UNDERSTANDING AGRICULTURE/FOOD SYSTEM-NUTRITION LINKAGES

INNOVATIONS IN METHODS AND METRICS

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THE BURDEN OF MALNUTRITION

80% of NCDs deaths in LMICs

1 in 4 children globally are stunted and will not reach their full physical or cognitive potential.

An estimated 2 billion people worldwide are deficient in key micro-nutrients.

A quarter of all deaths from non-communicable diseases occur under the age of 60.
HIGH GEOGRAPHIC INEQUITY: 34 COUNTRIES ACCOUNT FOR 90% OF GLOBAL BURDEN OF MALNUTRITION
HIGH SOCIOECONOMIC INEQUITIES PERSIST

Source: Global Nutrition Report 2016
RURAL-URBAN INEQUITIES PERSIST: BUT STUNTING IN URBAN AREAS IS ALSO HIGH

Source: Global Nutrition Report 2016
POOR DIETS ARE A TOP RISK FACTOR FOR DISEASE
What do we do?
INCOME GROWTH DOES REDUCE UNDERNUTRITION

A 10% increase in GDP/PC leads to a 6% reduction in stunting

Prevalence of stunting in children aged 0-5 years and GDP per person

Source: Ruel and Alderman; Lancet 2013
INCOME GROWTH CAN ALSO HAVE UNINTENDED CONSEQUENCES

A 10% increase in GDP/PC leads to a 7% increase in overweight & obesity

Source: Ruel and Alderman; Lancet 2013
INCREASED ATTENTION TO THE UNDERLYING DETERMINANTS

Agriculture / food systems

Benefits during the life course

- Morbidity and mortality in childhood
- Cognitive, motor, socio-emotional development
- School performance and learning capacity
- Adult stature
- Obesity and NCDs
- Work capacity and productivity

Optimum fetal and child nutrition and development

- Breastfeeding, nutrient rich foods, and eating routine
- Feeding and caregiving practices, parenting stimulation
- Low burden of infectious diseases

Food security, including availability, economic access, and use of food

Feeding and caregiving resources (maternal, household, and community levels)

Access to and use of health services, a safe and hygienic environment

Knowledge and evidence
- Politics and governance
- Leadership, capacity, and financial resources
- Social, economic, political, and environmental context (national and global)

Source: Adapted from Bhutta et al; 2013
SDG 2: Target 2.2
By 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons.
THE RAPIDLY CHANGING LANDSCAPE
<table>
<thead>
<tr>
<th>RAPID CHANGES AFFECTING THE UNDERLYING AND BASIC DETERMINANTS OF NUTRITION STATUS</th>
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<tbody>
<tr>
<td>Climate change/environmental fragility; migration and conflict</td>
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<td>Rapid urbanization and rural transformation</td>
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<td>Changing food system governance, production &amp; distribution</td>
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<td>Shifting grounds for women and men as they respond to evolving risks and opportunities</td>
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THE BIG QUESTIONS
1. How do we make our agriculture-food systems sustainable and healthy to all people in this rapidly transforming context?

2. How do we make nutritious diets physically and economically accessible in an equitably and just way?
INCREASED MOMENTUM TO INFORM ACTION: LEVERAGING THE ROLE OF AGRICULTURE FOR NUTRITION
## A BRIEF GLOBAL HISTORICAL CONTEXT

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Events and Highlights</th>
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<tbody>
<tr>
<td>1970s</td>
<td>• Green revolution; “Food First” paradigm</td>
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| 1980s       | • The search for technological solutions; nutrient values of foods  
              • CGIAR focuses on nutrition |
| 1990s       | • **Commercialization of agriculture**  
              • Intrahousehold resource allocation; gender roles in agriculture  
              • Food and non-food determinants of undernutrition |
| 2000s       | • AIDS & food prices/volatility  
              • Sustainable agri-food systems and policy  
              • Several systematic reviews on micro pathways |
| Late 2010 onwards | • A more comprehensive agenda (diet quality; food safety NCDs; Environmental concerns) |
1. DEVELOPMENT OF CONCEPTUAL PATHWAYS AND FRAMEWORKS

Agriculture is fundamental to structural transformation of economies and poverty reduction.

But pathways to nutrition are diverse & interconnected.

