SECTION 2.1
Flagship 1: Food Systems for Healthier Diets
SECTION 2.1
SECTION 2: Flagship Program (FP1) on Food Systems for Healthier Diets

RATIONALE AND SCOPE

Food systems, encompassing the production, processing, distribution, waste disposal, and consumption of food (see Box 2.1.1 and Figure 2.1.1) can help ensure that people have access to affordable, nutritious foods at all stages of life (Global Panel on Agriculture and Food Systems for Nutrition 2014). Limited access to and consumption of healthy diets among the poor are at the root of the triple burden of malnutrition: persistent chronic undernutrition and micronutrient deficiencies in early childhood exist in the poorest segments of populations, especially in low- and middle-income countries in Africa and South Asia, alongside rapidly rising rates of overweight, obesity, and diet-related non-communicable diseases (Lim et al. 2012; Popkin and Hawkes 2015).

Food systems and the natural resource base are under increasing pressure to provide sufficient, safe, nutritious, and affordable food for all. In recent decades, food systems have undergone major transformations (Reardon et al. 2012). Food production has become more capital-intensive and supply chains have grown longer as basic ingredients undergo multiple transformations towards becoming final food products (Hawkes et al. 2012). At the same time, diets are changing quickly, often driven by the rapid urbanization in many developing countries (D. L. Tschirley et al. 2015).

Box 2.1.1. Definitions for concepts in FP1: Food Systems for Healthier Diets

| The term **Food System** refers to the full set of processes, activities, infrastructure, and environment that encompass the production, processing, distribution, waste disposal, and food consumption. Food systems are multidimensional, including sociocultural, economic, environmental, and political aspects, and complex, with multiple actors (food producers, food-chain actors, and consumers) managing multiple linked and nested agri-food value chains within dynamic and interactive food environments (Figure 2.1.1). |
| **Food system thinking** is an approach that considers how all components and actors of the food system are interrelated and can be affected by (targeted) incentives or interventions that change final (nutrition) outcomes (Herforth, Lidder, and Gill 2015). |
| **Food system research** includes the governance and political economy of food production and consumption (access and equity), sustainability, effects on health and well-being (nutrition and food safety), and links between food production and the natural environment. |
| **Diet quality** is central to healthy diets and encompasses aspects of both adequacy and moderation. Adequacy refers to getting enough of desirable foods or food groups (whole grains, fruits, vegetables, fish, meat, nuts and seeds, beans and legumes, milk, eggs, and dietary fiber), energy, macro- and micronutrients. Moderation refers to restriction of unwanted foods, food components or nutrients such as fat (especially saturated fat), cholesterol, sugar, sugar-sweetened beverages, and sodium (Herforth et al. 2014; Alkerwi 2014). |
The urban poor and emerging middle-class households tend to reduce their consumption of cereals, roots, and tubers while increasing demand for refined grains and flours, sugar, salt, and fats. Demand for processed and convenient foods at supermarkets, fast-food restaurants, and for informal street foods becomes increasingly important. For middle-class population groups, demand for fruits, vegetables, and animal-source foods (ASF), such as dairy, poultry, eggs, meat, and fish, strongly increases (D. Tschirley et al. 2015). Especially in high- and middle-income countries, consumption of healthier foods has grown in the past two decades, but particularly in low-income countries, consumption of less healthy foods, such as processed meats and sugars, is rising even faster (Imamura et al. 2015).

Improving diet quality by changing interactions and feedbacks between food systems components is considered an essential element of sustainable efforts to alleviate malnutrition and nutrition-related diseases worldwide (Popkin and Hawkes 2015). As they undergo transformation and seek to respond to dietary changes, local and regional food systems must resolve tradeoffs between nutritional, social, economic, and environmental objectives and constraints. In particular, food systems must: (1) meet consumers’ food quality and safety demands; (2) develop effective value-chain linkages; and (3) reduce pressure on aquatic and terrestrial ecosystems, while increasing their capacity to respond to climate change.

**Strategic rationale and scope**

The dietary implications of food system transformations for health in developing countries and the need to support food systems to produce and supply appropriate nutritious, safe foods for healthy lives are increasingly recognized by governments, businesses, and civil society groups (WHO/FAO 2003; International Food Policy Research Institute (IFPRI) 2014; Access to Nutrition Foundation 2016) and by international forums, including the 2nd International Conference on Nutrition (ICN2) in 2014, the International Panel of Experts on Sustainable Food Systems (IPES Food) in 2015, the Global Panel on Agriculture and Food Systems for Nutrition in 2014, and the WEF Global Agenda Council on Food and Nutrition in 2015. These forums generally seek some input from CGIAR to gain a better understanding of (1) how food systems can be guided to become healthier and more sustainable; (2) the driving forces and the dynamics of food system changes, including foresight tools; and (3) how the private sector and civil society can collaborate to identify food system innovations at different scales and nutrition-sensitive scaling approaches at the national food system level.

FP1 will directly address **Sustainable Development Goal (SDG) 2** and **SDG 3**. Better nutrition boosts adult productivity (Strauss and Thomas 1998), and better nutrition of females is associated with empowerment of women in agriculture (Malapit et al. 2015; Malapit and Quisumbing 2015). Improvements in nutrition, including reduction in undernutrition, micronutrient deficiencies, and overweight and obesity, all lead to declines in nutrition-related mortality, infectious diseases at a young age, and non-communicable diseases later in life (Black et al. 2013). This FP will also contribute to **SDG 4** and **SDG 5**: better nutrition is vital for early child development and education, and it improves the ability of girls, adolescents, and women to perform well at school and become empowered in the workforce and wider society (Victora et al. 2008). FP activities will also contribute to **SDG 14** and **SDG 15** by aiming to reduce pressure of food systems on these aquatic and terrestrial ecosystems.

In this context, this FP will focus on a dynamic analysis of the transformation of food systems and diet transitions. It will seek to understand not only the impacts and effectiveness of specific types of policy interventions and business innovations in relation to the food system for different target populations, but also their possible environmental and economic trade-offs. Our research will be organized in three clusters of activities (CoA):

- **CoA 1**: Analysis and modeling of the transformation of food systems and diet transitions.
- **CoA 2**: Development of policy and business innovations to support healthier and more sustainable food systems.
- **CoA 3**: Monitoring and evaluation of the impacts and effectiveness of policy and business innovations.
• CoA 1: assessing regional and subregional drivers of food system transformation, and options and constraints for dietary change (diagnosis and foresight),
• CoA 2: testing concrete agri-food value chains innovations and interventions for improving diet quality and diversity (food system innovations), and
• CoA 3: supporting the scaling up of successful actions through effective engagement of multi-stakeholder platforms and multisectoral mechanisms (scaling up and anchoring).

