Friedman School
of Nutrition Science and Policy

The Contribution of Agriculture to Nutrition: Thought Experiments and Experimental Thoughts

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Innovation Lab Director's Council and Partners Meeting
Kathmandu, Nepal

March 2014

Feed the Future Innovation Lab
For Collaborative Research on Global Nutrition

USAID
FROM THE AMERICAN PEOPLE

"Chronic malnutrition rates have not declined significantly over the years despite increased income from high value crops.

New approach to resolution of problem is required."

USAID/Update (Guatemala Portfolio Review 2013)

So what do we do that is evidence-based?

- Scaling up evidence-based *targeted interventions*: "30 million fewer children under the age five would be **stunted**… representing **a 20% reduction.**"

  Horton (2010)

- 10 known targeted nutrition interventions "could reduce **stunting by 20%.**"

  Bhutta et al. (2013) Lancet Series

- Doubling per capita income is associated with reduced stunting of **14.8%**.

World Bank (2012)

- "A doubling of per capita income ***from agriculture*** is associated with a **21 percent** reduction in stunting."

Webb and Block (2012)
Proceedings of the National Academy of Sciences

- "Up to **43% of observed growth faltering** [stunting] can be explained on the basis of … **long-term intestinal lesions**."

Lunn et al. (1991) *Lancet*

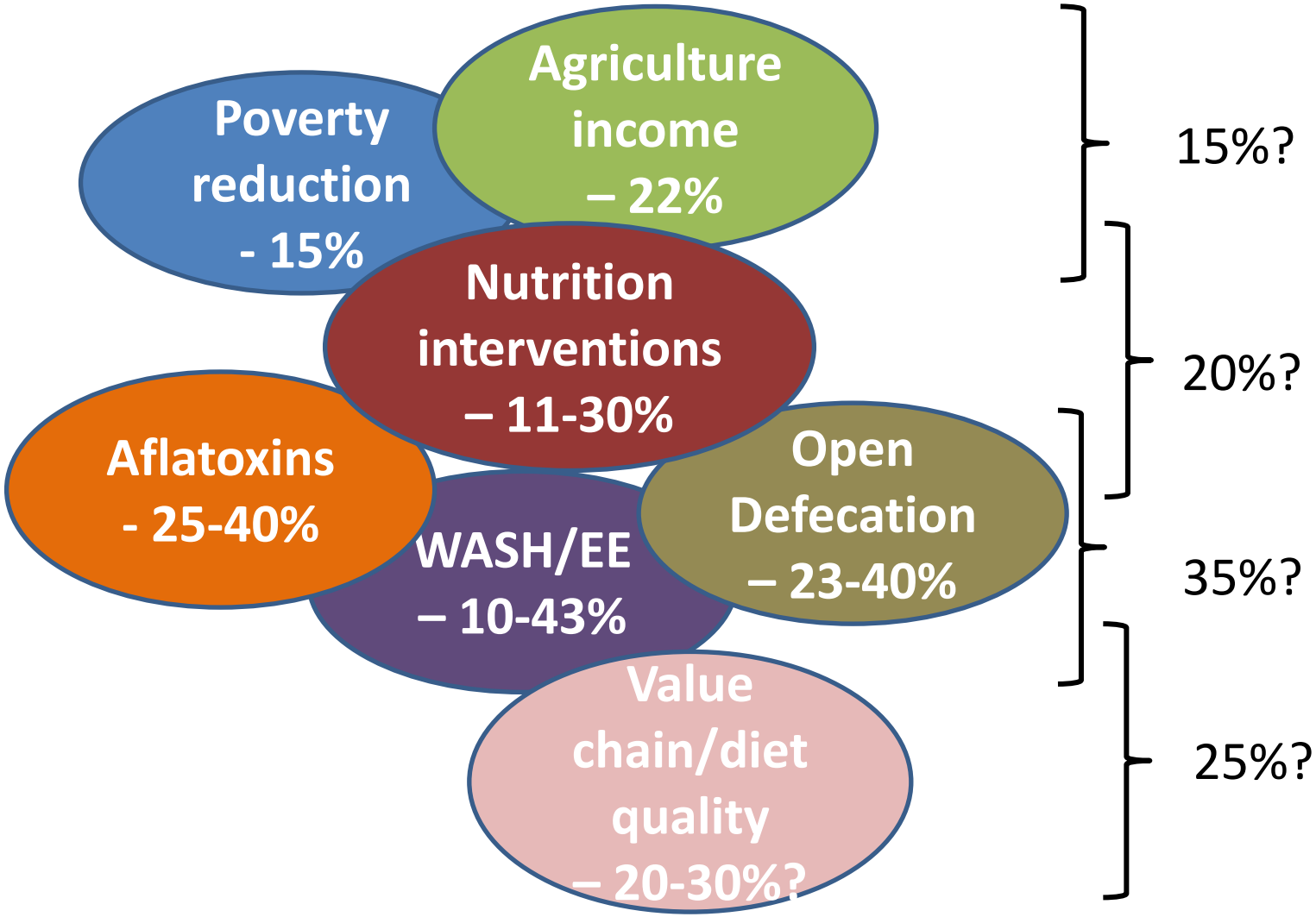
- **37% of stunting** explained by **aflatoxin levels.**

Gong et al. 2002. Brit. Med. Jou.

- "Best linear approximation to the true average causal effect of **village-level sanitation [on children's height**] is likely to be a large fraction of 0.45 (**45%**).

