



Independent CRP-Commissioned External Evaluation of the CGIAR Research Program on Agriculture for Nutrition and Health (A4NH)

Expert Panel Report on Research Gaps and Potential A4NH Involvement

June 2015

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RESEARCH
PROGRAM ON
Agriculture for
Nutrition
and Health

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Summary

A five-person expert panel representing several disciplines and four continents was contracted as part of the evaluation of the CGIAR Research Program (CRP) on Agriculture for Nutrition and Health (A4NH), to consider the question of the relevance and scope of the A4NH portfolio. The panel was requested not to make specific research recommendations as A4NH management is currently consulting widely on aspects of its research portfolio in preparation for Phase 2 and instead to consider the pros and cons of various options, and key questions which should frame the planning process.

The panel worked in pairs to consider five broad topics of interest to A4NH: agriculture-associated diseases; value chains, food systems and the private sector; urbanization, obesity and dual burden; policy and enabling environment; and nutrition-sensitive agriculture/development. The panel was supported by the A4NH evaluation core team, who provided the panel with an evidence summary for each topic, facilitated two panel meetings and prepared this report¹.

This report summarises the results for each topic. It suggests possible advantages and disadvantages for A4NH of working in specific research areas, as well as broader issues for A4NH leadership and others to consider. The panel concurred that A4NH should consider areas and target groups where it has not done much in the past (e.g., health, poor urban consumers, adolescent girls) but also urged that A4NH should then focus on a few specific research questions where it can add most value, rather than trying to manage many small scattered research efforts.

The Expert Panel also considered the ‘comparative advantage’ of the CGIAR and of A4NH to address issues that might be handled better by or with others, such as the private sector, noting that in some cases A4NH might not have much to contribute or would need to forge different collaborative relationships to succeed. It was agreed that A4NH potentially unites areas of expertise which are rarely found in one institution, such as nutrition, food safety and agriculture associated diseases, so it would be good to exploit these research synergies.

¹ The Expert Panel was facilitated by Diana McLean. Evidence summaries and templates were prepared by Mysbah Balagamwala and Julia Compton.

1. Introduction and purpose

An independent evaluation has been commissioned of the CGIAR Research Program (CRP) on Agriculture for Nutrition and Health (A4NH). The main aim of the evaluation is to feed into decisions about the future of A4NH. Specifically, the results of the evaluation should inform the planning and approval process for Phase 2 of the CGIAR Research Programs (CRPs).

The evaluation aims to answer four main evaluation questions (EQs):

- EQ1 Is A4NH on course to achieve its outputs, outcomes and impacts? Why or why not?
- EQ2 Within the CGIAR, has A4NH added value in comparison to pre-reform ways of doing business? Any disadvantages?
- EQ3 Does A4NH have the right resources, systems and approaches to partnerships?
- EQ4 Is the scope and focus of A4NH relevant and appropriate?

A five-person Expert Panel was engaged as part of the Independent Evaluation of A4NH to address one of the forward looking sub-questions of EQ4, namely, “Is the current and planned configuration of A4NH the most appropriate for the current and future context of agriculture, nutrition and health?” More specifically, the evaluation inception report stated:

“The expert panel will consider the current state of knowledge on major research gaps in agriculture, nutrition and health, the comparative advantage of A4NH and the CGIAR, and the roles of other international and national players, and produce a short report on the pros and cons of the current scope and focus of A4NH, and on options that the CRP could consider in planning its second phase. The evaluation team will facilitate the work of the Expert Panel and provide the panel with background documentation and a summary of issues.”

2. Composition and Process

The Panel was composed of five senior people from four continents with expertise in social science, economics, agriculture and health. Panel members were:

- **Robert Bos**, public health biologist, previously Coordinator of the WHO Water, Sanitation, Hygiene and Health Program, Department of Public Health and Environment.
- **Haris Gazdar**, Director and Senior Researcher with the Collective for Social Science Research, part of the Leveraging Agriculture for Nutrition in South Asia (LANSA) Research Policy Consortium, Pakistan.
- **Bonnie McClafferty**, Director of Agriculture and Nutrition at the Global Alliance for Improved Nutrition (GAIN).

- **Festus Murithi**, Head - Socio-Economics and Policy Development Research Unit, Kenya Agricultural and Livestock Research Organization (KALRO).
- **Simlice Nouala**, Chief Animal production officer at African Union – Inter-African Bureau for Animal Resources (AU-IBAR).

The panel was divided into pairs to address five areas of focus, reflecting areas under consideration for development for A4NH Phase 2:

- Health: zoonotics/agriculture-associated diseases
- Value chains/food systems/private sector
- Urbanization, obesity and dual burden
- Policy and enabling environment
- Integrated programs: nutrition-sensitive agriculture/development

Food safety and biofortification were considered cross-cutting, as applicable.

The core A4NH evaluation team provided the pair working on each theme with a short summary to support their work. This comprised:

- A brief summary of current and proposed research on the theme in A4NH
- Priority evidence gaps for international research identified in recent reviews and notes on other researchers active in the field
- Relevant extracts from A4NH and CGIAR planning documents and results frameworks for Phase 2 discussion paper for Independent Advisory Committee on Planning for Phase 2 Proposal (version February 2015) presented to CFP meeting March 23, 2015.

The Expert Panel members were also provided with a summary of results from a short questionnaire survey circulated by the core evaluation team to expert stakeholders on key evidence gaps and potential priority areas for research for A4NH. This survey had a poor response rate (only 30 responses) but a good spread of responses both geographically and by area of expertise (academics, private and public sectors, UN etc) and generated some interesting suggestions.

Panel members were also encouraged to consult other experts and to share ideas in their working groups.

Following an introductory virtual meeting held on March 6, 2015, the Panel members met face-to-face from April 23 to 24, 2015 in London to discuss these issues. This meeting also provided an opportunity for a Question and Answer session with the A4NH Director and also with the Director of the Leverhulme Centre for Integrative Research on Agriculture and Health (LCIRAH) who is a member of the Program Management Committee of A4NH. There was considerable discussion on the evolving ANH landscape and challenges which will face A4NH in future.

Each Panel working group was provided with a template and asked to outline: the process followed and data consulted; overarching issues; key questions for A4NH leadership to consider; and the pros and cons of working in different research areas. They were requested *not* to make specific recommendations for A4NH to follow. The results are given in Section 4 below.

Challenges faced by the Panel were (1) budgetary constraints which limited the authorized level-of-effort to five days per panel member and (2) the availability of some Panel members during critical periods of analysis and reflection. All teams managed to complete their assignments though with some delays.

3. Background Considerations and Uncertainties

The A4NH CRP is in a state of change with Phase 2 planning already underway to develop a pre-proposal for August 2015. This will be in accordance with the changes in the revised CGIAR Strategic Results Framework and may address some areas of nutrition and health programming not covered in the first phase of A4NH.

There are however many uncertainties about what the entire CRP landscape will look like in Phase 2.

- Other CRPs and Centers have A4NH-relevant initiatives. It is not yet clear to what extent A4NH management will have any role or “authority” to lead, coordinate, network or convene on these issues system-wide.
- It is uncertain what levels of funding will be made available and through what modalities to the CRPs and specifically to A4NH. This limits “blue skies” thinking about what new areas of research might be possible and desirable. While not wanting to stifle ideas, the Panel was well aware that all is not possible and that some priority setting will need to be made when funding levels are better understood.
- It is clear that any expansion of programming in Phase 2 in nutrition and particularly health and interventions further up the supply chain will require a reconsideration of partnerships. In recent years, there are many more organizations working in ANH, including for example FAO and other international organisations, research institutes and universities, and the private sector, and A4NH would need to show strong working partnerships with these groups and/or carve out a unique niche to justify working in particular research areas. This is especially so in health (apart from nutrition), and in working with the private sector, as A4NH has done less of this in Phase 1.
- Agriculture-nutrition linkages are context-specific and will require country-level research and research uptake to bridge evidence-outcome gaps. A4NH has potential advantages in this area but there are likely to be tensions with CGIAR/A4NH objectives of producing global public goods and incentives of research teams to produce cutting edge research.
- Specific to health, some key questions need to be considered: how are agricultural variables included in the health research of other organizations? Where does the CGIAR/A4NH have a comparative advantage to fill gaps not filled by others?
- How can A4NH encourage the agriculture sector to consider nutrition and health more in planning and implementing initiatives? Should A4NH lead or participate? How will it more effectively work with other CRPs? What are the expectations of capacity support?

4. Points of Discussion

In addition to the above considerations, the Expert Panel discussed a number of points, some of which framed their analysis.

Who exactly is the A4NH target group? The CGIAR has historically been most involved with farmers and rural communities and has its strongest credibility within the agricultural community. More focused targeting can allow for more effectiveness in delivering outputs and measuring outcomes and impact. Phase 1 of A4NH has been focussed largely on small-scale farmers and has principally targeted “the first 1000 days” (from conception to two years) for nutrition programming. An increased focus on food systems and enabling environments and the inclusion of non-communicable diseases and obesity in programming would open the door to work on a much wider scale, including an increased focus on urban consumers and the value chains which supply them, and to different population groups, in particular adolescent girls and young women. This will need new skills and there is also a risk of spreading A4NH too thin.

Will A4NH have a leadership and/or convening role within the CGIAR on ANH? As the CRP with the most nutrition expertise, what roles are envisaged for A4NH in terms of providing support to Centers, other CRPs or partners? Specifically, the Panel considered the importance of developing tools and metrics for ANH; developing/completing food composition tables for all edible crops, vegetables, etc. (potentially with FAO); and efforts to support broadening the scope of the CGIAR from commodities to diets, which also would include more fruit, vegetables and other non-staple foodstuffs.

Does A4NH have clear enough criteria and systems in place for prioritizing research? In a universe where there are many things A4NH could include, it was not clear to the Expert Panel how exactly A4NH set priorities in the past or how it intends to set research priorities, particularly at Flagship and sub-Flagship levels. Clearly one of these criteria should be the comparative advantage of the CGIAR and A4NH to lead on an issue, necessitating a clear analysis of who else is already working or is planning to work in this research area. Observations of Phase 1 reveal more of a “business as usual” approach rather than real innovative thinking.

What can A4NH do to make a better “business case” for ANH initiatives? Many ANH initiatives involving home gardens, aquaculture, biofortification, livestock production and cash cropping, and more complex interventions involving social protection, have been assessed in recent years using a combination of quantitative and qualitative information. Many of the assessments lack quality information on cost-effectiveness or do not fully examine the complex socio-economic environments affecting these technical initiatives. This may be the result of poor quality metrics and monitoring within the projects themselves or reflect a need for better economic tools to capture the small-scale and informal sources of incomes and livelihoods affecting decision-taking by small farmers.

Is A4NH planning to address seasonality issues more in Phase 2? Consumption is year-round, but production is not. A4NH – and indeed much of the CGIAR – has not paid sufficient attention to post-harvest technologies and food preservation technologies to support a diversified diet.

