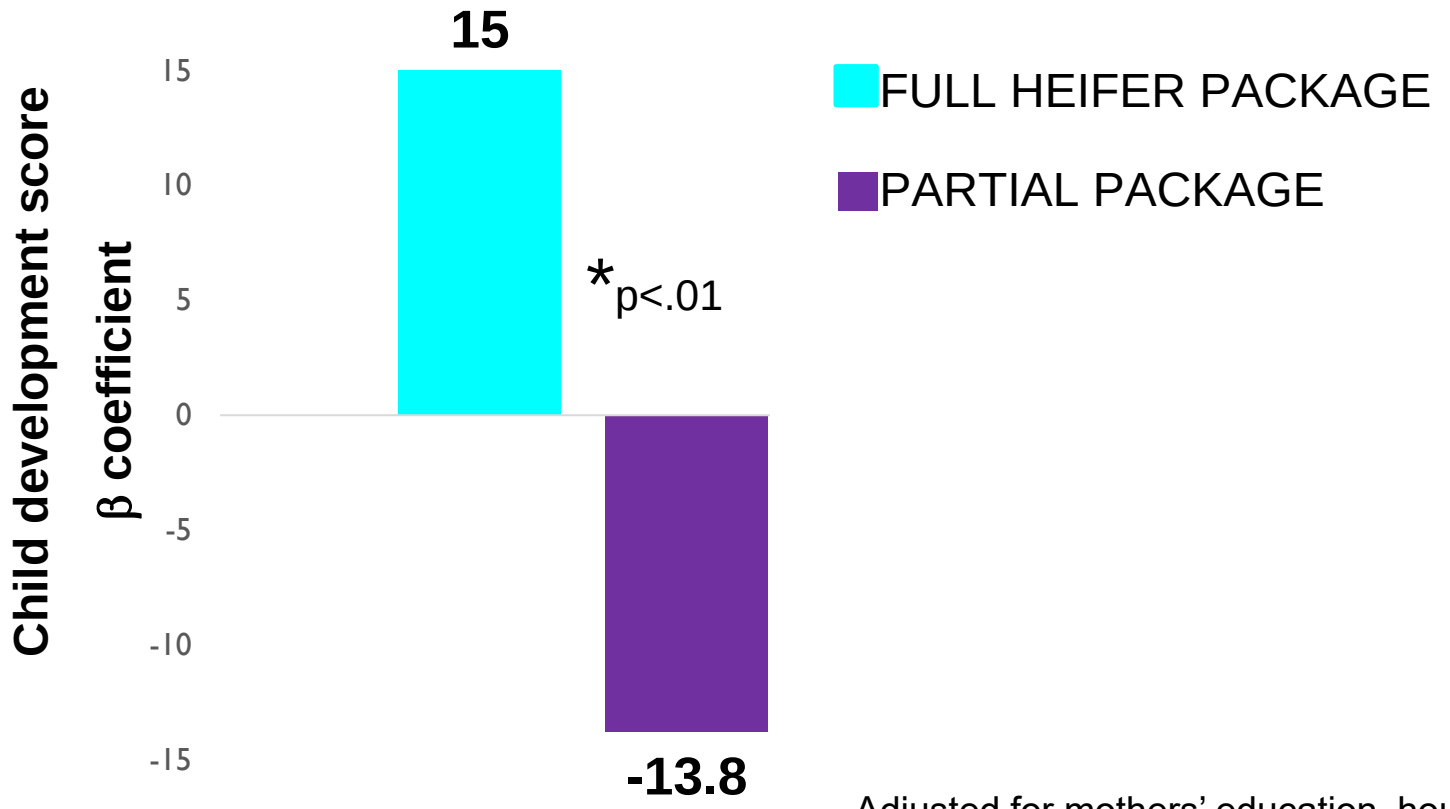
- Diarrhea
- Respiratory illness
- Fever

(Composite score)

- Partial Package intervention "looked like" Control for most of the variables assessed, but…

