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AGRILINKS




Research for Development: How Three Innovation Labs Are Driving Impact

Speakers: *Patrick Webb, Feed the Future Innovation Lab for Nutrition;*
Peter Goldsmith, Feed the Future Soybean Innovation Lab;
Dena Bunnel, Feed the Future Innovation Lab for Post-Harvest Loss

Moderator: *Julie MacCartee, USAID Bureau for Food Security*

Date: *Tuesday, July 25, 2017*

Patrick Webb, Feed the Future Innovation Lab for Nutrition

Patrick Webb is a Professor at the Friedman School of Nutrition at Tufts University. He is the Director of the Feed the Future Innovation Lab for Nutrition, and also Principal Investigator for the Office of Food for Peace's Food Aid Quality Review. The latter builds on his work as Chief of Nutrition for the World Food Program in Rome, the former builds on 9 earlier years at IFPRI. In his spare time, Patrick serves as Technical Adviser for the London-based Global Panel on Agriculture and Food Systems for Nutrition, he's a member of the CGIAR's Independent Science and Partnership Council, and also a member of the World Economic Forum's Global Futures Council on Food Security and Agriculture. In addition to the Friedman School, Prof. Webb has academic affiliations with Hohenheim University (Germany), Patan Academy of Health Sciences (Nepal), and the Fletcher School of Law and Diplomacy at Tufts.

Peter Goldsmith, Feed the Future Soybean Innovation Lab

Peter Goldsmith is the Director of the Feed the Future Soybean Innovation lab, at The University of Illinois. Dr. Goldsmith graduated in 1995 from the Ohio State University with a PhD in Agricultural Economics. He is currently a Professor of Agribusiness Management in the Department of Agricultural and Consumer Economics, University of Illinois. In addition to his PhD, Dr. Goldsmith has received an MBA specializing in Finance, and undergraduate degrees in Dairy Science and Political Science. His research interest is global agro-industrial marketing and strategy. Dr. Goldsmith, has worked the last fifteen years in Mato Grosso Brazil and Argentina and is one of the world's leading soybean economists with unique expertise in tropical soybean production and agro-industrial development. He currently directs the Food and Agribusiness Management Program at the University of Illinois and is a Fellow of the International Food and Agribusiness Management Association.

Dena Bunnel, Feed the Future Innovation Lab for Post-Harvest Loss

Dena Bunnel is the program coordinator for the Post-Harvest Loss Innovation Lab at Kansas State University where she manages operations and communications for the lab. She previously served as an agricultural advisor with the USDA Foreign Agricultural Service in Kabul, Afghanistan. Dena holds master's degrees in agricultural and resource economics and international agricultural development from the University of California, Davis and bachelor's degrees in agricultural communications and political science from Kansas State University.

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Feed the Future Innovation Lab for Nutrition

Patrick Webb, Ph.D.

July 25, 2017

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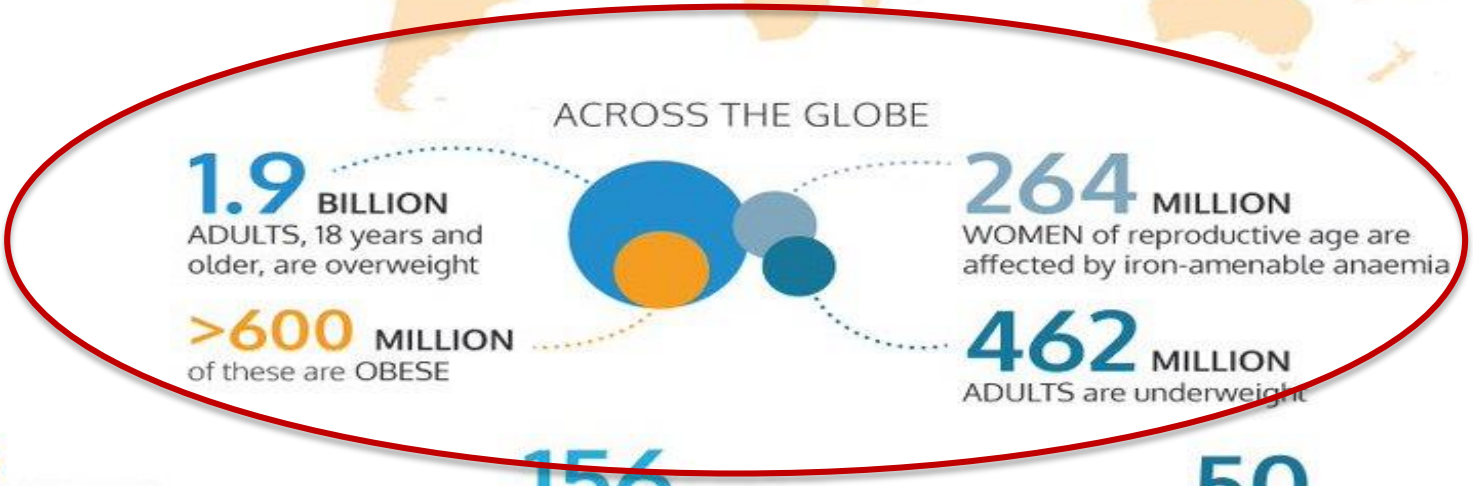
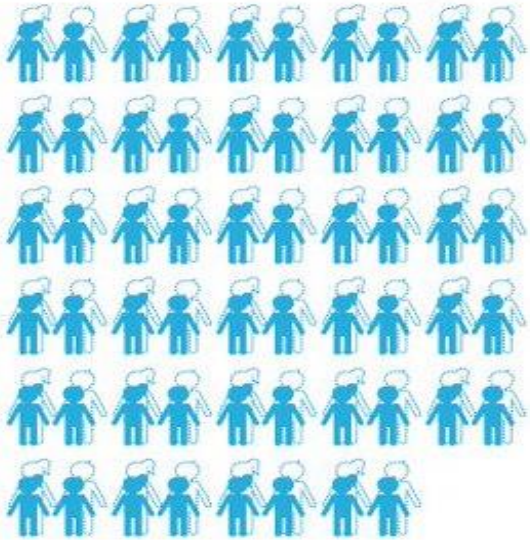
MALNUTRITION AFFECTS ALL REGIONS WORLDWIDE

