CGIAR Advisory Services

CGIAR Research Program 2020 Reviews: Agriculture for Nutrition and Health (A4NH)- List of Annexes

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Annex 1: Terms of Reference for the CRP 2020 Review

TERMS OF REFERENCE & CALL FOR EXPRESSIONS OF INTEREST

CRP 2020 Independent Reviews of Quality of Science and Effectiveness

Background

In 2020, the CGIAR Advisory Services Shared Secretariat (CAS Secretariat[1]), through its evaluation function, is planning independent reviews of the twelve CGIAR research programs (CRPs[2]). The reviews, commissioned by the CGIAR System, will provide information on Quality of Science and Effectiveness in each CRP. The CAS Secretariat has been mandated to undertake this work as part of its role in providing independent evaluation and assessments to the CGIAR System[3]. The reviews are designed to be rapid (completed within 11 weeks) and produce top-level findings, but not to generate the range of in-depth information as would be obtained from an evaluation. Further, the reviews are entirely desk-based, and no travel is planned.

Between April and December 2020, teams of two external expert consultants will each review one CRP, relying on its documentation and a limited number of virtual (telephone or online) interviews with the CRP Program Leader, staff and key external stakeholders. An internet-based survey will also be conducted for CGIAR researchers and CRP donors and partners. Bibliometric analysis conducted by the CAS Secretariat will supplement the information available to the expert reviewers.

The CRPs were designed to run for six years, from 2017 to 2022, but have been curtailed by one year and are now scheduled to conclude in 2021. Each CRP is composed of 3 to 5 Flagship Programs (see Annex 1), which in turn operate clusters of activities for research. The CRP reviews will rely on data and information available for the period 2017-2019, and will inform future research modalities to be developed in 2021.

A key document for the CRP review is the program Theory of Change, which in many cases may be the version developed in the CRP proposal or its updates. In some programs the Theory of Change may be implicit or not completely documented. The external experts who will conduct the reviews will rely on additional sources (annual planning documents or interviews) to understand the Theory of Change in use by the CRP, which will be the basis against which the program will be reviewed. The Flagship Programs within the CRP each have their own Theories of Change, which are nested under the CRP Theory of Change. Together, the hierarchy of the CRP and Flagship Theories of Change form the key reference documents for the CRP 2020 Review.

As a desk-based review, this effort will attempt to minimize the burden on CRPs. In advance of the reviews, CRPs will prepare the set of reference documents for the review. At the start of each review, the CAS Secretariat will organize an initial briefing involving the team of expert reviewers and the respective CRP Lead and staff .During the data collection phase, the review team will conduct an interview with the CRP Leader and a focus group discussion (FGD) with other members of the CRP management. The review team will provide a debrief discussing the preliminary findings with the CRP management and the CAS Secretariat, for validation and feedback. The draft report will be shared with the CRP Leader and staff for factual correction and final feedback. CRPs may choose to provide a formal management response to the review, though this is not a requirement.

[1] See Annex 4 for a list of acronyms used in this Terms of Reference
[2] See Annex 1 for a list of the twelve CRPs and their associated Flagship Programs.
[3] The CAS Secretariat/Evaluation 2021 workplan will propose a similar review or evaluation of the CGIAR Platforms, creating a harmonized Terms of Reference that has been adjusted to Platform's characteristics and function. The Platforms are considered separately from CRPs in order to address aspects of their work that differ substantially from the CRPs.

In July 2020, the CAS Secretariat also will conduct an after-action review with the Program Leader and staff from the first three CRPs reviewed, to ensure that the approaches used to pursue the review questions are as streamlined and appropriate as feasible.

Purpose of the review

The primary purpose of the CRP 2020 review is to assess the extent to which CGIAR research programs are delivering Quality of Science and demonstrating effectiveness in relation to their own Theories of Change (or other planning documents stemming from the Theory of Change set forth at program inception, in the event that the original Theory of Change has not been updated to reflect the current thinking behind the CRP's work). Within that primary purpose, the objectives of the independent CRP reviews are captioned below:

1. To fulfil CGIAR's obligations around accountability regarding the use of public funds and donor support for international agricultural research;
2. To assess the effectiveness and evolution of research programs' work under CRP 2017-2021;
3. To provide an opportunity for programs under review to generate insights about their research contexts and programs of work, including lessons for future CGIAR research modalities.

Expected uses and users of the CRP 2020 reviews

The CRP 2020 reviews are a key step in the CGIAR System's demonstration of accountability. Accordingly, the primary users of the reviews will be the CGIAR System Council, with insights and lessons developed from the reviews for use by the programs themselves.

Recognizing the potential of these reviews to support Program Leaders and their teams, the CAS Secretariat will engage the expert review team to work with each Program Leader in defining any supplementary questions of specific interest to their CRP, which will be included in the scope of work for the respective CRP review, subject to the limitations of time and resources for the review. Interested consultants should keep in mind that the final scope of work follows the structure and process laid out in this Terms of Reference and for some CRPs may include 1-2 well-defined additional question(s) from the CRP under review.

Further, the CRP reviews may provide lessons that inform the transition to One CGIAR in 2022, based on the program-level findings and a synthesis of system-level findings in 2021; to that extent, the reviews will be a future reference for system management in the change process.

In the final report, the expert review teams are expected to identify findings, conclusions and recommendations that apply to CRPs for use in refining the 2021 Plans of Work and Budget (POWB) to the extent feasible in the remaining program year, and lessons to inform future research modalities.

Scope of the CRP 2020 review

The CRP reviews will cover 12 CGIAR research programs from the proposal acceptance date in 2017 through 2019, making use of all the reporting and monitoring information available to date. The first three reviews will rely on the CRP's 2019 draft annual reports, prior to their vetting and quality assurance by the CGIAR System Management Office, and the other nine reviews will use the finalized CRP annual reports. The scope will include the program of work of each CRP and its Flagship Programs, with the reviews guided by the CGIAR's Quality of Science and Effectiveness criteria, and the Theories of Change for the CRP and its Flagship Programs. The reviews will not assess individuals, teams, or institutes in which programs reside. Emphasis will be on the CRP's Sphere of Control, that is, the quality of inputs, activities and outputs, and Influence, that is, short and intermediate outcomes that are expected to lead to a development impact.

The CGIAR System defines outcome-level changes as Intermediate Development Outcomes (IDO) and System Level Outcomes (SLO), as described in detail on the CGIAR website[4]. The CRP 2020 Reviews will focus on the IDOs, including sub-IDOs, given the short span of time (three years) for the current phase

4 https://cas.cgiar.org/sites/default/files/ISPC_WhitePaper_SLOsIPs.pdf

of CRPs. Expectations of documented outcomes will be informed by (a) the amount of time the research has been conducted under the CGIAR and its centers, including research prior to the CRP in the case of legacy programs, and (b) whether the CRP's targeted first users of research outputs are within the research community or closer to market adoption. It is not expected that all planned outcomes will have been achieved by the CRPs at the time of its review, because the present reviews are to be conducted after three years of operation on five-year research programs (originally planned for six years). Where data on impacts have been reported in an Outcome and Impact Case study Report (OICR) these will be included in the review. To the extent feasible, the review of CRP effectiveness should assess the likelihood for achieving IDOs and/or sub-IDOs, based on the CRP's and its Flagship Program's documented performance in relation to their Theories of Change.

Review Criteria

The CRP 2020 Review will be based on two of the six CGIAR evaluation criteria as defined in the CGIAR Evaluation Policy[5], which comprise relevance, quality of science, efficiency, effectiveness, impact, and sustainability. Because the CAS Secretariat/Evaluation Function has been directed to execute the external reviews in a compressed timeframe, the two criteria for assessing the CRPs that have been agreed with the System Council committee that is concerned with evaluation are Quality of Science and Effectiveness.

Quality of Science in the CGIAR is defined as the ways by which research is designed, conducted, documented and managed, in terms of the processes, inputs and outputs. The CGIAR's definition of Effectiveness aligns with that of OECD-DAC and other international bodies as the extent to which objectives have been achieved. An element of effectiveness present in the definition of impact is "a chain of events to which research outputs and related activities have contributed that are likely to contribute to impacts."[6] The application of these criteria in the CRP 2020 Review is further elaborated, below.

Review of Quality of Science

The CRP 2020 Review will examine quality of science and looks both at the conditions that are in place for assuring high quality of science, and the conduct and outputs of research. A systematic and consistent review of science quality across research programs and program components has three dimensions:

- Processes for assuring and enhancing science quality (staff recruitment, performance management and incentives; review processes used; codes of conduct; monitoring, evaluation and oversight for enhancing science quality);
- Inputs (quality of staff and research leaders, facilities and equipment, data management, research design);
- Outputs (volume and quality of publications, genetic materials, etc.).

The above dimensions are captured and elaborated in the review questions, below.

Review of Effectiveness

Assessing effectiveness of a CRP includes documenting the achievement of outputs and outcomes based on program reports and interviews and surveys of people involved or in a position to observe these. Outcomes or impacts will be included when those have been reported in an OICR. The CGIAR reporting definitions of these terms, and a modification made in the definition of outcome for these reviews, are as follows:

- *Outputs:* Knowledge, technical or institutional advancement produced by CGIAR research, engagement and/or capacity development activities. Examples of outputs include new research methods, policy analyses, gene maps, new crop varieties and breeds, institutional innovations or other products of research work.
- *Outcome:* A change in knowledge, skills, attitudes and/or relationships, manifested as a change in behavior, to which research outputs and related activities have contributed.

5 https://cgspace.cgiar.org/handle/10947/2762
6 https://marlo.cgiar.org/glossary.do

For the CRP 2020 reviews, the definition of outcome will be expanded to include innovations[7] that have entered into use. CGIAR defines innovation as follows: "development innovations are new or significantly improved (adaptive) outputs or groups of outputs - including management practices, knowledge or technologies. This could also refer to a significant research finding, method or tool. A significant improvement is one that allows the management practice, knowledge or technology to serve a new purpose or a new class of users to employ it … ."[8]

- *Impact:* A change in state resulting from a chain of events to which research outputs and related activities have contributed. Some examples: crop yield, farm productivity, household wealth (state) income (flow), quality of water (state), water flow (flow).

The CRP 2020 Reviews will assess CRP effectiveness from two perspectives. The first will compare planned versus completed outputs and outcomes as provided by the programs in annual Plans of Work and Budget and Annual Reports for 2017, 2018 and 2019. The second perspective is to assess reported achievements against the CRP's and its Flagship Programs' Theories of Change, which articulates the pathways from outputs to a sequence of outcomes and impact, to be tested in the course of program implementation. As noted earlier, the CRP's Theory of Change is either the original version from its proposal with any updated documentation or, if that Theory of Change has not been followed, an implicit theory in the CRPs annual work plans (POWB). The Flagship Programs' theories of change supplement the CRP Theory of Change as additional reference documentation.

The likelihood of future progress is a further aspect of effectiveness to be examined in the 2020 reviews**.** Whether or not there is a pipeline of innovations, which are reported by stage such as "ready for take up" and policies influenced by sphere of influence, will be determined. Reports of capacities developed, environment enabled, and key partnerships in place for development will also be considered as will opinions of research managers and key partners. Another important factor in future effectiveness, and a common question asked in CGIAR external evaluations, is about the management and governance that is in place in the CRP. Evidence gathered will include presence of a learning environment, addressed and unaddressed challenges to success, and integration across other CRPs' work.