How do health and nutrition fit under the A4NH umbrella and how do they relate? A4NH has not yet fully exploited the synergies of being one of the few international programs to address health issues more broadly as well as nutrition in agriculture. Linking work on nutritional impacts of gut flora (microbiomes) to food safety and livestock-human health issues through environmental enteropathy might be an example of such an opportunity. Another is linking the One-Health and One-Water concepts to tackle diseases such as malaria (see page 13).

Contextual determinants and adaptive research under A4NH. Being anchored in the CGIAR, A4NH should follow through from strategic research to applied research, to taking things down to the national agricultural research institutions to sort out the contextual details. It needs to clarify its role with the private sector, working alone or in collaboration to address research that may not initially attract the private sector due to limited marketing potential. Large strategic impacts need to be scaled up in the practical implementation phase. At a time when paradigms are shifting (for example, in health: the epidemiological transition from communicable to non-communicable diseases; in agriculture: from value chains to food systems), there are numerous new opportunities that can be taken up. Can health be better integrated into food systems? A4NH also sets the example of a new way of working which can be emulated at the national level through partnerships across disciplines and messages across sectoral boundaries.

Can results of A4NH help influence the redefining of the training curricula of agriculture, nutrition and health professionals? Traditionally, training of agriculturalists has put more emphasis on achieving high production than its role in influencing human nutrition and health. The same is true where training in nutrition and health could better emphasize the potential role of agriculture in meeting desirable nutrition and health outcomes. A4NH might consider developing partnerships with specific training institutions and national programs, including Ministries of Education, to develop training units on A4NH which can become part of the training curricula for agriculture, nutrition and health professionals, bringing about more multi-disciplinary and integrated programming².

5. Working Group Analyses

The working groups were asked to develop brief reviews of some of the thematic areas being considered in Phase 2 planning for A4NH. At this preliminary stage and with the time available, they reviewed some of the recent literature on perceived research gaps in these areas and considered possible areas for continued or new research, casting them not as recommendations but in terms of pros and cons. These are not intended as exhaustive reviews but rather as points for consideration in future programming.

² A4NH is a founding member of the recently-launched [ANH Academy](#) which aims to tackle some of these issues

Group 1: Zoonoses/Agriculture-associated Diseases

Name of experts

Robert Bos and Simplicie Nouala

Scope of assignment

The scope of the assignment is the public health dimensions of agricultural production systems and of the value chains of agricultural produce with a focus on communicable diseases, non-communicable diseases, food safety and occupational health:

- identifying knowledge gaps that can be addressed by multi-disciplinary research to which CG Centers, NARs, global and national public health research centers can contribute from a position of comparative advantage;
- answering research questions that will otherwise not be addressed because of the fragmentation of the research community, of the donor community supporting research and of the institutions involved in policymaking, programs, regulation and service delivery;
- with a view to generating evidence that will provide a basis for public health interventions that are embedded in the agricultural production and value chain context aimed at protecting and promoting the health of farmers, farming communities, consumers and actors along the value chain;
- research outcomes should be new methods, procedures or tools that can be adapted to local contexts and applied in agriculture and/or policy relevant evidence that supports inter-sectoral action with the dual objective of promoting human health and sustainable agricultural production.

Process followed

Review of the short summary provided by the evaluation team and of the recent literature through a web search.

- Exploratory discussions with former colleagues in WHO responsible for zoonoses, food safety and occupational health.
- Review of early documents of events leading up to the creation of CRP A4NH.
- Consideration of relevant aspects of the discussions on the post-2015 Development Agenda (Rio+20 outcome report (“The Future We Want”), proposed SDGs and targets.
- Review of the World Bank Global Food Safety Partnership, DFID/BBSRC Zoonoses and Emerging Livestock Systems (ZELS) and DFID Zoonoses project and the Emerging Pandemic Threats (EPT) Program of USAID
- CGIAR A4NH Website and A4NH Extension Proposal 2015-2016
- PACA Strategy, 2013–2022 and PAC website (Aflatoxin activities)

A main challenge is that the materials produced under Phase 1 of A4NH and for the evaluation exercise have a strong nutrition focus, with relatively little broader public health issues (mainly zoonoses and food safety, some agro-ecosystem/health issues).

The evaluation also draws on the one of the authors’ (RB) past experience of developing and implementing public health research with CGIAR institutions:

1985	Workshop at then IIMI on malaria and irrigation in Sri Lanka
1987	Workshop on rice agro-ecosystem management for the control of vectors of human diseases, at IRRI, Los Baños, followed by
1987 – 91	The formulation of a regional proposal on the same subject (never implemented in its entirety)
1992 – 97	WHO/WARDA/IDRC Consortium Research Project on the Association between Rice Ecosystems and Malaria/schistosomiasis in different Eco-zones of West Africa (approximately 11 publications in medical/public health journals, many in Tropical Medicine and International Health TMIH)
1998	ICIPE/ILRI Proposal development on livestock management for malaria transmission control in the Mwea Rice Irrigation System, Kenya (zooprophyllaxis)
2000 – 01	Cooperation with ISNAR on the promotion of alternatives to persistent organic pesticides in agricultural production systems in countries of the former Soviet Union.
2001 – 05	The System-wide Initiative on Malaria at IWMI
2006 onwards	Preparatory work for the CRP on Agriculture for Health and Nutrition with IFPRI

History and lessons learned

There is at least a 30-year history of engagement by individual Centers within the CGIAR system with public health institutions/professionals to develop research initiatives aimed at developing interventions focused on managing agro-ecosystems for the control of vectors of human diseases (malaria/schistosomiasis/others), on the safe management of chemical inputs into agricultural production systems, on the prevention of zoonoses and other diseases on the interface of human public health, veterinary public health and animal husbandry, and on the dissemination of health messages to the farming community through the agricultural extension services or farmer field schools.

In the 1980s this engagement was triggered by a number of drivers: the phasing out of the global malaria eradication program based on indoor spraying of residual insecticides requiring a shift to environmental management interventions; a re-evaluation of the opportunities offered by environmental management in specific eco-epidemiological settings including agro-ecosystems; perceptions about an imminent rapid expansion of water resources development for irrigation; the global movement against pesticide use culminating in international environmental conventions like the Stockholm Convention on Persistent Organic Pollutants; outbreaks of zoonoses traced back to animal husbandry practices and the marketing and consumption of meat from raised or wild animals; and a greater interest in multidisciplinary research as a basis for formulating cross-cutting development policies.

Lessons learned reveal potential bottlenecks for A4NH and include:

- Sustained engagement by individual CGIAR Centers in agriculture-associated public health research critically depends on the level of interest of the leadership, and this puts solid longitudinal research protocols at risk of being cut off before they deliver their results. This implies that multidisciplinary research addressing agriculture/health issues needs to be firmly anchored in the program/budget of the CGIAR and relevant individual Centers.

- Bilateral donor agencies interested in supporting development research generally cannot honor submissions of proposals for multidisciplinary research because their internal structures are based on sectors. They seldom have financial provisions for research approaches that cut across disciplinary boundaries and whose outputs are intended to be translated into inter-related or overarching policies for a number of sectors.
- Among the common misconceptions that exist within the agriculture and health communities alike, two are prominent: a poor appreciation of the complexity of challenges on the other side of the sectoral/disciplinary divide (health professionals may have a simplified idea of the contextual determinants of agricultural production systems, while agricultural professionals may consider the rigorous adherence by the health sector to an evidence-based approach obsessive); and the wrong perception or stereotyping of the roles of certain professionals in research (as an example, in one agriculture/health study by a CG Center, the Director of Research insisted the principal investigator had to be an MD, while an epidemiologist or public health economist would have been preferable).
- The outcomes of agriculture/health research often get poorly directed and the potential impact of the research can therefore be seriously diminished. In projects where the context is agricultural development or production, and the study focus is on health impact management, the key investigators will have a medical/public health background, will have an overriding control over data analysis and will want to publish their results in medical/public health journals. CG Centers lack the capacity to “translate” these results into policy briefs for the decision makers in the agriculture sector who are expected to act on the results. In the end, the research serves academic purposes, but loses out on influencing policies and programs in agriculture.
- The nature of agriculture/health research, particularly the research focusing on the association between the management of agro-ecosystems, community health status and disease burdens in vulnerable groups requires a shift from a reductionist to a comprehensive approach, is served by a longitudinal rather than a cross-sectional design, and needs to consider and, where possible, incorporate in its analysis an important number of confounding factors originating from environmental and social determinants of health. Long-term commitment and planning, flexibility in bringing in the necessary disciplines and a steady, secured budget are among the implications that make special demands on the research consortium and the donor support.
- In the context of multidisciplinary research, conflicts of interest may arise. An example is the work on integrated disease vector management in irrigated rice ecosystems, proposed in the early 1990s. Reducing larval vector populations in rice fields clashed with the objectives of the Integrated Pest Management group, because these populations play an important role in the food chain of predators of agricultural pests. There are also important differences in perception about engagement with the private sector in the agriculture and health sectors.
- Experience has shown that embedding a health research team in a CG Center requires an unrelenting effort to keep the health researchers focused on issues that meet the dual objectives of health and agriculture, and to prevent them from going off-track on issues that may be of public health importance (even within the limits of the agricultural production system) but are not

relevant to specific agreed policy objectives. In one case, a research program focusing on water management to protect and promote human health re-shifted its focus to safe storage of pesticides to prevent farmer suicide – while this is in some places an important public health issue, it did not fit in the scope of this particular agriculture/health cooperation and alienated the water management professionals engaged in the research.

Overarching issues

The health sector perspective

What are the critical issues? Over the past decade the health sector focus has gradually shifted from infectious to non-communicable diseases – partly on the basis of burden of disease estimates and partly on models that aim to predict trends in the global disease burden for the next 20 years. Lifestyle and nutrition issues have come to the foreground in intervention strategies targeting cardiovascular disease, malignant tumors and diabetes. The epidemiological transition from communicable to non-communicable diseases is a global phenomenon partly associated with the process of rapid urbanization.

This does not imply that infectious diseases are no longer on the agenda – many countries invest large amounts of money to prevent and control diseases of viral, bacterial and parasitic origin. Often these are linked to specific ecosystems; some are linked to agro-ecosystems, affecting farmers and farming communities. Others are linked to basic needs: poor water supply and sanitation, poor food safety.

Trends in agriculture and health have many drivers in common: poverty, population growth, urbanization, water scarcity, climate change. Some of the relevant specific challenges of the health sector include growing resistance to antibiotics (for the control of bacterial infections) and pesticides (for vector-borne diseases control); and, the need to strengthen resilience and sustain public health achievements in the face of social unrest, civil strife and all-out war, when conventional recurrent health services break down – solid infrastructure, including agricultural infrastructure, is critical under these conditions.