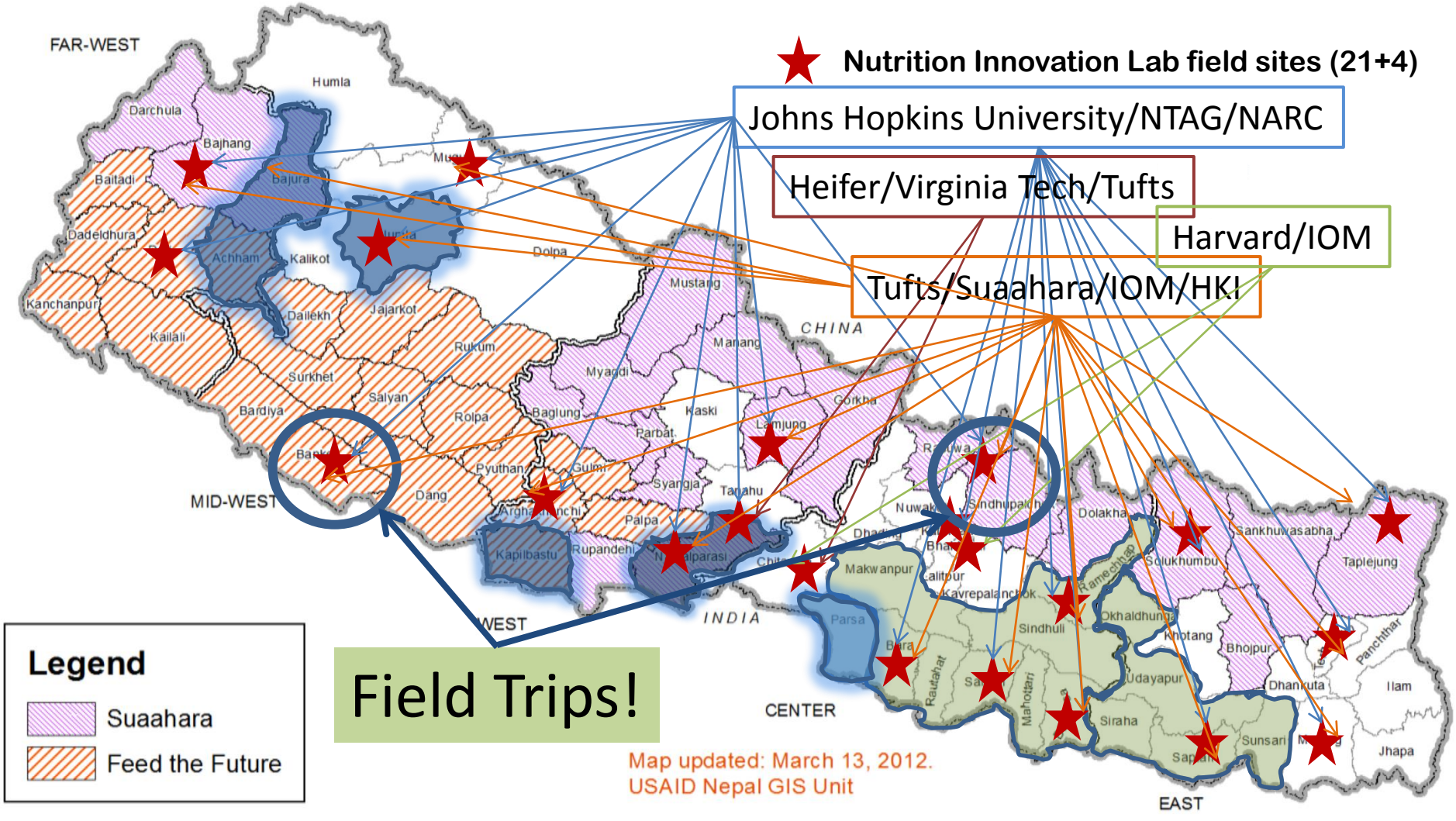
Spears (2013)