…some child outcomes looked worse in the Partial Package group than in Control

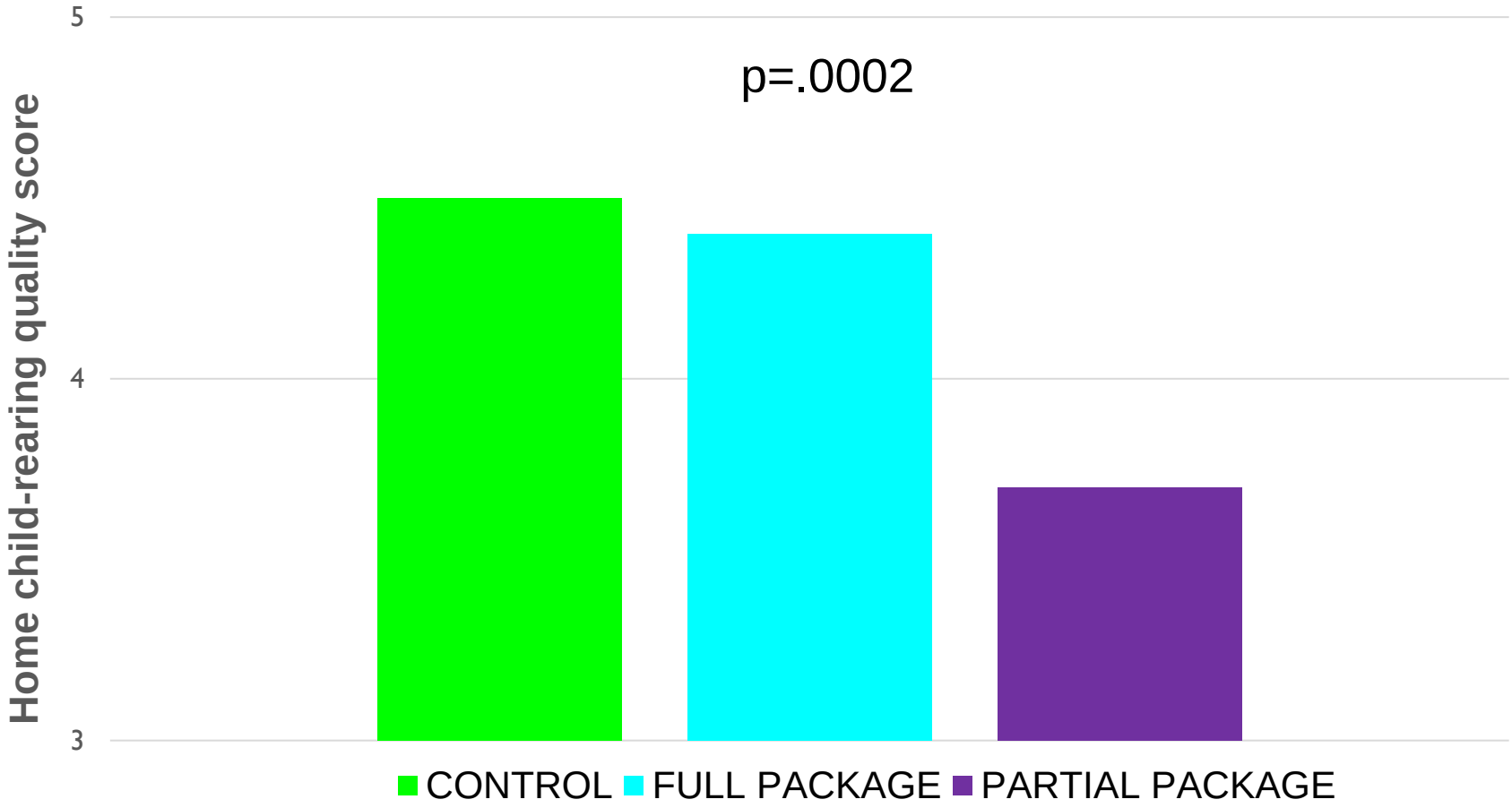
Children in Partial Package HHs had worse development at age 2 years



Adjusted for mothers' education, household wealth, child ASF consumption

Food Nutr Bulletin (2021), 42:36

Partial Package HHs had worse home child-rearing quality



Food Nutr Bulletin (2021), 42:36

- An incomplete or poorly integrated program may be worse than no program at all

SUMMARY

Better outcomes were seen in families which received the Heifer Full Package intervention, at both the **child** and **HH** level

Child: More improvement in
- Growth (HAZ, WAZ, WHZ)
- Diet quality (ASF, DDS)
- Health (# of illness episodes)

HH: Greater increases in
- Wealth
- Hygiene
- Diet diversity
- Food security

TAKE-HOME MESSAGES

- Multisectoral interventions can affect non-targeted sectors
- Personal/HH qualities relate to response to interventions
- It takes time to appreciate the impact of complicated multisectoral interventions

- Multisectoral interventions including a social capital component were associated with more favorable HH and child outcomes than training alone
- Incomplete programs may have unintended, unfavorable consequences

Intensive, multisectoral interventions may be more effective in creating measurable and sustainable improvements in important child and HH outcomes…

….although these are more costly, difficult, and time-consuming to implement

ACKNOWLEDGMENTS

- Sumanta Neupane
- Heifer Nepal
- Heifer International
- Valley Research Group
- Nutrition Innovation Lab
- Participating families

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Implications of Aquaculture and Horticulture Engagement in Bangladesh

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BACKGROUND

- Repeat longitudinal panel study design
- 3060 households in 102 unions of Barisal, Khulna, and Dhaka
- Representative of the Feed the Future area
- 3 panels: Jan-April 2016, Aug-Oct 2016, and Feb-May 2017
- Household head and mother questionnaires
- Anthropometry assessment of mothers and children under 5 years