1. Agriculture as a source of food
2. Agriculture as a source of income and expenditures
3. Agricultural policy and food prices
   Gender dimensions
4. Women’s status and intra-HH resource allocation
5. Women’s ability to manage young child care
6. Women’s own nutritional status & intergenerational implications for nutrition

Source: Headey, Chiu and Kadiyala, 2012; Kadiyala et al 2014
Source: Headey, Chiu and Kadiyala (2012); Kadiyala et al (2014)
Climate-Agriculture-Nutrition Pathways

Source: Ronsenstock et al. 2016
2. EVIDENCE GENERATION: EMERGING EVIDENCE OF THE IMPACT OF AGRICULTURE INTERVENTIONS

- Impact/correlations on agriculture production, income and diets
- Impact on wasting and anemia
- No impact on stunting
  - Concern about short timelines to show impacts on stunting
  - Pathways to impact are positively impacted
- Markets seem to play a counter-intuitive role (Headey and Hoddinott 2014)

Source: several including Ruel et al. 2017
AMBIGUOUS IMPACTS OF WOMEN’S TIME ALLOCATION ON CHILD NUTRITION

- Indicators of food consumption and nutrition could worsen due to time burdens of women
- No clear-cut nutritional impact
- Other care givers are important
- Sometimes the income effect dominates
- Time-use methodology and metrics are problematic
  - poorly conceptualized, variable recall periods
  - Variable activity recalls
  - What is time poverty?

Source: Johnston et al., 2015
3. Innovations in Evidence Generation

- Stepping out of disciplinary comfort zones
  - From evaluating homestead food productions to livestock and dairy value chains; innovative agriculture extension systems for nutrition
  - From subsistence based agriculture rural models to food systems based models in rapidly transforming contexts
  - Embracing environmental fragility/change and what this means for nutrition and vice-versa

- Development, testing and validation of innovative conceptual frameworks, methods and metrics
  - Innovative Methods and Metrics for Agriculture and Nutrition Action (IMMANA)
**IMMANA**: To accelerate the development of a robust scientific evidence base needed to guide policy investments in agriculture for improved nutrition and health.

<table>
<thead>
<tr>
<th>IMMANA Grants</th>
<th>IMMANA Fellowships</th>
<th>Agriculture, Nutrition &amp; Health Academy</th>
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<tr>
<td>IMMANA Grants aim to accelerate the development of innovative interdisciplinary methods, metrics, and tools to fill key knowledge gaps in agriculture-food systems and nutrition research.</td>
<td>IMMANA Fellowships aim to build a cadre of early career researchers in agriculture and food systems, nutrition, and health research.</td>
<td>ANH Academy is a global research network in agriculture and food systems for improved nutrition and health to serve as a platform for learning, sharing and collaboration.</td>
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<tr>
<td>2 rounds</td>
<td>4 rounds; 4th round now open</td>
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- The Women’s Empowerment in Nutrition Index (WENI)
- Women’s empowerment in livestock-focused agriculture
- His and Hers, time and income: How intra-household dynamics impact nutrition in agricultural households
- A novel tool for the assessment of household-level water insecurity

- Leveraging value chains to improve nutrition: methods and metrics for improving the identification, design and evaluation of interventions
- Indicators of Affordability of Nutritious Diets in Africa (IANDA)

- ENRICH - Enriching vegetable consumption by using reliable, cheap and fast consumer-generated data
- New Keys for Old Black Boxes: Developing Methods to Improve Nutrition Assessment by Measuring Energy Expenditure
Developing an innovative approach to measuring the livelihoods of smallholder farmers and testing critical linkages from farmer livelihoods to nutrition

Using Information Communication Technologies (ICTs) to understand the relationships between labour-saving agricultural innovations, women’s time use and maternal and child nutrition outcomes
The aim of the ANH Academy is to foster a global community of interdisciplinary researchers working on agriculture and food systems for improved nutrition and health.
ANH ACADEMY ACTIVITIES

• The ANH Academy Week
• Webinars
• Online and face to face capacity strengthening activities
• Technical working groups

ANH Academy Weeks

- June 2016 in Addis Ababa
  - 300 participants from 30 countries
- July 2017 in Kathmandu
  - 430 participants from 30 countries
- 25-29 June 2018 in Accra
  - 5 day event
    - 2 days of “learning labs”
    - 3 days of research conference

www.ANH-Academy.org
Purpose

To synthesise the state-of-art concepts, methods and metrics to facilitate their greater use and accelerate research on agriculture/food systems and health and nutrition dynamics.
ANH Academy Working Groups

1. Food Environments
2. Sustainable Diets
3. Time-use (Quasi)
4. Food Safety
5. Costs and benefits of agri-food system strategies for nutrition and health (October 2017 onwards)
6. Animal source foods (October 2017 onwards)
Improving nutrition through enhanced food environments