OBJECTIVES AND TARGETS

The overarching goal of FP1 is to understand how changes in food systems can lead to healthier diets, and to identify and test entry points for interventions to make those changes. We focus on measuring changes in diet quality among (young) women, their children, and vulnerable populations, who are most at risk for malnutrition. This FP’s contribution to the 2022 CGIAR target is a 10% reduction in consumption of less than the adequate number of food groups among women of reproductive age and their children in the four target countries (Performance Indicator Matrix – Table A). In addition, this FP will contribute to development outcomes in three ways:

1. By providing evidence on drivers of and constraints to diet changes among target populations and food system performance related to healthier diets, to inform policy discussions and multi-stakeholder dialogues in target countries;
2. By improving the performance of multiple nutrient-rich agri-food value chains and identifying options to upscale effective food system innovations to large segments of target populations; and
3. By supporting agri-food system CGIAR Research Programs (AFS-CRPs) through communities of practice (CoP) that can guide researchers in using food-system pathways and strategies for strengthening and leveraging agri-food systems for healthier diets in CGIAR research.

This knowledge will support scaling up through targeted capacity building, knowledge dissemination, and policy engagement. Through an agri-food value chains pathway and a policies pathway, the FP directly addresses the second system level outcome (SLO2) on improved food and nutrition security for health, through the sub-intermediate development outcome (IDO) on improved diets for poor and vulnerable people. It also has important links with the SLO on reduced poverty, through the contributions to the sub-IDO on diversified enterprise opportunities, and to SLO3 on improved natural resource systems and ecosystem services, through the contribution to the sub-IDO on enhanced adaptive capacity to climate risks. Given the wide-ranging implications of food system changes, it also contributes to three of the cross-cutting issues (see Figure 2.1.2 and Performance Indicator Matrix – Table C).

By 2022, this FP expects its research to contribute to three main outcomes, as described in Performance Indicator Matrix – Table B):

• Partners and other CRPs, like AFS-CRPs, food producers, and agri-food value chains actors incorporate nutrition, health, and gender in agri-food value chains and food system programs.
• Stakeholders (corporate investors, civil society, academia, industry, policymakers) consider healthier diets in processes related to food systems.
• Strategies for agri-food value chains innovation are implemented at scale by partners.

By 2022, the following outcomes will be achieved in all four target countries (see geographies below):

• Portfolio of validated metrics and tools for assessing diet quality and characterizing food systems as well as for foresight and scenario analysis applied
• Key leverage points for improving diets through food systems identified and at least four interventions co-designed, tested and evaluated with local platforms, partners, and stakeholders
• Active policy engagement on improving food systems for healthier diets (concerted actions)
• Knowledge dissemination among important decision makers and across larger networks of stakeholders accomplished.
• Capacity developed among key individuals and groups in relation to improving food systems from a dietary perspective

Figure 2.1.2. Impact pathways for FP1: Food Systems for Healthier Diets

Target Geographies
FP1 will focus on two regions: Africa south of the Sahara, and South and Southeast Asia. In addition, complementary studies may be conducted in Latin America on specific experiences with food system innovations and dietary change. In the focal regions, we will examine trends and variability in healthier diets within and across countries and population segments, linking them to changes in food system dynamics. To provide a deeper understanding of diets and food system interactions at national and subnational levels, we will conduct more detailed analysis of diets and food systems in four target countries: Bangladesh, Ethiopia, Nigeria, and Vietnam. These countries provide a range of diet and (sub)-national food system contexts at various stages of food system transformation and urbanization, and they are all CGIAR Site Integration ++ countries. In other countries, specific interventions may be piloted and scaled up, but not research on the national and sub-national food-systems.

IMPACT PATHWAY AND THEORY OF CHANGE
FP1 contributes to development outcomes through two primary impact pathways: Agri-food Value Chains Pathway and Policies Pathway. Both pathways are linked and synergies and trade-offs are recognized. While the first pathway provides the necessary evidence to make policy decisions, in turn, policy decisions may also influence the pathway. Both are strongly context specific; and the
diagnosis/foresight work and testing of identified food system innovations are important for adjusting the Theories of Change (ToCs) to national level.

In the first pathway, diet quality is improved and human well-being increased through changes in multiple nutrition-relevant agri-food value chains. For target populations with low dietary diversity, we will explore how to support more rapid development of (in)formal agri-food value chains for nutritious foods—whether single foods (e.g. fruits, vegetables, ASF, grain legumes, and biofortified staples) or combinations of foods (e.g. processed foods)—to enhance diet quality among women and children. The ToC in Figure 2.1.3 has both supply (left) and demand (right) components. In the focus countries, this FP will identify the best leverage points for entry into food system dynamics from a dietary perspective. On the demand side, changes in diets can occur in response to changes in cultural or social norms, preferences, education, and access to information, relative prices of foods, income, or through behavior change. Changing behavior requires five steps: making new behaviors understood, easy, desirable, rewarding, and habitualized (Weed 2012). On the supply side, entry points include the types of products and their key characteristics, such as affordability and accessibility. To attain the IDOs, it is important to identify the agri-food value chains and partners most relevant for healthier diets. The goal of CoA 2: food system innovations, is to test the effectiveness of such interventions (see below).

The supply side offers several key testable assumptions. For example, do producers or agri-food value chains actors have the resources and perceive benefits from opportunities for new, healthier products? We will measure available endowments and attitudes among key groups for specific, identified opportunities and then test whether producers/actors are willing to take the risk embedded in these new opportunities by investing in new crops or products. On the supply side, it is particularly important to pay attention to the role of gender; when specific crops are produced, processed, and/or sold by either men or women, gender relationships along the food production side of the chain can influence welfare, bargaining, and, ultimately, nutritional outcomes. Finally, FP1 will assess how beneficial, detrimental, or vulnerable a specific innovation is to the environment and integrate those insights into decision-making processes.

On the demand side, this FP will test whether or not information about healthier diets reaches targeted beneficiaries or those who purchase food for them (especially mothers), as well as whether those knowledge changes are leading to behavior changes. This FP will also measure the relative cost of more nutritious foods to understand whether these foods fit income constraints and whether decisionmakers have the agency, information, resources, and desire to purchase and consume more nutritious foods. If these assumptions can be met, improved accessibility of nutritious foods could lead to improved diet quality among (young) women, children, and vulnerable populations. Being the future workforce, leaders and bearers of the next generation, needs and aspirations of the adolescent girls and young women are important to consider as in this period of life youth is receptive to new ideas and make lifestyle (including diet) choices determining their future health. If they cannot be met, it is important to trace where assumptions break down so that projects can adapt.