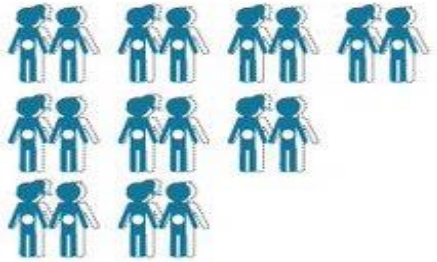


42 MILLION
children under the age of 5 years are **overweight or obese**

156 MILLION
children are **stunted** (too short for age)



50 MILLION
children are **wasted** (too thin for height)



Source: WHO 2017

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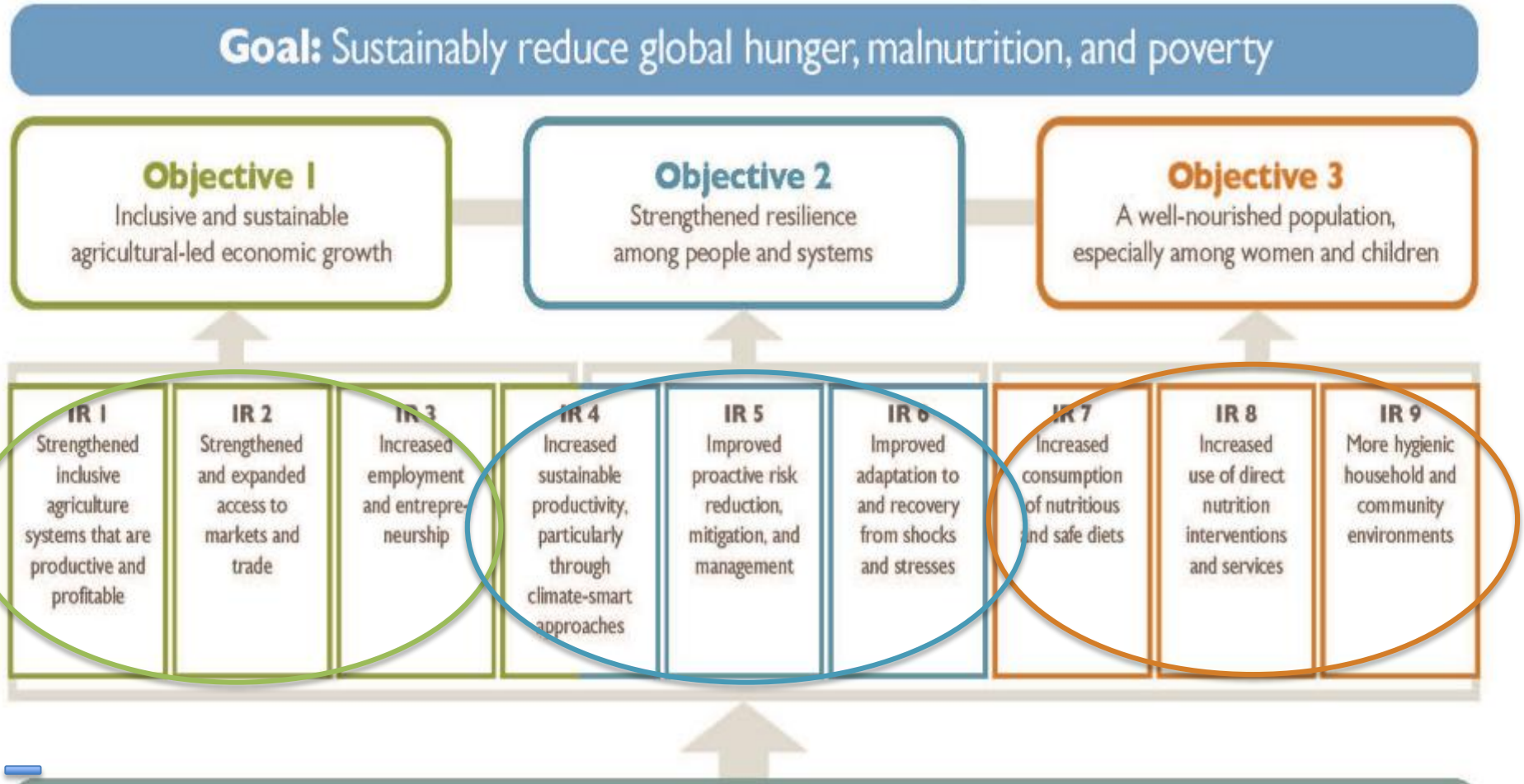

KEY *NUTRITION LAB* RESEARCH THEMES

- What *measurable* impacts do **investments in agriculture** have on nutrition (positive and/or negative)?
- What individual and institutional commitment/capacity affect impact of nutrition **policies and programs**?
- What **biological mechanisms** must be understood to design interventions to improve **diets and nutrition**?

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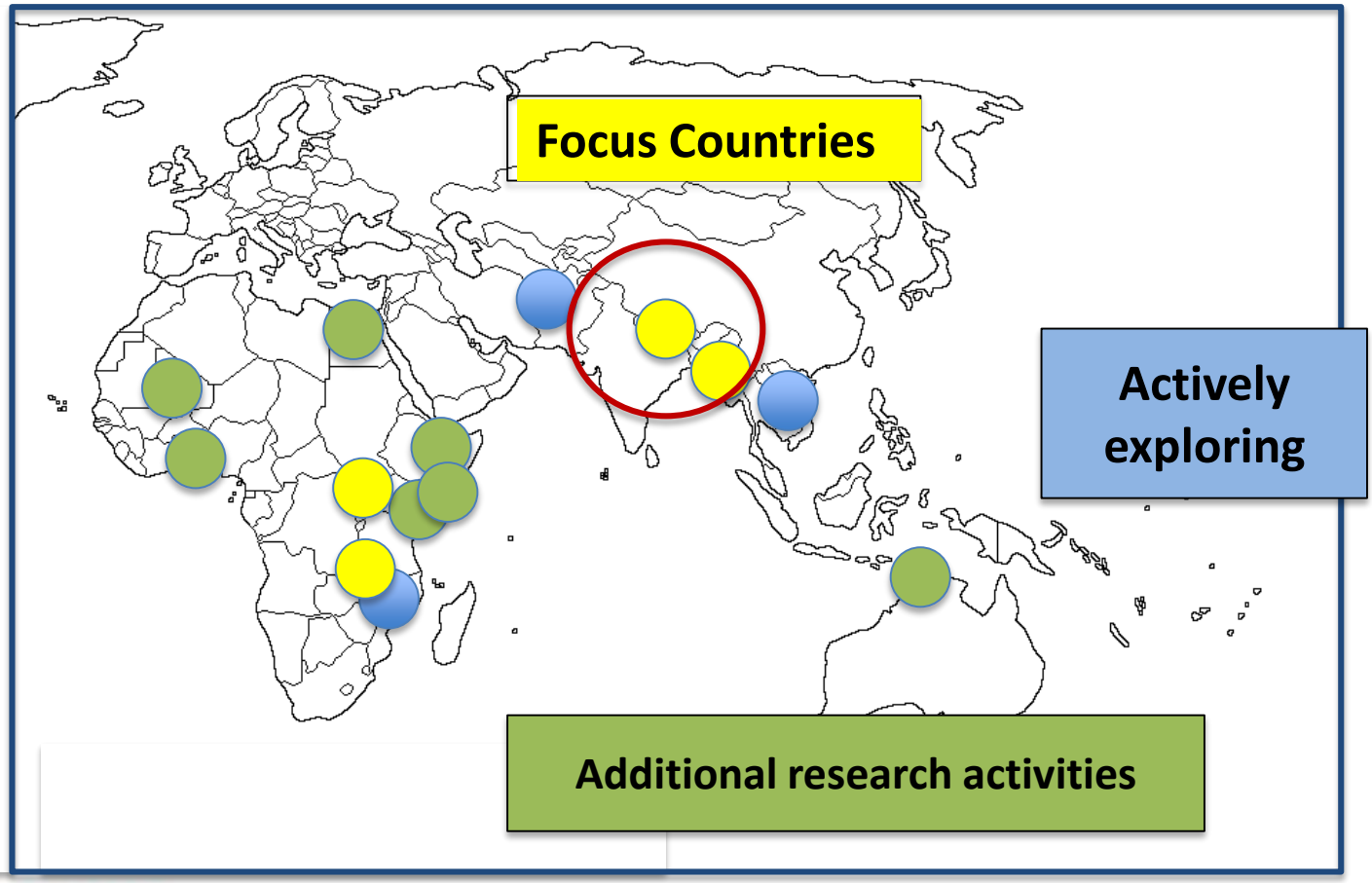
NUTRITION INNOVATION LAB: Country-specific activities