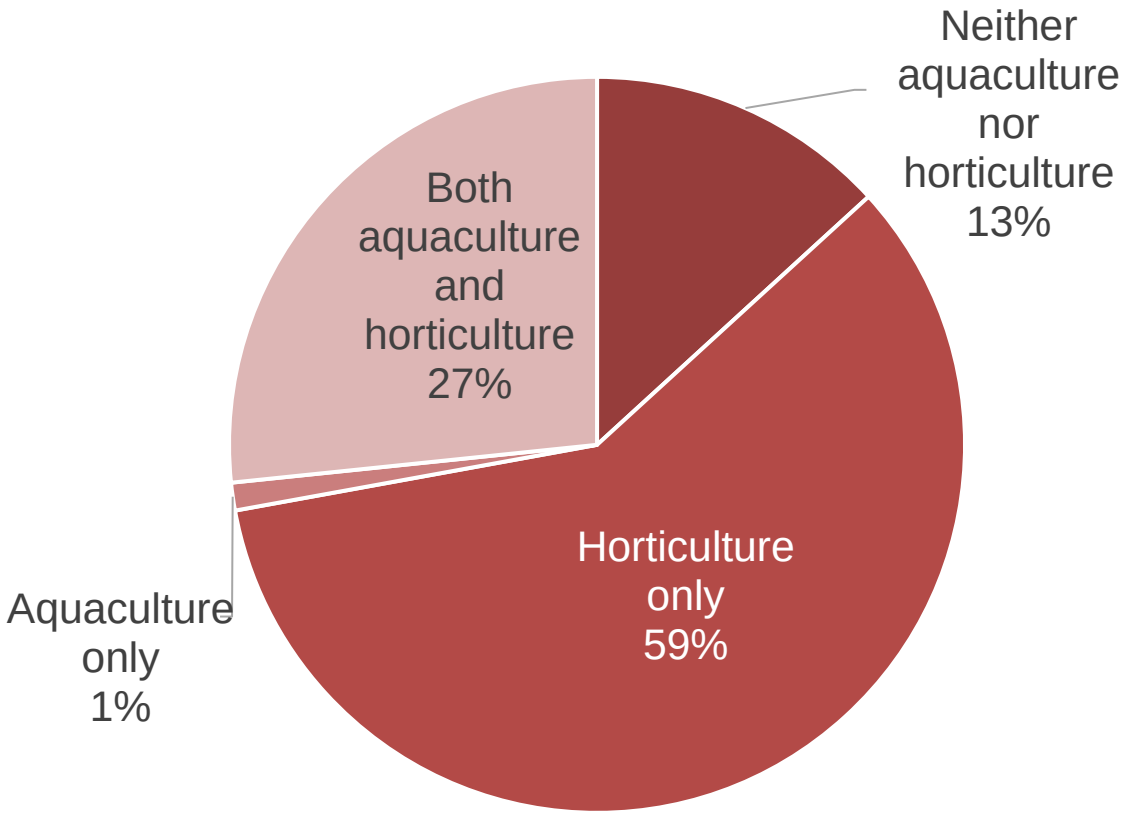
RESEARCH QUESTIONS

Are **mothers and children 6-59 months** living in households that participate in **both aquaculture and horticulture** more likely to:

- have **more diverse diets**?
- consume **animal source foods (fish, meat, poultry, dairy, and eggs)**?
- consume other **nutrient-rich foods (fruits, vegetables, and legumes)**?

And does this lead to **better nutritional outcomes**?

AQUACULTURE AND HORTICULTURE ENGAGEMENT



Data pooled across rounds

- **Aquaculture**: produced fish from a pond
- **Horticulture**: produced fruit and/or vegetables from an agriculture or homestead plot

3 category variable for the analysis:

- **Neither**: household did not produce fish or fruits and/or vegetables
- **Either**: household produced fish or fruits and/or vegetables
- **Both**: household produced fish and fruits and/or vegetables