In the second impact pathway, this FP will contribute to development outcomes through policy processes, initially in target countries and later in other countries. National and sub-national governments, and other local and regional actors, can influence policy and regulatory frameworks to promote healthier foods and reduce unhealthy components and to make food systems more environmentally sustainable and resilient to climate-change. To inform policy discussions and regulatory options, this FP will conduct policy analysis and provide evidence on diet and food system changes and their links to national and sub-national policy processes, in relation to direct domains (e.g. food safety,
health, agriculture subsidies) and indirect domains (e.g. urbanization, infrastructure planning, environment or climate change). Key decisionmakers and stakeholders (i.e. from private sector and consumer organizations) will be identified and engaged early in target countries. Results of the diagnostic work can help frame policy debates. Later, evidence on specific policy interventions can help shape the policies themselves or how they are implemented (e.g. through public-private investments). The ToC of this policy pathway is described in Figure 2.1.4. We will work closely with FP4: SPEAR, which works on public good program pathways and looks at country SDG indicators for nutrition and health, while this FP concentrates on food policy, regulations, and investments linked to the agri-food value chains pathway. While in both pathways, diet quality for (young) women and children is the main outcome, we will also work closely with the CRPs on Climate Change, Agriculture, and Food Security (CCAFS) and Policies, Institutions, and Markets (PIM) to ensure that we consider synergies and tradeoffs between impacts of food system innovations on diets with other outcomes, such as equity, empowerment, economic performance, and sustainability.
Figure 2.1.3. Theory of Change of the Agri-Food Value Chains Pathway

**Impact:** Increased diet quality of young women, children and vulnerable populations

**Assumptions:**
- Practices are effective

**Practice changes:** Consumers make it a habit to make healthier food choices

**Assumptions:**
- Practices are feasible to adopt (easy, i.e. available, affordable & convenient)
- Consumers see it as rewarding and are supported and reminded by their environment to make healthier food choices.

**Capacity changes:** Consumers want to make healthier food choices.

**Assumptions:**
- Healthier food choices are seen as desirable
- Main household food purchaser understands the importance of diet quality for healthy diets
- Food purchaser has decision making power to purchase more nutritious foods

**Reach/reaction:** Consumers, both men and women, hear about importance of nutritious foods and healthy diets and consider it relevant

**Assumptions:**
- Behavior change communication plan is set up and targets consumers who need to hear about nutritious foods and healthy diets
- Behavior change communication reaches the consumers whose diets need to be improved, especially mothers and children

**Practice changes:** Farmers produce nutritious foods; private sector uses knowledge and skills in their business practices

**Assumptions:**
- Farmers/chain actors are willing to risk pursuing identified opportunities
- Private sector is willing to embed innovations as business practices
- No large big changes to the environment affecting profitability or productivity of new crops
- Growing more nutritious food does not occur at the expense of natural resource base

**Capacity changes:** Farmers/chain agents have increased capacity to use opportunities to grow, process, and trade more nutritious food and food products

**Assumptions:**
- Information on leverage points and principles reaches right actors and stakeholders
- Farmers and chain actors have the resources to try the identified opportunities

**Impact:** Increased availability and accessibility of nutritious food and food products

**Assumptions:**
- Practices are effective

**FP1 Output:**
- Understanding of diets, food system and their trends and linkages
- Leverage points for agri-food value chains innovations identified
- Principles of agri-food value chains interventions for healthier diets understood
Figure 2.1.4. Theory of Change of the policies impact pathway

**Impact:** Increased diet quality of consumers

**Impact:** Increased availability and accessibility of nutritious food and food products

**Practice changes:** Policies are more conducive to healthier diets and do not have detrimental impacts on environment and are climate-sensitive

**Capacity changes:** Policy makers consider the evidence and understand the appropriate policy levers for improving diets

**Reach/reaction:** Policy makers and stakeholders become aware of the food system changes needed to lead to healthier diets

**FP1 Output:**
- Tools and metrics to assess and evaluate sustainable food systems, diet quality
- Evidence base on diet and food system status, trends, and policy frameworks at national and subnational levels
- Leverage points identified, tested, and evaluated

**Assumptions**
- Policies are enforced and effective

- **Assumptions**
  - Political climate is conducive to policy changes related to improving diets
  - Some policy maker(s) are willing to expend political capital to champion new policies
  - Policymakers understand any relevant trade-offs between healthier diets and climate impacts

- **Assumptions**
  - Policy changes related to diet improvements fit the policy agenda
  - Policy changes support gender equity

- **Assumptions**
  - Right information reaches right policy makers and stakeholders
  - Information is relevant
  - Policy makers and stakeholders are receptive

- **Assumptions**
  - Policy changes related to diet improvements fit the policy agenda
  - Policy changes support gender equity

- **Assumptions**
  - Right information reaches right policy makers and stakeholders
  - Information is relevant
  - Policy makers and stakeholders are receptive

- **Assumptions**
  - Policy changes related to diet improvements fit the policy agenda
  - Policy changes support gender equity

- **Assumptions**
  - Right information reaches right policy makers and stakeholders
  - Information is relevant
  - Policy makers and stakeholders are receptive
**SCIENCE QUALITY**

This FP builds upon lessons learned from the Phase I flagship on Value Chains for Enhanced Nutrition (VCN), whose main goals were to build a framework to assess single-product value chains from a nutrition perspective, to pilot innovations for improving value chains, and to test local opportunities to improve consumption of nutrient-dense foods. The framework analyzes value chains from the consumer, rather than producer perspective, and provides an understanding of how to fill dietary gaps with nutrient-dense foods, such as ASF, fruits, vegetables, and pulses (Gelli et al. 2015). It suggests both nutrition and agricultural performance indicators to understand whether agri-food value chains are functioning properly to deliver nutritious foods. It also develops tools for better understanding the role of gender in terms of food choices and bargaining at different points in the chain.

Using this framework, the research team has made considerable progress analyzing value-chain improvements from a nutrition perspective, and experimenting with incentives to increase demand for nutritious foods. Value-chain assessments show how markets can be relevant for filling gaps in the diets of poor consumers, based on the analysis of value chains for indigenous fruits in Kenya and Peru, animal-source foods in the slums of Nairobi, and beans and amaranth in East Africa (Kehlenbeck, Asaah, and Jamnadass 2013; Penny et al. 2015). Projects with World Food Programme (WFP) focus on food system metrics, taking a multi-chain approach for structured demand (e.g. schools and hospitals). Other ongoing work for food systems and nutrition analysis at national and subnational levels is funded by the International Fund for Agricultural Development (IFAD), the Bill & Melinda Gates Foundation (BMGF), and the European Union (EU). The CRP on Agriculture for Nutrition and Health (A4NH) partners are collaborating with AFS-CRPs to assess national and local food systems, including linkages and trade-offs between nutritional, environmental, and socioeconomic performance, in Ethiopia, Kenya, Vietnam, and Zambia. The work on nutrition sensitive landscapes led to a conceptual framework and methods and tools for assessing potential synergies and trade-offs between agricultural production, the environment, and food and nutrition security in selected landscapes (Groot et al., in press; Kennedy et al., in press).