Questions for the CRP 2020 Review

Cross Referencing to the CGIAR Quality of Research for Development Frame of Reference

The CRP 2020 review will cross-reference and map Effectiveness and Quality of Science to the CGIAR's broader Quality of Research for Development (QoR4D) frame of reference. The QoR4D frame of reference encompasses all review criteria and indicators, albeit organized in a different fashion and with a stronger emphasis on how each CRP positions its research and outputs for development outcomes and impact. In deploying two out of six of the evaluation criteria (i.e., as defined in CGIAR's 2012 Evaluation Policy and its accompanying Guidelines), while also bridging with the QoR4D frame of reference adopted by CGIAR in 2017, the review will overtly map the query areas and indicators to the QoR4D frame of reference so that the CRP 2020 Reviews speak to the QoR4D frame of reference. For more information, refer to the QoR4D brief on the CGIAR website: https://cas.cgiar.org/isdc/publications/quality-research-development-cgiar-context

To guide the planning and implementation by the expert review teams contracted to complete the CRP 2020 Reviews, questions for the review have been provided below. These questions were developed based on the definitions of the two review criteria (Quality of Science and Effectiveness), existing self-reported program data and internally funded studies by external experts. This set of review questions will be applied in each CRP review. As noted earlier, the CAS Secretariat will arrange for an initial briefing between the expert review team and the CRP under review, which will include a discussion to define 1-2 supplementary questions of interest to the CRP itself, if any.

[7] CGIAR glossary (https://marlo.cgiar.org/glossary.do) defines an innovation as an output while most research evaluation defines an innovation as a new or improved technology, product, process, or business model that has been put into use (OECD/Eurostat 2005).
[8] https://marlo.cgiar.org/glossary.do

Quality of Science

1. To what extent does the CRP deliver Quality of Science, based on its work from 2017 through 2019?

1.1. To what extent does the CRP benefit from sufficient high-quality inputs (with reference to the research environment and project designs)?

The review should look at productivity and engagement of scientists; diversity of teams and partnerships, in relation to planned outcomes; quality of facilities, equipment and other tools for research; and the level and predictability of CRP funding during the review period.

1.2. To what extent do the CRP management processes ensure the quality of science, including credibility, legitimacy, relevance to next stage users, and potential effectiveness, of the research and operations?

The review will consider the CRP's periodic re-assessment of the demand and quality of research; the research work environment as enabling QoR4D; research ethics, transparency and procedures for conflict of interest; and use of learning mechanisms to inform current and future research, for ultimate users of the research.

1.3. In what ways are the research outputs, such as germplasm, knowledge tools and publications, of high quality?

The review will assess external recognition of CRP outputs as high quality; collaboration for innovation with next stage users and/or beneficiaries; value of outputs in developing capacities for researchers, next stage users and partners.

Effectiveness

2. What outputs and outcomes have been achieved and what is the importance of those identified results?

2.1. To what extent have planned outputs and outcomes been achieved by 2019?

The review should examine the CRP's own targets and deliverables (outputs, milestones, and outcomes) as listed in the program's Plan of Work and Budget (POWB) and annual reports or in the OICRs; as well as contributions to cross-cutting issues, and integrated work with other CRPs.

2.2. What is the importance of achieved outcomes, with reference to CGIAR intermediate development outcomes (IDOs) and sub-IDOs, cross-cutting issues (Capacity Development, Climate Change, Gender and Youth), and partners' objectives, with consideration for predictability of funding and legacy time frame for the CRP?

The review will focus on IDOs and sub-IDOs and other unanticipated outcomes reported by the CRP, whether positive or negative; the program's engagement with cross-cutting issues, namely gender, capacity development, innovation and partnerships; the program's age and maturation (with research in some cases preceding the current CRP cycle) and the context of its work; and achievements in relation to partners' expressed needs.

2.3. How have the program's management and governance supported the CRP's effectiveness in research?

The review will consider changes and adaptations in the program's activities, objectives, and strategy based on lessons learned; unaddressed changes in context or other challenges; and risk management planning and mitigations by the CRP.

2.4. To what extent has the CRP and its Flagship Programs made progress along their Theories of Change?

The review will assess how the program has used its TOC, if at all, or developed an alternative program logic; progressed along the defined impact pathways; and adapted its TOC (explicit or implicit) based on learning and evidence.

Future orientation

3. To what extent is the CRP positioned to be effective in the future, seen from the perspectives of scientists and of the end users of agricultural research (such as policy-makers, practitioners or market actors)?

3.1. What programmatic evidence exists for future effectiveness within the life of the program (through 2021), considering the comparative advantages of the CRP and its Flagship Programs and drawing on the CRP's and its Flagship Programs' progression according to their Theories of Change?

The review will assess the readiness for adoption of the program's deliverables at the IDO and sub-IDO levels; and changes in the program's enabling environment, capacities and partnerships that prepare its research outputs for successful use by next users and beneficiaries.

As noted, 1-2 supplemental questions may be developed by the expert review team and senior scientists and leadership from the CRP under review, with guidance from the CAS Secretariat. These limited questions will align within the three primary review questions as shown above, and will not constitute additional, stand-alone review questions.

Methods and data sources

The reviews will rely extensively on CRP documentation and interviews with Program Leaders and external groups including research partners, national policy-makers and donors, and FGDs with CRP staff. Additionally, bibliometric analysis of CRP research products (publications) will be conducted by the CAS Secretariat and provided to the expert review team. The primary sources of data and information for the reviews comprise the following:

*Documents from the CRP***:** These include CRP proposals (2016-2018) including the CRP's Theory of Change as well as any documented updates or revisions, the CRP's Flagship Program Theories of Change, program independent steering committee reviews, CRP Plans of Work and Budget (POWB), Annual Reports for 2017 through 2019 (the 2019 annual report will be drafted by April and finalized by July 2020), the internal program MARLO data system or the Measurement, Evaluation and Learning Platform of the CGIAR MEL organization, the most recent CRP independent, external evaluation report (for CRPs that had such an evaluation), impact studies from the past five years (for CRPs that have had such a study) and other relevant program documents.

CGIAR Results Dashboard: The results dashboard is an online portal that summarizes each CRP's reported results, including innovations, capacity development, policies and partnerships, as a quantitative supplement to the CRP annual report.

CGIAR database of Output Impact Case Reports (OICRs): OICRs are short reports describing and documenting the contribution of CGIAR research to development outcomes and impact, searchable by geographic location, level of maturity along the impact pathway, or by their contribution to CGIAR's IDOs. The benefit of the OICR analyses is its critical review of the development effectiveness of the CRP's work, in generating lessons learned based on concrete cases, for the design of future research arrangements.

Interviews with CRP Leaders, donors and partners, including CRP Program Directors and levels of management above them. Their wide perspective will be particularly helpful for key accomplishments now and projected for the future and challenges faced. The expert review team will conduct these short (approximately one hour) interviews by phone or video conference call.

Focus group discussion (FGD) with CRP management, to assess aspects of quality of science and the research environment, and to obtain broader views on management and governance. The expert review team will conduct FGDs through a virtual (webinar with video) setting.

External Expert Studies: Any outcome and impact assessment studies conducted or commissioned by the CRP itself, as well as external assessments on other subjects including those that cross-cut programs, are also available.

The CAS Secretariat will conduct pre-analysis on the datasets captioned below, and provide the outputs to the review team for inclusion in the analysis of the CRP. The review team does not need to access these data sources directly. These include data and information from the sources below.

Bibliometric and Altmetric and Other Studies of CRP Publications and Other Outputs: These studies are done mostly by CRP or CGIAR staff. Sources of information about outputs such as datasets, innovations, contributions to policy-making and decision support tools include literature and website reviews.

Survey of Researchers in CGIAR and research partners. To avoid researchers receiving multiple surveys, a master list will be compiled of researchers and the programs/flagships each is involved with. Individual

programs could add a few program-specific questions to the general battery of general interest questions such as opinions of the research environment.

Survey of Partners, defined as a relationship with CGIAR with specific objectives (fund, joint planning or implementation). To avoid partners receiving multiple surveys, a master list will be compiled of partners and the programs/flagships each is involved with. Individual programs could add a few program-specific questions to the battery of general interest questions such as satisfaction with joint efforts with CGIAR.

Overview of Methods and Analysis

These reviews will use mixed methods, quantitative and qualitative, so that analysts can triangulate perspectives, both internal (CRP) and external (partners, next users, etc.) in analysis. When assessing a CRP's quality of science, the expert review team will derive findings from existing CRP documents, bibliometric analysis and reports of any external expert reviews, and from primary data collection from questions on surveys of researchers and partners, interviews with CRP leader (also Principal Investigator) and external stakeholders, and focus group discussions with others in the CRP management.

Publication data collection, bibliometric and Altmetric analyses, and a set of analyses of CRP results are done internally by the CAS Secretariat and CRPs. Analysis of the quantity and quality of research outputs, the number of publications in peer-reviewed journals and other outlets, and the citation of those publications by other scientists will be provided to the expert review team for triangulation of findings.

Three general methods will be utilized in assessing programs on both effectiveness and quality of science: content analysis, descriptive and statistical analysis, and synthesis of existing external evaluations. More information on each of these follows.

- Content Analysis. Quantitative and narrative descriptions of achievements and programmatic actions are found in the CRP documents for the review, particularly the proposal, annual plans, annual reports and selected OICRs. Content analysis of individual reports and cross-report analysis can summarize findings for many of the review questions, including production and utilization of non-publication outputs such as datasets and training events. This could include preliminary analysis of trends observed, given the low number of available data points in the period under review.
- Surveys and Interviews with Statistical and Content Analysis. Representative samples of both researchers and partners will be developed for surveys. Interviews will be done with the CRP manager and selected partners, and an FGD will be conducted with the CRP management and staff. Qualitative analysis will be done on open-ended questions. As with any survey, statistical analysis will be completed with survey responses where that is feasible.
- Synthesis. The content of existing external studies will be aligned with stated objectives of the program and findings in these studies summarized. In a few cases, the studies themselves provide a synthesis across studies to draw more general conclusions.

Methods for documenting the CRP's effectiveness and responses to challenges rely on examining the Theories of Change or alternative program logic at the program and flagship levels in relation to the CRP's reported results from monitoring data (reported on CGIAR's MARLO and/or MEL platforms) and outcome/impact case reports (i.e., OICRs).

- *Comparison of achieved results versus proposed objectives/milestones*. Because each CRP uses annual work plans (POWB) and produces annual reports, it will be relatively straightforward to compare planned outputs against reported completed deliverables (some CRPs may also use milestones, along with or instead of deliverables). The reports also record when deliverable deadlines slip, with explanations for that lack of expected progress. Tagging innovations by stages will also help with year to year comparisons.
- *Comparison of operational or proposed theories of change with reported achievements:* As programs are not asked to report progress along their specific theories of change, the expert review teams will map reported achievements against the expected sequence of achievements along the elements of the CRP and Flagship theories of change (or alternative program logic models). With that, the review team will be able describe what and where progress has been made toward reaching stated objectives and link these to learnings about the theory to change and influencing factors. The benefit of this approach is that it describes the program progress toward objectives more clearly than counts or lists of deliverables, providing a better understanding of (a)

the plausibility of cause-effect linkages within the program logic and (b) the contribution of the CRP to development outcomes.