Agro-ecosystem management in support of human health relies on crop selection and rotation, irrigation practices, chemical input management, livestock density and distribution, labor management and mechanization. There is on-going work by IWMI and WHO on the safe use of wastewater in agriculture and aquaculture, including efforts to develop business plans for scaling up this normally informal agricultural practice, and developing a systematic and integrated risk assessment and management approach along the chain from field to consumer. Also in relation to water and sanitation, recent research has revealed the impact of poor drinking-water quality on the composition of the intestinal flora and how water-related infections contribute to malnutrition. The profile of occupational health (including that of farmers), on the other hand, has diminished.

Emerging zoonoses have frequently made the headlines over the past decade and research on how zoonotic pathogens jump the barrier to infect humans continues to be the subject of substantial research.

Sectoral versus intersectoral action for health

The concept of intersectoral action for health became a serious consideration in public health thinking with the 1978 Alma Ata Declaration on Health for All, and the associated primary health care approach. Holding all sectors accountable for the health implications of their policies and programs defines the difference between the delivery of health services and the promotion of community health status. Yet in practice, it has been a challenge to realize the concept, as the boundaries between sectors are harder to

cross and the professional silos more difficult to break down than anticipated. Health research in the context of the CGIAR is an attempt to overcome these hurdles at the research end, with a view to translating them into policy messages and technical briefs of an intersectoral nature. The concept has been embraced on and off within the health sector itself. This relates to lack of donor support for intersectoral initiatives, but also to a reluctance in the health sector itself to share responsibilities for the public health issues in specific settings with other sectors. Competition between sectors for scarce resources is stronger at the national level, and, pending resource decisions at the national level, cooperation between sectors at the community or district level is normally a practical reality. Producing results of multidisciplinary research that can generate the evidence base for cross sectoral public health policies is an essential building block towards an intersectoral approach.

Environmental vs social determinants of health

With a focus on commodities and natural resources, CGIAR centers may consider health a part of their social science research programs, or they may want to consider the public health dimensions of ecosystem management – in reality they should address health, in principle, as resultant from both environmental and social determinants, assessing in specific settings, which are the prevailing determinants. Cattle management is a good example in this connection – managing the spatial distribution of cattle in, for example, an irrigated area offers opportunities to influence malaria transmission in cases where mosquito species have a clear preference to take their blood meals from cattle. However, placing cattle in “buffer zones” between mosquito breeding places and areas of human habitation may meet with farmer resistance in areas where cattle theft is a real threat. On the other hand, farmers may be keen to see cattle used for traction replaced by machines as part of mechanization of agriculture, without being aware of the risk of malaria transmission increases this may entail in some settings (in Guyana, this resulted in an outbreak of malaria). There are many such examples which underscore the need to do a proper analysis (using the methods and procedures of health impact assessment) of the critical environmental and social determinants of health that need to be addressed.

The comparative advantage /niche of CGIAR on this topic

With its global infrastructure of Centers working on agricultural commodities and natural resources, CGIAR provides a sound basis for work on public health issues. It complements, in a sense, the global infrastructure for health research adopted by the WHO with its “open laboratory” approach as reflected in the UNDP/World Bank/UNICEF/WHO Tropical Disease Research program TDR, which relies on national research institutions. The annual budget of this network is approximately 10% of that of the CGIAR system.

Public health research in the CGIAR context should go beyond the traditional farmer/farming community focus, but also look along the value chain to identify vulnerable groups. Clearly, basic research will need to elucidate the nature and spin of relations between agricultural parameters and public health outcomes, but the knowledge generated will then have to be applied in research to test public health interventions by the agriculture sector. The CGIAR has various comparative advantages here. First of all, it is a research outfit of high reputation whose messages and information are highly credible and trusted; second, there is a strong tradition of multidisciplinary already existing (agricultural scientists work with social scientists and engineers); there are strong links with national agricultural research institutes, as well as links with the UN and the international donor community. The CGIAR leads by example and adopting a clear, system-wide policy on agriculture/health research is highly likely to be emulated by research entities operating at the national level.

Global food systems have experienced rapid transformations in recent years, particularly in low- and middle-income countries. This transformation has been driven by a complex set of factors and has raised more health issues related to zoonoses, water-borne diseases and other human health issues as a result of changing land-use patterns, modified cropping patterns, increased irrigation, shifts in chemical inputs, increased use of wastewater in agriculture (sanitation) and food safety concerns as a result of the expansion of retailers and distribution networks both through “supermarketization” and expansion of informal markets. The increased encroachment of people and domestic animals into formerly sheltered natural ecosystems and greater contact with wildlife has also resulted in more concerns in disease outbreaks at the wildlife-livestock and wildlife-human interfaces.

Links to other A4NH topics - there are links to Policy and the Enabling Environment, to Nutrition and Food Safety, and to changing patterns in relation to Urbanization.

Potential research areas, pros and cons

Potential research area	Pros for A4NH	Cons for A4NH	Observations and suggestions
Designing integrated approaches to control zoonosis – combining the one-health concept with the one-water concept	This research will help balance the A4NH package better between nutrition and public health	The CGIAR niche may not be clear, and bringing together a range of disciplines both from the water and the animal/veterinary public health areas may be a challenge.	A start-up workshop where livestock specialists, zoonoses specialists and water specialists can start a dialogue that helps sets the boundaries for this research is essential.
The evidence base for genetic resistance management: antimicrobial resistance, pesticide resistance, resistance in aflatoxin-producing fungi.	High profile for A4NH in an area that has top public health priority, and where credible messages for the ag sector are required;	This is a demanding segment of the ag/public health research terrain	Synergies can be achieved by looking at all forms of genetic resistance.
Development of monitoring and mapping tools for agriculture-associated human disease hazards and risks, including the impact of climate change.	This will put A4NH in the forefront of research relevant to the new SDG framework; generic tools can have a multiplier effect by adaptation to national needs; the tools we have and against which genetic resistance is developing are valuable global public goods.	Various other research groups may be working in parallel on monitoring, mapping and indicator issues, and the risk of overlaps and duplication is great.	

<p>Extending the value chain: the integrated assessment and management of risks of produce grown with wastewater along the chain.</p>	<p>The focus of safe use measures continues to be on the cropping and irrigation practices – more needs to be done on safety in marketing and preparation aspects; A4NH can link up with IWMI to strengthen this research; donor interest considerable.</p>	<p>This covers issues with a high level of informality, and communicating the outcome of the research may meet with uncertainties about whom to address.</p>	<p>Partnering with IWMI and WHO essential.</p>
<p>The broad human health perspectives of wastewater use in agriculture (including the nutritional aspects of diarrhoeal disease and helminth infections).</p>	<p>The knowledge base for indirect impacts of wastewater-associated ill health needs elucidation, and the link with nutrition should be a key focus.</p>	<p>The complexity of this research lies in the many confounding factors, and the contextual nature of many phenomena.</p>	
<p>The value chain in reverse: disincentivizing the trade and consumption of bush meat – what are the determining factors?</p>	<p>Bush meat has been the source of important outbreaks of disease; options to break the value chain must be investigated. A4NH (IFPRI and ILRI) together can research the nutritional, economic and zoonotic aspects.</p>	<p>Again, an area where informality reigns, regulatory frameworks are non-existent in endemic countries, and communication of research results to the right audience may be challenging.</p>	
<p>Healthy people, healthy agro-ecosystems: what factors determine the success or failure of this match?</p>	<p>Broad ecological research that can be extended across the CGIAR system; experience in some CGIAR Centers with important lessons learned.</p>	<p>Hard to attract donor funding as it falls between in the cracks between the various sectoral funding priorities.</p>	

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Group 2: Value Chains, Food Systems and Private Sector

Name of experts

Bonnie McClafferty and Haris Gazdar

Process followed

- Review of the short summary provided by the evaluation team
- Literature review
- Consultation with leadership in respective organizations and experience with donor, policy and civil society engagement on the topic.

Overarching issues

For the purposes of identifying key research questions for A4NH, focal experts composed a list of research questions within the proposed research clusters including research questions that would best fill information gaps in: a) **interventions** that could be implemented along the value chain to improve nutrition through agriculture, b) **assessments** and methods that use a value chain perspective for understanding processes and activities that exist between one stage of the chain and the next, and c) value chain **landscapes**. The Panel members found this last area, VC landscapes, though important, perhaps incompatible within a “value chain” analysis framework that is bound by the series of activities that make up the chain. The evaluation team dedicated to this topic suggests that large portions of the “value chain landscapes” work, particularly research concerning evidence-to-outcome gaps in policy processes, would perhaps be better placed under the Enabling Environment work stream for A4NH.

Existing reviews (e.g. Geli 2014) and the current design of the flagship acknowledge two broad ways in which value chain research can lead to improved nutrition: first, through the application of the value chain method to the analysis of bottlenecks, constraints and frictions in the consumption of nutritious foods, and, second, through specific value chain interventions which might help to overcome some of these constraints. The key defining feature of value chain research is that it allows an integrated view of the (linear) progression of a raw product through a variety of links and processes towards food consumption. To conduct a value chain analysis, one begins by identifying each part of its production process and identifying where steps can be eliminated or improvements can be made to get to the ultimate goal – in this case the consumption of a nutritious food by those most in need. Value chain analysis or assessments, ought to, in principle, precede value chain interventions, though a research portfolio might not necessarily reflect such sequencing.

While the review work which acts as the backdrop for this flagship cites how both value chain research can lead to improved nutrition outcomes, it is not clear if the choice of projects within the flagship has undergone a rigorous process of prioritisation in this regard. The main strength of the VCN flagship currently is the link between this social science research and scientific work conducted within the various CGIAR partners.

This strength, however, has a corresponding handicap. We propose that the appropriate starting point of VCN research should be the end-point of the value chain: namely the consumption by the poor and

the vulnerable of a nutritious and healthy diet. Starting from the consumer's vantage point (particularly from that of the poor and vulnerable consumer), it should be possible to identify elements in the diet which can be influenced by interventions in particular commodities. While we understand the difficulties in adopting such an approach for coming up with research priorities in this flagship – the obvious practical one being that CGIAR science partners are mostly organised around commodities rather than diets – it is suggested that attempts be made to establish a link from nutritious diets back to commodities in order to justify the nutrition focus of the research. As discussion moves from value chains to food systems, the need to establish a connection with consumer diets will become stronger still.