A thought experiment

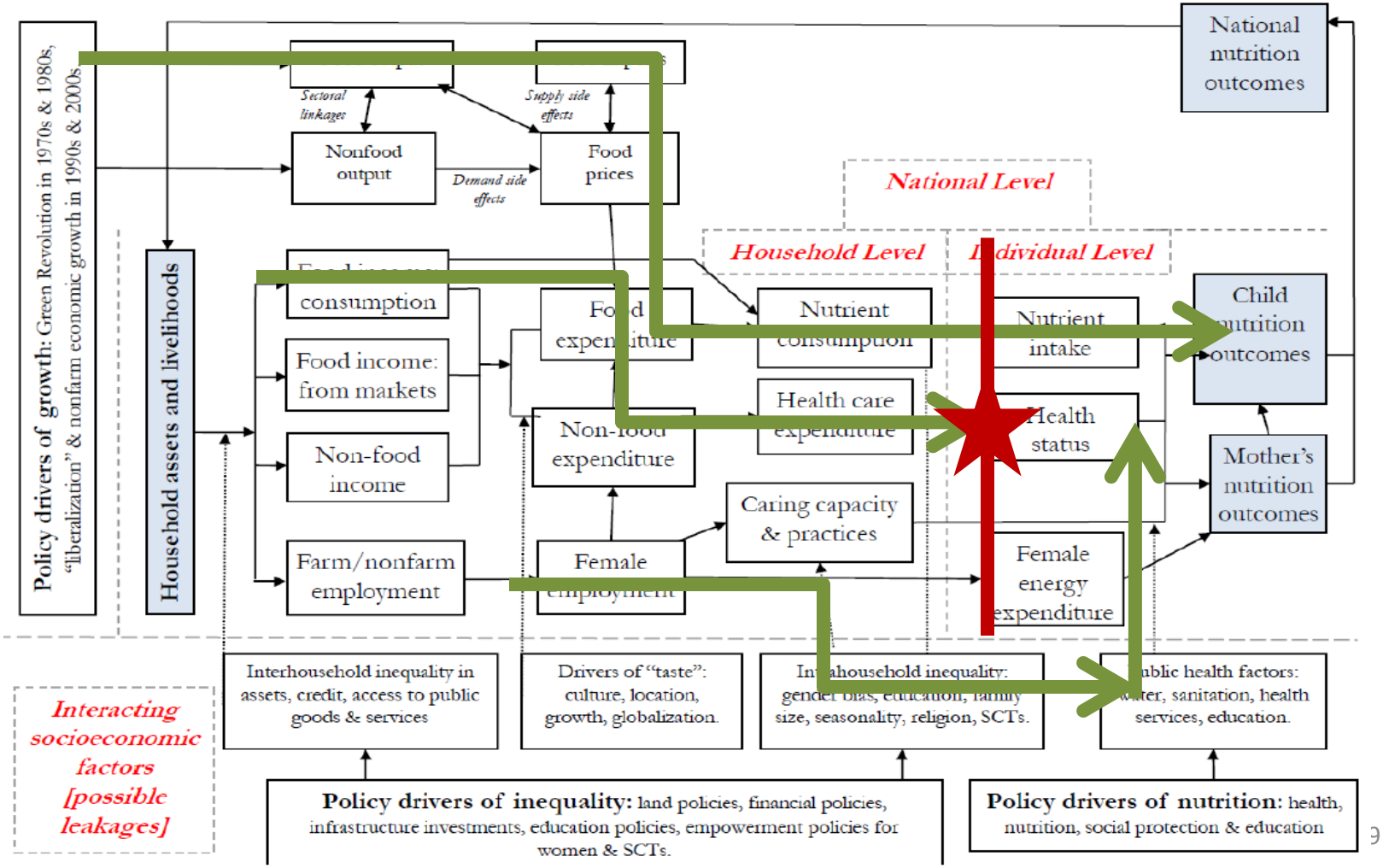


But…

a) Optimal packages for nutrition impact unknown
b) Translation from trials to scale poorly documented
c) Cost-effectiveness of packages unmeasured


Nutrition Innovation Lab field sites (21+4)
Johns Hopkins University/NTAG/NARC
Heifer/Virginia Tech/Tufts
Harvard/IOM
Tufts/Suaahara/IOM/HKI
FAR-WEST
MID-WEST
WEST
CENTER
EAST
CHINA
INDIA
Humla
Darchula
Bajhang
Baitadi
Bajura
Dadeldhura
Achham
Kalikot
Dolpa
Mustang
Kanchanpur
Dailekh
Jajarkot
Kailali
Rukum
Manang
Surkhet
Salyan
Myagdi
Bardiya
Rolpa
Baglung
Kaski
Gorkha
Parbat
Lamjung
Pyuthan
Gulmi
Syangja
Tanahu
Dang
Palpa
Kapilbastu
Rupandehi
Makwanpur
Parsa
Sindhuli
Dolakha
Sankhuwasabha
Solukhumbu
Taplejung
Bhojpur
Khotang
Udayapur
Siraha
Sunsari
Dhankuta
Ilam
Jhapa
Panchthar
Legend
Suaahara
Feed the Future
Field Trips!
Map updated: March 13, 2012.
USAID Nepal GIS Unit
Sunaula Hazar
Multi-Sector Nutrition Plan