- *In-depth analysis of selected outcomes and impacts*. The expert review team will select one or two Outcome and Impact Case Reports (OICRs) for each CRP, in consultation with CRP leadership. The review will analyse the selected OICR(s) in greater depth, looking at the contribution of the CRP's research in successfully addressing a given development objective, mapping the reported outcome or impact within the Theory of Change at the Programme and Flagship level. This work will be done through analysis of documents from the CRP and from next users of the research, such as national government policies, and interviews with key informants (both within the CRP and equally importantly the next users of the research, e.g., external stakeholders in NARS and national policy-makers) who may assist in better understanding the nature and importance of the CRP's contribution, as reported in the OICR. A specific reporting template for the OICRs analysis will be provided to the review team.
- *Contextual analysis*. For many reasons related to context within the program or the context of those who would move the research forward to development and scale up, research for development projects and programs may progress at a different pace. At a minimum, context of a program will be characterized by the age of the program including all earlier phases of similar research, total amount of budget, quality of funding, and the CRP's typology as a Global Integrating Program or Agri-food System Program.
- *Analysis of management and governance*. There are several sections in the Annual Reports in which CRPs report aspects related to learning lessons as the research evolved and challenges that arose and how those were handled. The annual POWB discusses changes, if any, in the theories of change. The review team will supplement these sources with responses from surveys, interviews and focus group discussions. The analysis will triangulate information from these sources to identify how the CRP has managed and governed its research program in the context of the challenges faced over the period of review.

Deliverables and consultation for the CRP Review

The review team is expected to produce the following deliverables:

1. A preliminary findings matrix, for discussion midway through the review process, to check the progress of the review and to provide a basis for early course correction if required. The CAS Secretariat will provide the review team with a template for the preliminary findings matrix.
2. A brief presentation of preliminary findings, for the debrief with the CRP management and the CAS Secretariat for validation, factual corrections, and feedback.
3. A draft report of the CRP review, for review by the CRP management and the CAS Secretariat for final feedback. The CAS Secretariat will provide a template for the draft and final reports.
4. A final report of the CRP review, following the report template with a maximum of 20 pages, a 2-3 page executive summary, and a set of annexes with additional information apart from the main body of the report.
5. A PowerPoint presentation covering the main points of the review, including purpose, methods, findings, conclusions, recommendations and additional notes relevant to the review. The CAS Secretariat will provide a template for this presentation.

Templates for the preliminary findings matrix, draft and final report, and the presentations will be provided to the review team in the first week of the review.

The review team will engage with the CAS Secretariat and the CRP under review at the following key points:

- Initial discussion with the CAS Secretariat to start the review and clarify questions from the review team;
- Briefing at the start of the review between the review team and CRP management, facilitated by the CAS Secretariat;
- Interview with the CRP Leader and a focus group discussion (FGD) with other members of the CRP management during data collection;

- Debrief presentation of the preliminary findings led by the review team, for validation, clarifications and feedback by the CRP management and the CAS Secretariat;
- The draft report will be shared with the CRP Leader and staff for factual correction and final feedback.

Additional discussions between the review team, the CRP management and the CAS Secretariat may be scheduled based as needed during the course of the review.

Schedule of the reviews

The reviews will be conducted in a phased, stepwise manner, so as to enable due support from CAS Secretariat throughout the review process. The first three reviews will take place between April and June 2020. Thereafter, in late June, CAS Secretariat will conduct an 'after-action review' involving the Program Leaders from the first three CRPs reviewed, for fine-tuning of the review process in enhancing learning and minimizing the burden on CRPs. While refinements to the review process may be made, the fundamental review parameters will remain harmonized for all CRP reviews through the year. Substantive changes on questions and sub-questions are not foreseen from the after-action review. The subsequent nine CRP reviews will be conducted in the second half of the year, commencing in August 2020.

The first set of reviews, scheduled for April through June 2020, includes three CRPs - one global integrated program and two agri-food system programs. This initial selection of CRPs for review is based on (a) two Agri-Food Systems and one Global Integrated Program, (b) the length of time since the last independent evaluation conducted for the CRP and (c) CRPs with and without substantial changes in program and/or structure from Phase I to Phase II. CRPs that had requested to be included in the first set of reviews were prioritized, within the above criteria. The working schedule of CRP reviews is attached as Annex 2. For each review, an indicative time frame of deliverables and milestones for the review is provided in Annex 3.

Qualifications for the expert review team

Each review team is anticipated to include (1) a senior subject matter expert with in-depth subject matter expertise related to the CRP under review, and (2) a senior evaluator with experience in agriculture, natural resources management, food systems or nutrition. Of the two team members, one must serve as the team leader, who will bring relevant experience in that evaluation leadership and be the lead author for the report and accountable for the review team performance.

The estimated number of days of effort for each role in the review is provided below:

- Senior Subject Matter Expert: 40 days;
- Senior Evaluator: 30 days;
- Team Leader (additional to one of the above roles): 10 days.

The qualifications for each role are outlined below. **This is a desk-based review and no travel is envisaged.**

Qualifications for the senior subject matter expert include the following:

- Excellent understanding and knowledge of the key issues in agriculture, natural resources management, food systems and/or nutrition, as related to the CRP to be reviewed;
- 15 or more years (preferably, over 20 years) of work experience in the domain(s) related to the CRP to be reviewed;
- Strong knowledge of the main international institutions and mechanisms involved in the areas of research and development that are the focus of the CRP to be reviewed;
- Academic background relevant to the CRP's areas of research;
- Excellent understanding and knowledge of the international debate on the key issues related to the CRP to be reviewed;
- Depth of knowledge of areas of research and development that are the focus of the CRP to be reviewed;
- Knowledge of the CGIAR and/or the CRP to be reviewed.

- Strong English writing and verbal communication skills.

Qualifications for the senior evaluator include the following:

- 8 or more years of experience leading evaluations, preferably including international programs or research on agriculture, natural resources management, food systems and/or nutrition;
- Extensive experience with theory-based evaluations, including analysis of effectiveness in relation to a Theory of Change with potential implicit adaptations;
- Preference for evaluation experience in one or more research areas specific to the CRP;
- Preference for knowledge of the CGIAR and/or the CRP to be reviewed.
- Strong English writing and verbal communication skills.

In addition, the consultant (from one of the above two positions) who will also serve as Team Leader must demonstrate the following:

- Experience leading evaluation of complex programs, preferably in international agricultural research;
- Demonstrated accountability in terms of timeliness and quality of deliverables and responsiveness in communication;
- Academic background or experience in evaluation and/or an area relevant to the CRP's work;
- Strong project management skills;
- Experience working virtually (online) in successfully conducting interviews and facilitating discussions with senior managers, researchers, practitioners and policy-makers;
- Excellent English writing and verbal communication skills.
- Excellent presentation and report writing skills, including for executive and multicultural audiences and remote/virtual presentations.

Alternative team configurations may be considered, and the CAS Secretariat will discuss options presented by the proposed consultants.

Applications are encouraged from teams of two consultants with the qualifications and experience outlined above for the senior subject matter expert and the senior evaluator, clearly indicating which individual is proposed for the team leader role. Individual consultants may also apply for the subject matter expert or evaluator roles, with the intent to be matched with a suitable counterpart from the roster of other applicants.

Application process

Interested teams and individuals should send their CV and a cover letter indicating the role to which s/he is applying and the CRP(s) in which s/he is qualified to serve as a reviewer (see Annex 1 for an overview of the CRPs and their flagships and also the full CRP profiles on the CGIAR website: https://www.cgiar.org/research/research-portfolio/). The CV and cover letter should include information on the applicant's:

- Proposed role (Senior Subject Matter Expert or Senior Evaluator) and intended CRP(s) for the review, with both the role and intended CRP(s) clearly stated in the subject line of the email and the cover letter;
- Demonstrated expertise in the technical research areas relevant to the CRP to be reviewed;
- Experience in evaluation;
- Expected daily fee rate (demonstrable with evidence of rates on previous assignments);
- Location and time zone of her/his work location;
- Email, telephone and Skype contact details of the applicant(s);
- Names and contact information (email, telephone and postal address) for three (3) referees, who will be contacted for short-listed candidates;

- Availability for the CRP review based on the schedule provided in Annex 2, as well as more generally over the period April through December 2020.
- List of publications (including peer reviewed work and past evaluations/reviews authored)

Interested teams or individuals meeting the above criteria should send their application by email to CAS-Evaluation@cgiar.org . Applications are accepted on a rolling basis, and the CAS Secretariat will contact short-listed candidates for follow-up at an early date, for potential scheduling of the relevant CRP review. Regrettably, we are unable to respond to all applicants, but will retain CVs and contact information on file for those who meet the above criteria.

Contract and payment schedule

The CAS Secretariat is hosted at the Alliance of Bioversity International and the International Center for Tropical Agriculture[9], at the offices in Rome, Italy. Consultancy contracts will be issued by the host institute of the CAS Secretariat. The members of the review team are expected to abide by the Conflict of Interest and Safeguarding policies of the CAS Secretariat and its host institutions, and must maintain independence in fact and appearance from the CRP under review throughout the duration of the assignment. Each review team member must sign and return statements indicating their understanding and compliance with the policies of the CAS Secretariat and its host institutions.

Payments under the contract are scheduled as below:

- 25% on signing of the contract;
- 25% after the midterm check-in discussion and delivery of the preliminary findings matrix, subject to satisfactory approval by the CAS Secretariat;
- 50% on delivery of the final review report, subject to satisfactory approval by the CAS Secretariat.

This is a short-term consulting opportunity with the level of effort as indicated for each consultant role. All consultancy fees and conditions will be administered in line with the Alliance for Bioversity International and CIAT's approved policy for consultants.

Contact at the CAS Secretariat for the CRP 2020 Review

The CAS Secretariat has appointed an Evaluation Consultant, Dr. Ravi M. Ram, to manage the CRP review process, along with CAS evaluation staff and a consultant providing senior technical advice, under the overall direction of the CAS Secretariat Director, Allison Grove Smith. Questions regarding this Terms of Reference should be directed to r.ram@cgiar.org .

Who we are

CGIAR is a global research partnership for a food-secure future. CGIAR science is dedicated to reducing poverty, enhancing food and nutrition security, and improving natural resources and ecosystem services. Its research is carried out by 15 CGIAR Centers in close collaboration with hundreds of partners, including national and regional research institutes, civil society organizations, academia, development organizations, and the private sector. These 15 Centers have close to 10,000 staff based in over 50 countries.

Each Center has its own governing instrument, board of trustees, director general, and staff. CGIAR Research Centers are responsible for hands-on research programs and operations.

The CAS Secretariat supports and facilitates the CGIAR's independent advisory services, comprising the Independent Science for Development Council (ISDC), the Standing Panel on Impact Assessment (SPIA) and an independent evaluation workstream.