Recently, the framework extended to consider agri-food value chains from both a nutrition and sustainability lens (Allen, de Brauw, and Gelli 2016). A4NH began to experiment with methods of stimulating demand for nutritious foods. In Bangladesh, studies focused on specific value chains, placing nutrition messages on seed packets given to randomized groups, and trying to understand factors stimulating demand for yogurt. In another project, women were organized into cooking contests that required the use of more nutrient-dense foods, as an effort to stimulate the use of more nutritious ingredients in selected communities. Also in Bangladesh, a project planned for 2016 will measure the change in people’s willingness to pay for specific pulse products when nutrition information is displayed on the packaging. In India, A4NH is testing an intervention for getting unsold vegetables into the hands of relatively poor consumers. In Colombia, Honduras, and Nicaragua, research co-financed by the Ford Foundation, focusses on how to stimulate demand for heathier diets by poor consumers.

In Phase I, research focused on assessing value chains and their contributions to improved nutrition. In Phase II, this will expand to include the wider food system. Taking a diet quality perspective, the scope must broaden from analysis of single commodity value chains, to innovations at the whole food system level. This widens the scope of research to consider, while continuing to focus on linkages between food consumption and agricultural production. Specifically, decisionmaking on business practices in the private sector that could affect the food system at different levels (household, municipality, region, country) must be considered, and the policy scope must include food system, environment, and other scaling policies.
This FP will therefore pursue a novel line of research by studying food systems comprehensively, within the broader socio-economic, political economy, and environmental systems in which they are embedded (McDermott et al. 2015; Ingram, Erickson, and Leverman 2010). This FP will develop generic frameworks and integrated metrics to assess food-system performance and drivers for diet change at individual, household, (sub)regional levels in different national contexts. Institutional and regulatory frameworks, and power relations—in particular those formed along gender or similar lines—are considered crucial in determining how food systems are performing. We cannot rely on unidirectional flows of knowledge from scientists to decision-makers, but need reciprocal flows between science, policy, and practice, building transdisciplinary science (Foran et al. 2014; Hammond and Dubé 2012). Understanding feedbacks between food system actors (as complex adaptive systems) and nonlinear interactions (through multi-agency simulation) offers opportunities for a new generation of food and nutrition foresight models for pursuing healthier and sustainable diets.

CGIAR has considerable capacity in many elements of food systems research including primary agricultural production, agro-food value chains, natural resources and environmental sustainability, and policies and institutions. In 2012, CGIAR added improved nutrition and health as a high-level goal (or System Level Outcome). A4NH has developed a strong basis for this proposed research: it has validated dietary diversity indicators (Fiedler et al. 2012; Martin-Prével et al. 2015), developed a framework for nutrition-sensitive value-chain interventions (Gelli et al. 2015), analyzed agriculture-nutrition pathways (Gillespie, Harris, and Kadiyala 2012), developed gender-nutrition tools and methods (Johnston et al. 2015), and assessed diet transitions (Headey et al. 2015; Arimond et al. 2010). However, the nutrition transition requires diet quality indicators beyond simple dietary diversity scores to evaluate diet composition (both healthy and unhealthy components), and dietary patterns, and to develop and validate new assessment tools (Ocke 2013; Imamura et al. 2015; Marshall, Burrows, and Collins 2014; Waijers, Feskens, and Ocké 2007).

Beyond A4NH’s experience developing research on value chains for enhanced nutrition, Wageningen University and Research Centre (Wageningen UR) brings experience and leadership in international projects related to food systems, and a strong capacity component of training young researchers from lower- and middle-income countries (LMICs). The EU-funded Sustainable Food and Nutrition Security (SUSFANS) project provides a conceptual framework and analytical tools for underpinning food policies and their impact on consumer diet, implications for nutrition and public health, the environment, and the competitiveness of the agri-food sectors. The FOODSECURE project provides a set of analytical instruments to experiment, analyze, and coordinate the effects of short and long term policies to achieve food security, and can be operationalized into the EU-Africa Research & Innovation Partnership, with a focus on food and nutrition security and sustainable agriculture. Multi-stakeholder partnerships between food system actors (business, research organizations, government and civil society) are essential to identify and test innovations at a scale. Experiences in public private partnership platforms (e.g. the Amsterdam Initiative against Malnutrition) suggest key action areas to establish effective upscaling networks and pathways for institutional anchoring (Reid, Hayes, and Stibbe 2014). This also broadens the scope for innovations on incentives (nudging) to motivate individual consumers and the private sector towards healthier food choices.
LESSONS LEARNT AND UNINTENDED CONSEQUENCES

As discussed above, FP1 builds and expands upon lessons learned from the Phase I VCN flagship. This flagship will also continue the consumer perspective, in this case studying the food system from the perspective of the diet, in alignment with CGIAR’s Strategy and Results Framework (SRF). The primary emphasis on food systems will be at the national level, since national governments play an important role in determining policies and investments to help meet their agricultural potential, and such investments have important implications for what farmers grow and what people eat within a national context. Next, one can consider subnational agro-ecological zones, and how the food systems of each fits together. One can build up national food systems to consider regional food systems, which may be particularly important in countries with a great deal of agricultural trade.

Phase I research focused primarily on individual value chains for more nutritious foods (ASF, fruits and vegetables, and pulses). By broadening the focus to food systems, this FP can incorporate multiple value chains that come together within the context of food systems, spanning multiple crops and food products that are the focus of AFS-CRPs and other potential partners. The goal in Phase II is to better complement the supply side emphasis of value chain research conducted by AFS-CRPs, and to enhance the tools for value chain analysis that have been developed in FP3 of PIM, from a healthy diets perspective.

In order to make diets healthier through food systems, a deep engagement with the private sector in focus countries is necessary; in Phase I, private sector engagement was limited to interactions mediated through business schools. To ensure dietary improvements are anchored in the food system, research programming must address how private actors in the economy account for dietary quality in their decisionmaking, and understand how dietary quality trades off against profits and sustainability considerations. Through its strong partnership with the Global Alliance for Improved Nutrition (GAIN), this FP will engage in action research projects with the private sector to build an understanding of these tradeoffs in focus countries.

It is first important to understand the diet from a more holistic perspective, understanding the drivers that lead to both undernutrition and overnutrition, from a systems perspective. As those drivers are understood, this FP can then consider and pilot test interventions to improve the diet from a health perspective, while considering economic and environmental tradeoffs. Alternatively, this FP can suggest policy changes that could lead to healthier diets based on modeling. As successful interventions and policies are identified, they can be considered for scale up at a national level.