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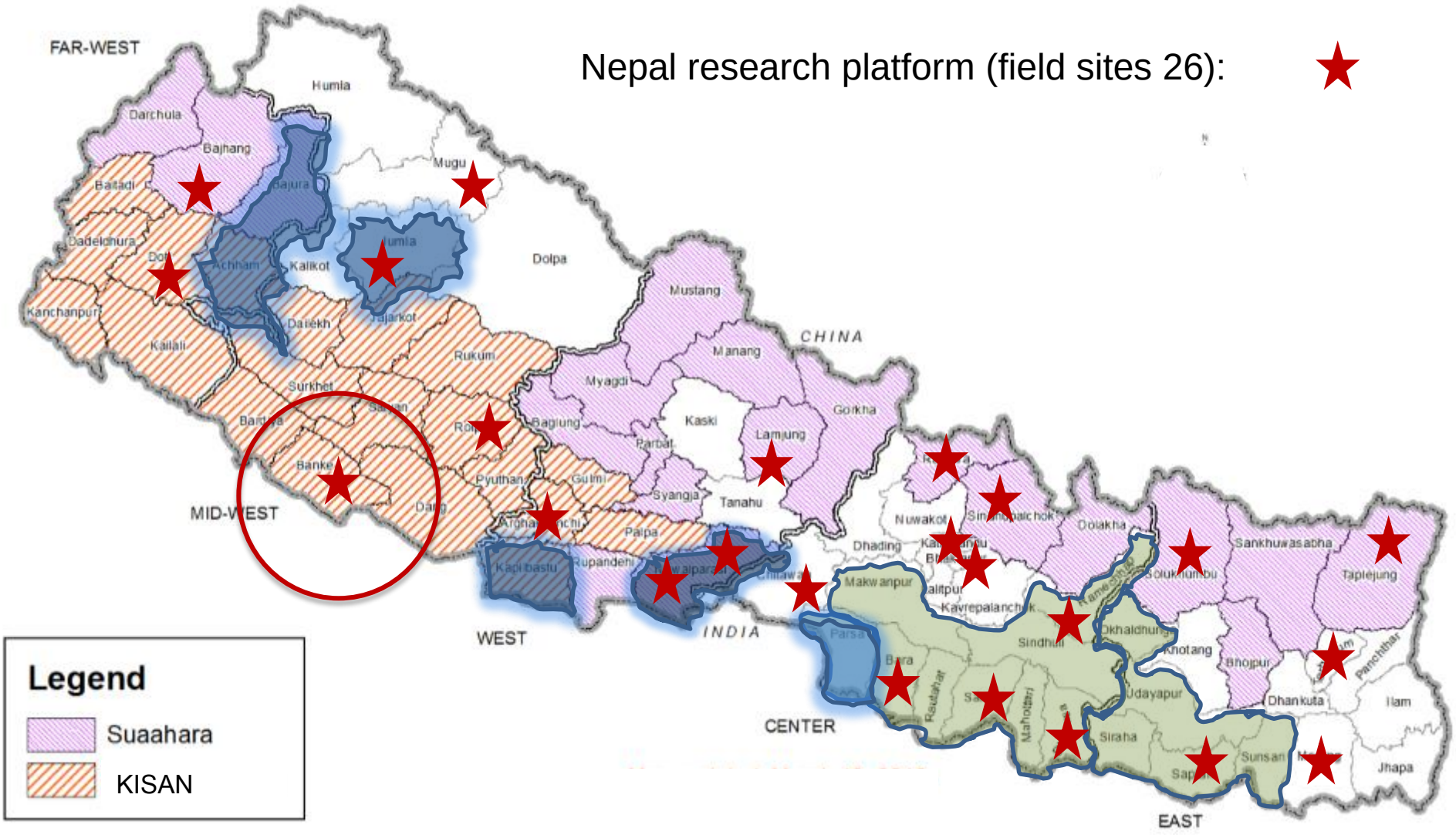