We are asked to consider:

1. Is the current and planned A4NH research portfolio on value chains reasonable in terms of international priorities and the comparative advantage / niche of the CGIAR as you see it? ³ Are there any glaring gaps? Are there areas which could more easily be covered by other actors (including the private sector)?
 - The current and planned research portfolio in this area should be better aligned around a common theory of change. What is the problem that is being addressed? What are the solutions that are being evaluated? What are the goals of the research and the activities that are proposed to address the goals and ultimate problem solution?
 - The priorities into the future appear correct but there was insufficient information related to how these priorities were established. The renewed focus on a larger and more diverse basket of foods will be essential.
 - There is a large gap in understanding the demand for nutritious commodities, the development of tools and methods to support dietary diversity, and foods that meet the needs of mothers, young children and girls. Some of this is the niche of the CGIAR as shepherds of a healthy food production system.
 - There is a large gap in addressing the food needs for growing urban populations and the use of long value chains.
 - Which are the most vulnerable populations/groups/individuals, and what type of constraints do they face in any context (country or region) with respect to consuming nutritious diets?
2. Are there potential efficiencies that could be made in the proposed portfolio? For example would it be better to concentrate resources on one or two research topics or geographic areas? Are there ways in which the coherence of planning or of information use could be increased? For a broad topic like Food Systems, this question is an important one for this working group.
 - Value chain assessment work and outputs are clearly global.
 - As the CGIAR takes on the food system, the private sector will be the anchor partner given their dominant role in the food landscape post farm gate which will be increasing into the future.

³ (Menon et al., 2014) has a relevant discussion of the incentives for researchers and how these can be framed to promote adaptive and policy-relevant research in nutrition (P Menon works under A4NH)

- The portfolio needs to better reflect the implications for food and nutrition security as the food production and consumption system becomes increasingly vertically integrated as the private sector consolidates small farmer production.

As background, the following chart describes the A4NH value chains flagship and clusters as originally conceived and as modified for the 2-year 2015-16 extension.

Research clusters	2012 – 14 A4NH	2015 – 16 A4NH
VCN-interventions: value chain interventions for nutritious foods	Research framework; nutrition-sensitive value chain pilot studies on technical or institutional innovations for nutritious foods	Expand research in specific value chains, such as pulses and grain legumes, fruits and vegetables, ASF, and complementary foods for young children (e.g., millet)
VCN-assessments: assessing value chains for nutrition –understanding demand and supply constraints; assessing impact on specific outcomes	Assessment of different types of value chains, at different entry points (inputs, processing outputs), to enhance consumption of nutritious foods	Assess the potential of new institutional arrangements (public-private partnerships, dedicated value chains, social enterprises, ICT enabling) to deliver impact on a variety of outcomes including income, women’s empowerment (where relevant) and nutrition
VCN-landscapes: nutrition-sensitive landscapes	New in 2015-16	Framework and tools for multi-disciplinary research across agriculture-nutrition-environment and health; sustainable food systems and diet quality improvement and assessment

Overarching priority questions for A4NH leadership:

1. To what extent should the CGIAR expand beyond its current institutional mandates to incorporate more nutritious foods, such as vegetables, in the overall portfolio?
2. Does the CGIAR want to focus on the nutrition of farmers and their families as a defined group or target interventions in a different way?
3. Does the CGIAR want to consider long as well as short value chains? This has implications for investing and retooling expertise across the Centers.
4. Considering carefully a food systems approach would go well beyond CGIAR core competencies and move it far from farmers and the farm gate. Would the donor community turn to the CGIAR for insights into the food system? Are there others in this space? If not, can the CGIAR retool to address this issue beyond addressing an occasional interesting question? Expanding into the food system will require retooling to address the entire food industry. This would involve a deep exploration of food industries that control most of the processing, trade and marketing of foods and in particular those having an impact on the double burden and who will be responsible for feeding urban centers. This is an extremely important area but we suggest a proper risk analysis before deciding to expand into this area.

Potential research areas, pros and cons

Potential research area	Research goal	Sample questions	Pros for A4NH	Cons for A4NH
Value chain assessments: Use value chain of nutritious foods to address systemic constraints for poor producers and consumers	<p>Understanding demand along the value chain for:</p> <ul style="list-style-type: none"> Affordable diversified diets for girls, mothers and young children Formulated foods that meet the needs of infant growth and development. Nutrition security for farm families 	<p>What are the demand constraints along the value chain for affordable diversified diets for girls, mothers and young children?</p> <p>Understanding determinants of the choices that influence diet quality, including how it is influenced by home production, provenance of local food, market access, habits, prices and income for various age groups.</p> <p>What does an affordable adequate diversified diet look like in target regions for critical populations?</p> <p>What incentivizes public and private sector actors along the value chain to invest in nutritious diets for the undernourished? Map these incentives.</p> <p>What are the most effective marketing and social behavior change approaches that lead to improved consumption of nutritious foods and healthy diets among undernourished populations?</p> <p>Understand price volatility of nutritious commodities along the value chain. As the chain lengthens, what happens to price along the way? How can we innovate to bring down the price of perishable nutritious foods at various points along the chain?</p>	High priority area. A4NH has the expertise to understand farmer and farm household demand drivers for fresh or processed foods.	Lack of clear niche for CGIAR beyond the farm gate and orientation for longer value chains, e.g., processors, packagers, wholesale, retail, urban consumers

Potential research area	Research goal	Sample questions	Pros for A4NH	Cons for A4NH
		For the nutritious crop of choice, which stage of the value chain offers the most opportunity for increasing productivity, reducing price or eliminating waste?		
	Dietary diversity	Identify the mechanisms and models that allow for a multiproduct analysis of production and consumption of a diverse basket of food.	Priority area. High comparative advantage for CGIAR	
		Identify and validate cost effective measurement tools for assessing dietary diversity.	High priority. CGIAR best placed.	
		Identify best practices and constraints for producing, harvesting, storing, processing, marketing and consuming a diverse food basket.	Production through storage and consumption in rural settings is clear niche for CGIAR	Need to better incorporate food processing, marketing of processed foods and urban food security as a driver for rural incomes and food production.
		Diet quality assessment and understanding where quality can be augmented or lost.	High priority area. Comparative advantage of CGIAR if they were to augment technical nutrition across the centers	Risky as there is a need to develop and validate cost effective and efficient tools for measurement.
		What are the policy mechanisms that result in better access to health and nutritious foods in rural and urban settings	Well placed for CGIAR to address this within agricultural policy and rural settings	Not so well place to work with urban planning
Value chain interventions: Use value chain analysis to identify	Production	Assess the performance of agricultural technologies and inputs to improve the production of nutritious affordable foods.	Clear niche for CGIAR	

Potential research area	Research goal	Sample questions	Pros for A4NH	Cons for A4NH
opportunities and entry points for assessment, innovation and intervention		<p>Identify policy and pricing interventions to improve production of nutritious foods?</p> <p>What are constraints to affordable inputs for nutritious foods and what are some innovative policy or pricing mechanisms to encourage the production of nutritious foods?</p>		
	Storage, transport and processing	<p>What are the innovations and Is there enough evidence related to improvements in the storage and processing related to safety of food that can lead to improved consumption and nutrition outcomes?</p>		<p>Not CGIAR niche. Thinking and thought leadership on these stages of the supply chain is housed within private associations or alliances working very closely with and representing business. That said, there are a few innovation labs that also cover these issues. They are generally housed in universities. WFP has some knowledge of these issues but not for perishable nutritious crops such as horticulture or animal sourced foods.</p>
	Marketing, and public distribution	<p>Understand the working of retail and urban markets for the poor and the vulnerable, including issues in quality, price differences, and intra-household allocations</p> <p>Investigate ways in which pro-nutrition agricultural interventions might work their way through public distribution and social protection programs</p>		<p>Not all CGIAR Niche</p>

Potential research area	Research goal	Sample questions	Pros for A4NH	Cons for A4NH
	Demand, consumption and behavior change	<p>Understand nutritious food choice in the household in rural and urban settings</p> <p>Co-location vs integration of nutrition interventions along various entry points in the value chain. Do nutrition specific interventions need to be modified for farming communities and households?</p> <p>Understand motivations and culture of foods for populations in need in rural and urban settings.</p> <p>Forecast demand for baskets of nutritious fresh and processed foods over time horizons</p>	Builds well from the gender work previously performed in the CGIAR. Links farmers with nutrition	Would need to add an urban component to CGIAR work. Structure of demand as food products are shifting to meet consumer needs in urban settings and the onset of processed foods. Need to consider obesity in this context.
Value chain and landscapes	Nutrition sensitive interventions. Agriculture as a mechanism for influencing nutrition outcomes. Interface of agriculture in other sensitive areas. Define clearly what is agriculture as a sensitive intervention		The majority of this work is well placed for the CGIAR but does not fit within a value chain framework. Suggest it is repositioned within another work stream. Exception is dietary quality assessment which should remain under value chains as the quality/nutritional value of food is lost or augmented along the value chain.	

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Group 3: Urbanization, Obesity and Dual Burden

Name of experts

Robert Bos and Bonnie McClafferty

Process followed

- Review of the short summary provided by evaluation team and of the recent literature through web search.
- Exploratory discussions between the two authors of this review.
- Review of early documents of events leading up to the creation of CRP A4NH.
- Additional document review: Tzioumis, E. and Adair, LS (2014). Childhood dual burden of under- and over-nutrition in low- and middle-income countries – a critical review. Food and Nutrition Bulletin vol 35 2: 230-243

Situation analysis

Dual Burden and Obesity

A recent literature review by Tzioumis and Adair presents an up-to-date, though patchy, image of the current global situation with respect to the dual burden, the dynamic co-existence of under- and over-nutrition in populations, measured at the community, household and individual level. What follows is extracted from this review. In 2010 an estimated 171 million under-fives were stunted, nearly all in low- and middle-income countries. The global trend in stunting prevalence has been downward, from 39.7% in 1990 to 26.7% in 2010, with significant regional disparities: the situation in Africa remains unchanged at 40%. Prevalence of micronutrient deficiencies in under-fives was estimated at 47% (293 million) for anemia and 33% (190 million) for vitamin A deficiency in 2005.

Global prevalence of states of overweight or obesity was estimated to have increased from 4.2% to 6.7% between 1990 and 2010. Measurement of under-nutrition relies on traditional anthropometric indicators; the use of biomarkers for micronutrient status still leaves significant room for development; BMI remains the standard indicator for overweight and obesity. For all these indicators timescales reflecting normal child development need to be refined. Attribution of a state of under- or over-nutrition needs to be refined through quantitative risk assessment methods in order to better define the critical determinants in socio-economic terms, including the value chain, and environmental terms, including aspects of urbanization and elements of agriculture that can be rendered nutrition-sensitive.

The global data conceal important disparities among continents, regions, countries and within countries between rural and urban populations, and among regions. Some studies have taken this analysis to the household level. While there is no global picture of all disparities, studies from individual countries reveal gender and ethnic differences, differences emerging when disaggregating datasets by wealth quintiles, and differences linked to socio-economic status. Similar to the information on status, the dynamics of the transition from predominant under-nutrition to pre-dominant over-nutrition (and the dual burden in between) shows important variability, linked to socio-economic status, family situations and the pre-natal nutritional status of mothers. Some studies indicate common causes for childhood stunting and forms of childhood obesity (central adiposity).