Wageningen UR will lead this FP, using its experience in bringing together multiple disciplines in previous food systems projects (e.g. the SUSFANS project) and its strong track record of research on human health and diet quality in relation to food systems. It has also brought together multiple disciplines in previous food systems projects and has strong linkages with the private sector. Additionally, GAIN and its Amsterdam Initiative against Malnutrition will be an important partner in this FP, strengthening partnerships with the private sector. To limit the otherwise broad focus of food systems, this FP will focus its work in four countries, developing partnerships and relationships with important actors in the food systems of those countries.

CLUSTERS OF ACTIVITY

FP1 strengthens the analytical capacity on food systems for healthier diets in CGIAR and beyond by revisiting and advancing concepts, recasting and testing evidence, conducting rigorous analysis, and engaging stakeholders. The FP is organized in three CoAs: in CoA 1: diagnosis and foresight, the initial focus is to fill crucial knowledge gaps on the dynamics of interactions between food systems and diet
quality at national and subnational levels. The knowledge will be used to identify actions needed to address diet gaps through food systems, while accounting for possible environmental and economic trade-offs. Concrete opportunities to improve diet quality and policies/regulatory frameworks will be identified and tested in CoA 2: food system innovations, by identifying and testing interventions that work through food systems to provide a diversity of healthier foods. Through the compilation of results generated from the first two CoAs, CoA 3: scaling and anchoring, will identify lessons for scaling up within focus countries.

CoA 1: Diagnosis and foresight: Linking dietary and food systems transformations
Despite food systems’ critical role in people’s diets, limited information about both food system transformations and diet changes exists and the theoretical and empirical understanding of the interactions between food systems and diets is incomplete. A thorough understanding of the current status and dynamic interaction between food systems, diets and their drivers (e.g. urbanization, demographic transition, climate change, new food retail and prepared food outlets) is required to guide transformations of food systems toward healthier diets for poor populations and to address future environmental, social and economic trade-offs. This CoA will be structured around five main research questions (see Box 2.1.2).

Box 2.1.2. Main research questions in CoA1: Diagnosis and Foresight

1. What are the crucial gaps (including deficiencies, excesses, imbalances) in diet quality in the focus countries (and subregions), and how are those gaps linked to the present state of their food systems?
2. How are diet quality changes influenced by food system transformations and vice versa, and how does this interaction play out for the different target groups (women and children)?
3. Which constraints and enablers within national and subnational food systems hinder or support key actors (including consumers, public and private food actors, and producers) in making diets healthier?
4. What are environmental, social, and economic trade-offs and synergies of improving food systems and diets to ensure sustainability of sufficient diet quality for human well-being?
5. What are the key leverage points to support food systems in focus countries in ways that lead to improved diets?

The research will have three interlinked sets of activities. The first set involves concept development, metrics, and tools. The research will focus on reviewing and refining existing conceptual frameworks, including relationships and interactions between consumers, value chain actors (retailers, wholesalers, food processors), and primary producers, from a nutrition lens. The resulting framework will be used to develop testable hypotheses on how a range of food system activities contribute—positively or negatively—to diet quality and how they are influenced by environmental, economic, social, cultural, and policy processes. Relevant qualitative and quantitative metrics, data collection, and analytical tools will be developed to assess diet quality and characterize food systems using primary and existing secondary data. This work will be supported by analytical tools and foresight techniques used to analyze drivers shaping the linkages between food systems and diet quality, and the role of policies in influencing food system–diet relations locally and nationally.

The second set of activities focuses on characterization and assessment. Metrics, methods, and tools identified in the first set of activities will be used in focus countries (and subnational regions/landscapes) to characterize diets, determine crucial diet quality gaps, and link findings to current food systems. We will assess drivers of existing diets and food systems and their interlinkages, specifically investigating
how demand- and supply-side drivers influence diet trends for nutritious foods, such as fruits, vegetables, and ASF, and how diet transitions influence local food systems. Special attention will be paid to trade-offs and synergies, in terms of nutritional, environmental (land and water use, biodiversity), and equity outcomes. This work will also examine the influence of policies (international, national and subnational) and the political economy of policy changes, especially the implications for different socioeconomic and gender groups.

Based on results of the first two areas of work and priorities arising from the other two CoAs (see below), the third set of activities will be structured around **foresight and scenario analysis**. Modeling and scenario techniques will be used at three main scales to support foresight on food system development from a diet perspective, while considering sustainability and climate change constraints. First, dynamic micro-level models will be used to operationalize healthy diets and to understand their feasibility, affordability, convenience, and desirability. Farm household modeling will be used to understand the environmental, climatic, and economic trade-offs of focusing the food supply on optimized diets. At the meso-level, country/landscape-level modeling will build understanding of the drivers and interlinkages between diets, food systems, and agro-ecosystem conditions. This area of work will build on economy-wide models developed under FP2 in PIM and by LEI-Wageningen UR (Magnet) with the objective of assessing how key drivers, such as urbanization and income growth, interact with domestic farming systems, natural resources, and climate, leading to changing relative food prices and production patterns, particularly for more nutritious foods. Finally, macro-level modeling will aim at improving current global models being applied to trade, agricultural policy, biofuel policy, and climate change issues. The three levels of modeling will be implemented in close cooperation with PIM and CCAFS to reinforce the coherence with the other CRPs' portfolios. Major outputs and outcome ones are described in **Box 2.1.3**.

**Box 2.1.3. Major outputs and outcomes of CoA1 (see Perf. Indicator Matrix – Table D for more)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Outcomes</th>
</tr>
</thead>
</table>
| 2017 | - a full framework conceptualizing the interactions between food systems and diet quality and their environmental, economic, social, cultural and policy drivers  
     - the portfolio of validated metrics and tools for assessing diet quality and characterizing food systems developed and use started in Ethiopia and Vietnam |
| 2019 | - Detailed analytical reports and publications will be produced on food system and diet quality linkages and dynamics, and foresight and scenario analysis for the four focus countries. —Bangladesh, Ethiopia, Nigeria, and Vietnam  
     - Portfolio of validated metrics and tools for assessing diet quality and characterizing food systems, applied in the four key countries and used by other CRPs |
| 2022 | - Evidence delivered on key leverage points for improving diets through food systems in all four key countries  
     - Partners and other CRPs incorporate nutrition, health and gender in value chain and food systems programs |

**CoA 2: Food System Innovations**

This CoA will identify concrete opportunities to improve diet quality and develop solutions in partnership with food systems stakeholders, referred to as “co-development,” and then analyze these innovations to study their dietary impacts. Innovations may occur in the public or private sector, and can involve specific nutritious agri-food value chains or broader elements of the food system. Such
innovations need a proof of concept to validate their technical, organizational, socioeconomic, and environmental feasibility, and to assess food-system actors’ incentives to implement them. Research in this CoA will be guided by the results generated in CoA 1: diagnosis and foresight, for the focus countries and augmented by targeted opportunities in additional countries. Activities will be structured around three main research questions (see Box 2.1.4).