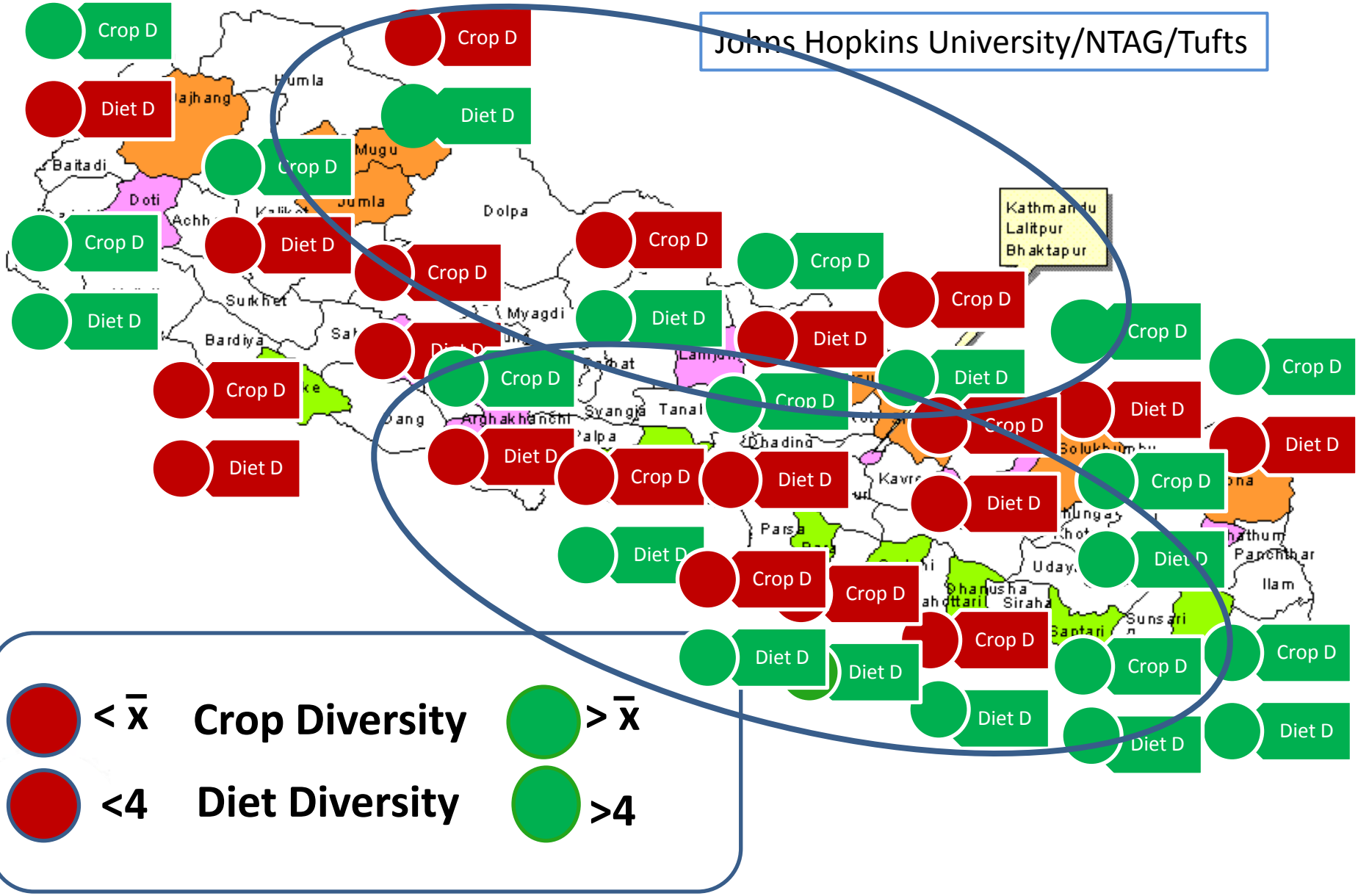
1 Agriculture-Nutrition Pathways



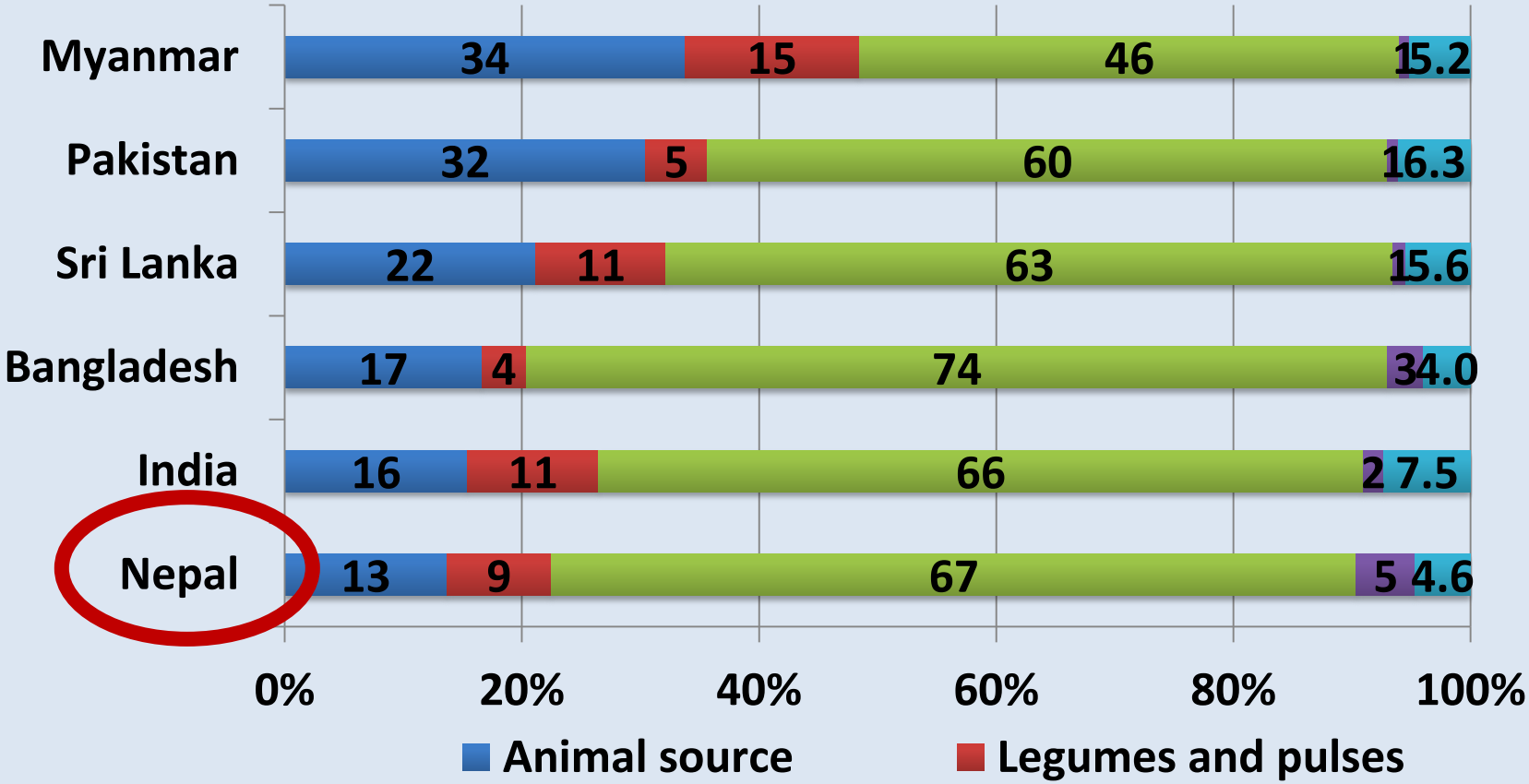
Crop yields in Nepal and child nutrition (stunting), by district