The review comes to a general conclusion that there is a global trend of diets becoming more energy-dense and nutrient-poor, while physical activity is gradually replaced by sedentary lifestyles. This presents few entry points for specific research questions that A4NH can tackle; rather, it presents an open playing field for a range of research efforts, and it will be crucially important to be clear about objectives and maintain focus in future A4NH work in this area. The review also draws attention to the concept of environmental enteropathy, a sub-clinical inflammation of the digestive tract resulting from the ingestion of high levels of fecal bacteria as happens under unsanitary conditions. It has been postulated that environmental enteropathy may be a critical limiting factor that can explain the relative lack of success of interventions focused on micronutrient supplementation. A growing body of evidence suggests an independent association of frequent childhood diarrheal disease with increased risks of abdominal obesity and diabetes – further research is needed to elucidate the mechanics of the “triple burden” at the intersection of gut inflammation, under-nutrition and over-nutrition.

Tzioumis and Adair list a number of research issues, including:

- Improved anthropometric monitoring,
- an increased focus on water, sanitation and hygiene (in relation to environmental enteropathy as described above),
- appraisal and revision of relevant national and local public health policies,
- the design of comprehensive childhood nutritional monitoring programs,
- instruments to better determine the quality and energy content of foods and supplements as part of the design of nutritional interventions and food programs, and
- Further analysis of the options and opportunities at different levels to manage the double (triple) burden.

Urbanization

Asian and African cities are now experiencing annual population growth rates of 2 and 3 percent, respectively. Uncontrolled urban expansion is expected to induce: 1) the loss of nearby agricultural land that once supplied food, 2) stresses on already weak transportation and logistics systems that will strain to bring food to market, and 3) inefficient urban distribution systems that will exacerbate issues of access and the quality of food. These features, combined with high levels of poverty, are expected to contribute to food price volatility and to the adoption of strategies by the poor to cope with food security threats either by going without adequate food or substituting cheap and potentially less nutritious food.

A4NH considers whether to embark on a research agenda that will include issues of the double burden and urbanization. In this context, the following trends should be taken into consideration. According to D. Tschirley et al in the 2014 WIDER Working Paper titled, *The rise of a middle class in East and Southern Africa: Implications for food system transformation*, in the next 30 years highly processed foods will penetrate far deeper into rural and urban areas than previously believed, eventually comprising up to one-third of all purchased foods. This suggests that farming populations will soon be eating as much purchased processed foods as their urban brothers and sisters across all age groups. While the processed-food revolution has spurred positive innovations in convenience, food safety and storage, its ultimate impact will depend on the degree to which processing avoids doing harm. These new foods

must be low in fat (and the remaining fats must be good fats), low in sugar and salt (preferably iodized), and fortified with the essential vitamins and minerals often lost during mass production.

As incomes rise, more nutritious, but perishable foods such as vegetables, dairy and other animal-sourced goods will fortunately comprise a large portion of the diet, even in urban settings. Given the growing demand for these foods, we need to redouble our efforts to sustainably strengthen the supply chains that support them not only vertically along specific supply chains but most importantly in refrigeration and other aspects of the cold chain, in the absence of which too many nutritious perishables will go to waste. This will require the CGIAR to look toward non-traditional partners to improve nutrition including the cooling, transport and storage authorities. The third point of the WIDER report is that, contrary to popular wisdom, rising incomes will be spent largely on local, rather than imported, foods. This is good news not only from a “climate-smart” perspective, but also for smallholder farmers and local markets. The nutritional content of those foods will depend on whether farmers and traders have the inputs (improved seeds, enriched fertilizers, modern post-harvest technologies, Coolbots, and drying sacks) necessary to prevent rot and minimize such health threats as aflatoxins.

Emerging issues for A4NH leadership:

This is not a traditional area of research for the CGIAR and it is therefore important to maintain a tight focus on a few specific research questions rather than embark on a scattered attempt to cover all of this large and complex area. A4NH must consider whether this area is their unique selling point and whether partners and donors would be drawn to A4NH to address these problems or other partners would be better suited to address the food system in the context of the dual burden and urbanization. Current A4NH research related to the dual burden in urban settings can be categorized under three Flagships: 4, 3 and 1 – Flagship 4 research in a range of geographical settings but not necessarily with a specific focus on urbanization, obesity and the dual burden, Flagship 1 mainly value chain – nutrition assessments in African and Asia, and Flagship 3 on food safety questions. In addition, there is a relevant biofortification component addressing nutrition of urban consumers in Latin America under the AgroSalud program. The scope for this area of work in the second phase of A4NH should review the above experience in the light of a landscape of players and consider positioning itself as one of many actors in this area and to limit and focus its participation under a different paradigm of consortia and partnerships potentially applying the following lens:

- The **post farm value addition** for different strata of urban populations
- The dual burden issues, considering lack of micronutrients and few calories in the diet, as well as overconsumption and its impact on health. Research that addresses the dual burden of under- and over-nutrition in relation to rapid urbanization will require first of all the establishment of partnerships that can bring about the right combination **of knowledge and experience in agriculture, nutrition, epidemiology and environmental hazard and risk assessment** – individuals and institutions will have to contribute from a position of comparative advantage, all agreeing on priority research questions, methods and procedures, and the policy relevance of expected outcomes. The definition of objectives and clear criteria will be essential. For this subject the CGIAR might have to consider a paradigm shift from a focus on value chains to a more integrated concept of the food system. Value chains may be considered in their short or long interpretation, but with the on-going urbanization, value chains tend to become longer,

and a demand-driven approach to research will be needed to address the limits and bottlenecks affecting them.

- A multidisciplinary research approach to develop opportunistic solutions on either the demand or the supply side of a **diverse, affordable and healthy diet**. In this context, nutrition-sensitive urban agriculture may provide a valid context for further research about the options, opportunities and challenges that scaling up presents and how business plans can help harness a nutrition-sensitive approach. But clear interventions and measurement tools related to nutrition-sensitive agriculture still need to be validated. The work of IWMI on business plans to support scaling up peri-urban agriculture based on the safe use of wastewater, excreta and grey water may be of use in elaborating this idea.
- The development of **economic instruments to influence healthy food production and consumption patterns and diets in the urban/peri-urban setting**. In the rapidly growing urban environment, analysis of big data on marketing and purchasing indicators, dietary composition, eating habits and health status may offer opportunities for the generation of new, correlational data sets, and the creation of new tools for monitoring the situation and processes. Stratification along socio-economic boundaries or by using wealth quintiles can help gain better insights in intra-urban disparities and their underlying key determinants.
- Scaling up informal **food production systems around large urban conglomerations** in a way that favors nutrition-sensitive agriculture and nutritious food value chains. The potential role of local government in creating incentives for people to improve their nutritional behavior cannot be underestimated, but local government will have to be given solid, reliable and credible evidence to design its intervention programs. Efforts to bring agricultural scientists and urban planners together around relevant research questions will be a first step towards creating an innovative partnership that will ensure all options for (peri)-urban agriculture and urban planning to mutually re-enforce one another.
- The **supermarketization of the food chain, and options to promote locavorous consumption patterns**. Marketing and its link to nutritional conditions need special attention – the trends driven by supermarketization carry the risk of the creation of urban deserts of highly processed food and research needs to focus on measures to counter this trend and take advantage of the short chains for peri-urban grown food as a viable alternative and a basis for urban food security.
- Benefits and risks of urban agriculture and livestock husbandry in terms of nutritional status, communicable and non-communicable disease incidence and pollution and toxicity in the food system. In the urban setting, many aspects of **food safety** will need attention; this food safety lens should also take into account the growing urban environmental problems as they come to expression in agricultural produce: food crops grown on polluted lands, green leafy plants filtering polluted air.

Potential research areas, pros and cons

Potential research area	Pros for A4NH	Cons for A4NH	Observations and suggestions
The role and contribution of urban and peri-urban agriculture to the variety of foods marketed to the urban population and the impact on diets	(Peri)-urban agriculture is a rapidly expanding practice, and a better understanding of marketing and associated dietary impacts is of great societal relevance; this research area offers important opportunities for partnering with other CG centers, for example IWMI; the launch of a research program on this subject can be given high profile at the Oct 2016 HABITAT III Conference in Quito, Ecuador.	The concept takes a great variety of shapes in different geographical and cultural contexts, and consolidating research results into generic policy messages will be a challenge; the position of research donors with respect to (peri)-urban agriculture is not clear; the informality of this type of agriculture will require an intense research approach, while the target audience of the research outcome may be hard to define.	A first step towards proposal development would be a solid desk study of the state of our knowledge about status and trends in (peri)-urban agriculture, with clear criteria required for the decision whether to proceed with proposal formulation or not
Managing food and beverage consumption patterns: optimizing the behaviors of urban populations through market incentives and sanctions- what works and what does not work?	Strong focus on a detail of the value chain with high potential impact on consumption; opportunities to link with the private sector; practical results that can be applied by policy makers and regulators.	Not typically the unique offering of the CGIAR. Policy decisions in this area are outside the agricultural production mandate of the CGIAR. Likely to be highly contextual, hard to extrapolate to regional or global levels; risks associated with linking to private sector because of potential conflict of interest; studying human behavior highly feasible, changing it a challenge – this undermines the ultimate objectives of this research.	Is this research for IFPRI/CGIAR or should the private sector and/or urban planners be encouraged/regulated to carry out this type of research?
Establishing working relations with the urban planning and development community: study options for agricultural land use in the urban environment that	Outcomes of this research would assist urban planners to better consider options for agricultural development in urban settings; urban agriculture can be linked to	An area of work on the margins of IFPRI/ILRI's remit, would require major effort to establish relevant partnerships; CGIAR has no	This area of work perhaps goes beyond the A4NH scope, but it is sufficiently important to explore options in the broader CGIAR/CRP context.

Potential research area	Pros for A4NH	Cons for A4NH	Observations and suggestions
optimize the production of safe and wholesome food and minimize adverse health impacts	on-going efforts to improve urban water management; new productive research partnerships can be established.	advantage of credibility with the target audience of urban planners.	
Clarify the critical environmental and social determinants of value chain choice in an urban context—diverse dietary patterns – immediate health outcomes – non-communicable disease incidence	Allows a retro-analysis starting from trends in NCD's to identify the environmental and social determinants along the value chain; provides a basis for an integrated risk assessment and management approach along the value chain; comparative advantage IFPRI in partnership with public health research institutes.	Because the CGIAR does not encompass all the value chains that make up diverse diets and is thin on health expertise across value chains, this work would have to partner with external organizations whose strength is linking NCDs to dietary consumption and choice. Would require long-term, longitudinal studies that may not fit the time frame of the next CRP phase.	
Address the issues of supermarketization, local foods, wet vs dry markets – identifying factors contributing to the promotion of healthy diets and reducing microbial health risks	Fits with the on-going research on value chains and adds a dimension of analyzing determinants of diet other than individual choice; links in with existing research; comparative advantage IFPRI to promote briefs resulting from research outcomes.	At the national level research partners may not always be obvious; engagement with private sector may result in perceived conflict of interest.	
Supporting research on water fit for purpose: how to optimize the use of scarce water resources of different qualities (ground water, rain water, waste water) for food production and domestic use in the urban setting.	Urban water management is an increasingly important area that can profitably be linked to research on food production; opportunities to develop partnerships within the CG notably with IWMI; outcomes will	Subject area marginal to IFPRI and ILRI, may be perceived as encroaching by CG centers that have a mandate in water and irrigation unless the food security argument is made clear.	