DIETARY DIVERSITY

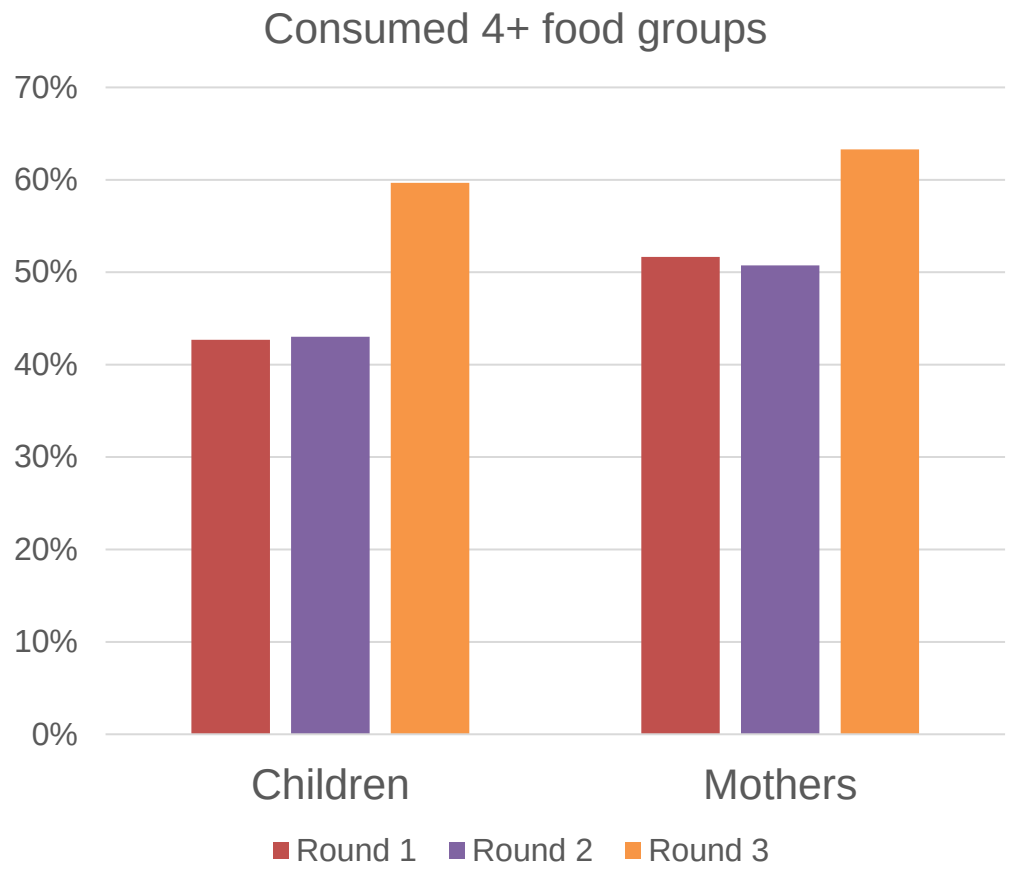
Child's indicator made up of 6 food groups:

- Grains, legumes, dairy, meat/fish/poultry, eggs, and fruits/vegetables

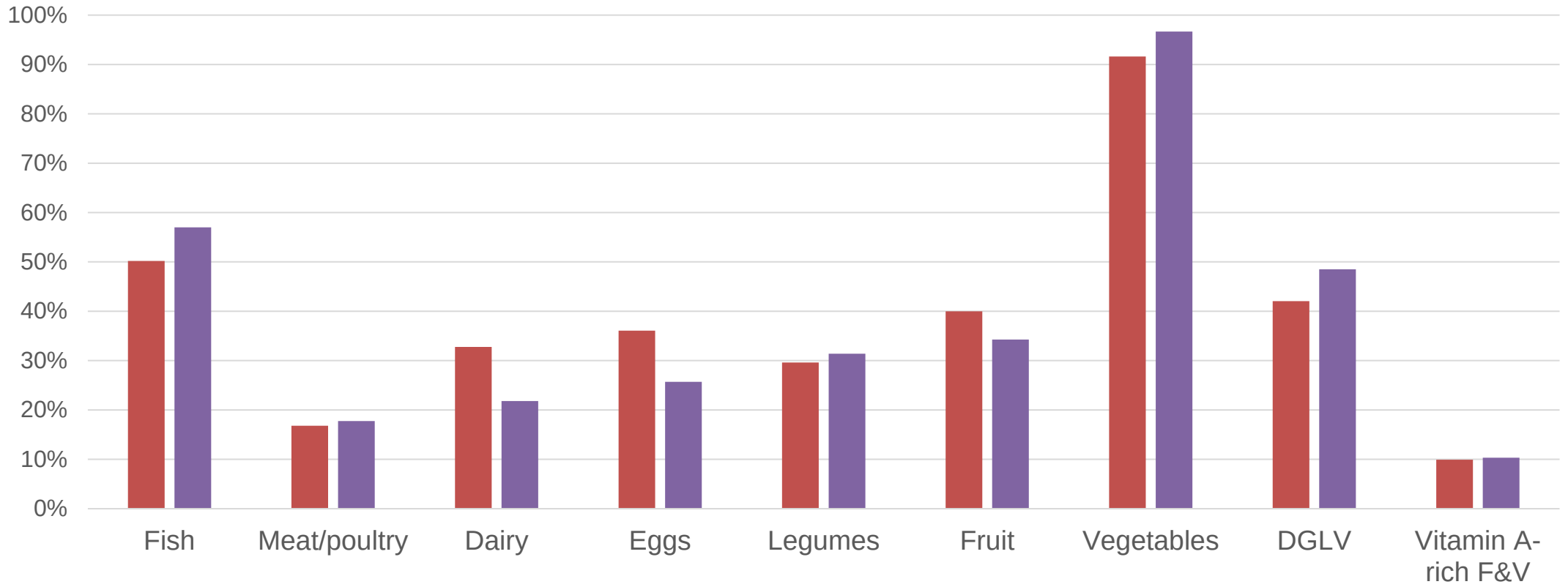
Mother's indicator made up of 7 food groups:

- Grains, legumes, dairy, meat/fish/poultry, eggs, fruits, and vegetables

"Met" dietary diversity indicator if consumed 4 or more food groups in the past 24 hours



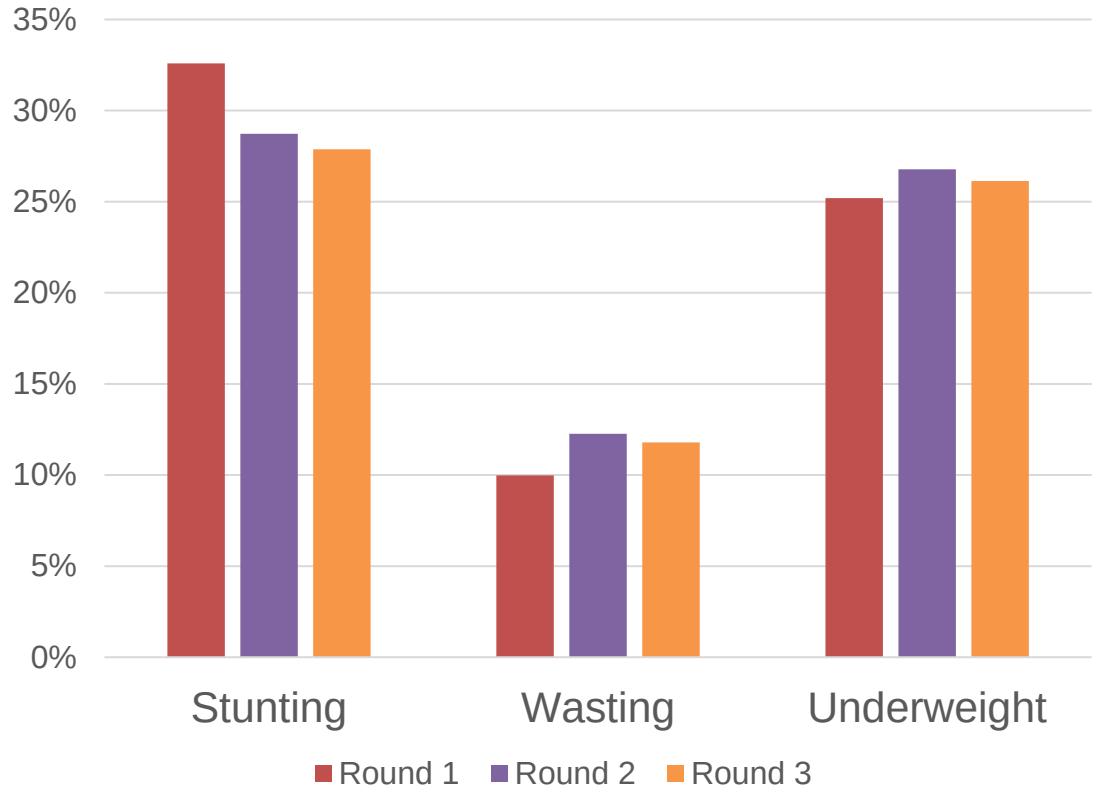
INDIVIDUAL FOOD GROUPS



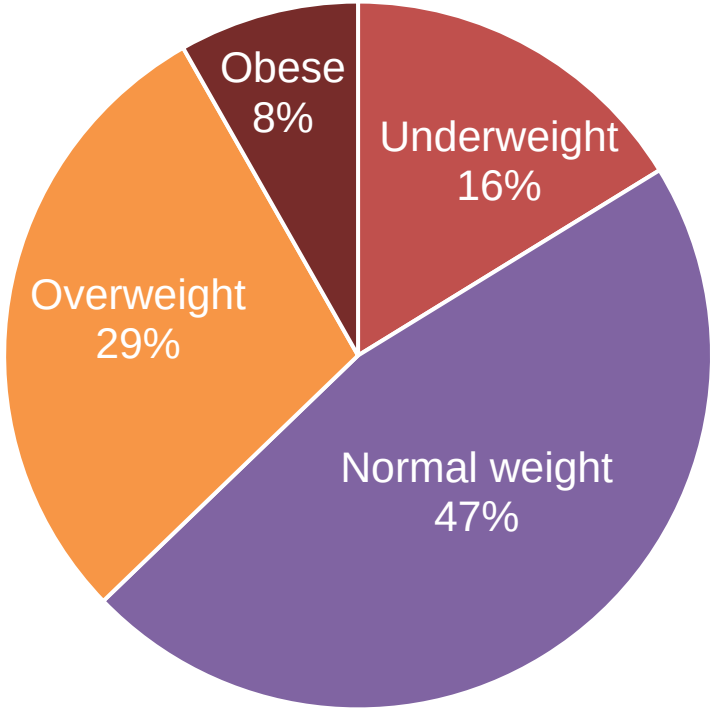
Data pooled across rounds

NUTRITIONAL OUTCOMES

Child's Anthropometry



Mother's BMI



BMI data pooled across rounds, excludes pregnant mothers

DIETARY DIVERSITY RESULTS

	Dietary diversity (count of food groups) β (SE)		Consumed 4+ food groups OR (95% CI)	
	Children	**Mothers**	**Children**	**Mothers**
Aquaculture/horticulture engagement (neither ref.)				
Either	-0.03 (0.11)	-0.04 (0.10)	1.25 (0.97, 1.61)	**1.25 (1.00, 1.54)***
Both	**0.51 (0.12)*****	**0.44 (0.11)*****	**2.44 (1.88, 3.17)*****	**1.98 (1.54, 2.54)*****
Purchased foods	0.14 (0.03)***	0.11 (0.02)***	2.11 (1.53, 2.93)***	1.85 (1.44, 2.39)***
Interaction: aquaculture/horticulture engagement and purchase				
Either	0.03 (0.03)	0.03 (0.02)	0.97 (0.68, 1.40)	0.94 (0.72, 1.24)
Both	-0.06 (0.03)	-0.04 (0.03)	**0.62 (0.42, 0.92)***	0.76 (0.56, 1.05)

* p<0.05; ** p<0.01; *** p<0.001

Child models adjusted for age, sex, wealth, and survey round; mother models adjusted for wealth and survey round. All models adjusted for survey design and sampling weights.