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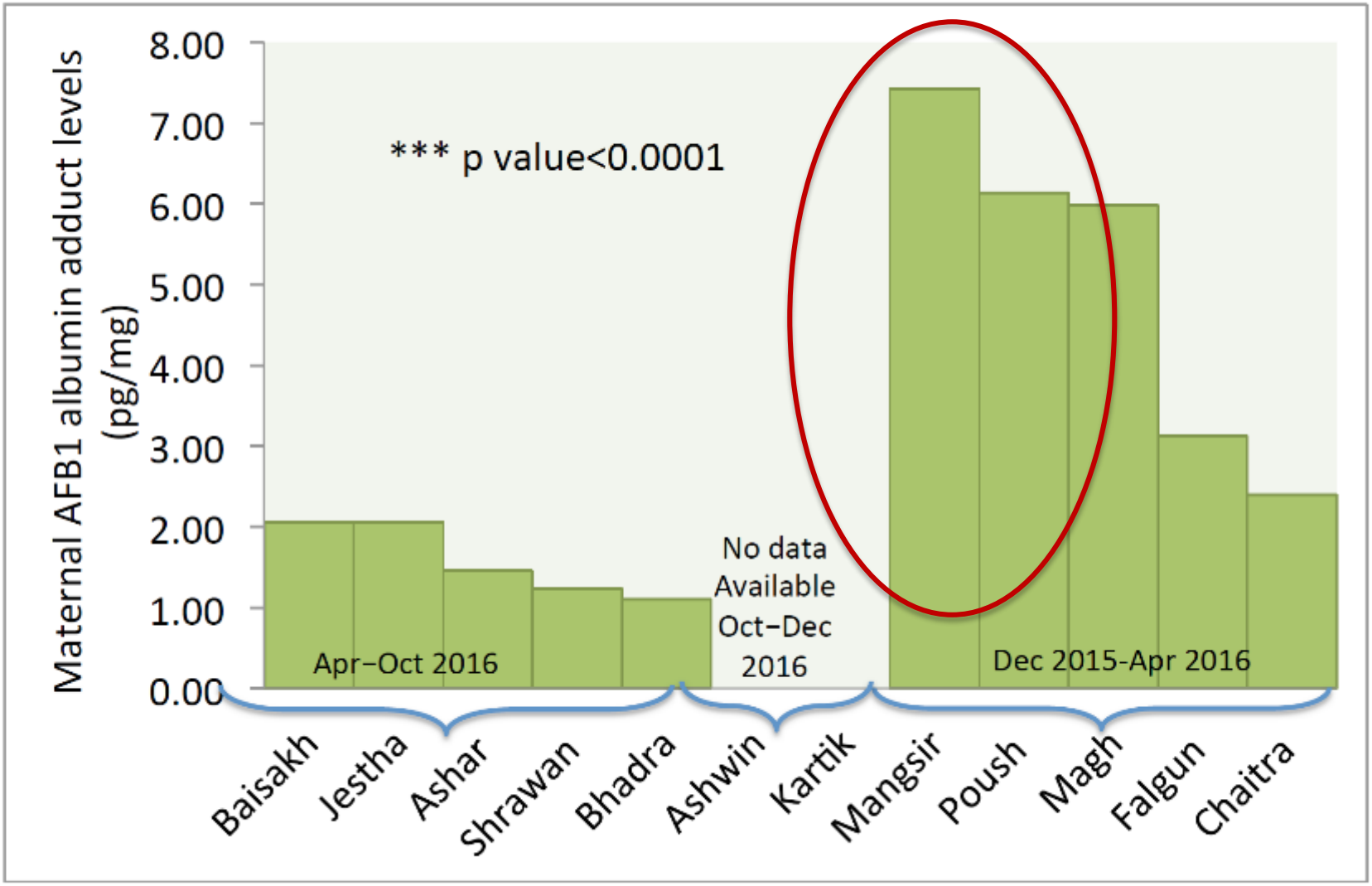
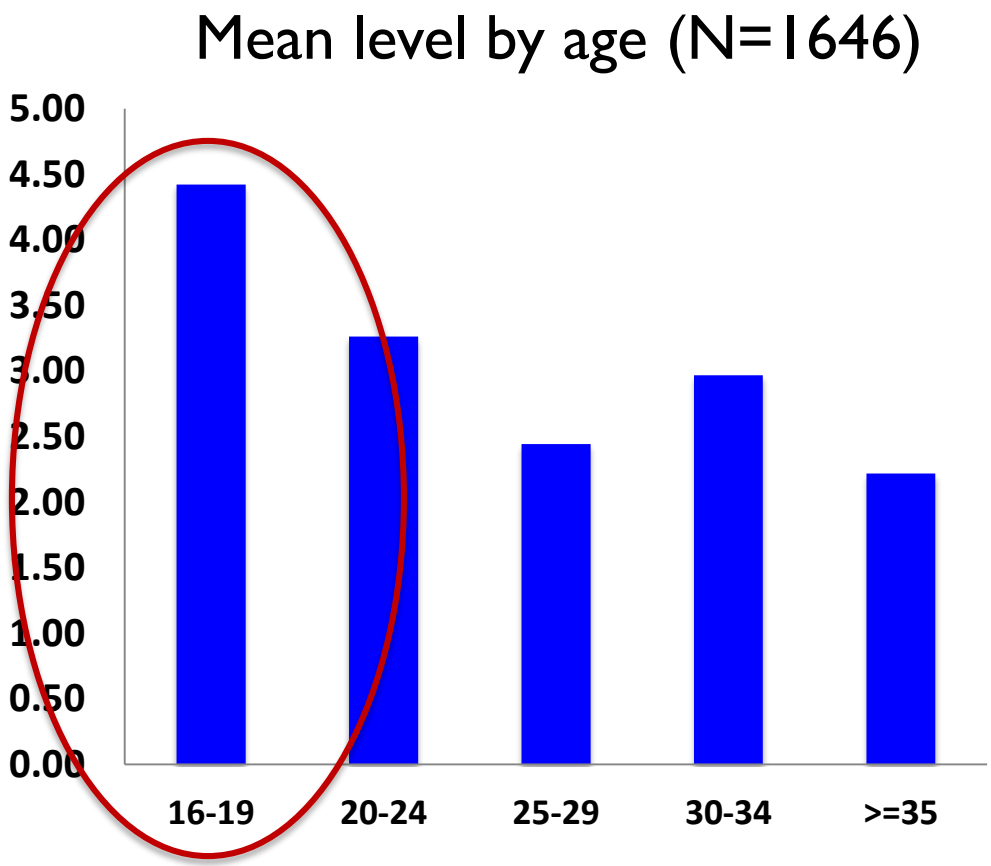
MEAN AFB1 BY MONTH, N=1648



AFB1 (pg/mg) values were log-transformed for the bivariate analysis

AFLATOXIN IN BLOOD: PREGNANT WOMEN, NEPAL

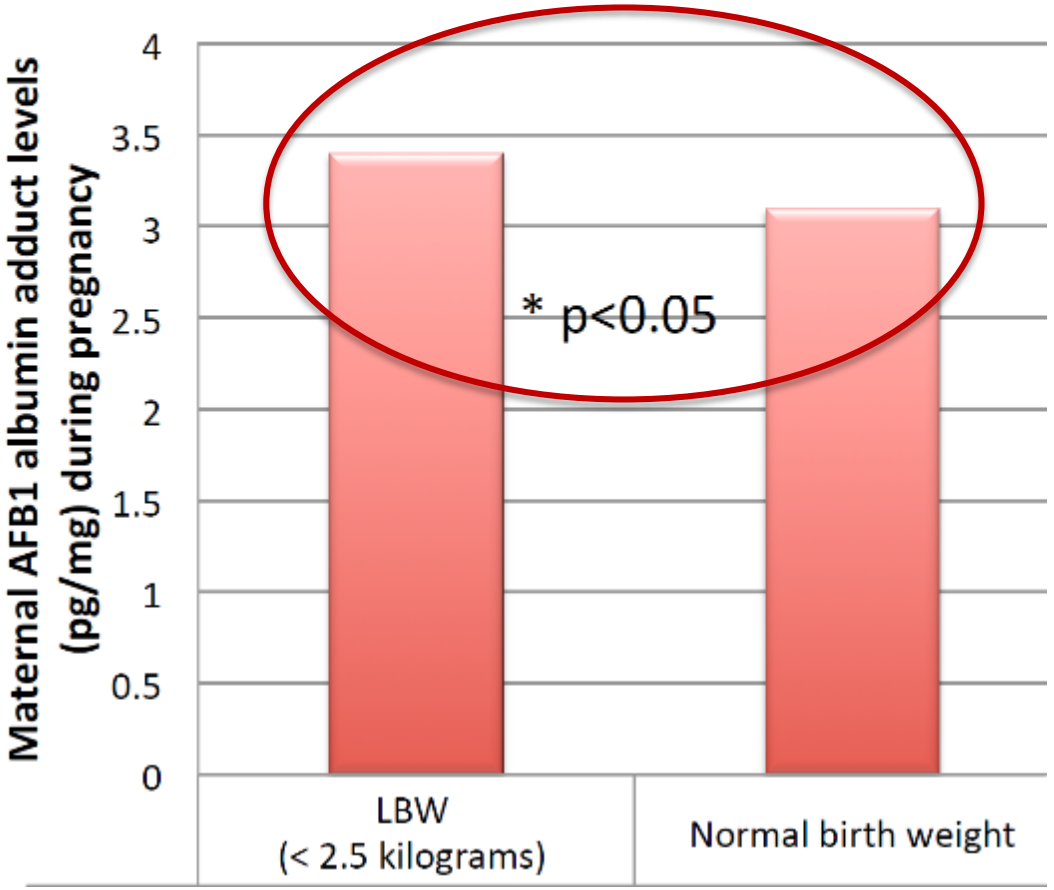


MATERNAL AFB1 AND LOW BIRTH WEIGHT (LBW)