**Box 2.1.4. Main research questions in CoA 2: Food System Innovations**

1. Which demand-side innovations stimulate consumers to choose foods that make them healthier (across all food groups or for specific nutritious food groups)?
2. What supply-side innovations will promote the affordability, availability and sustainability of nutritious foods (across all food groups or for specific nutritious food groups)?
3. How do these innovations influence the diet; e.g., what are the net nutritional impacts of specific innovations, and are there gender-related, income and/or environmental trade-offs?

These research questions will be answered through three sets of activities. The first focuses on identifying and assessing demand-side innovations. Without proper incentives, consumers will not necessarily purchase healthier foods, and even if they do, targeted individuals (women, children, youth, and the poor) may not consume them. Building on studies conducted or begun in Phase I, we will study ways to stimulate demand among food purchasers in households and among individuals within households. At a micro level, different methods of advertising, packaging, store placement, pricing, or behavior change communication (including public policy campaigns) can all potentially improve demand for readily available healthier foods. Methodologies used include lab-in-the-field experiments and randomized control trials designed in collaboration with implementing partners. This research will generate knowledge about how to stimulate demand for healthier foods.

The second set focuses on identifying and assessing supply-side innovations. Value chains—for one product or multiple products—are a major channel for interventions to improve diets. For example, we can safely assume that fruit and vegetable consumption is lower than optimal, and increasing seasonal and overall availability, affordability, convenience, and desirability of fruits and vegetables would improve diets (Siegel et al. 2014). We will address the relative lack of production of nutritious foods with implementing partners from the private and public sectors. Innovations may relate to inputs (seed or seedling quality, fertilizer use, credit), postharvest handling and management (storage, transport), or market outlet frameworks (daily delivery, contracts, preferred suppliers). In value chains combining several foods, innovations can help make nutritious foods more available and affordable relative to less nutritious foods. Such innovations may include improving fresh markets for food safety and availability, establishing nutritional profiling systems as a basis for regulatory and fiscal food system policies, or guiding food processors on maintaining nutrients during processing and/or limiting levels of fat, sugar and salt in processed foods. Such interventions will be assessed using tools developed by PIM’s FP on Inclusive and Efficient Value Chains, and during A4NH’s first phase.

The third set relates to evaluating the influence of these innovations on the diet. Outcomes of studied innovations will be assessed through base- and end-line dietary assessments, and analyzed in terms of their effectiveness, cost, and practical feasibility for addressing dietary gaps in targeted groups. Evaluations will be designed to learn about gendered and environmental impacts (biodiversity, water quality, soil fertility, land degradation, climate change), so innovations that would negatively affect either gender balance or the environment if scaled up would not be recommended. Assessment tools developed during Phase I of the CRPs on CCAFS, Water, Land, Soils, and Ecosystems (WLE), and A4NH and by CoA 3: scaling and anchoring, will be used to assess interventions.
The process ownership will be shared by food system stakeholders and researchers, so that all are involved in the development and evaluation of innovations. Early and full stakeholder engagement increases the likelihood that innovations are implemented and adopted by consumers. We will focus on working through public-private platforms (PPPs) in focus countries, to identify incentives that encourage positive shifts by the private sector. The goal is to build up contextual evidence to use in CoA 3: scaling and anchoring. For each of the research questions, research generated by individual activities will be synthesized into reports and policy briefs that discuss any generalizable lessons. Datasets generated as part of the research on specific innovations, will be made publically available. CoA 3: scaling and anchoring, offers a major area of joint research with AFS-CRPs.

Major outputs and outcome ones are described in **Box 2.1.5**.

### Box 2.1.5. Major outputs and outcomes of CoA2 (see Perf. Indicator Matrix – Table D for more)

<table>
<thead>
<tr>
<th>Year</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>Identification and co-design of at least two opportunities for food systems innovations with AFS-CRPs, local platforms, partners, and stakeholders in Ethiopia and Vietnam</td>
</tr>
<tr>
<td>2019</td>
<td>Identification and co-design of additional two opportunities for food systems innovations in Ethiopia and Vietnam and at least four opportunities in Nigeria and Bangladesh with AFS-CRPs, local platforms, partners, and stakeholders in the four countries</td>
</tr>
<tr>
<td></td>
<td>At least two food systems innovations tested and evaluated with local platforms, partners, and stakeholders in the four focal countries.</td>
</tr>
<tr>
<td>2022</td>
<td>At least four food systems innovations tested and evaluated with local platforms, partners, and stakeholders in the four focal countries.</td>
</tr>
<tr>
<td></td>
<td>Stakeholders (investor, civil society, policy makers) consider healthier diets in processes related to food systems</td>
</tr>
<tr>
<td></td>
<td>Small and medium agri-food enterprises implement increased value addition</td>
</tr>
</tbody>
</table>

**CoA 3: Upscaling and Anchoring Food System Transformation**

This cluster aims to identify and better understand drivers and innovations enabling food system transformation for healthier diets at scale, building on knowledge gains from system analysis in CoA1, and small-scale innovations studied in CoA2. Research will focus on influencing food systems' performances at two levels. First, actors in agri-food value chains will be supported in scaling up innovations for healthier foods and improving the nutritional quality and safety of already distributed foods. Second, research will focus on how public policy and investment decisions enable food system transformations for healthier diets at scale, building on the first CoA. This research will use PPPs to anchor innovations in the food system, where anchoring is a process of making multiple connections to increase the chance that sustainable change is realized (Elzen, van Mierlo, and Leeuwis 2012; Leeuwis et al., n.d.; Linn 2012).

Research into options for scaling up and anchoring food system transformation for healthier diets is based on the premise that policy processes vary by country and can be influenced by several national strategies, enabling conditions for private sector innovation. The research will (a) systematically assess country experiences in food system transformation strategies at different points in time and (b) draw on relevant examples from countries (like Brazil), which made significant progress in reducing hunger and undernutrition with a combination of agricultural productivity growth, social protection, and new dietary guidelines. Policies and strategies that will be explored include:
• Major agri-food system policies (such as smallholder or larger farm-based growth, value addition of food products, and spatial focus on growth corridors, rural towns, and remote areas) (Hartmann et al. 2013).
• How food chain policies (pricing/taxation, labeling, and reducing transaction costs) account for economic, health, and environmental trade-offs, including their implications for equity; and
• Mainstreaming healthier food in food systems, through dietary guidelines, nutrient profiling, food grades and standards, and regulation and taxation of unhealthy foods (Tara Garnett et al. 2015).