9 Bioversity International and CIAT are CGIAR Research Centers. For further information consult the websites at https://www.bioversityinternational.org and www.ciat.cgiar.org

In 2020, CGIAR is embarking on an ambitious reform, One CGIAR, to streamline governance and operational structures and processes across CGIAR. More information can be found here[10].

The Alliance of Biodiversity International and CIAT is an equal opportunity employer and strives for diversity

[10] https://www.cgiar.org/how-we-work/strategy/cgiar-system-reference-group/

Annex 2: List of documents reviewed

Annex 2.1 A4NH Documents reviewed

A4NH Phase II Proposal and Annexes

ISPC Assessment of the A4NH Phase II Proposal

Reference Document for A4NH Theories of Change 2019 Update

ToRs for Flagship Leaders, Managing Partners, Country Coordination and Engagement Team, Planning and Management Committee, and Independent Steering Committee

ISC Meeting Summaries and Management Responses, 2017, 2018, 2019

A4NH to 2021 Memo from John McDermott to ISC

Partner Program Participant Agreements, Performance Memos, Compliance Matrix, and Annual Reviews for Bioversity, CIAT, IFPRI, IITA, ILRI, LSHTM, WUR

A4NH Governance and Management Handbook, 2/23/18 Edition

A4NH Annual Reports, 2016, 2017, 2018, 2019

A4NH Powerpoint Presentations for the Annual ISC Review Meeting, 2017, 2018, 2019

A4NH POWB, 2016, 2017, 2018, 2019, 2020

A4NH OICRs reported 2017, 2018, 2019

2016 CCEE External Evaluation of A4NH

2019 External Evaluation of Agriculture-Nutrition Programs and Policies Research from 2003-2016

CGIAR Strategy and Results Framework, 2016 to 2030

ISDC Brief Number 62, Quality of Research for Development in the CGIAR Context

Annex 2.2 References for OICR Reviews

Data sources for review of OICR #2782

Interviews

R. Bandyopadhyay and A. Ortega-Beltran, IITA and FP3 Cluster leaders

Victor Manyong, IITA and Managing Partner representative to A4NH

Amare Ayalew, PACA Director

Tracy Shanks, Garron Hansen, and Ed Landreth, Chemonics (ATTC implementing sub-contractor)

Kalpesh Shah, A to Z Textiles Ltd., Tanzania (Aflasafe manufacturer)

Publications

Bandyopadhyay, R., K.F. Cardwell, A. Ortega-Beltran, F. Schulthess, W. Meikle, et al. 2019. *Identifying and managing plant health risks for key African crops: maize*. In: Neuenschwander, P., Tamò, M.,editors. Critical issues in plant health: 50 years of research in African agriculture. Burleigh Dodds Science Publishing, Cambridge, UK. p. 173–212 doi: 10.19103/AS.2018.0043.08

Schreurs, F., R. Bandyopadhyay, C. Kooyman, A. Ortega-Beltran, A. Akande, et al. 2019. *Commercial products promoting plant health in African agriculture*. In: Neuenschwander, P., Tamò, M., editors. Critical issues in plant health: 50 years of research in African agriculture Burleigh Dodds Science Publishing, Cambridge, UK. p. 345–364 doi: 10.19103/AS.2018.0043.14

A. Ortega-Beltran, M. Konlambigue, T. Falade, J. Atehnkeng, J.Augusto, C. Mutegi, L.A. Senghor, A. Akande, J. Akello, G. Mahuku, A. Mauro, P.J. Cotty, and R. Bandyopadhyay. 2018. *Managing Aflatoxins with Aflasafe: A Training of Trainers Manual*. IITA, Ibadan, Nigeria. 71pp

IITA, Chemonics, and Dalberg. December 2019. *Guides to the commercialization process: Market Assessment and Strategy Development, Investor Selection, Structuring of the Business Relationship, and Implementation of the Business Development Strategy*. Unpublished papers from the ATTC project.

Konlambigue, et al. November 2019. *Our journey from incubation to market: Status of Aflasafe Commercialisation in Africa*, Brief prepared by the ATTC project team for the first Aflasafe for Africa Conference.

R. Bandyopadhyay1, A. Ortega-Beltran, A. Akande, C. Mutegi, J. Atehnkeng, L. Kaptoge, A.L. Senghor, B.N. Adhikari, and P.J. Cotty. Biological control of aflatoxins in Africa: current status and potential challenges in the face of climate change. World Mycotoxin Journal, 2016; 9 (5): 771-789.

L. A. Senghor, A. Ortega-Beltran, J. Atehnkeng, K. A. Callicott, P. J. Cotty, and R. Bandyopadhyay. The Atoxigenic Biocontrol Product Aflasafe SN01 Is a Valuable Tool to Mitigate Aflatoxin Contamination of Both Maize and Groundnut Cultivated in Senegal. Plant Disease. 2020. 104:510-520. https://doi.org/10.1094/PDIS-03-19-0575-RE

Website: www.aflasafe.com

Data sources for Review of OICR #3293

Interviews

Ekin Birol, HarvestPlus, FP2 Leader

Mduduzi Mbuya, GAIN

Lawrence Kent, BMGF

Jean Pierre Mbagugire, HarvestPlus Rwanda

Publications

Vaiknoras, K., Larochelle, C., Birol, E., Asare-Marfo, D., & Herrington, C. (2019). Promoting rapid and sustained adoption of biofortified crops: What we learned from iron-biofortified bean delivery approaches in Rwanda. Food Policy, 83, 271?284. https://doi.org/10.1016/j.foodpol.2018.11.003.

Lividini, Keith; Diressie, Michael. Outcomes of Biofortification: High Iron Beans in Rwanda. August 2019, Internal Resource Available upon Request. PowerPoint Presentation.

Haas, J. D., Luna, S. V, Lung?aho, M. G., Wenger, M. J., Murray-Kolb, L. E., Beebe, S., Egli, I. M. (2016). Consuming Iron Biofortified Beans Increases Iron Status in Rwandan Women after 128 Days in a Randomized Controlled Feeding Trial. The Journal of Nutrition, 146(8), 1586?1592. https://doi.org/10.3945/jn.115.224741.

Murray-Kolb, L. E., Wenger, M. J., Scott, S. P., Rhoten, S. E., Lungaho, M. G., & Haas, J. D. (2017). Consumption of Iron-Biofortified Beans Positively Affects Cognitive Performance in 18- to 27-Year-Old Rwandan Female College Students in an 18-Week Randomized Controlled Efficacy Trial. The Journal of Nutrition, 147(11), jn255356. https://doi.org/10.3945/jn.117.255356.

Luna, S. V, Pompano, L. M., Lung?aho, M., Gahutu, J. B., & Haas, J. D. (2020). Increased Iron Status during a Feeding Trial of Iron-Biofortified Beans Increases Physical Work Efficiency in Rwandan Women. The Journal of Nutrition. https://doi.org/10.1093/jn/nxaa016.

Research project report on qualitative analysis of biofortification lessons learned in Rwanda, 2019. Unpublished work available upon request.

GroundWork, Sagaci Research, University of Rwanda, and Global Alliance for Improved Nutrition (GAIN). Measuring the household coverage and quantifying nutrient contributions of biofortified foods in Musanze, Rwanda. GAIN: Geneva, Switzerland; 2020.

Communication materials

Video entitled Iron Beans in Rwanda: A Nutrition Success Story. https://www.harvestplus.org/knowledge-market/in-the-news/video-how-iron-beans-gained-ground-rwanda

HarvestPlus web story including an infographic: https://www.harvestplus.org/rwandasuccess;

https://www.harvestplus.org/sites/default/files/Rwanda%20Graphic-final.pdf

Data sources for review of OICR report #2734

Interviews

Agnes Quisimbing IFPRI

Ruth Meinzen- Dick IFRPI

Jessica Heckert IFPRI

Hazel Malapit IFPRI

Miriam Heidtmann GiZ

Steffen Becker GiZ

Publications

Listed in OICR

Johnson, N., M. Balagamwala, C. Pinkstaff, S. Theis, R. Meinzen-Dick, and A. Quisumbing. 2018. How do agricultural development projects empower women? What hasn't worked and what might. Journal of Agriculture, Gender, and Food Security 3(2):1-19.

http://agrigender.net/views/agricultural-development-projects-empowering-women-JGAFS-322018-1..

https://www.nepad.org/cop/agricultural-technical-vocational-education-and-training-atvet-and-atvet-[11]

Doing things differently: gender-transformative skills development in agriculture

By Miriam Heidtmann https://www.rural21.com/english/current-issue/detail/article/doing-things-differently-gender-transfor mative-skills-development-in-agriculture-00002938/

Misuse of the term 'empowerment' in daily conversations. Esther Njuguna-Mungai, Gender Scientist, ICRISAT http://tropicallegumes.icrisat.org/misuse-of-the-term-empowerment-in-daily-conversations/

Other publications

Kabeer, N. 1999. "Resources, Agency, Achievements: Reflections on the Measurement of Women's Empowerment." *Development and Change* 30 (3): 435–464. doi:10.1111/1467-

7660.00125.

How do agricultural development projects empower women? Linking strategies with expected outcomes. Johnson, Nancy; Balagamwala, Mysbah; Pinkstaff, Crossley; Theis, Sophie; Meinsen-Dick, Ruth; Agnes, Quisumbing. https://ageconsearch.umn.edu/record/293596

Development of the project-level Women's Empowerment in Agriculture Index (pro-WEAI)

Hazel Malapit, Agnes Quisumbing, Ruth Meinzen-Dick, Greg Seymour, Elena M. Martinez, Jessica Heckert, Deborah Rubin, Ana Vaz, Kathryn M. Yount , and the Gender Agriculture Assets Project Phase 2 (GAAP2) Study Team. http://www.elsevier.com/locate/worlddev

https://www.profor.info/content/brief-gender-forest-landscape-projects-actions-and-indicators

https://idl-bnc-idrc.dspacedirect.org/handle/10625/57120

https://www.agrilinks.org/post/data-suggests-feed-future-reaching-benefitting-and-empowering-women

[11] This article was not accessible.