	Child nutritional status	
Crop Yields	Below average	Above average
Below average	34	21
Above average	5	15

Source: Shively et al. 2014


Johns Hopkins University/NTAG/Tufts
Crop D
Diet D
Humla
Mugu
Jumla
Baitadi
Doti
Dolpa
Sukhet
Bardiya
Myagdi
Kathmandu
Lalitpur
Bhaktapur
Tanahu
Dhadingh
Parsa
Sunsari
Ilam
< x̄ Crop Diversity
> x̄
<4 Diet Diversity
>4

Percentage contribution to total protein



investme

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Policy & program mechanisms

- From Efficacy to Effect: What's Happening in Between?
- What bundle of agr/WASH/SBCC/value chain activity has real (measurable) impacts on nutrition?
- What combinations work most cost-effectively per unit of nutrition gained?
- Can we empirically measure quality of implementation and governance for nutrition impacts?

Conclusions

- Nutrition labs offer unique research platform on which to build

> **"Cost-efficacy of food and agriculture-based nutrition enhancing interventions has *not* been rigorously evaluated."**
>
> Pinstrup-Andersen (Nov 2014)
> ICN+22 prep meeting

-

Many collaborators (Asia and Africa):

MAKERERE UNIVERSITY

UNIVERSITAS BERGENSIS

JOHNS HOPKINS BLOOMBERG SCHOOL of PUBLIC HEALTH

HARVARD SCHOOL OF PUBLIC HEALTH
Powerful ideas for a healthier world

KATHMANDU NEPAL

पाटन स्वास्थ्य विज्ञान प्रतिष्ठान नेपाल
PAHS
Patan Academy of Health Sciences

PASS ON THE GIFT
HEIFER INTERNATIONAL

Helen Keller INTERNATIONAL

TUSKEGEE UNIVERSITY

PURDUE UNIVERSITY

DAI

जननी जन्मभूमिश्च स्वर्गादपि गरीयसी

IFPRI

SUAAHARA
Building Strong & Smart Families

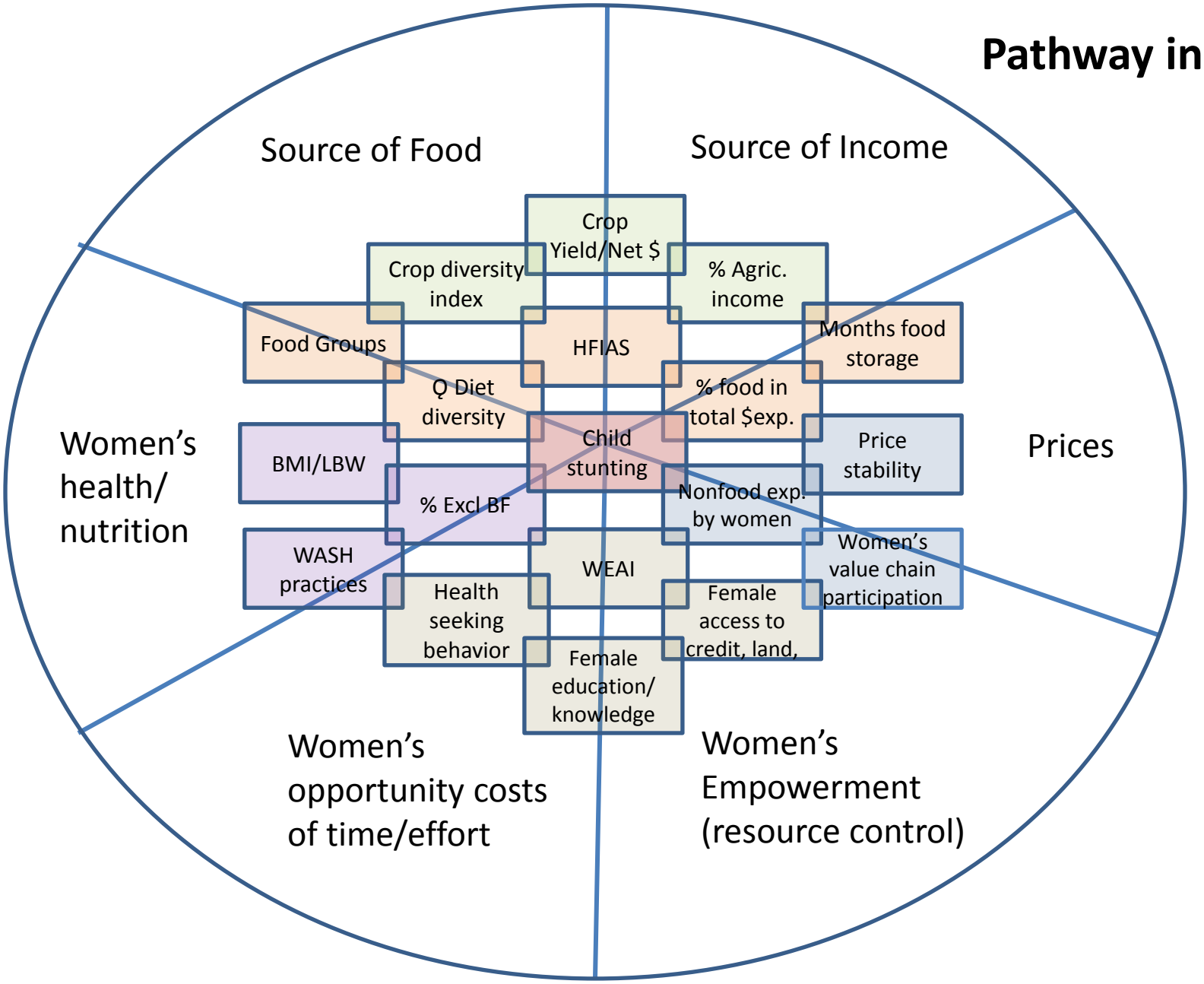
unicef

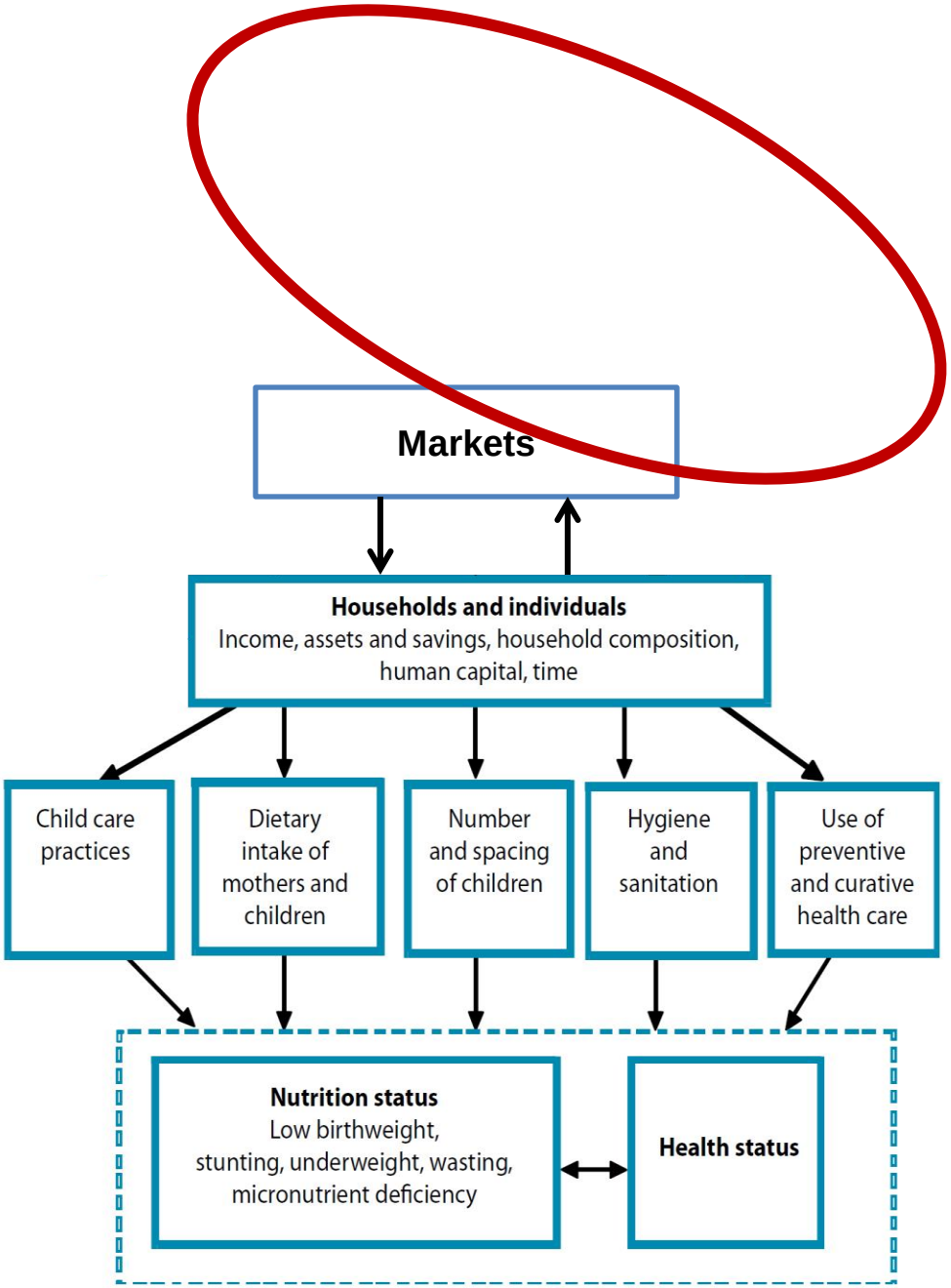
Feed the Future Innovation Lab
For Collaborative Research on Global Nutrition