Potential research area	Pros for A4NH	Cons for A4NH	Observations and suggestions
	allow balanced trade-offs between choices on water and food security.		
Trade-offs and positive spin-offs of commodity price changes in terms of consumption, dietary composition for stratified urban communities and in terms of farmer income.	Marketing research with opportunities to engage the private sector.	Is perhaps better done outside of the CG system.	
Opportunities, hazards and risks related to urban livestock management – what are the benefits and what safeguards to develop?	A clearer picture of urban livestock presence, distribution and management will help determine its role in access to low-cost protein, and the health hazards involved; generation of an evidence base for livestock management (distribution, densities, protective measures) is an under-researched area; high profile study for ILRI in the context of A4NH.	Will evidence generated be able to impact largely informal animal husbandry in urban areas; what are the trade-offs between health risks and nutritional benefits?	The role of poultry in the transmission of bird flu and West-Nile encephalitis has come to light in recent outbreaks (e.g. Cairo); little is known about the role of other livestock, if any, in urban zoonoses.

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Group 4: Policies and Enabling Environment

Name of experts

Haris Gazdar and Festus Murithi

Process followed

- Review of documents and background materials identified in gap analysis;
- Interactions with A4NH Director;
- Prior reading of literature on political economy and politics of policy-making and implementation, particularly with respect to nutrition and nutrition-related issues;
- Reflection on own engagement with policy and political process in poverty, nutrition, social protection, and agriculture.

Topic area

The topic organised under the title ‘Policies and Enabling Environment’ is proposed as a flagship called ‘Enabling Environment for Improving Nutrition and Health’ in the Planning for Phase 2 Proposal (A4NH 2015). Presently, in the extension period of Phase 1, this topic area exists within the ‘Integrated Programs and Policies’ flagship as a cluster area on ‘Cross-sectoral policies’. This commands relatively modest resources - \$10 million out of the total A4NH outlay of \$247 million for the extension period. Based on current trends, therefore, it would be the smallest of the proposed flagships.

The evolving nomenclature from ‘cross-sectoral policies’ to ‘enabling environment for nutrition and health’ and the title used for the purposes of this evaluation (‘policies and enabling environment’) appears to reflect evolution in thinking within A4NH about this topic. The fluidity about the proposed role and definition of the topic is reflected in the Phase 2 discussion where it makes an appearance both as a flagship and a cross-cutting theme, and it is proposed that the ‘enabling environment’ rubric might be used as an ‘integrative element in the CRP with cross-CRP parts linking to Flagship Program-specific parts’ (A4NH 2015).⁴

The extension proposal describes the topic area as: “...understanding how evidence about agriculture, nutrition and health linkages can be used to create and sustain an enabling environment for improving the design and implementation of nutrition- and health-sensitive policies and investments...” (A4NH 2014: 9). In the literature cited by A4NH (2014), enabling environment, in turn, is defined as “political and policy processes that build and sustain momentum for the effective implementation of actions that reduce undernutrition” (Gillespie et al 2013: 553).

⁴ The list of projects (provided in the summary of evidence) under the proposed flagship is helpful to gain clarity about the parameters of the topic area but boundary questions remain. Transform Nutrition (TN) which is included as a project is in fact a research program which itself lists ‘enabling environment for nutrition’ as one of its pillars alongside other pillars such as nutrition-specific interventions and nutrition-sensitive interventions. It is not clear if all of TN or only its ‘enabling environment’ pillar will be counted within the ‘policies and enabling environment’ flagship of A4NH. This, of course, is a matter not for the evaluation but for internal housekeeping, and is mentioned here merely to illustrate the topic boundary issue.

Rationale

The rationale for the proposed flagship and the key concepts used in defining it draw upon a set of review papers (particularly Gillespie, *et al* 2013 and Nesbitt, *et al* 2014), which argue, in the world of agricultural, health and nutrition research, for a careful consideration of politics and policy-making in shaping outcomes. This standpoint is widely accepted in development and it is valuable to bring it to the fore explicitly within the context of A4NH. This view is found also in other reviews of the field (Fanzo, *et al* 2014, Hawkes, *et al* 2012, and Resnick, *et al* 2015). Some of these reviews, however, also highlight the many different ways in which the issue of agriculture-nutrition policy can be theorised and made empirically operational.

The main implications of Gillespie *et al* (2013) and Nesbitt *et al* (2014) as articulated in the A4NH proposals relate to bridging the gap between evidence (on agriculture, nutrition and health linkages) and policy-making and implementation. Resnick *et al* (2015) take a broader view of political and policy processes which considers evidence gaps, but also other factors such the emergence of coalitions and champions, ideological considerations and incidental factors such as the timing of an initiative. Their proposed “kaleidoscope” model suggests a more complex theory of change with respect to pro-nutrition policy-making and implementation⁵.

The reviews cited above acknowledge the importance of the country context in determining nutrition outcomes (and linkages between research, policy-making and outcomes) and advocate not only case studies but also country-specific responses. Some reviews also cite case studies to draw out lessons of what has worked in different places (e.g. Fanzo, *et al* 2014). The prime focus across the reviews is on policy processes, even though mention is made of broader political processes and drivers.

Wider debates

There are three common features of the reviews cited which need to be taken into account before addressing what the ‘policy and enabling environment’ world might look like.

First, while the reviews start from the premise that nutrition is a complex issue (this, indeed, is the very rationale for working cross-sectorally), their review of the evidence is narrowly focused on those studies which explicitly cite nutrition. There are political and policy processes which would have delivered pro-nutrition outcomes through improvements in variables such as land access, income, food security, women’s agency, health services, public health, WASH, education, and fertility rates without making any specific reference to nutrition. The way in which these political and policy processes arose and were sustained would enlarge the canvas vastly. It is useful to look at a range of areas of policy-making and not just those which make explicit reference to nutrition.

⁵ The Resnick *et al* (2015) review was produced, incidentally, by the Development Strategy and Governance Division (DSGD) of IFPRI which is part of the CGIAR. IFPRI-DSGD is cited as a CGIAR Center responsible for one of the projects in the present topic area. It is not clear if the paper cited here was produced as part of IFPRI-DSGD work within A4NH. If not, this raises questions about coordination of the policy research in A4NH with that occurring in others parts of CGIAR. There might be similar issues of coordination with other CRPs such as the Policy, Institutions and Markets (PIM) research program which also conducts policy research (though not primarily policy research) in agriculture and related areas.

Second, while in principle, research on political and policy processes can be analytical without necessarily being prescriptive, in reality, most reviews cited here are prescriptive. This means that they often move from “what has worked” to broader generalisations about “what works”, and then onwards to how these lessons might be transplanted. This is problematic because very often insights are highly contextual – as acknowledged by the use of country case studies. Political processes, in particular, are extremely ‘messy’ with respect to institutions, history, and drivers of change. Policy processes might be more amenable to prescription and if so, it might be prudent to restrict the scope of topic area to policy processes within a narrowly defined domain of cross-sectoral policies as was done in the original nomenclature for this topic area.

Third, the reviews, even the more broad-based ones such as Resnick *et al* (2015), concern themselves with political and policy processes within existing structures of government. Studies of paradigmatic shifts in political and policy regimes, typically adopt broader methods still (such as comparative institutional analysis), and incorporate a wider range of factors such as history, patriarchy, conflict, class, ethnic/regional divisions, social capital, social movements as well as exogenous shocks. In some instances the very existence and coherence of a functioning state is problematized – reflected in development policy through the acknowledgement of ‘state fragility’ as an explicit development concern. Such studies into paradigmatic shifts and institutional comparison have been insightful in identifying drivers of change and/or difference, but do not lend themselves easily to policy prescription. Sometimes there are important lessons to be learnt simply about the constraints and challenges which might exist in particular countries. The range of ‘political’ issues considered in the review papers, by contrast, remains relatively limited. The case studies of South Africa, Brazil and Thailand (in Fanzo, *et al* 2014 and cited elsewhere), for example, cite leadership but pay little attention to the wider political-institutional backdrop which led to the rise of populist social-democratic parties/leaders in the first instance. It would appear naïve, therefore, to draw prescriptive lessons without paying attention to the historical-institutional context.

Emerging issues and potential research areas

The rationale for the ‘Policies and Enabling Environment’ topic area within A4NH is inarguable and it addresses a critical gap in the research portfolio of the CGIAR and A4NH. The trend in many countries towards cross-sectoral approaches to address nutrition (partly through the SUN movement) has not only been influenced by research in this topic area, but also creates avenues for more focused and productive future work. We summarise a number of questions arising from our review, identify potential research areas, their pros and cons, and further observations.

Boundary issues

The original rationale for this area (policy research) continued to inform its content in the extension period and the discussion in the proposal for Phase 2. This area with a specific focus on policy processes is clearly-defined, well-established, and with tangible advantages and benefits to CGIAR and A4NH. There are two sets of boundary issues that might require attention.

First, some of the debates which inform the topic area include references to political economy and political processes. The understanding of political economy and political processes as it presently exists within the review work cited is relatively narrow in scope compared with the conventional

understanding of these issues in the development arena. For research to gain wider acceptance as credible political economy and political process analysis, it will need to address questions and adopt methods which go beyond current strengths and advantages within the CGIAR. . It has been proposed that partnerships and collaboration with a wider range of political scientists within and outside CGIAR can help to address any gaps in this regard.

The boundary issue might be resolved in favor of conservatism, by limiting the focus to **policy processes**, and not expanding it to include political economy and political process analysis.

Second, there are research activities and outputs within the cluster which go beyond the rubric of ‘understanding how evidence.....can be used to create and sustain an enabling environment’ and actually go ahead to produce that evidence. While the evidence produced is of high quality and valuable, it does raise a question about the boundaries of policy research. Conversely, as we have noted above, there are other nodes within the CGIAR where policy research of the type envisaged in this topic area is being conducted. It will be useful, therefore, to work towards a more differentiated and unique identity for this topic area. An effective way of doing so might be to continue to specialise in research on processes within government systems which deal with **cross-sectoral policies, programs and strategies**. This will remain a promising area of work, given the successes already achieved in getting governments to agree to cross-sectoral approaches to nutrition.