Annex 3: List of persons contacted during the Review

Person/Role/Institution	Interviewed by	Date	How Selected
Program Management Unit			
John McDermott, A4NH Director, and Amanda Wyatt, A4NH Program Manager	LU, KM	Apr 23	Inception meeting
Devesh Roy, MEL Unit Leader, Country Coordinator-India	KM	May 26	For role in PMU
Managing Partners			
Stephan Weise, MP Bioversity	KM	May 19	For role in PMC
Trang Nguyen (Support Staff) Bioversity	KM	May 19	
Mark Lundy, MP (2018-present) CIAT	KM	May 12	For role in PMC
Marie Ruel, MP IFPRI	KM	May 19	For role in PMC
Victor Manyong, MP IITA	LU	May 8	For role in PMC
Jo Lines, MP LSHTM	LU	May 6	For role in PMC
Ruerd Ruben, MP WUR	KM	May 12	For role in PMC
A4NH Flagship Leaders			
Inge Brouwer, FP1 WUR	KM	May 13	For role in PMC
Ekin Birol, FP2 HarvestPlus	LU	May 6	For role in PMC
Delia Grace, FP3 ILRI	LU	May 12	For role in PMC
Deanna Olney, FP4 (2020- present) IFPRI	KM	May 20	For role in PMC
Bernard Bett, FP5 (2019 – present), ILRI	LU	May 11	For role in PMC
Other Flagship Staff			
Lucy Elburg, FP1 Manager, WUR	KM	May 19	For role in Flagship
Celine Termote, co- lead CoA 1.1 (2020-present), Bioversity	KM	May 19	
Chris Bene, co-lead CoA 1.3, CIAT	KM	May 21	For role in Flagship
Peter Oosterveer, co-lead CoA 1.3, WUR	KM	May 22	For role in Flagship
Jean Pierre Mbagurire, HarvestPlus Rwanda Office	LU	June 11	For role in Flagship
Ranajit Bandyopadthy, co-lead CoA 3.3, IITA	LU	May 13	For role in PMC
Silvia Alonso, leader CoA 3.2, ILRI	LU	May 26	For role in Flagship
Kristina Roesel, ILRI, FP3	LU	May 26	For role in Flagship
Namukolo Covic, co-lead CoA 4.3 and Country Coordinator-Ethiopia, IFPRI	KM	May 21	For role in Flagship
Stuart Gillespie, co- lead CoA 4.2, FP4 Leader (2017-2019), IFPRI	KM	May 21	For role in Flagship

Arshnee Moodley, CGIAR AMR Hub Director, FP5, ILRI	LU	May 21	For role in Flagship
Eric Fevre, FP5 cluster leader, FP5 Leader (2017), ILRI and U. Liverpool	LU	May 19	For role in Flagship
Jeff Waage co-lead CoA5.3, FP5 Interim Leader (2018), LSHTM	KM	May 28	For role with ANH Academy
Hazel Malapit, GEE Unit Leader, IFPRI	KM	June 17	For role in GEE unit and OICR - RBE
Agnes Quisumbing, Gender, IFPRI	KM	May 26	For role in GEE unit and OICR - RBE
Jessica Heckert, IFPRI	KM	June 17	For role in Cross Cut and OICR - RBE
Ruth Meinzen- Dick, IFRPI	KM	June 17	For role in Cross Cut and OICR- RBE
ISC			
Rob Paarlberg, ISC Harvard	LU, KM	May 7	For role in ISC
Emmy Simmons, ISC Former USAID	KM	May 11	For role in ISC
Joyce Kinabo, ISC Tanzania	KM	May 13	For role in ISC
Emorn Udomkesmalee, ISC Thailand	LU	May 14	For role in ISC
PARTNERS			
Mduduzi Mdubya, GAIN (FP2)	LU	May 21	Partnership with HarvestPlus, recommended by Birol
Amare Ayalew, PACA (FP3)	LU	May 28	Partnership with IITA; recommended by A4NH PMU
Kalpesh Shah, A to Z Textiles Mills Ltd, Tanzania (FP3)	LU	June 12	Partnership with IITA, recommended by Bandyopadhyay
Tracy Shanks and Garron Hansen, Chemonics (FP3)	LU	June 4	Partnership with IITA, recommended by Bandyopadhyay
DONORS			
Rachel Lambert,DFID (mult FPs)	KM, LU	May 14	Recommended by A4NH PMU
Lawrence Kent, BMGF (FP2)	LU	May 18	Recommended by A4NH PMU
Kristen MacNaughtan, BMGF (FP3)	LU	May 27	Recommended by Kent
Miriam Heidtmann GiZ	KM	June 17	Use of RBE – OICR
Steffen Becker GiZ	KM	June 17	Use of RBE – OICR

Annex 4: Data collection tools

Sample List of Questions in Interviews for Different Actors

FP leaders

Planning process (elaboration of POWBs and how they decide on focus/priorities) ; role of stakeholder input

Overall assessment of progress (including cross cutting issues)

Use of TOC/Indicators to measure progress

How do they decide on topics for OICRs

How do they find the reporting exercise

Value added from A4NH program

Support from CEE, MEL and GEE units

Opinion on the governance structure (Concerns about competing goals among centers, CRPs?)

Quality assurance ; Managing quality of science and researcher participation

Interaction with other FPs and with PMU

Funding reliability and enhanced potential with A4NH

Future potential/priority areas for future work

Implications of "One" CGIAR reform

Anything they would have done differently (with the benefit of hindsight)

Managing Partners

How does the Center/Partner manage quality of science within A4NH aligned activities, including review of research proposals, outputs, ethics? Review of researcher performance and productivity?

What specific contributions does your Center make to A4NH in terms of bringing a) facilities, equipment and other tools; b) partnerships; c) research expertise?

Experience of working jointly with other centres; pros and cons; Concerns about competing goals among Centers, CRPs?

Has the level of CRP funding been adequate (relative to committed activities) and has it been predictable? (need to distinguish W1/W2 from W3). Has CRP involvement contributed to raising new bilateral funding?

Has CRP involvement contributed to greater effectiveness through a) expanded audience; b) new partnerships) for Center programs? How has it altered the Center's activities over the past 5 years from what they would have been without the CRP?

Collaborations with next-stage users? Capacity development activities?

How do they obtain stakeholder input to ensure relevance? Are there examples of how such input has changed the program direction or activities?

Future potential/priority areas for future work

Implications of "One" CGIAR reform

Anything they would have done differently (with the benefit of hindsight)

Country Coordinators

Added value of country approach

Perception of A4NH work (ease of establishing collaborative ventures, quality of work)

Collaborations with next-stage users? How easy is it to establish these links?

Capacity development activities?

Future potential?

Implications of "One" CGIAR reform

Anything they would have done differently (with the benefit of hindsight)

Gender

Assessment of progress over Phase II?

Capacity development?

Priority areas for future work

ISC

Assessment of overall progress over Phase II?

Assessment of management/governance structure?

Opinion on QA process

Issues of greatest concern looking to the future?

Suggestions for future

Partners

How long is involvement with A4NH?

How did they become involved?

How does this involvement help your organization achieve its goals?

How do you communicate expectations to A4NH?

What is the most important outcome from this collaboration?

What is the future potential for collaboration?

Donors

How long have they supported A4NH and how has their support evolved?

What are the most important outcomes from your support?

Future potential in One CGIAR?

Annex 5: Additional Material Regarding the Quality of Science

Research Leadership in A4NH

A4NH benefits from diverse research leadership. Characteristics of the research leadership for flagships and clusters are shown in Annex Table 5.1. Of the 21 research leaders (Flagship leaders and cluster leaders), 9 (43%) are female, and 5 (23%) are from the Global South. Several disciplines are represented in the leadership, including social sciences, reflecting the broad scope of the A4NH program. FP1 has a particularly diverse leadership in disciplinary terms, showing the multi-disciplinary approach being taken to Food Systems. FP2 is an exception, as the A4NH cluster leader represents only one part (Impact and Strategy Unit) of a much larger program in HarvestPlus. FP4 and FP5 have a narrower disciplinary focus in nutrition and veterinary science, respectively. The FP3 leadership mix reflects the two elements of that program, one focused on microbiological hazards (veterinary epidemiology), and the other focused on plant toxins (plant pathology). Most research in A4NH follows disciplinary lines, and FP1 is the major exception.

Another dimension of research leadership is research productivity. Annex Table 5.2 shows the most productive A4NH authors (those publishing the most articles in 2017-19). These researchers include several research staff who are fully committed to A4NH, as well as several researchers who map considerable portions of their time to A4NH. Researchers from all flagships except FP2 are represented among the most productive, but FP4 is particularly well-represented. This reflects the well-established legacy program behind FP4. For FP2, much of the research is outsourced through contracts with external ARI, and publications from these contracts have been not been reported in a consistent way to the CGIAR.

A4NH Publications with Top Altmetric Scores or Citations

The top 10 articles in 2017-19 by citation analysis, plus the top 10 articles by Altmetric score in 2017, 2018, and 2019 were examined in depth. Due to overlap, there were a total of 34 articles examined. Annex Table 5.3 shows characteristics of these articles, including relevance to A4NH program objectives by Flagship, role of A4NH authors, and collaborations represented in authorship. Examining high altmetric or high citation articles based on a short time frame has limitations but does show where A4NH research is gaining most immediate attention. Given the short time frame, newer research programs such as FP1 or FP5 will be reflected only through related research that preceded A4NH Phase II.

These 34 publications are clearly addressing core program objectives, as most were scored "High" on program relevance. A4NH authors (that is authors who are also identified by A4NH as key research staff) are important or lead contributors in most articles. (Only one article appeared not to belong in A4NH at all.) Publications addressing topics in FP4 are well-represented (12 articles), followed by contributions from FP5 (9 articles); FP2 (6 articles); FP1 (4 articles); and FP3 (1 article). However, leaders in FP3 and FP1 are among the most productive authors (see above) so this particular selection of articles does not imply that those flagships are not making contributions.

Collaborations of many kinds are reflected in these 34 articles. There are articles from research funded by FP2 in ARI; there are collaborations with partners in countries where A4NH is working; and there are collaborations that cut across ARI, country partners, and CGIAR researchers. No particular pattern of authorship dominates, which indicates that collaborations are taking place in multiple different ways to support research outcomes.

Annex Table 5.1: A4NH Research Flagship and Cluster Leaders

	Institution	Gender	Nationality	Discipline
FP1				
Inge Brouwer	WUR	Female	Dutch	Human Nutrition
Chris Bene	CIAT	Male	French	Decision Analysis
Marrit Van Den Berg	WUR	Female	Dutch	Development Economics
Alan De Brauw	IFPRI	Male	American	Agricultural Economics
Peter Oosterveer	WUR	Male	Dutch	Environmental Policy
Gina Kennedy	Bioversity	Female	American	Nutrition
FP2				
Ekin Birol	IFPRI	Female	Turkish	Economics
FP3				
Delia Grace	ILRI	Female	Irish	Veterinary Epidemiology
Silvia Alonso	ILRI	Female	Italian	Veterinary Public Health
Ranajit Bandyopadhyay	IITA	Male	Indian	Plant Pathology
Alejandro Ortega-Beltran	IITA	Male	Mexican	Plant Pathology
FP4				
Stuart Gillespie	IFPRI	Male	British	Nutrition Policy
Jef Leroy	IFPRI	Male	Belgian	Nutrition
Nicholas Nisbett	IDS	Male	British	Nutrition
Deanna Olney	IFPRI	Female	American	Nutrition
Namukolo Covic	IFPRI	Female	S. Africa	Nutrition
FP5				
Bernard Bett	ILRI	Male	Kenyan	Veterinary Epidemiology
Jo Lines	LSHTM	Male	British	Medical Parasitology
Eric Fevre	ILRI	Male	British	Veterinary Epidemiology
Jeff Waage	LSHTM	Male	British	Agronomy
Barbara Wieland	ILRI	Female	Swiss	Veterinary Epidemiology

Sources: A4NH PMU; Institutional websites; ORCID.