USAID
FROM THE AMERICAN PEOPLE

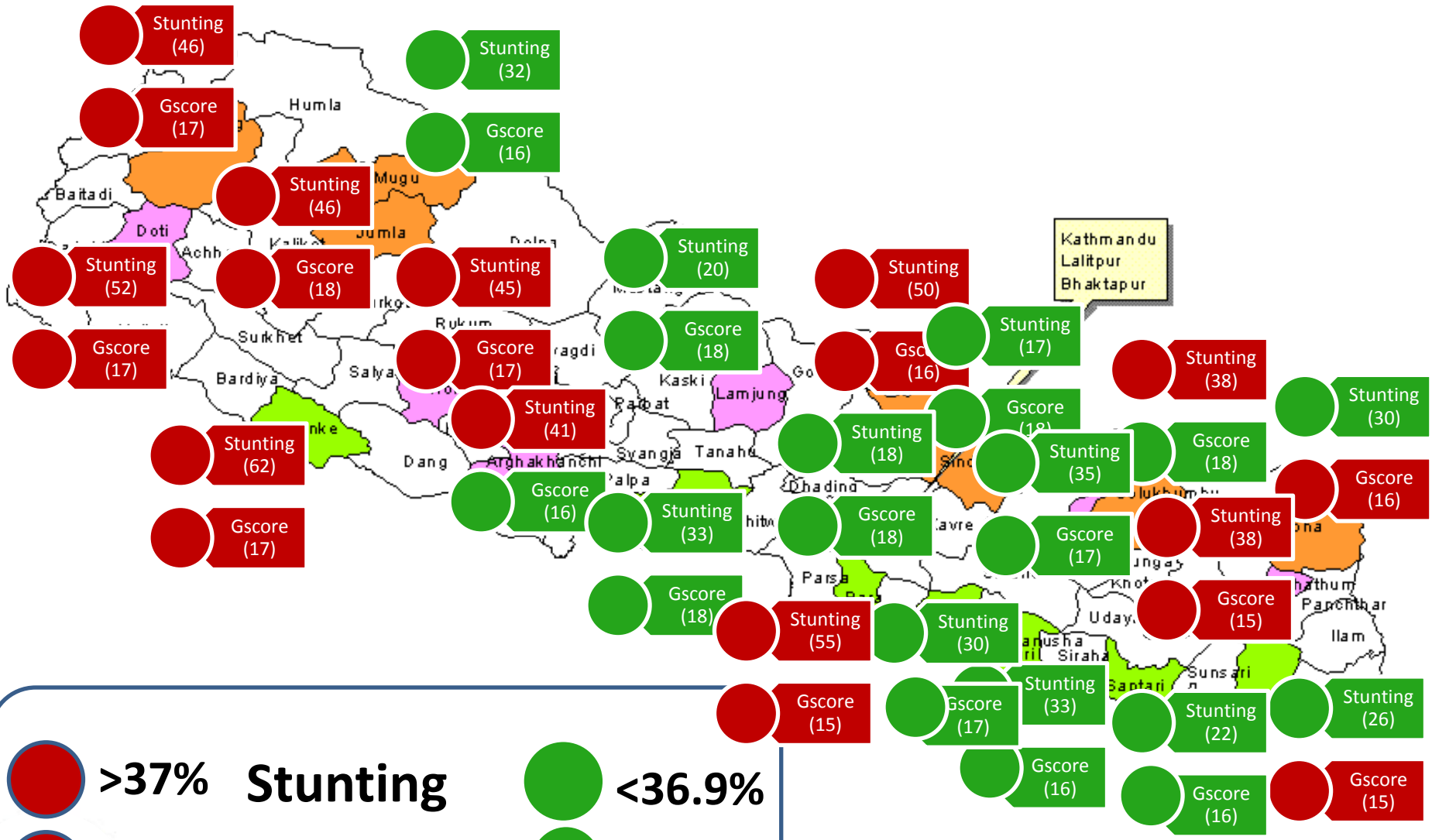
Tufts UNIVERSITY

Pathway indicators





World Bank (2010) *What can we learn from nutrition impact evaluations?* Washington, D.C.