Food systems are failing to deliver secure access to safe, high-quality diets for everyone. In this context, it is essential to improve food environments so that they can deliver a range of benefits: improved nutrition, healthier populations, and more productive economies. This brief considers current evidence on what works and provides recommendations for action that affect supply dynamics of the food system, aimed at both public and private sector actors.
30. Improved *food environments* allow consumers to purchase and consume more nutritious and healthy foods. Although a substantial body of research describes food environments in HICs – particularly in urban settings – less is available on LMICs. Factors that limit access to nutritious and healthy foods include economic constraints, lack of knowledge and resulting low demand. Nevertheless, policies and programmes focused on the food environment have been implemented worldwide, including approaches aimed to: improve access to nutritious and healthy foods in food deserts; provide healthy options in public establishments; and promote healthier diets through regulations and standards, taxes, subsidies, trade policies, labelling and advertising.
What is food environment?

- Is it just another way of saying “food systems”?
- Is it a part of the food system?
- Is the interface between the food system and the consumer?
- Is it an outcome of the food system?
- At what level is this concept applicable?
FOOD ENVIRONMENT WORKING GROUP DEFINITION

‘The interface that mediates one’s food acquisition and consumption within the wider food system’

Source: Agriculture, Nutrition and Health Academy Food Environment Working group (2017)
Figure 2: Food environment domains and dimensions

EXTERNAL FOOD ENVIRONMENT

Prices
Monetary value of food products

Marketing and Regulation
Promotional information, branding, advertising, sponsorship, labelling, policies

Affordability
Purchasing power

Desirability
Preferences, acceptability, tastes, desires, attitudes, culture, knowledge and skills

Availability
Presence of a food vendor or product

Vendor and Product Properties
Vendor properties (typology, opening hours, services) product properties (food quality, composition, safety, level of processing, shelf-life, packaging)

Accessibility
Physical distance, time, space and place, individual activity spaces, daily mobility, mode of transport

Convenience
Relative time and effort of preparing, cooking and consuming food product, time allocation

PERSONAL FOOD ENVIRONMENT
Figure 4: The ANH-FEWG methodological framework
“CONVENTIONAL” NUTRITION MEASURES STILL SUFFER FROM METRICS AND DATA PROBLEMS

- Coverage and quality of data on food consumption patterns, trends, and dynamics still remains poor

- Proxies for diet quality (DDS) are important
  - Need to be tested for cross-country comparisons
  - Validation of these indicators for different purposes (for example, monitoring, evaluation, targeting) needed

- Diet quality metrics beyond dietary diversity needed
  - Caloric and nutrient density, safety
  - Relationship between metrics of food diversity and quality in food system domains with diversity and quality of diets consumed
HOW WELL DO WE MEASURE AND TRACK ACUTE MALNUTRITION?

- **Wasting**: WHZ < -2SD

- **Mid-upper arm circumference (MUAC)**
  - Moderate acute malnutrition: MUAC ≥ 115 mm and < 125 mm
  - Severe acute malnutrition: MUAC < 115 mm

- MUAC and WHZ indicators report a similar prevalence of acute malnutrition, but identify different children
  - 40-60% overlap

- Current global estimates probably underestimate the actual annual burden of wasting
  - Wasting is episodic; incidence not captured
  - Seasonal peaks are probably underestimated
### How Well Do We Measure Anemia and Other Micronutrient Deficiencies?

<table>
<thead>
<tr>
<th>Standard Indicator?</th>
<th>Yes, only for anemia</th>
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<tbody>
<tr>
<td>Scientific Consensus?</td>
<td></td>
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<tr>
<td>• Yes on anemia, but not specific to dietary def</td>
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<tr>
<td>• Yes, for some other MNs. But Vitamin A, Zinc and Iodine measured by coverage, not the right indicators to assess the change in nutrition status</td>
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- Data on prevalence of micronutrient deficiencies is patchy at best
- Field friendly assessment methods for micronutrient biomarkers need to be developed, tested and scaled up
  - Example, dried blood spots

- Widespread current data systems available?
  - For anemia, DHS and MICS could more consistently collect data on anemia using the current assessment methods
  - Special surveys by WHO Vitamin and Mineral Nutrition Information System (VMNIS), but not currently amenable for consistent monitoring

Field friendly assessment methods for micronutrient biomarkers need to be developed, tested and scaled up. Examples include dried blood spots.
IN CONCLUSION ...
SUMMARY

- Low diet quality is a key modifiable risk factor for morbidity & mortality
- We need to demand much more of our agri-food systems to promote health
- We are making progress on having better tools in our tool box:
  - Integrated datasets: do we know what we want?
  - Consensus building on emerging concepts still remains a priority
  - Better methodologies to unpack and measure “food systems” and diets; pathways
  - Field friendly assessment methods for micronutrient biomarkers