N=1484

LBW <2.5 kg

Prevalence of LBW: 20%



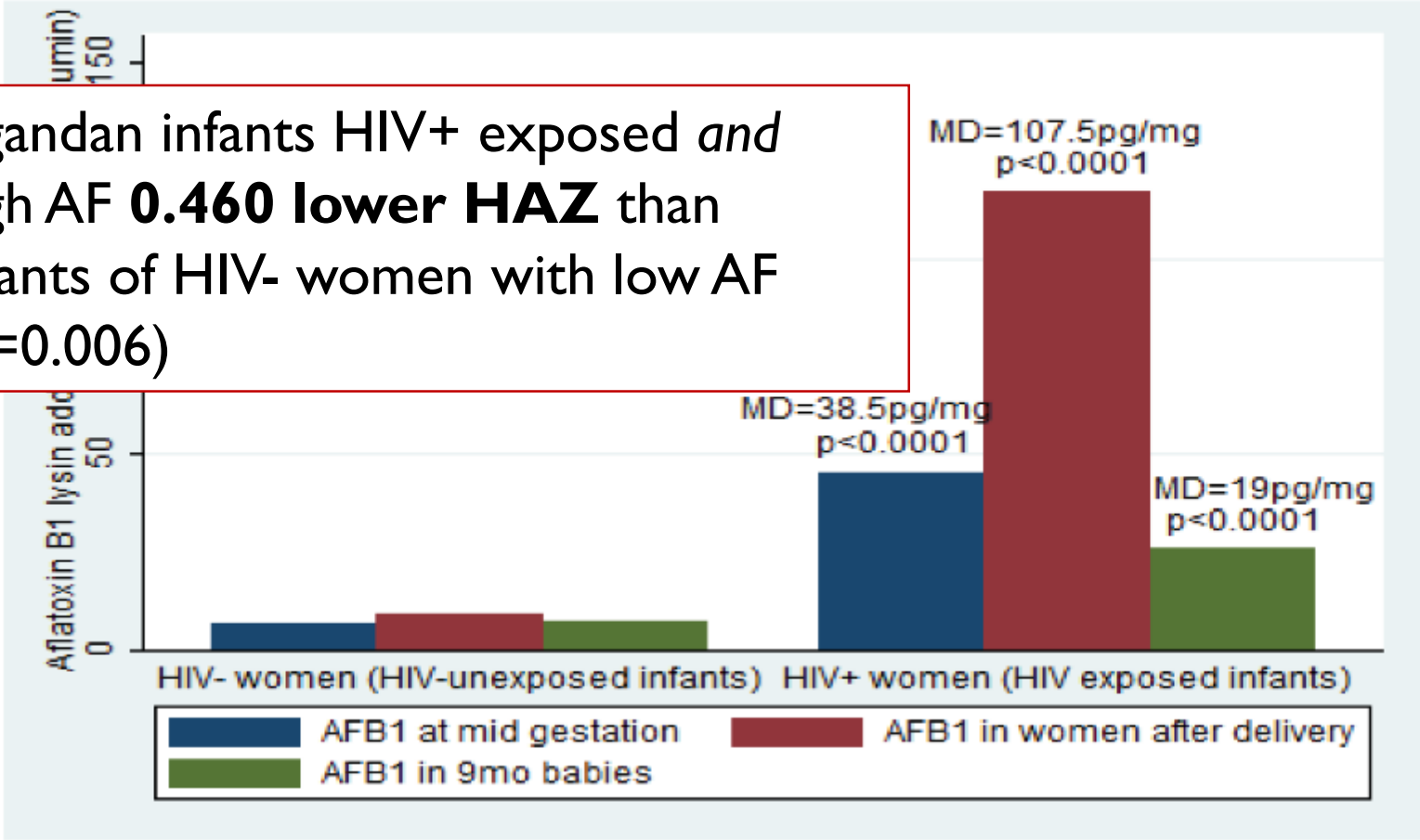
Adjusting for socio-demographic variables, the odds of having a LBW infant:

- AFB1 (OR=1.14; 95% CI: 1.01-1.28 p=0.031)
- Short maternal stature (OR=2.05; 95% CI: 1.45-2.89, p<0.0001)
- Having a girl (OR=1.42; 95% CI: 1.08-1.85, p=0.011)

- Education (OR=0.95; 95% CI: 0.91-0.98, p=0.001)
- Dietary diversity score (OR=0.84; 95% CI: 0.76-0.93, p=0.001)
- MUAC (OR=0.89; 95% CI: 0.83-0.94, p<0.0001)

AFLATOXIN LEVELS HIGHER IN HIV (+) WOMEN AND THEIR INFANTS

Ugandan infants HIV+ exposed *and* high AF **0.460 lower HAZ** than infants of HIV- women with low AF (p=0.006)



ENVIRONMENTAL ENTEROPATHY (EED)

"Leaky gut" leads to inflammation and loss of nutrients. EED testing in Uganda (lactulose:mannitol): **385 children 12-16 m**.

- Median L:M score 0.27: 21% no EED, **58% moderate, 22% severe**.
- Infants with **improved water source** better L:M scores (P<0.050).

- If **goats/sheep inside home**, significantly worse L:M (P<0.050).
- **L:M significantly higher if infants stunted or wasted at 6-9m** (i.e. prior to L:M test).

TAKE HOME MESSAGES

1. Malnutrition still major challenge in low income countries, and low income settings of middle income countries. Agriculture productivity and resilience only ***part* of the solution**.

2. Huge cross-cutting implications from agriculture, through **gender**, through diets, through nutrition outcomes.

3. AF *may* be linked to child growth (much through birth outcome, SGA). Season of birth matters in relation to duration of food storage. **Potential to cut stunting via mycotoxin control.**

4. **Research needed on EED** to determine role of SBCC and WASH. Access to 'improved water sources' alone not enough.

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USAID Innovation Lab for Soybean Value Chain Research
aka
Soybean Innovation Lab (SIL)

Peter Goldsmith, Ph.D.
Professor, Dept. Agricultural and Consumer Economics, University Illinois Urbana-Champaign

Principal Investigator, SIL

Soybean Success Kits
MRA 2

Research for Development: How Three Innovation Labs Are Driving Impact

Photo credit: Soy Innovation Lab

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Soybean Innovation Lab

Overview of the presentation

- Quick overview on SIL
- SIL as an expression of FtF and GFSS strategies matching evidence and technology to development's needs and pace
  - Walk away #1 is that USAID, via the SIL model, has found the sweet spot for integrating sorely needed evidence and robust findings directly, and in real time, into the development system
  - Walk away #2 is that Universities now have a structure and strategic guidance as to how to become more directly engaged in the development system
    - Move away from the periphery of only training graduate students, improving university institutions, and contributing long cycle (important) research
- Task now is to better integrate this new university activism more directly into the development process- IDIQs/Missions/ etc.