Integrative or free-standing

The question about whether the topic area remains a flagship or is seen as a cross-cut, appears to have been resolved in favour of thinking about it as an integrative flagship or cluster. There is an expectation elsewhere within A4NH that other flagships and clusters will also develop their policy research. Since all research within the CGIAR is, ultimately, motivated by policy it is understandable that policy research should be seen as applying across Centers and projects. The rationale for free-standing work (which might be utilised by other segments of the CGIAR) also remains strong. Reviews of policy processes across countries, and the development of specific tools and methods for policy engagement and evaluation would constitute valuable contributions not only to projects within the CGIAR but the wider agriculture-nutrition research community. There can be a tendency, however, given some of the legacy issues raised by A4NH key informants and transactions costs in working across projects, to fall back on free-standing research, thus foregoing the opportunity for realising the integrative potential of the topic area. The development of **specific proposals for utilising the integrative potential of work in this cluster/proposed flagship** can help to resolve the potential tension between the integrative goals of this topic area and the obvious attractions of conducting high quality free-standing research. Possible **examples** of integrative research will be:

- Detailed policy process analyses of countries targeted for uptake of research outputs of other flagships/clusters/centers
- Generic policy process analyses around specific research outputs of other flagships/clusters/centers
- Greater attention to agriculture/health policy issue and processes

Empirical focus

The main contribution of cross-country reviews of evidence carried out under this topic area (within A4NH and outside) is to problematize policy processes and to raise the salience of the ‘enabling environment’ concept. While such research might continue, as countries open up to cross-sectoral approaches to nutrition, it is important to shift the empirical focus to more detailed research within countries. Such work can utilise the framework developed in cross-country research, but will quickly need to move to more specific research using multiple disciplines to develop strategies for bridging evidence-outcome gaps in agriculture-nutrition. The development of **country case studies of policy processes** for the specific purpose of bridging evidence-outcome gaps in agriculture-nutrition in partnership with national researchers seems to be an obvious way forward. In the development of these case studies, it will be helpful to **start with minimal presumptions** (based on received frameworks) and to **encourage contextual analysis** which will be of practical use to policymakers, researchers, activists and donors.

Comparative advantages (and disadvantages)

We started out this review with the view that the CGIAR’s natural comparative advantage lay in its **core scientific research** on agricultural commodities and systems. Ideally, policy research would have a multiplier effect on the impact of the scientific research by establishing more effective ways of bridging the evidence-outcome gaps in agriculture-nutrition. Discussions with A4NH key informants suggested that there are challenges in working across projects and centers, and that other centers might be interested in developing their own nutrition components and policy research.

Our observations above about the relatively limited scope of existing political analysis within CGIAR underlines our prior understanding that CGIAR partnerships with country governments imply **avoiding ‘sensitive’ political issues**. This needs to be noted as a comparative disadvantage of the CGIAR with respect to political analysis and underscores our earlier suggestion of not expanding the topic area into political analysis. **Existing in-country partnerships**, however, are at the same time, an advantage for working on policy processes within government systems.

While it would be natural for this topic area to actively seek leverage on CGIAR’s core scientific research, it can also leverage on CGIAR partnerships and relationships in-country to gain traction for policy research nationally.

Potential research areas, pros and cons

Potential research area	Pros for A4NH	Cons/Risks for A4NH	Observations and suggestions
Country case studies of cross-sectoral agriculture-nutrition policy process in government systems, and actual engagement with policy process on basis of this research	Emerging area due to increasing adoption across countries of cross-sectoral strategies A4NH strength in policy process research CGIAR in-country partnerships with agricultural stakeholders Clearer A4NH and FP identity/boundary	A4NH limitations in broader political analysis CGIAR culture of non-engagement on sensitive issues in-country	Work collaboratively with in-country researchers in and outside agriculture Work collaboratively with a wider range of political scientists outside CGIAR Analysis of coherence/alignment of agriculture-nutrition policy with/to major development objectives
Comparative studies of policy processes across countries for specific agriculture-nutrition system changes	CGIAR core scientific research Deliver on promise of integrative research CGIAR in-country partnerships with agricultural stakeholders Clearer A4NH and FP identity/boundary	Challenges of working across CRPs, FPs, clusters CGIAR culture of non-engagement on sensitive issues in-country	Need for clearer understanding across CGIAR of value of research/engagement with policy process Work collaboratively with a wider range of political scientists outside CGIAR

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Group 5: Nutrition-Sensitive Agriculture/Development

Names of experts

Festus Murithi and Simplicie Nouala

Process followed

- A review of the research gaps analysis provided by the Evaluation Team, including key references.
- A review of the CGIAR A4NH website.
- A review of key additional references, including: FAO and WHO Report (2013), *Overview of nutrition sensitive food systems: policy options and knowledge gaps*.
- Consultation with other members of the Expert Panel and key inputs from the Evaluation Team.

Overarching issues

The definition of nutrition sensitivity used in this analysis, as published in the 2013 Lancet Series on Maternal and Child Nutrition, is:

“Interventions or programs that address the underlying determinants of fetal and child nutrition and development— food security; adequate care giving resources at the maternal, household and community levels; and access to health services and a safe and hygienic environment—and incorporate specific nutrition goals and actions. Nutrition-sensitive programs can serve as delivery platforms for nutrition-specific interventions, potentially increasing their scale, coverage, and effectiveness. Examples include agriculture and food security; social safety nets; early child development; maternal mental health; women’s empowerment; child protection; schooling; water, sanitation, and hygiene; health and family planning services.” (Ruel and Alderman, 2013).

It is worth noting that there is a lot of interest among WASH professionals to get a better understanding of the links between poor WASH, in particular poor water quality and poor hygiene and nutritional status. There are questions at the macro-level, particularly in water scarce settings, about managing "water fit for purpose" (i.e. which water quality for which use, with agricultural production and drinking water critical in this context) and at the micro-level. As more information becomes available about the composition and dynamics of intestinal microbial populations, the role of food and water intake may need further scrutiny.

Within A4NH there are two sub-groups of research proposed in the Phase 2 Integrated Programs (IP) Flagship: nutrition-sensitive agriculture and nutrition-sensitive development.

- **Nutrition sensitive agriculture** includes the evaluation and strengthening of nutrition-sensitive agriculture programs. Current activities include evaluations; analysis and synthesis of results on program delivery and impact in collaboration with program implementers; dissemination of findings and lessons learned widely; sharing methods and approaches for evaluation, including strong gender research methods; and exploring opportunities for scaling-up results through other implementers.

- **Nutrition sensitive development** includes the evaluation and strengthening of multi-sectoral nutrition-sensitive development programs and of scaled up nutrition-specific programs. Current activities include evaluation; sharing program delivery evaluation results with implementing partners to ensure improved program implementation and service delivery and potential for impact; and expansion of program intervention evaluations to include a greater focus on maternal and newborn health and nutrition; and to reaching adolescent girls through multi-sectoral programs. There are however some concerns on whether this particular stream should be part of A4NH activities where specific agricultural interventions are not part of the activities being implemented.

Nutrition sensitive agriculture and development by its nature overlaps with and links to other A4NH themes, such as the policy enabling environment, value-chains for nutrition-sensitive agriculture and the impacts of nutrition-sensitive agriculture programs on health.

Policy research, which was previously part of the IPP Flagship, will likely be a cross-cutting Flagship within the Phase 2 configuration of A4NH and is key to designing and implementing successful nutrition-sensitive agriculture programs. FAO and WHO (2013) have identified the following policies which could impact nutrition through food systems, noting that the success of nutrition sensitive policies depends on how well they align with other food system priorities - namely meeting and generating economic demand and production goals.

- **Policies which promote dietary diversity among rural populations**, providing incentives and support to production, marketing and consumption of nutritious, low-input, short duration crops which ideally compliment staple crop production cycles; cultivation of home gardens; and production, marketing and consumption of animal source foods.
- **Industrial fortification policies** as part of an important strategy for increasing the micronutrient content of available foods, e.g. iodizing salt.
- **Biofortification programs** aiming to increase micronutrient availability in staple crops.
- **Policies which strengthen the food supply chain** to reduce waste and losses caused by deficits in storage, transportation and other food system activities.
- **Policies to improve the nutrient content of processed foods.**
- **Appropriate research and technology policies** to generate an economic surplus by improving productivity of resources (land, water capital, or labor).
- **Public and private investments in the food marketing sector** to alter the nutritive quality of available foods.
- **Trade liberalization** to increase opportunities for foreign investment in domestic food systems and impacts on relative prices.
- **Direct food aid and food assistance programs** which target food-insecure populations with a better provision of macro and micro-nutrients (beyond carbohydrates).
- **Commodity specific policies** aiming to influence access to a particular food, e.g. through taxes or subsidies.

These policy options make assumptions about various causal pathways. The assumptions include that increased purchasing power will lead to improved nutrition outcomes; that generating employment

opportunities for women will lead to improved nutrition outcomes; that one type of malnutrition takes precedence over another within a given population; and that using nutrition education to ensure that nutrition-sensitive policies have the desired effect. These assumptions might not hold true in all situations and more specific studies may need to be conducted to test them.

While some of the policies listed above are relevant for this flagship, some may be more appropriate for other flagships e.g. 'policies which strengthen the food supply chain' may be more suitable for the Flagship on Food Systems and Value Chains while some policies may be out of A4NH's scope e.g. industrial fortification. However as noted earlier, it would be expected that there could be some overlaps among different flagships within the CRP and even among different CRPs.

Reviews and evidence base

Global interest in nutrition-sensitive research and development has increased dramatically in the last decade. A number of stakeholders have been working on developing definitions, good practices and evaluation methods, based on research from IFPRI, IDS and other collaborators (see references). The body of evidence for assessing past agricultural development activities and their effects on nutrition is growing, and to date they present a mixed picture of results, in terms of direct impacts on nutritional outcomes. This is largely due – not necessarily to the absence of effects – but to poor program and project designs, monitoring and evaluation which may have prevented changes from being captured. Nonetheless, there is growing evidence to support a more concentrated effort in these areas, if improvements in identified gaps can be addressed.

Some key recommendations coming from these reviews to improve nutrition-sensitive programming are to:

- Empower women
- Facilitate production of diverse, nutrient-dense foods and improve processing
- Incorporate explicit nutrition objectives and indicators into design of policies and strategies
- Assess the nutrition context at local level
- Target the nutritionally vulnerable
- Collaborate and coordinate with other sectors
- Expand markets and market access to vulnerable groups
- Increase market access and opportunities for nutritious foods
- Incorporate nutrition behavior change communication
- Maintain and improve the natural resource base

Similarly, there is a growing agreement on the impact pathways that have been identified for reaching nutritional outcomes in agricultural programming, based on a model which includes agriculture as a direct and indirect source of food at household level; agriculture and trade policy as a driver of food prices; and agriculture as an entry-point for enhancing women's control over resources, knowledge and status. These indicative pathways are:

- **Agriculture as a source of food:** This is based on the assumptions that farm production increases food availability and access at household level, and that increased food availability and access will lead to increased intake at individual level.