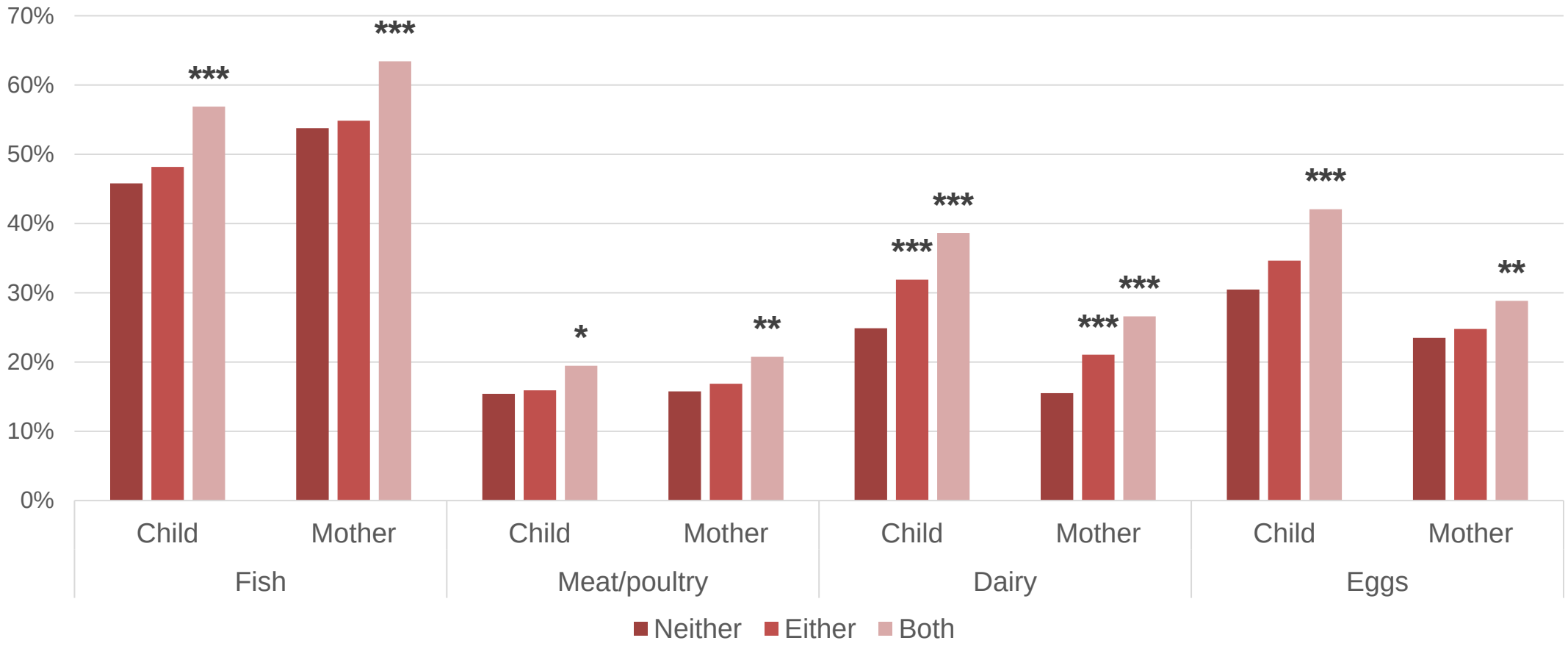
ASF RESULTS

	Count of ASFs β (SE)		Consumed any ASF OR (95% CI)	
	Children	**Mothers**	**Children**	**Mothers**
Aquaculture/horticulture engagement (neither ref.)				
Either	0.03 (0.07)	0.04 (0.06)	0.80 (0.51, 1.27)	0.89 (0.55, 1.42)
Both	**0.33 (0.07)*** **	**0.28 (0.06)*** **	**2.43 (1.47, 4.01)*** **	**2.19 (1.37, 3.48)*** **
Purchased foods	0.17 (0.03)***	0.14 (0.03)***	1.83 (1.22, 2.77)***	1.60 (1.09, 2.35)*
Interaction: aquaculture/horticulture engagement and purchase				
Either	0.03 (0.03)	0.01 (0.03)	1.26 (0.78, 2.03)	1.08 (0.67, 1.75)