Soybean Thresher Development MRA 2

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- 2013-2018
- $10m +$1.4m buy-ins
- The University of Illinois is the lead institution
  - Mississippi State University
  - University of Missouri
  - International Institute for Tropical Agriculture (IITA), Ibadan, Nigeria

SIL

Soybean Research Farm, Nyankpala, Ghana
MRA 3

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What we do

- Our Mission: to establish a foundation for soybean development in the developing world- principally Africa
- Our Role: to provide the technical knowledge and associated appropriate technologies to make successful those trying to develop soybean in emerging markets
  - Researchers, extensionists, private sector, contractors, NGOs
  - Working with those that work with farmers
- Our expertise: producing and utilizing soybean in the tropics
- Our scope: the soybean value chain-----from inputs through to livestock and human utilization
  - Inoculum, fertilizer, breeding, seed, agronomy, mechanization, poultry and aquaculture feed, soy milk and soy flour…

Soybean Field day
Kenya, MRA 1

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Where we work

Started in five countries now in 13

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FtF and GFSS Strategies

"Systemic Approaches to Sustain Impact"

- FtF
  - Evidence, Data, and Research ● **Evidence-based approach**: Our continued focus on generating evidence on what works; using rigorous monitoring and evaluation approaches focused on management and learning; and building strong mechanisms for learning and adaptation are essential for us to achieve maximum results.
- GFSS
  - Innovative research: We will continue to **advance and scale the results of high-quality biophysical and social science research** to help ensure a pipeline of innovations, tools, and approaches designed to improve agriculture, food security, resilience, and nutrition priorities in the face of complex, dynamic challenges. U.S. universities are critical to efforts to strengthen capacity of partner country research institutions to engage in locally and globally relevant research.

Dr. Awuni, MRA 3
MSU Agronomist

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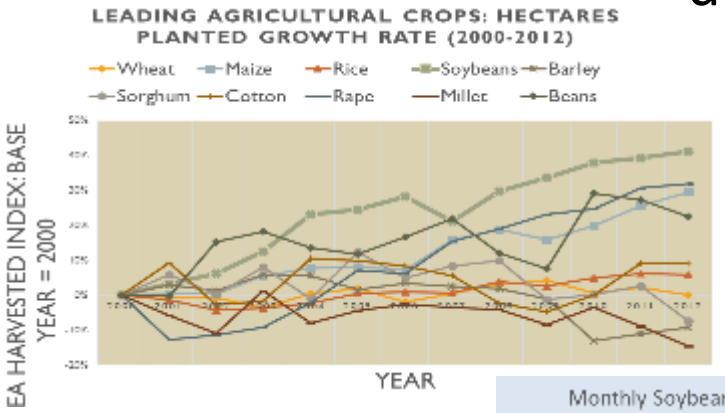
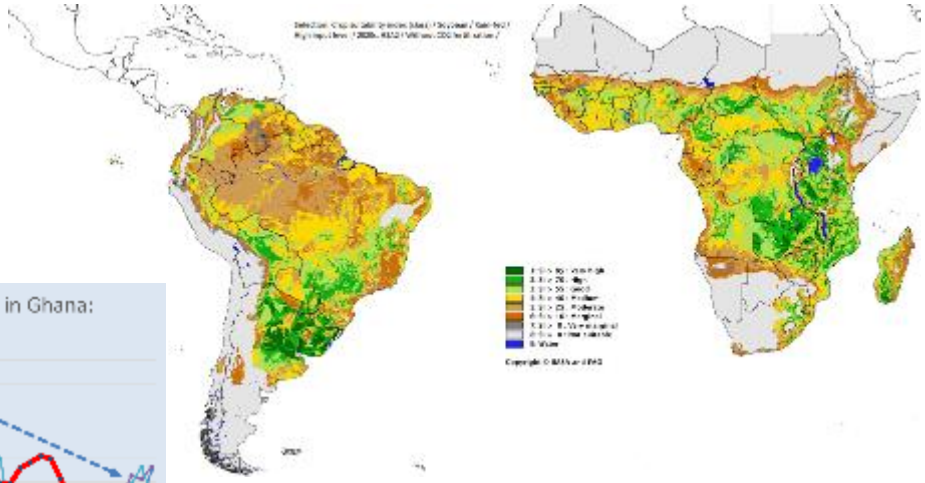
FtF and GFSS R4D Strategies

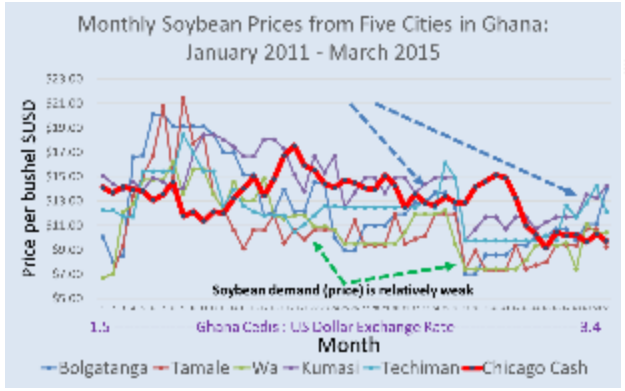
USAID Soybean RFP in 2012

Getting the "evidence" horse back in front of the "development" cart

Support the significant investment by donors to use soybean as a development engine







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FtF and GFSS R4D Strategies

SIL's model directly injects evidence and applied science into the development process

SIL's 10 key tactical approaches….

1. Operate through partnerships with practitioners
2. Work "in country"
3. Move faculty (knowledge) to directly engage with practitioners
4. Specialist faculty write proposals and manage projects directly with partners
5. Listen and be needs driven
6. Be grounded
   - on the ground
7. Sustain and focus engagement
   - Specialists as mentors, teachers, trainers
8. Deliver managed (applied) research
   - Coordinated, central strategy and design
9. Provide disciplinary strength with multidisciplinary opportunities
10. Cluster activities
    - allows for feedback, learning, financial economies