Annex Table 5.2: Researchers with the Greatest Number of Journal Articles among A4NH Publications and How Their Time is Mapped to A4NH

Staff	Institution	Number of A4NH publications 2017-19	Flagship	Total 2019 Time in A4NH	W1/W2	W3/bilateral
Grace, D	ILRI	54	3	1.0	0.19	0.81
Menon, P	IFPRI	32	4	0.65	0	0.65
Fevre, EM*	ILRI/ U. Liverpool	28	5	0	0	0
Bett B	ILRI	25	5	1.0	0.54	0.46
Hung Nguyen-Viet	ILRI	23	3, 5	1.0	0.41	0.59
Phuong Hong Nguyen	IFPRI	18	4	1.0	0.05	0.95
Ruel MT	IFPRI	18	4	0.84	0.76	0.08
Headey D	IFPRI	16	4	0.96	0	0.96
Lindahl J	ILRI/SLU	15	3,5	1.0	0.4	0.6
Brouwer ID	WUR	14	1	1.00	0.50	0.50

Notes: These are the top 10 authors either by number of articles in the 528 publications included in the bibliometric analysis. Percent of time in A4NH is only reported for staff from Managing Partners as part of the Roster provided to the PMU with their annual financial reports

*In spite of the zero time reported in the staff roster, Fevre is a Cluster Leader in FP5.

Annex Table 5.3: Significant Journal Article Publications by Bibliometric or Altmetric Scores

Article Title	Journal/Year	A4NH authors/ contribution	FP	Significance/ Relevance to A4NH
Top 10 for citations from 2017-2019 Bibliometrics				
*The Lancet Countdown: Tracking progress on health and climate change.	Lancet, 2018	Grace (ILRI) and Dominguez-Salas (ILRI/LSHTM) are two of 60 plus authors	FP5	Medium
Improving nutrition through biofortification: A review of evidence from HarvestPlus, 2003 through 2016	Global Food Security, 2017	Bouis and Saltzman, both formerly with IFPRI/HarvestPlus	FP2	High
*The 2018 report of the Lancet Countdown on health and climate change: shaping the health of nations for centuries to come	Lancet, 2018	Grace (ILRI) and Dominguez-Salas (ILRI/LSHTM) are two of 68 authors	FP5	Medium
The Lancet Countdown on health and climate change: From 25 years of inaction to a global transformation for public health	Lancet, 2017	Grace (ILRI) and Dominguez-Salas (ILRI/LSHTM) are two of 63 authors	FP5	Medium
Urbanization and Disease Emergence: Dynamics at the Wildlife–Livestock–Human Interface	Trends in Ecology and Evolution, 2017	Fevre (ILRI) is one of four authors	FP5	High
Agronomic biofortification of cereals with zinc: a review	European J. of Soil Science, 2018	Authors are at U. Turkey but work funded by HarvestPlus	FP2	High
*Countdown to 2030: tracking progress towards universal coverage for reproductive, maternal, newborn and child health	Lancet, 2018	Over 70 authors; Gillespie and Menon (IFPRI-PHND) are the A4NH contributors	FP4	High

The global burden of disease study 2013: What does it mean for the NTDs?	PLOS Neglected Tropical Diseases, 2017	Fevre (ILRI) is one of 21 authors	FP5	High
Reducing antimicrobial use in food animals	Science (Policy Forum), 2017	Robinson (formerly ILRI) is one of 9 authors	FP5	High
Nutrition-sensitive agriculture: What have we learned so far?	Global Food Security, 2018	Ruel, Quisumbing, (both IFPRI-PHND) Balagamwala (formerly IFPRI/A4NH-PMU)	FP4	High
Top 10 Altmetrics from 2017 annual report (if not included above)				
Consumption of Iron-Biofortified Beans Positively Affects Cognitive Performance in 18- to 27-Year-Old Rwandan Female College Students in an 18-Week Randomized Controlled Efficacy Trial	J. of Nutrition, Community and International Nutrition, 2017	One of 6 authors is Lung'aho (CIAT/HarvestPlus); international collaboration; work funded by HarvestPlus	FP2	High
Agrobiodiversity and a sustainable food Future	Nature Plants, 2017	De Haan (formerly CIAT) is one of two authors	FP1	High
Dietary species richness as a measure of food biodiversity and nutritional quality of diets	PNAS, 2018	5 of 17 authors are with Bioversity (Raneri, Kennedy, Hunter, Odhiambo, Ntandou-Bouzitou, Remans, Termote	FP1	High
Retention of Carotenoids in Biofortified Maize Flour and β-Cryptoxanthin-Enhanced Eggs after Household Cooking	ACS Omega, 2017	Work funded by HarvestPlus	FP2	High
The "quiet revolution" in the aquaculture value chain in Bangladesh	Aquaculture, 2017	Ahmed (IFPRI-PHND) and Hernandez (formerly IFPRI, currently CIAT) are 2 of 6 authors	FP1	Medium

An integrated study of human and animal infectious disease in the Lake Victoria crescent small-holder crop-livestock production system, Kenya	BMC Infectious Diseases, 2017	4 of 6 are ILRI (Fevre, De Glanville, Thomas, Cook)	FP5	High
Structure of Phytoene Desaturase Provides Insights into Herbicide Binding and Reaction Mechanisms Involved in Carotene Desaturation	Structure, 2017	No CGIAR authors; work funded by HarvestPlus	FP2	Medium

Top 10 Altmetrics from 2018 annual report (if not included above)

Income growth and climate change effects on global nutrition security to mid-century	Nature Sustainability, 2018	Lividini (IFPRI/HarvestPlus) and Remans (Bioversity) are two of 14 authors	FP1	Medium
Animal Sourced Foods and Child Stunting	American Journal of Agricultural Economics, 2018	Headey (IFPRI-PHND) is lead author	FP4	High
Understanding the geographical burden of stunting in India: A regression-decomposition analysis of district-level data from 2015–16	Maternal and Child Nutrition, 2018	Menon, Headey, Avula, Nguyen are all IFPRI-PHND	FP4	High
Identifying sociodemographic, programmatic and dietary drivers of anaemia reduction in pregnant Indian women over 10 years	Public Health and Nutrition, 2018	Chakrabarti and George, (IFPRI-PHND) are first 2 of 5 authors; Scott (IFPRI-PHND) is last author	FP4	High
Trends and drivers of change in the prevalence of anaemia among 1 million women and children in India, 2006 to 2016	BMJ Global Health, 2018	4 out of 5 authors from IFPRI-PHND Nguyen, Scott, Avula, Menon	FP4	High
Women in agriculture: Four myths	Global Food Security, 2018	Quisumbing (IFPRI-PHND) is one of 4 authors	FP4	Medium

An egg for everyone: Pathways to universal access to one of nature's most nutritious foods	Maternal and Child Nutrition, 2018	Headey (IFPRI-PHND) is third author	FP4	High
Top 10 Altmetrics from 2019 annual report				
Rising rural body-mass index is the main driver of the global obesity epidemic in adults	Nature, 2019	A. Le Port (IFPRI-PHND) one of over 300 contributors	FP4	High
The Relative Caloric Prices of Healthy and Unhealthy Foods Differ Systematically across Income Levels and Continents	J. of Nutrition, 2019	D. Headey and H. Alderman, both IFPRI-PHND	FP4	High
Biofortification of field-grown cassava by engineering expression of an iron transporter and ferritin	Nature Biotechnology, 2019	E. Boy (HarvestPlus) is one of 14 authors; broad intl collaboration	FP2	High
Social, biological, and programmatic factors linking adolescent pregnancy and early childhood undernutrition: a path analysis of India's 2016 National Family and Health Survey	Lancet Child Adolescent Health, 2019	PH Nguyen, S. Scott, S. Neupane, P. Menon (all IFPRI-PHND) are 4 out of 5 authors; 1 from NGO	FP4	High
Perspective:What Does Stunting Really Mean? A Critical Review of the Evidence	Advances in Nutrition, 2019	J. Leroy (IFPRI-PHND) with collaborator from ARI	FP4	High
Agricultural non-CO emission reduction potential in the context of the 1.5 °C target	Nature Climate Change, 2019	13 authors of whom 4 are from WUR but not listed in A4NH staffing	None	Doesn't belong in A4NH publication list
Clinically relevant antimicrobial resistance at the wildlife–livestock–human interface in Nairobi: an epidemiological study	Lancet Planet Health 2019	15 authors of whom 5 are with ILRI (Hassell, Muloi, Bettridge, Ogendo, Fevre). Broad intl collaboration	FP5	High

Development of Project Level Women's Empowerment in Agriculture Index (pro-WEAI)	World Development, 2019	Six of 9 authors from IFPRI (Malapit, Quisumbing, Meinzen-Dick, Seymour, Martinez, Heckert) project collaborators	All, Gender	High
The role of livestock products for nutrition in the first 1,000 days of life	Animal Frontiers, 2019	Alonso and Grace from ILRI and Dominguez-Salas from ILRI/LSHTM	FP3	High
Does urbanization make emergence of zoonosis more likely? Evidence, myths and gaps	Environment and Urbanization, 2019	One of 6 authors is Fevre (ILRI)	FP5	High

* indicates article found both in top ten cited articles in bibliometric analysis and in top 10 altmetrics on CGIAR dashboard

Note: Year of publication can change depending on date of online vs print publication. The PMU relies on how these publications are entered in institutional repositories and/or appears in Google Scholar at the time of reporting to CGIAR in the annual report.

Source: Bibliometric analysis of citations for A4NH publications, 2017-19; CGIAR Dashboard website for articles with top 10 altmetric scores from A4NH in 2017 and 2018; A4NH PMU for articles with top ten altmetric scrores in 2019. Altmetric scores reflect time when articles reported to CGIAR.

Annex 6: In Depth Review of Three Selected OICRs

This Annex provides the complete analysis of the three selected OICRs that are discussed section 2.2.2. Each OICR deep dive is based on the elements in the OICR report. It includes review of publications, technical documents, communications materials referenced in the OICR report for their quality and relevance to reported outcomes, and other references determined to be relevant (references list provided in Annex 2). Interviews are carried out with the contact person for the OICR and with partners listed to evaluate how partnerships have contributed to impact. An analysis is provided of a) how the OICR's policies and innovations contribute to the SRF and IDOs, b) how the activities reflect CGIAR comparative advantage in delivering R for D, and c) whether the OICR demonstrates the relevance of the Flagship's ToC.

Annex 6.1 Review of OICR 3293 "Innovative Delivery Models for Iron Beans Resulted in Adoption by an Estimated 442,000 Households in Rwanda"

Why Selected for Review

Flagship 2 has only 3 OICRs (one per year), in spite of the fact that it is the oldest legacy program, and best funded flagship program. Clearly the OICRs are representing only a small slice of the work underway in FP2. The selected OICR (#3293 Innovative Delivery Models for Iron Beans Resulted in Adoption by an Estimated 442,000 Households in Rwanda) represents a specific country case where a biofortified crop appears to have been widely adopted. This is chosen in order to represent program impact closest to the SLO Goal 2: Improved Food Security and Nutrition for Health. This OICR has a rating of significant for all four cross-cutting dimensions.

Overview of case

High iron beans were developed based on research by CIAT on improved bean varieties, including enhanced iron content. Local adaptive breeding in cooperation with the Rwanda Agricultural Board (RAB) began in 2010, in partnership with CIAT. Crosses with local varieties led to iron fortified bean varieties with genetically stable iron levels and superior agronomic characteristics. HarvestPlus invested in equipment and RAB staff training to speed the process of cultivar evaluation and selection.