Both	-0.04 (0.04)	-0.05 (0.03)	0.61 (0.36, 1.03)	**0.59 (0.37, 0.96)***

* p<0.05; ** p<0.01; *** p<0.001

Child models adjusted for age, sex, wealth, and survey round; mother models adjusted for wealth and survey round. All models adjusted for survey design and sampling weights.

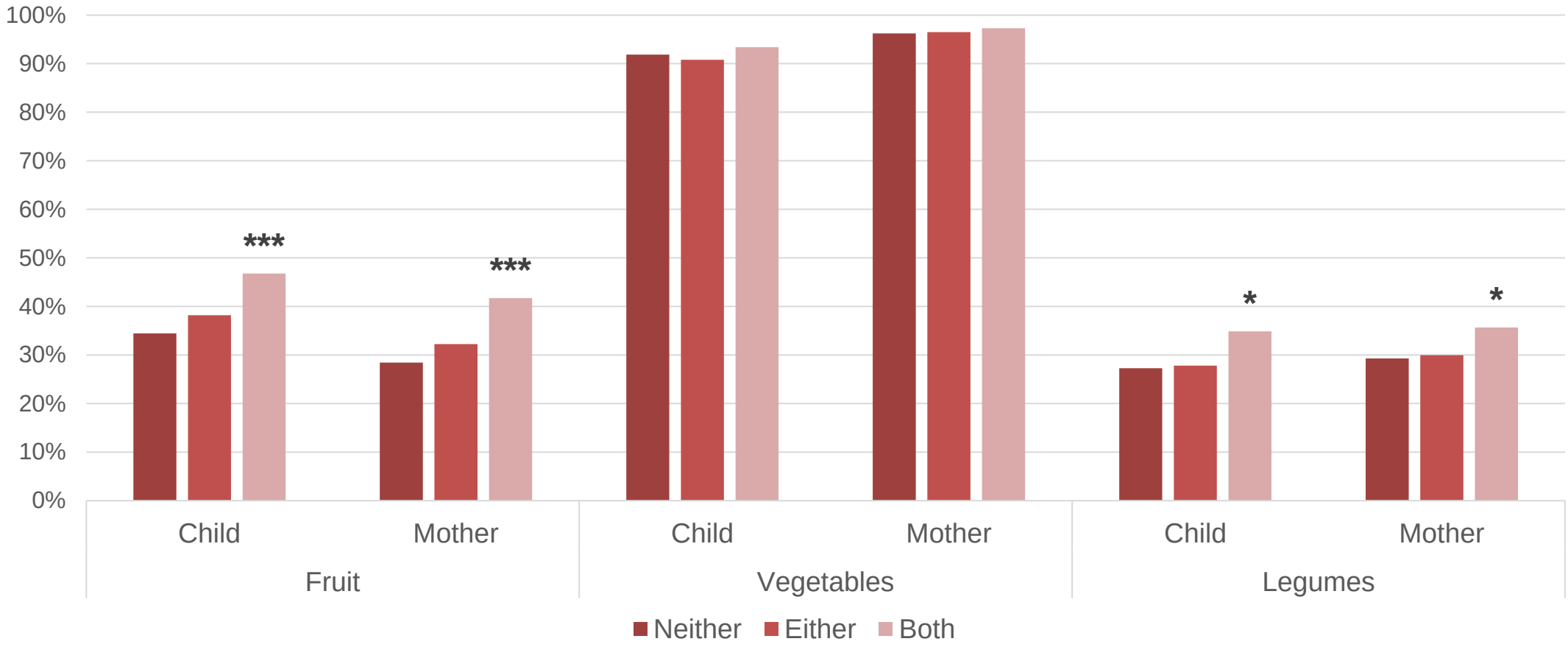
INDIVIDUAL ANIMAL SOURCE FOODS



* p<0.05; ** p<0.01; *** p<0.001

Child models adjusted for purchasing, age, sex, wealth, and survey round; mother models adjusted for purchasing, wealth, and survey round. All models adjusted for survey design and sampling weights.