- **Agriculture as a source of income:** The main assumption here is that an increase in income (due to wages earned through agricultural labor or sale of agricultural products) is used to purchase and consume not only more food, but higher quality, nutrient-dense food.
- **Agriculture as a driver of food prices:** Agriculture and food system policies affect a range of supply and demand factors which influence the price of marketed food and non-food crops. These prices, in turn, affect the income of net seller households, the purchasing power of net buyers, and the budget choices of both. As with Pathway 2, it is assumed that changes in income or purchasing power will affect what foods households buy, with subsequent implications for individual intake.
- **Agriculture to improve women’s decision making power and control over resources:** Initiatives which involve women in agriculture based activities can positively affect their access to, and control over, resources and assets, consequently increasing their power to make decisions on the allocation of food, health, and care within their household. The assumption here is that empowering women, especially in regards to resource allocation, will have positive impacts on nutrition.
- **Agriculture’s impact on women’s time allocation:** The benefits which come from increasing women’s participation in agriculture based activities must be weighed against potential losses that may occur in regards to other activities associated with good nutrition. Women’s participation in agriculture can affect their time allocation and the balance between time spent in income-generating activities and time allocated to household management and maintenance, care giving, and leisure. From a nutrition perspective, this pathway is especially important in regards to its impact on child care.
- **Agriculture’s impact on women’s own nutrition and health:** Increasing women’s participation in agriculture can affect their nutritional requirements, namely through increased energy expenditure, and their health, for example through exposure to agriculture-associated diseases. In addition to the woman herself, this is of particular concern both from a nutrition perspective for children during the “first 1000 days”.

According to FAO and WHO (2013), in order to advance action to improve the nutrition sensitivity of food systems, three knowledge gaps should be addressed.

- **How to take action across sectors and disciplines?** To be successful, food-based nutrition-sensitive actions must be multi-sectoral and multidisciplinary, integrating food and non-food nutrition relevant factors. This means collaboration among relevant ministries (e.g. agriculture, health, social protection, women’s affairs), and among experts from different disciplines (e.g. nutrition, economics, health, and agriculture) is critical. This will however require that also nutrition be included as a performance indicator in the mandates of these institutions.
- **What are the nutrition impacts of large-scale food system initiatives?** Almost all the assessments of the nutrition impact of food system activities have focused on small-scale projects and the findings have been inconclusive or of very limited value. There is an urgent need to assess the nutrition effects of large-scale food system initiatives such as technological change, land grabbing, climate change, water management improvements in agriculture, agricultural subsidies as well as non-food interventions related to sanitation, drinking water, hygiene and health programs.

- **How to make nutrition sensitive incentives compatible with economic incentives?** Efforts to enhance nutrition impact should appreciate that the food system is primarily profit-driven. Thus to be successful, nutrition-sensitive policies should aim at changing either economic demand or production possibilities or both. FAO and WHO argue that nutrition sensitive food system initiatives will succeed only if their outcomes are compatible with market signals reflecting the behavior of consumers, producers, processors, and traders.

The meta-analysis of evidence gaps and current, planned and emerging research areas conducted by DFID (2014) noted the following areas requiring more research to inform policy and programming decisions:

- Cost effectiveness
- Comparative data across nutrition-sensitive agriculture interventions (home gardening, aquaculture, livestock production, cash cropping and biofortification)
- Sustainability
- Role of women
- Qualitative data

These studies also noted the preponderance of current and planned research projects taking place in sub-Saharan Africa (62%), followed by South Asia (24%) and South East and East Asia (11%) (Hawkes, *et al*, 2012). Given the absolute numbers of the world's poor affected by malnutrition in South Asia and the incidence of malnutrition among populations in Central and South America, the geographic emphasis of future research may need to be reconsidered.

A4NH has developed good working relationships in some areas and may need to consider expanding its reach and working even more collaboratively in addressing new research areas. Some of the prominent organizations working in nutrition-sensitive agriculture are LCIRAH, IDS, Sussex, the World Bank, Save the Children, ACF, USAID, Tufts University, and Cornell University.

Potential research areas: Pros and Cons for A4NH

While having access to the current portfolio of A4NH research projects in this area, there is little explicitly available on shifts of emphasis for Phase 2 planning. Consequently, considering the gaps identified by recent summative work, it is possible to identify areas where more needs to be done or done in a different way. For this analysis, we have clustered important research areas under the headings of design and M&E, research management, implementation and scale-up, and cost-benefit analysis. An over-riding concern of the Expert Panel is that findings from Phase 1 and subsequent Phase 2 research result in practicable changes for those designing and implementing agricultural programs aiming to have nutrition and health outcomes.

Potential research areas	Pros for A4NH	Cons for A4NH	Observations and suggestions
<p>Program design, M&E</p> <p>Research to support more diverse targeting, e.g., adolescent girls, rural workers, non-rural populations.</p>	High priority area; takes optics beyond “1000 days”.	Not necessarily A4NH comparative advantage; need to investigate who else is working in this area.	Highly consultative process to engage others working on this in the international community.
Research on methods for enhancing production and consumption of highly nutritious foods, including more efforts on post-harvest handling.	High priority for CGIAR as a global public good; opportunities to focus on under-researched area of post-harvest technologies and their effects on nutrition	None, though A4NH would need to clarify who else is working in these areas and coordinate across flagships and CRPs.	Requires integrative mechanisms and partnerships with different Flagships, CRPs, national agriculture/ nutrition/ health programs, private sector, civil society and donors. This could also fit quite well under the value chains flagship.
Methods to clarify the appropriate research design and metrics relevant to complex, multi-sectoral interventions, including means to better attribute results/ impacts to specific approaches (e.g. home gardens, biofortified staples), and to interventions involving multiple approaches.	High priority area to look at more complex scenarios; A4NH expertise.	Would benefit from more inter-Flagship collaboration than evidenced in Phase 1	It is important to try to understand the more complex agricultural environments and their relative importance to N/H. To date, analyses seem to be looking more at single approaches (e.g. home gardens or fisheries) and not at the more complex systems in use.
Incorporation of nutrition outcomes into holistic M&E and impact assessment frameworks of agriculture programs, including identifying, developing and testing suitable indicators.	High priority and public good which the CGIAR has a comparative advantage to coordinate; opportunity to link to the new Sustainable Development Goals (SDG) framework.	None	Highly consultative process; to put into use may require capacity building for practitioners to be able to identify the nutrition sensitive outcomes of agriculture programs and be able to carry out M&E and impact assessments from a nutrition perspective.
Assessing the impact of food security programs and (including possibly social protection to vulnerable groups such as provision of food aid) on human nutrition and health	Global public good; high priority; proven A4NH capacity	None though requires widespread consultation with key international players to gain agreement.	At the international level, integration of roles of CGIAR, FAO and WHO in articulating A4NH activities to ensure issues of complementarity, synergies and avoidance of potential conflicts

Potential research areas	Pros for A4NH	Cons for A4NH	Observations and suggestions
		These studies will have a strong local focus if the data sets are to be disaggregated to confirm the critical determinants.	needs to be given priority, while considering the comparative advantage of each organization. There is already some agreement within the international community about the possible role of social protection programs in affecting nutrition and health. A4NH e.g. has some projects studying impact of a cash transfer program in Mali on nutrition
Research management Developing an integrated research agenda, principally at national level	High priority and global public good; enhanced local/national partnerships; in countries where a national council for research and technology exists (such as in many Latin American countries) this may provide a new entry point for the promotion of multidisciplinary research.	Links between A/N/H research disciplines not well established; A4NH may not have expertise/resources to assist in training or to otherwise support integrated research teams.	Institutional research linkages (inter-ministerial) are weak in most national systems; needs to be tackled at leadership levels and at practical working levels, e.g., through course curricula/training of A/N/H professionals and mentoring of multi-disciplinary researchers ⁶ . This is could also be handled under the policy flagship.
Implementation and scaling up Qualitative research to understand barriers to participation, adoption and use of program inputs and services.	CGIAR priority to scale up and out; A4NH has expertise.	Other organizations might provide more skilled social science support to this type of research	A4NH seems to have a higher proficiency in economics research than in social research; this may be a misconception on our part. This could be a key area to consider, going forward especially because scaling-up is an important agenda item for A4NH. It also has important potential interaction with the

⁶ There is little A,N,H coverage in training programs/curricula of researchers. Whereas agriculture curricula often cover animal nutrition, human nutrition and health are not addressed. Similarly, the role of agriculture and food-based approaches in nutrition and health are not included in N/H curricula.

Potential research areas	Pros for A4NH	Cons for A4NH	Observations and suggestions
			research on policy processes under the proposed 'Policies and Enabling Environment' FP.
Research to better understand the challenges of people living in fragile states and post-conflict situations to adopt nutrition-sensitive agriculture	High priority for vulnerable populations;	Other international organizations work more prominently with these populations: A4NH might serve in a supportive role. In the complex setting of fragile states the promotion of the concept of nutrition-sensitive agriculture may be "a bridge too far".	Unfortunately, fragile and post-conflict states are increasing in number and malnutrition is a tragic consequence. The global community needs this kind of research though perhaps a partnership with WFP, UNHCR or others would be the best approach.
Research on identifying pro-nutrition approaches which are more compatible with the economic incentives which drive agriculture and food systems	A4NH has expertise in economics research; relates to cost-effectiveness below.	None.	May require more globally focused research; may require cross-Flagship collaboration with policy, value chains, biofortification groups.
Research on the sustainability of ANH interventions and impacts	High priority; A4NH expertise.	None.	Of high interest to funders; research could be done in collaboration.
Cost-effectiveness: Development of methods to compare the relative cost-effectiveness of different types of interventions to improve human nutrition and health (e.g. comparison of the social benefits of complex programs with many objectives and joint outcomes against the benefits of single-outcome programs;	High priority; A4NH has a comparative advantage especially with cross-cutting policy expertise	Current interventions appear location specific; higher-level research results need to be generated to offer global/national guidance; would likely require more cross-Flagship research design/implementation – something not very evident in current A4NH programming	May require more globally focused research; cross-Flagship collaboration with policy, value chains, biofortification groups. This will require that the metrics for economic evaluation of agricultural inputs vs nutrition and health outcomes be further developed and harmonized. The Disability Adjusted Life Year has been around for over 20 years, yet has

Potential research areas	Pros for A4NH	Cons for A4NH	Observations and suggestions
<p>Comparisons of investments targeting men and women; Comparisons of different initiatives, e.g., increased production, diversified diets, industrial fortification, biofortification, improved nutritional composition of processed foods, trade liberalization, direct food assistance and social protection programs.⁷; and There is need to design simplified and inexpensive methods to assess deficiencies in the field. This could facilitate the assessment of the impact of interventions.</p>			<p>yet to meet with wide acceptance outside the health sector.</p>

⁷ Some of these analyses may be done under the Policy Flagship where this is most relevant.

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