Beans account for a high percentage of calories in Rwanda (over 30%), and iron deficiency is widespread. Thus, this biofortification target was identified by HarvestPlus as having the potential to alleviate iron deficiency. A series of controlled nutritional studies verified that consumption of high iron beans resulted in improved iron status in women, as well as improved cognition and energy.

This OICR reports on successful delivery and education efforts to promote adoption, marketing, and consumption. Several iron bean varieties were released between 2010 and 2014 in Rwanda, but there were challenges in the seed delivery system that required intervention. A variety of seed distribution systems were used, including a seed payback program; a seed swap program; distribution through NGOs; and sales through agro-dealers. The latter required the establishment of seed standards for beans, as well as programs to educate farmers and ag input suppliers about the benefits of iron biofortified beans. At the same time, HarvestPlus carried out public information campaigns with consumers and bean vendors. HarvestPlus worked with policy makers at the national level to support these efforts through nutrition messaging provided by the Ministry of Health and through a "farmer promoter" program with the Ministry of Local Governments.

HarvestPlus carried out a number of rigorous M&E studies to document the impact of these efforts. The many complementary activities in seed dissemination and promotion led to successful adoption by over 440,000 farm households. Furthermore, iron biofortified beans account for 15 to 20% of total consumption and most consumers are aware of their nutritional benefits. Most consumption is in farm households although there is also a premium market for sales of iron biofortified beans, and a processed product for urban consumers.

HarvestPlus carried out a series of monitoring and evaluation studies beginning in 2015. These have documented the extent of adoption, determinants of adoption and disadoption, and the impact on iron bean supply and consumption, all based on sound survey methods and rigorous methodologies. HarvestPlus has estimated the benefits arising from higher yields, increased farm incomes, as well as the impact on improved iron status and corresponding improvements in health (measured as a reduction in DALYs). The results show a benefit cost ratio of 6 to 8.

The entire iron biofortified bean program has been turned over to a Rwanda Bean Alliance, established during a 2019 transition year. This group is coordinated by CIAT and RAB, and includes representation from value chain actors, and activities from research through consumer education. During the rollout and promotion of iron biofortified beans, HarvestPlus was the main actor facilitating coordination among value chain actors, and this role has been replaced by the Alliance, which provides a "platform" so they can continue to work together. The goal is for this to become a privately driven effort. Private incentives arise from Rwanda's role as production hub and supplier of both bean seed and grain for neighboring countries: the DRC, Burundi, and Tanzania.

Review of publications and other materials

Two kinds of publications are referenced in the OICR. The first is a set of journal articles documenting the nutritional benefits from consumption of high iron beans in the Rwanda population. Another set of articles documents determinants of farmer adoption of iron beans and impacts on farm households using survey data and appropriate statistical techniques. This research documents lessons from the alternative delivery mechanisms for beans to farmers and draws lessons for future delivery efforts.

Internal documents from HarvestPlus (referenced in the OICR and made available on request) were reviewed to see the methods used to evaluate adoption, nutritional impact, and to estimate a benefit cost ratio for this investment. This work is in process for publication and seems to follow well-established methods.

In addition to documents provided by HarvestPlus, a recent study (in process for journal submission) in collaboration with GAIN was also reviewed. This study examines biofortification coverage in Rwanda, and documents the uptake of high iron beans from the consumer and market perspective, rather than from the farm adoption perspective. The research successfully demonstrates a novel approach to assessing biofortification success (indicators of coverage) that can be used in the future for either industrially or bio- fortified foods, and which is focused on the end consumer.

An infographic and video regarding iron beans in Rwanda on the HarvestPlus website were reviewed. These are of high quality and communicate a complex story in understandable terms.

Role of external/internal partnerships

The successful uptake of iron biofortified beans in Rwanda is the result of many different kinds of partnerships, beginning with the HarvestPlus partnership with CIAT for bean breeding with biofortification. In Rwanda, the most important partnership is with the RAB for the development and dissemination of locally adapted varieties. As discussed above, partnerships were also forged with other government programs. But beyond these fairly traditional partnerships for a CGIAR program, HarvestPlus also worked with the private sector, including seed dealers, food processors, and market vendors. The breadth of these partnerships, and the relatively speedy handoff to a new Bean Alliance group is a notable achievement.

Although it is not directly part of the Rwanda effort, HarvestPlus has forged a new partnership with GAIN to work together on fortification efforts (both traditional and bio-), especially those involving commercial products, in six countries. This new partnership is part of a larger pivot towards placing biofortification within a food systems context.

Cross Cutting Dimensions

This OICR reports significant relevance to all four cross cutting dimensions. With respect to gender, adoption studies took into account gender control over production and marketing. Both women and men were included in agronomic training, which was found to improve adoption.

Youth relevance is claimed due to the prevalence of anemia among young children and the potential of this technology to alleviate this deficiency and promote healthier growth and development.

Capacity development had multiple dimensions over a nine-year time span. Training of different value chain actors took place relevant to their role (e.g. seed multiplication, marketing). The national bean breeding program benefited from training and technical support. The national seed certification agency received special training associated with the new program for bean seed certification.

Climate change is addressed as the beans are bred to be heat and drought tolerant. Increased iron levels will offset some of the expected losses in nutrients with increased drought in the region (nutrient loss is a known climate change risk for many crops).

Contribution to SRF and IDOs, including policies and innovations

The outcome described in this OICR contributes to SLO 2: Improved Food Security and Nutrition. As reported, it contributes towards these Sub-IDOs:

- Increased access to diverse nutrient-rich foods
- Conducive agricultural policy environment

And to these SRF 2022/2030 targets:

- of more people, of which 50% are women, without deficiencies of one or more of the following essentials micronutrients: iron, zinc, iodine, vitamin A, folate and vitamin B12
- of more farm households have adopted improved varieties, breeds or trees

It contributes to two of the high-level goals in the A4NH Phase II proposal (that mirror above SRF targets):

- 20M more farm households in 12 countries (includes Rwanda) will adopt improved varieties
- 150M more people, of whom 50% are women, in 14 countries (includes Rwanda) will be without deficiencies of micronutrients (includes iron).

Clearly the outcomes reported in this OICR contribute directly to the SRF and to the A4NH goals. Their adoption led to reduced micronutrient deficiencies among either farm households or purchasing consumers. Because they are higher yielding and drought resistant, they provide higher incomes to adopters. The process of development and dissemination brought about a conducive policy environment for future biofortification efforts.

Relevance of outcomes to ToC for flagship

According to the Reference Document for Phase II Theories of Change 2019, FP2's ToC is based on country specific efforts under Phase I to better understand the context specific pathway from research—through seed dissemination, adoption, and consumption—to improved diet and micronutrient availability. However, the elements of this ToC are not spelled out clearly in this A4NH document, but exist in the HarvestPlus 2018-22 strategic plan, which identifies specific countries, crops, and adoption targets (referenced in the A4NH annual presentation to ISC, 2017).

For A4NH reporting, FP2 identified key areas for research in Phase II that were designed to guide country-level delivery and monitoring, and to inform scaling approaches in market environments. The mixed public-private delivery model in Rwanda demonstrates the use of these guidelines, as reported in the 2019 Reference Document for Phase II Theories of Change, for scaling of biofortification. These include use of delivery strategies that: build on technical assistance and training NARS; build on operational partnerships with organizations interested in biofortification; use studies of farmer and consumer acceptance; use cost-effectiveness studies; and hand-off to partners after the crop is released. The OICR report on Rwanda and the reference materials demonstrate all of the above elements, and thus provide a good example of how the Phase I lessons informed the delivery strategy.

Comparative Advantage and public goods

The biofortification research of HarvestPlus and its Center partners represent a unique effort to provide global public goods to address micronutrient deficiencies. Sustained investment to explore and prove this concept, and then to refine and target it, represent a significant achievement for the CGIAR. The CGIAR had the comparative advantage in carrying out the initial research, and in creating the knowledge base for biofortification to become an actionable part of national nutrition plans. Furthermore, the CGIAR

continues to have the comparative advantage in demonstrating how to "mainstream" biofortification into varieties which are then adapted by NARS.

In this Rwanda case, the delivery and education mechanisms provide potential models and lessons for efforts in other countries. Some elements of this story may be unusual, however, including the potential for a premium market and the apparent agronomic superiority of the iron biofortified varieties. However, this successful public-private delivery model constitutes an international public good, with potential lessons for other countries in the region.

Lessons learned/ Future Prospects

The Rwanda story shows that many different elements-- public to private, farmer to consumer-- are needed for success in delivering biofortification to the consumers who will benefit from it. HarvestPlus has developed the capacity to bring those elements together. It will be useful to continue to monitor the progress of iron biofortified beans in Rwanda, and the activities of the Rwanda Bean Alliance, to understand the sustainability of this success.

HarvestPlus is in the midst of a pivot away from breeding and delivery, towards policy advocacy, partnerships to mainstream biofortification into breeding programs, and partnerships to place delivery efforts within a food systems context. New partnerships and policy outreach are underway to support this pivot, such as the one with GAIN on how to better utilize value chains and the private sector. Funding for biofortification now goes directly to the Centers, and it is envisioned that HarvestPlus will assist and monitor them as they mainstream nutrition goals into breeding programs. The Rwanda effort can be seen as strong proof of concept for biofortification approaches. For similar success in the future, HarvestPlus must succeed in persuading others to continue the momentum from past biofortification efforts.

Annex 6.2 Review of OICR 2782 Aflasafe biocontrol products to reduce aflatoxin contamination are now registered in nine African countries and available at more than 30 distribution points in seven countries

Why this OICR was selected

Flagship 3 has reported 14 OICRs, but 9 of them relate to one hazard, aflatoxins, and of those, 7 represent one technological innovation, Aflasafe. This OICR, #2782 *Aflasafe biocontrol products to reduce aflatoxin contamination are now registered in nine African countries and available at more than 30 distribution points in seven countries*, is chosen because it shows work that is closest to impact in terms of achieving SLO Target 1 (adoption of improved practices). (This OICR was originally reported in 2018 under the same ID but titled *Aflasafe products to reduce aflatoxin crop contamination are now registered in eight countries—three new countries in 2018* and then updated with the new title in 2019 to describe progress in registration and commercialization.) OICR #2782 summarizes the current level of scaling for the Aflasafe technology. It may be mischaracterized as Level 1, given the maturity of scaling efforts. In terms of cross-cutting dimensions, this OICR has a 1 (significant) for Capacity Development, and 0 for all others.

Overview of case

Starting in the 1990s, researchers at IITA began adapting a natural control method for aflatoxins on maize that had been developed by the USDA-ARS.[12] In simple lay terms, the Aflasafe technology uses non-toxic strains of the fungus to crowd out the toxic strains. Basic research to identify strains in Africa that are non-toxic and to characterize the genetic determinants of atoxicity was carried out at IITA.