In sum, talented faculty who want to make a difference, now

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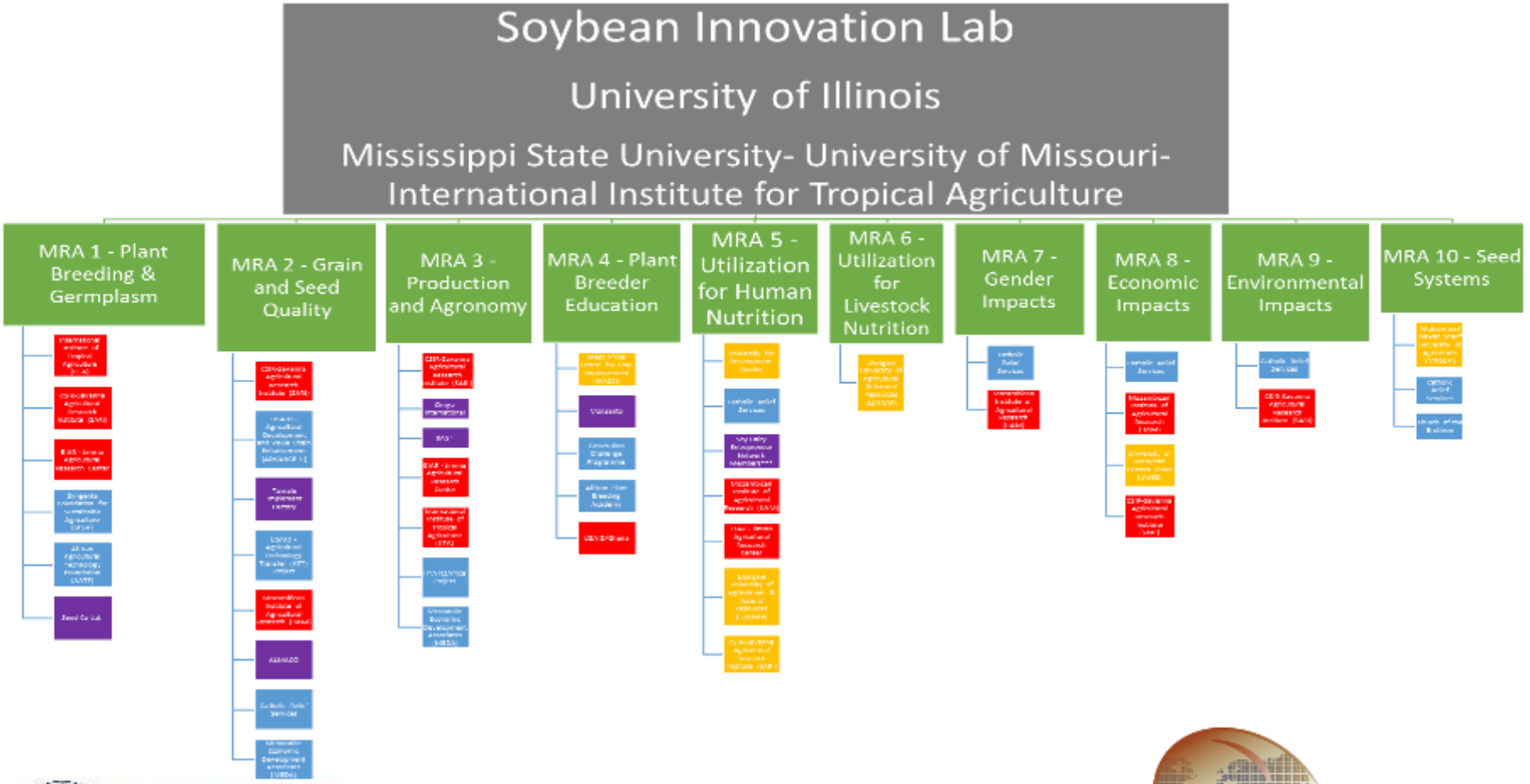
Organizational Structure



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Organization 2 of 2: Faculty Led Units (MRAs)

- Faculty with expertise in the discipline area design and operate each one of the ten units
  - Allows for accountability
- Research activities are co-located, focused, and integrated
  - Leverages discipline strength
  - Achieves high levels of multidisciplinarity
- SIL is not a granting organization
- SIL is a managed program executing strategy through ten "business units" directly in partnership with African organizations
  - A common culture
- Lesson is that universities can responsive to development needs and can still bring to bear the expertise of leading faculty

Dr. Tesfaye, MRA 1 Soybean Breeder, Jimma, Ethiopia

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SIL in Action

Examples

- Dr. Kathleen Ragsdale, PI MRA 7, Women's Empowerment and Gender Equity
- Professor, Anthropology, Mississippi State University
- Partnership- Catholic Relief Services
- Location- Savannah Agricultural Research Institute, Nyankpala, Ghana
- Focus: Gender implications from the introduction of a commercial non-native non staple crop technology
  - Understanding women's empowerment when practitioners try and introduce soybean
  - Normatively very different than when working with maize, cassava, sweet potato, millet, cow pea, ground nuts

Dr. Ragsdale, MRA 7

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SIL in Action

Examples

- Dr. Juan Andrade, PI MRA 5, Human Nutrition
- Professor, Nutrition, University of Illinois
- Partnership- Catholic Relief Services, University for Development Studies, Savannah Agricultural Research Institute
- Location- Savannah Agricultural Research Institute, Nyankpala, Ghana
- Focus: Soy as a nutrition (human) sensitive agricultural crop
  - Soy as a complementary food to economically improve the nutritional characteristics of local recipes, institutional feeding programs such as school lunch
  - Soy dairy to combine nutrition and economic development

Complementary Food with OFSP, MRA 5

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FEED THE FUTURE INNOVATION LAB FOR THE REDUCTION OF POST-HARVEST LOSS

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Research for Development: How Three Innovation Labs are Driving Impact

Presented by Dena Bunnel

July 25, 2017

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Post-Harvest Loss Reduction

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IMPACT OF POST-HARVEST LOSS

- Quantity and quality loss
- Food safety, nutrition, economic implications
- Estimated losses of 1/3 in developing economies
- Scant evidence base – weak methodologies
- Many interventions available, off the shelf or used elsewhere
- Tremendous promise to address food security

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POST-HARVEST LOSS INNOVATION LAB

A strategic, applied, research and education program aimed at improving global food security by reducing post-harvest losses in stored crops, such as grains, oilseeds, legumes, root crops and seeds.

Key Technical focus areas:

- Drying
- Storage
- Mycotoxin assessment
  (losses from insect, fungi, other pests)

Cross-cutting:

- Capacity building
  (human and institutional)
- Nutrition
- Gender
- **Engagement**
  (effective education, adoption)