Stunting (46)
Gscore (17)
Stunting (32)
Gscore (16)
Stunting (46)
Stunting (52)
Gscore (18)
Stunting (45)
Gscore (17)
Stunting (20)
Gscore (18)
Stunting (50)
Gscore (16)
Stunting (17)
Kathmandu
Lalitpur
Bhaktapur
Stunting (38)
Stunting (30)
Gscore (17)
Gscore (17)
Stunting (41)
Stunting (62)
Gscore (16)
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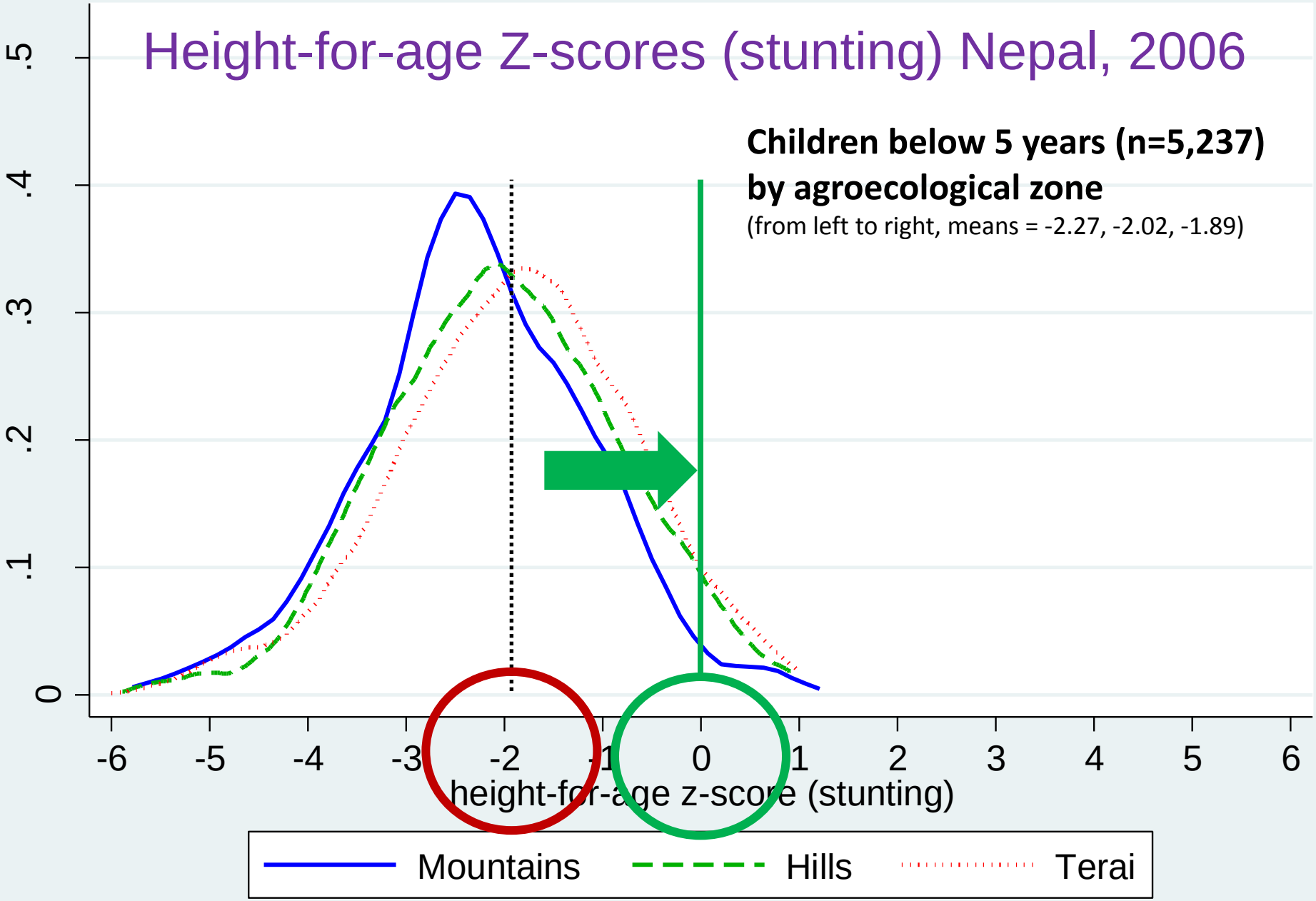
Humla
Mugu
Baitadi
Doti
Jumla
Sukhet
Bardiya
Salya
Dang
Rukum
Kaski
Lamjung
Tanahu
Dhading
Parsa
Sunsari
Ilam
Panchthar
>37% Stunting
<36.9%
<16 Gov. qual.
>16.1

Height-for-age Z-scores (stunting) Nepal, 2006



Source: DHS 2006 and Shively (2013)

"The link between income and health is not reliably mechanical."

"The relationship between population heights [stunting] and income is inconsistent and unreliable."

Angus Deaton (2007)
Height, health and development. *PNAS*

WASH and stunting

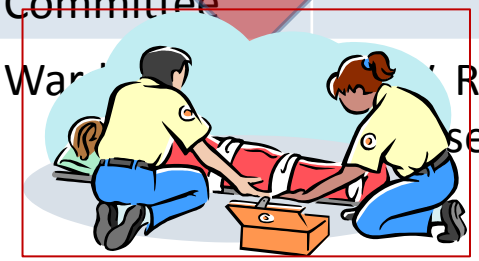
"Meta-analysis including 4,627 children identified a … **statistically significant effect of WASH interventions on height-for-age** z-score."

But…"review identified the **paucity of rigorous evidence** evaluating the effect of WASH interventions on child nutritional status."

Source: Dangour et al. (2013) *Interventions to improve water quality and supply, sanitation and hygiene practices and their effects on child nutrition.*

Nepal policy and program research

Level	tution/Individual	N = 708
National	Policy makers, donors, international non-governmental organizations (NGOs), academics	26
Regional	Regional Administrator, Ministries of Health, Agriculture, Livestock, Education, Local Development, Water Supply,	29
District	Departments of Health, Agriculture, Livestock, Education, Local Development, Social Development, implementing NGOs	278
Ilaka	Offices of Health, Agriculture, Livestock, Education, Local Development	79
Village Development Committee	VDC Secretaries of Health, Agriculture, Livestock, Education, implementing NGOs	97
Wa	Representative – Ward Citizen Forum, FCHVs sentative MG, Representative Cooperative/Groups	199



Source: Survey data 2013