Particular attention is paid to the dynamic role of agri-food business networks (small and medium-sized enterprises (SMEs) enterprises, business incubators) and connections to scaling agents (supermarkets, agri-food processors, finance and banking, and trading/logistics firms). Within this broader food system analysis, four key research questions relevant for scaling and anchoring are formulated (see Box 2.1.6).

**Box 2.1.6. Main research questions in CoA 3: Scaling and Anchoring**

<table>
<thead>
<tr>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. In specific national contexts, what specific policies can enable food systems to sustainably shift toward healthier diets at scale?</td>
</tr>
<tr>
<td>2. What innovations at scale are successful at supporting food systems for healthier diets for specific target populations?</td>
</tr>
<tr>
<td>3. Can engaging consumers and civil society/advocacy groups effectively influence demand for healthier and more sustainable diets, and more sustainable food systems?</td>
</tr>
<tr>
<td>4. Will agri-food businesses include sustainability and health considerations in their decisions, and does this influence the accessibility and consumption of healthier food?</td>
</tr>
</tbody>
</table>

The research will have three linked sets of activities. The first set focuses on comparative learning, systematically assessing different scaling and anchoring options for food system transformation linked to changing dietary patterns within and across countries. The goal is to compare different pathways toward healthier and more sustainable diets in relation to varying market and institutional conditions. The second set involves participatory scenario analyses. Here we will analyze different scenarios of possible food system changes (generated in CoA 1: diagnosis and foresight) together with key societal partners, to identify effective informative arrangements and appropriate policy incentives for upscaling. This activity will collaborate with CCAFS CoA 1.2 to generate combined climate, food and nutrition scenarios at national and subnational levels, linked to global scenarios. Attention will be paid to both horizontal (cooperative) networks and vertical (supply) chains for innovations that enhance food quality (Ruben et al. 2007), improve reliable logistic conditions, and support PPPs for anchoring food system change (Hartwich et al. 2008). Third, identified options will be tested through concerted actions. The emphasis will be on aligning healthier food chain innovations with consumer choice, which requires an understanding of the role of diet information, sector-wide standards, commodity labels, and certification in food system transformation.

Main research approaches will include comparative case studies, participatory scenario analysis, robust impact assessment and interactive adaptive system methods. Consumer response surveys, non-experimental approaches, and experiment-based methods may be used to assess broader feasibility of food system innovations (Kiesel, McCluskey, and Villas-Boas 2011). Major outputs and outcome are described in Box 2.1.7.
Box 2.1.7. Major outputs and outcomes of CoA3 (see Perf. Indicator Matrix-Table D for more)

<table>
<thead>
<tr>
<th>Year</th>
<th>Outputs and Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>• Systematic assessments of scaling up and anchoring options for food systems transformation with a diet perspective in Ethiopia and Vietnam</td>
</tr>
</tbody>
</table>
| 2019 | • Participatory analysis, and foresight and scenario analysis Ethiopia and Vietnam  
      • Systematic assessments of scaling up and anchoring options for food systems transformation with a diet perspective in Bangladesh and Nigeria  
      • Active policy engagement in the focus countries |
| 2022 | • Dissemination activities among key decision makers in the four countries and among larger networks  
      • Partners implement A4NH strategies for value chain/food system innovation at scale |

PARTNERSHIPS

To address the challenges of convening and integrating diverse partners in a food systems and diet transition research program, A4NH will launch a partnership with Wageningen UR as leader of this FP. Wageningen UR currently partners with most CGIAR Centers and AFS-CRPs and has a portfolio of food system projects (total contracted value of 15M€). It provides broad expertise across all food system analysis elements and longstanding experience in linking technical, behavioral and policy analysis beyond what currently exists within CGIAR. It also adds considerable experience with (inter)national PPPs.

Research will be carried out with a wide range of research institutes, including:
- Within A4NH, FP4: SPEAR, related to CoA3, to develop methods for cross-country and multi-level analysis of drivers of food system changes. Similar collaborations are planned for FP2: Biofortification and FP3: Food Safety.
- Other AFS-CRPs and CGIAR Centers (e.g. WorldFish, World Agroforestry Centre (ICRAF), International Maize and Wheat Improvement Center (CIMMYT), International Potato Center (CIP), International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)) to jointly identify key leverage points in specific agri-food value chains, and to compliment ongoing AFS-CRP research.
- Other ICRPs: for economic, environmental, and policy perspectives with PIM’s FP on Inclusive and Efficient Value Chains (e.g. trade and subsidies; value chain hubs). For natural resource and climate change research with the sustainability and resilience of food systems under WLE’s FP on Rural-Urban Linkages, and with CCAFS.
- Universities and (public health) research institutes to align research on, for example, dietary assessments (e.g., Tufts University INDEXX project with IFPRI and FAO) and on the health consequences of dietary change (e.g. Tufts, Harvard).

As agri-food chains actors, especially private companies, play a large role in food systems, operational research on the types of PPPs that can best lead to healthier diets will occur through existing PPPs (e.g. Amsterdam Initiative for Malnutrition (AIM), the GAIN Marketplace for Nutritious Foods, COLEACP, The Sustainability Consortium (TSC), the Pulse Innovation Partnership led by McGill University) and through collaboration with private companies, such as Nutreco, Unilever, DSM and FrieslandCampina. Collaboration will be sought with SMEs in the key countries in developing healthier food products and portfolios. Opportunities for consumer labels will be worked out with, for example, Choices International Foundation, Fair Trade, and Eco.

Co-development and testing of food system interventions and innovations will be done with national partners, especially in the focus countries (see initial consultation in Ethiopia). Examples of local
partners are the Ethiopian Public Health Institute, University of Ibadan (Nigeria), ICDDR,B and BIDS (Bangladesh), and National Institute of Nutrition and Can Tho University (Vietnam). In focus countries, we will work closely with local agriculture, public health, and policy agents to identify appropriate incentives and regulatory responses. We will cooperate with the Scaling Up Nutrition (SUN) national multi-stakeholder platforms to support national leadership for pursuing nutrition-specific interventions and promoting good nutritional practices and enhancing nutrition-supportive policies and regulations.

For increased uptake at the global level, we will engage with the United Nations system (e.g., WFP), IFAD, the global SUN Movement, the Milano Urban Food Policy Pact, and the EAT initiative and will complement FP4: SPEAR working with SUN on monitoring and evaluation of public programs and country performance for the SDGs/WHA targets. This FP will cooperate more with the GAIN coordinated SUN Business Alliance.