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WHERE WE WORK

Afghanistan
Tree nuts, raisins, wheat

Nepal
Maize, peanuts, feed

Guatemala
Maize

Ethiopia
Chickpea, maize, sesame, wheat

Bangladesh
Rice

Honduras
Maize

Ghana
Maize

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Post-Harvest Loss Reduction

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PROGRAM TIMELINE

Human & institutional capacity building

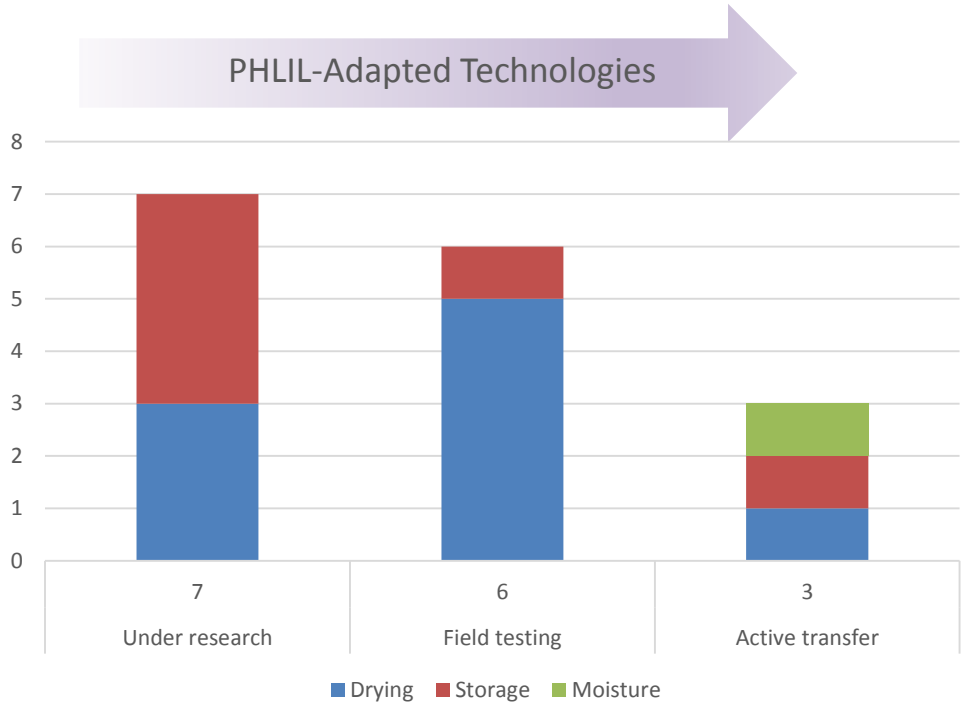
Partnerships

Communications

Year 1: Partnership logistics, baseline surveys (practices, PHL losses, socioeconomic factors)

PHLIL: RESEARCH INTO USE

- **Drying**
  - Solar Biomass Hybrid Dryer (Ghana)
  - STR Dryer (Bangladesh)
  - Solar Bubble Dryer
  - Cabinet Dryer (Ethiopia)
  - Modified biomass furnace dryers (Guatemala)
- **Storage**
  - Hermetic Bags – PICS, GrainPro, ZeroFly
  - Traditional bags
  - Metal and Plastic storage bins
- **Moisture**
  - EMC moisture meter



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INTEGRATING TECHNOLOGY PACKAGES

BANGLADESH –
STR Dryer & Hermetic Storage

GHANA – SBHD & EMC Moisture Meter

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INTEGRATED APPROACHES MOVING FORWARD

- Enhance national capacity (human and institutional, including risk communication)
- Characterize mycotoxin prevalence across food and feed including risk mapping, practices, gender, ag econ, policy
- Identify and pilot integrated intervention packages to:
  - Link policy, regulatory
  - Study next order questions during roll-out
  - Reduce pre-and post-harvest accumulation
  - Predict and remove outbreaks as they occur (modelling, mobile testing, mobile responses)
  - Alternative uses to avoid concentrating toxins on most vulnerable populations

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POST-HARVEST LOSS REDUCTION TO IMPROVE NUTRITION

- Agriculture as part of an integrated approach to Nutrition (eg, Nepal)
- Preserve nutrient content including through value addition
- Food safety (mycotoxins, pesticides, biological hazards,…)

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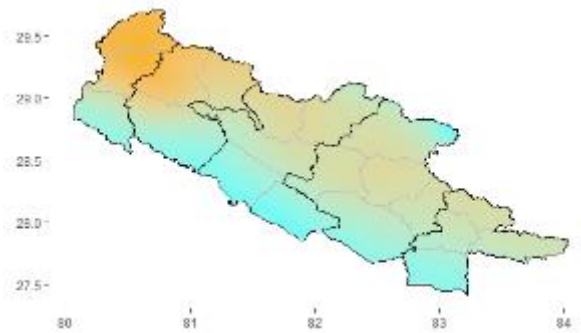
AFLATOXIN: A THREAT TO FOOD AND NUTRITIONAL SECURITY

- **Mycotoxins** – toxic fungal metabolites
  - **Aflatoxin** – produced by *Aspergillus* fungi
- ~**4.5 billion** people, **25% global** food supply
- Contamination of food and feed
- Humans and livestock are susceptible
- **Chronic exposure**:
  - Causal: cancer
  - Correlated: stunting children's development, nutrient uptake, immunosuppression
- **Acute exposure**: death (e.g., Kenya outbreaks)
- Negative impact on agriculture, health, trade and environment (US corn losses up to $1.68 billion – Wu et al. 2017)
- Often undetectable/invisible

Photo: Karanja, KARI

NEPAL BUY-IN OBJECTIVES

- Engage and enhance the **capacity of national partners** (including risk communication). ***Collaboration with Mars Global Food Safety Lab, China.***
- **Assess mycotoxin content** in potentially sources of mycotoxin exposure (food and feed), in markets and on farm. Includes information on storage systems.
- **Characterize the toxigenic fungal species** present in crops (and soil) that could contaminate food supplies.
- For identified high risk mycotoxins, recommend short-, medium- and long-term intervention strategies.



- **Phased approach:**
  - Round 1: market snapshot
  - Rounds 2-3: Markets – 20 districts; On farm – 4-6 sentinel districts
  - ***analysis, risk mapping***

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ADDRESSING GENDER ROLES IN POST-HARVEST

Using the Women's Empowerment in Agriculture Index as a foundation, surveys on gendered roles in post-harvest activities were conducted in 3 countries.

- Ghana: FGDs or individual surveys with 418 farmers
- Ethiopia: FGDs with 240 farmers
- Bangladesh: FGDs with 209 farmers

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WOMEN-CENTERED ENTERPRISE

- Women are keepers – and therefore sellers – of saved seed.
- Hermetic seed storage has allowed farmers to save seed and even sell excess.
- Control of these economic gains remains an unknown and a challenge.

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DEMAND-DRIVEN RESEARCH

Parboiling rice is a large time burden for women in Bangladesh. Research is taking place on converting a PHLIL-BAU modified dryer for use on parboiled rice.

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THE GLOBAL FOOD SECURITY STRATEGY

Objective 1	Objective 2	Objective 3
Inclusive and sustainable agricultural-led economic growth	Strengthened resilience among people and systems	A well-nourished population, especially among women and children

- Strengthen the capacity of all food system participants
- Targeting investments and strategically focusing resources to drive development
- Country leadership (including risk management)
- Partnerships
- Harnessing science, technology and innovation
- Sustainability

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Post-Harvest Loss Reduction

Kansas State University

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U.S. RETURN ON INVESTMENT

- *Proactively working on a variety of **pests and diseases** before they hit the United States*
- *Gaining access to **germplasm** for future breeding use*
- *Stimulating demand and **opening trade opportunities** for U.S. producers*
- *Developing **technologies, varieties and methodologies** with direct application to domestic farm operations*
- ***Feedback to US private sector** on potential new markets for their technologies*
- *Exchange of the best and brightest **scientists** in the world*
- *Enhanced **national security** through development*

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Questions and Answers

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