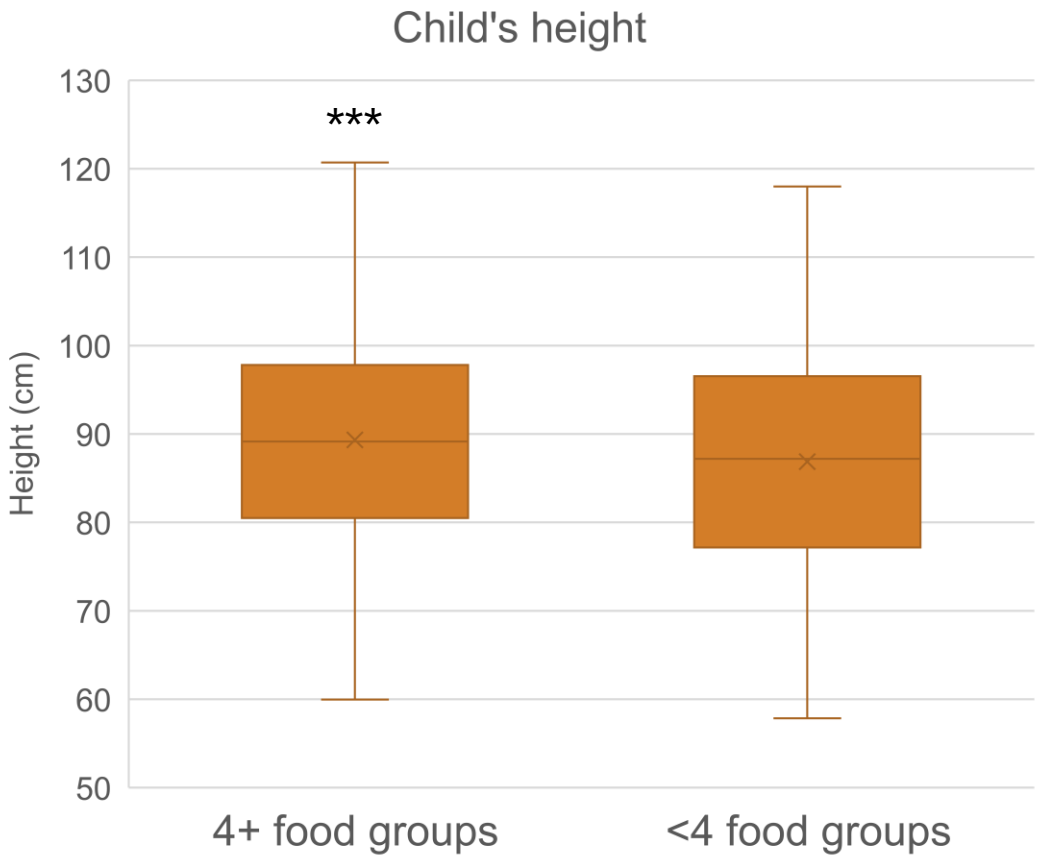
PLANT-BASED FOODS



* p<0.05; ** p<0.01; *** p<0.001

Child models adjusted for purchasing, age, sex, wealth, and survey round; mother models adjusted for purchasing, wealth, and survey round. All models adjusted for survey design and sampling weights.

ANTHROPOMETRY RESULTS



- Child's height significantly associated with consuming 4+ food groups (β=0.11, p=0.001)
- No significant associations with child's HAZ, WAZ, WHZ, MUAC, or weight
- No significant associations with mother's BMI or MUAC

* p<0.05; ** p<0.01; *** p<0.001

Child models adjusted for age, sex, mother's height, wealth, mother's education and survey round; mother models adjusted for wealth, and survey round. All models adjusted for survey design and sampling weights.

CONCLUSIONS

- Dietary diversity improved over time
- Vegetable consumption high, but more nutrient dense veg (DGLV and vitamin A-rich) still low
- Meat/poultry, egg, dairy, legume, fruit consumption increased but still low
- Child and mother's diets are positively associated with aquaculture and horticulture engagement
- Child's height is positively associated with dietary diversity
- Benefit of engaging in **multiple types** of agriculture
- Combination of **purchasing** and **producing** is very important

Q&A

THANK YOU

- To register for upcoming webinars, you can visit **NutritionInnovationLab.org** or **AdvancingNutrition.org**. More details coming soon!
- Recordings and slides for each webinar will also be posted on our websites.

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