CLIMATE CHANGE
Climate change is an important factor in research proposed in this FP. Concerning CoA1, climate change is a key potential driver of food systems transformations and will affect productivity, quality, availability, stability, and affordability of food for many agricultural products. This will influence how value chain and other food system actors will respond and interact. Climate change will also affect priorities related to agricultural investments and therefore directly to the food system through the 'policy' impact pathway. Diagnostic tools and forecasting models for food system dynamics and their trade-offs will be developed in close collaboration with the CCAFS FP on Priorities and policies for climate-smart agriculture, to assess likely scenarios for climate change that apply to different settings, ensuring proper integration of climate change into our diet and food systems analyses, as well as ensuring diet and food system scenarios are included in climate change analysis (see Annex 3.6).

In CoA2, climate change is key when selecting pilot food system innovations to test. Some nutrient dense foods are resource intensive, so resource use must be considered in planning interventions that may lead to increased consumption of such foods. Specifically, ASF are both land- and water-intensive, and fruits and vegetables are typically water-intensive. Our proposed innovations to promote production and consumption of these foods will consider climate-smart varieties and animal breeds, and nutrient dense crops that may be more adapted to heat, drought tolerance, and other climate effects. We will work with agri-food value chains actors to develop and test innovations for post-harvest handling and storage, for example on cold chain technology. CoA3, will scale up interventions deemed successful in the second CoA, to ensure tradeoffs related to climate change are well understood.

GENDER
Gender issues are of critical importance throughout this FP. Access to nutrition, food choices and dietary outcomes (CoA 1: diagnosis and foresight) are strongly influenced by gender bargaining power at intra-household and community level. We will register gender-associated trends in nutrients and energy intake for gender dietary profiles to enable gender-specific analysis of food choices. Similarly, gender engagement into commercialization (CoA 2: food system innovations) is frequently accompanied by exclusionary practices, and benefits from agri-food value chains innovations do not automatically accrue to women and children. Consequently, gender equity requires a precise tracing of revenue streams and targeting of welfare effects throughout the agri-food value chains. Due attention is also given to implications for gender-based differences in labor use associated with particular food system innovations. Fostering women’s participation in food systems co-innovation partnerships will require gender-specific strategies to ensure gendered control over assets, including technology and women’s employment. This also holds for the upscaling strategies (CoA 3: scaling and anchoring) that are based
on steering consumer choice towards healthier diets and tend to rely strongly on gender-based food selection decision-making frameworks. Similarly, preferences and response reactions will reflect gender-related differences that should be acknowledged to enable gender equity at scale. Priority will be given to ensure both women and men benefit from healthy food systems, especially as consumers and food chain actors, while avoiding unintended negative consequences, such as harm to women’s time in child care, food processing, storage, and to work burden, control over income and resources, and health status. Where appropriate, we will suggest ways gender roles can be modified to improve food systems outcomes.

CAPACITY DEVELOPMENT
For the design and implementation of the capacity strengthening activities (e.g. for producers, chain agents, consumers, and policymakers), the elements identified by the CGIAR CoP on capacity strengthening will be used (CRP Section 1.10 and Annex 3.2). Key to our strategy is co-learning across CGIAR, Wageningen UR, and national partners, encompassing two interrelated components: joint learning and formal training. Joint learning will occur through co-development and testing of food system innovations with national partners and in collaborative and cross-country research with AFS-CRPs and GI-CRPs. Specific gaps at national partner level will be assessed in collaboration with the CGIAR CapDevCoP and then addressed with individual, formal learning through short-term training courses (e.g. at Centre for Development Innovation at Wageningen UR (CDI), and long-term PhD programs at Wageningen UR and/or other universities). This dual strategy will help develop individual and institutional food system champions, building capacity of partners in the analysis of diet and food systems change data, and building capacities amongst public and private agents to design, implement, and assess interventions and approaches. The Wageningen UR sandwich PhD program suits this process well, as it allows joint supervision between Wageningen UR and CGIAR staff, and includes a 2.5 year research period at the partner institute, ensuring joint learning and embedding in the partner countries. Joint learning activities will also build capacity among policymakers and actors in the policy process to support the willingness and ability to use evidence in policymaking and implementation, including commitment to collecting and analyzing diet-related data to inform policy decisions and monitor progress towards outcomes. The free public access to learning materials by the partner institutions increases the multiplier effects in capacity development.

INTELLECTUAL ASSETS AND OPEN ACCESS MANAGEMENT
Intellectual assets will be designed based on CGIAR open access and open data principles. In Phase II, researchers from this FP will contribute a number of intellectual assets, such as decisionmaking tools, new databases, evidence of cost effectiveness, and impact evaluation analysis. CGIAR researchers associated with this FP will make their data available to other researchers through their Center-specified platform, such as the IFPRI Dataverse platform. Publications related to evidence and analysis will also be made open access in following the CGIAR open access policy. Wageningen UR in all its activities will obey the Netherlands Code of Conduct for Academic Practice governing the correct exercise of duties for staff members at institutions that fulfil a societal role, developed by the Association of Universities in the Netherlands. Data are deposited into the Data Archiving and Network Services (DANS) of the Netherlands Organisation for Scientific Research (NWO). More details on the A4NH management of both open access and open data and intellectual assets can be found in Annexes 3.8 and 3.9, respectively.

FP MANAGEMENT
Project management will be based on activity-based budgeting like EU programs, see Figure 2.1.5) and programmatic management identified at three levels: FP, CoA, and focus country.
Wageningen UR will be the **overall FP leader** and will employ an experienced FP leader responsible for scientific leadership, coordination, and management (to be recruited, see ToR for the position in Annex 3.7). Together with **finance/admin support** provided by LEI-DLO, the FP leader will constitute the **Daily Management Team (DMT)**. The FPMT will cooperate with the Amsterdam Initiative against Malnutrition (AIM/GAIN) for involving private sector partners in food system co-innovations.

For each **CoA**, joint leadership will be established with representatives of two institutes, for example CoA 1: diagnosis and foresight (Wageningen UR/Bioversity International), CoA 2: food system innovations (IFPRI/AIM (GAIN)), and CoA 3: scaling and anchoring (Wageningen UR/International Center for Tropical Agriculture (CIAT)), guaranteeing research coherence, policy relevance, and cross country learning.

For each focus country, one partner is assigned as the responsible **Country Team Leader**, for example Ethiopia (Bioversity International/ILRI); Nigeria (International Institute for Tropical Agriculture (IITA)); Bangladesh (IFPRI); Vietnam (CIAT), responsible for embedding the research in respective countries.

Chaired by the FP leader, the **FP management team (FPMT)** is comprised of one representative of each CoA and Country Team, and of key institutions involved (CGIAR Centers, Wageningen UR, GAIN/AIM, other business partners) and will meet at least once annually to review overall progress. The FPMT will be responsible for major strategic decisions and for determining long term FP strategy and direction (steering). This FP will convene regular food systems events within the framework of the Agriculture, Nutrition and Health (ANH) Academy linked to the CoP.

**Figure 2.1.5. Organization of clusters and set of activities**
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