[12] Aflatoxins are a naturally occurring food safety hazard on many crops, and occur more frequently in the tropics. High levels of aflatoxin can be deadly, but the more important health impacts come through long term exposure that has been linked to liver cancer and possibly to child stunting. Aflatoxins on animal feedstuffs are known to reduce animal growth and productivity.

Adapting this knowledge to create a product that could be used in farmer's fields required further applied research, including understanding the sustainability of the approach, its impact on post-harvest emergence of aflatoxins, and its role in integrated management. IITA began manufacturing Aflasafe in Nigeria, and now uses that plant as a training facility. During A4NH Phase I, a major World Bank project in Nigeria subsidized marketing and adoption there for use in maize production (reported in OICR #3351).

This OICR reports on the more recent evolution of this technology towards adoption and scale under Phase II. There are two major elements required to move the technology forward in new environments across Africa. As Aflasafe is introduced into new countries and/or for use on different crops (e.g. groundnuts), new adaptive research is required to identify and test atoxic strains. IITA has carried out this research in cooperation with national systems, which includes capacity development of local scientists. The data are developed to support registration of the product for use as a biological control. This process takes three to five years. As the OICR reports, Aflasafe is now registered for use in 9 countries, and is distributed in 7 countries.

Once a product is registered, the second phase is commercialization. A strategic decision was taken to promote commercialization through a country partner who would manufacture and market Aflasafe, while at the same time pursuing complementary efforts to promote policy awareness through PACA. (The alternatives would have been subsidized distribution through public extension, or commercialization through a multinational input supplier.) The ATTC project carried out a complex process in seven countries to design and implement a commercialization strategy, usually by focusing on the elements of the market where there is aflatoxin awareness (e.g. poultry feed, brewing inputs).[13] Manufacturing licenses were awarded based on a competitive process. The ATTC project provided support for business development and IITA provides technical support for the manufacturing process. At the same time, policy dialogue and public education take place to develop awareness. As the OICR reports, manufacturing and distribution is now underway in seven countries.

One licensee in Tanzania shared perspective on developing this entirely new market. Based on the market analysis provided by the ATTC project, they will first focus on high end processors (e.g. breweries) that contract with farmers for maize. After two to three years, they will attempt to develop the market among small holders, where they already sell storage bags. They are also expecting greater government intervention to promote aflatoxin reduction during this time frame.

Review of publications and other materials

Two recent book chapters referenced in the 2018 version of the OICR (see below) contain useful reviews of the extensive related literature produced by IITA scientists over the past two decades. As noted in the quality of science section, Bandyopadhyay has made a significant impact on the field of plant pathology.

A website has been created to provide information to the public: Aflasafe.com. This website appears to contain useful information, although it did not always load correctly (on an Apple computer). The website could use a redesign and perhaps better targeting, as it is not clear who the audience is.

In addition to the OICR references, the commercialization manuals and selected materials from the ATTC project were reviewed. These are all well-written and communicate the complex subject matter clearly. A well-written "train the trainers" manual has been developed that is targeted to extension workers and agro-sales representatives, and it is comprehensive and well-written.

A series of manuals were created documenting the elements of the commercialization process. These document this approach to commercialization of a technology in some detail, and show the level of effort required where market incentives are not immediately apparent but might be developed with the right

[13] One licensee in Tanzania shared perspective on developing this entirely new market. Based on the market analysis provided by the ATTC project, they will first focus on high end processors (eg., breweries) that contract with farmers for maize. After two to three years, they will attempt to develop the market among small holders, where they already sell storage bags. They are also expecting greater government intervention to promote aflatoxin reduction during this time frame.

strategic approach. These manuals provide useful documentation for a future evaluation of whether this model can be used for other technologies from the CGIAR.

Role of external/internal partnerships/support

This research program predates A4NH and became a part of the CRP when A4NH was created in 2012. The research has benefited from partnership with IFPRI to bring economics collaboration and with ILRI for studies of aflatoxins in feeds. The IITA aflatoxin research has benefited from the continuation of "core" funding for personnel under A4NH, and the PMU has provided strategic support for outreach efforts to policymakers. However, these benefits may have been offset by the awkward status of this program within A4NH. The importance of aflatoxins as part of agriculture for health is not universally accepted within the A4NH leadership.

External partnerships have been key to this effort, beginning with NARS, national policy makers, regional policy organizations, sub-contractors in the ATTC project, and private sector firms. This OICR success story is notable for the number of successful partnerships that have supported it in different ways. Threading together so many different kinds of support and collaboration required a strong vision for how to proceed through the research for development process.

The collaboration with PACA (Partnership for Aflatoxin Control in Africa) provides one example. This organization was initiated in 2012 with funding from BMGF. A4NH has played a critical role in providing technical support for PACA. IITA was a founding member and Bandyopadhyay was on the steering committee. IITA provides technical support for the country action plans that are a primary outcome from PACA. PACA advises the ATTC Aflasafe commercialization efforts and can promote Aflasafe as part of an integrated approach to aflatoxins.

Cross Cutting Dimensions

The OICR has a rating of significant for Capacity Development and 0 for other cross-cutting dimensions. Capacity development has taken place in a number of ways. First, training workshops for regulators to provide education about issues involved in biopesticide registration were held in three regions across Africa. Biopesticides had not been approved before in many countries, and training of regulators provided them with the appropriate background in risk assessment and understanding of the technology. This capacity development can serve as a foundation for future regulation of biocontrol products. Second, adaptive research in each country was carried out in collaboration with the NARS. One example is Senegal, where 5 years of trials were carried out to identify local strains and to test their effectiveness in collaboration with the NARS plant pathology unit (Direction de Protection Vegetaux). The result was a new product, information to support product registration, and a collaborative publication (Senghor et. al, 2020).

Contribution to SRF and IDOs, including policies and innovations

This research contributes to the SLO Outcome 1 of Reduced Poverty, and the 2022 Target of 100 million HH adopt improved management practices, which is directly reflected in the A4NH Phase II target: 20 million more farm households in at least 12 countries will have adopted improved varieties, breeds or trees and/or improved management practices.

As reported in the OICR, this research for development effort contributes to Sub-IDOs:

- Reduced biological and chemical hazards in the food system
- Reduced market barriers

Increased incomes (reduced poverty) can result from market access or price premiums associated with reduced aflatoxins, higher yields, and/or reduced storage losses. All of these outcomes are associated with Aflasafe. Reduction of aflatoxins improves human and animal health and improves food safety, both of which are sub-IDOs to SLO 2: Improved Food and Nutrition Security for Health.

According the A4NH 2019 Annual report, approximately 95,000 farmers treated more than 120,000 hectares with Aflasafe™ in 2019, supporting production of maize and groundnut with safe aflatoxin levels across nine countries in sub-Saharan Africa. This fairly modest uptake reflects the very recent opening of manufacturing in most of the countries listed in the OICR. There is preliminary evidence based on the Nigeria experience, that higher crop yields, increased farm incomes, and consumption of safer food might be outcomes that could be expected in the future. But to track this would require greater M&E efforts

than currently envisioned. (Note: the 2020 milestone is an ambitious 500,000 ha with 156,000 farmers adopting across 8 countries.) The CGIAR dashboard lists 17 innovations (Aflasafe products adapted to different countries) in 2017 and 2018. This research has produced a significant number of innovations.

This OICR does not report any policies, but the CGIAR Dashboard shows one reported policy outcome from this work: Nine policy briefs on aflatoxin were developed in partnership with the East Africa Commission and in use in the region to inform aflatoxin policy. This policy impact is reported separately in OICR#2780. Also see the partnership with PACA discussed above.

Relevance of outcomes to ToC for flagship

See above discussion of how outcomes support progress towards the SLOs. The outcomes from this OICR work primarily through the Agri-Food Value Chain pathway. The research delivery process has worked with producers, value chain actors, and regulators in the process of commercialization, leading to adoption. However, as noted in the A4NH Reference Document for Theories of Change, evidence is weak for the final stages towards greater food safety and enhanced smallholder market access. As scale is now achieved across several countries, it would be timely to reassess those linkages.

Comparative Advantage and public goods

Adapting and developing this technology for its use throughout Africa is certainly well within the comparative advantage of the CGIAR and constitutes a significant global public good. It has the potential to provide expanded benefits to African producers and consumers in the future.

The Aflasafe commercialization project can be considered an important test for a particular strategy, with potential lessons for delivery of other technologies. With a useful technology ready to go into farmer's fields, the challenge is how to hand it off to next users. A strategic choice was made around commercialization through small firms in different countries, and that is moving forward now with apparent initial success. However, this may or may not be effective or efficient compared to alternative strategies, and ex-post evaluation would provide valuable lessons for other CGIAR efforts.

Lessons learned/ Future Prospects

As adoption evolves in countries where Aflasafe is available, it would be valuable to monitor how Aflasafe influences farm household income and the safety of the food supply. Understanding this final step towards the outcomes envisioned in the ToC should be a high priority. At the same time, there is a clear need to carry out an evaluation of the commercialization effort in order to better inform future delivery strategies.

Funding for the current commercialization effort is coming to an end, and new funding sources and partnerships are being developed. It is also unclear how it will fit into the new One CGIAR framework. This research has always been at the intersection of crop productivity enhancement and food/feed safety. Participation in A4NH has strengthened connections to health economics and policy, but more could be done to bring a One Health dimension to future work on aflatoxins.

Annex 6.3 Review of OICR 2734: "Reach, Benefit, Empower Framework of indicators for monitoring programs and policies incorporated into trainings conducted by partners"

Why this OICR was selected

Flagship 4 has 9 OICRs (5 in 2017, 2 in 2018 and 2 in 2019). The selected OICR was chosen due its relevance to gender, which is a priority cross cutting issue for A4NH, and the potential scope for applying this tool across both FPs and CRPs as well as other organisations. Although the title of the OICR refers only to its use in the context of trainings, this is inaccurate as the OICR goes on to report that the Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ) and the New Partnership for Africa's Development (NEPAD) have incorporated the Reach, Benefit, Empower (RBE) principle in their

"Agricultural Technical Vocational Education and Training (ATVET) for Women" programme [14]and have expressed their interest in partnering with IFPRI to measure the state of empowerment of women beneficiaries who receive training (and their spouses) using IFPRI's Women's Empowerment in Agriculture Index for Value Chains (WEA4VC). WEAI4VC is the latest iteration of the WEAI to capture additional activities at higher nodes of agricultural value chains, going beyond the original WEAI's focus on agricultural production. The WEAI team proposed to conduct two pilot studies in two countries (Malawi and Benin) in Africa in 2019-2020, and the proposal was officially accepted in March 2019 and is now nearing completion. In addition, the research work referred to in the OICR referenced article,[15] also describes the research conducted on the empowerment strategies of 13 projects that are part of the Gender, Agriculture, and Assets project (GAAP2), which entails the development of a project-level Women's Empowerment in Agriculture Index, or pro-WEAI- though this is not referred to in the OICR. The subject matter of the OICR is therefore of particular interest as it relates to three separate, yet interrelated tools, that aim to improve the design of projects (through RBE) as well as the capacity to measure the impact of projects on women's empowerment (through the use of the WEAI4VC and pro WEAI) in order to better identify what works and what doesn't.

In terms of cross-cutting dimensions, it has a 2 (principal) for Gender and 0 for all others.

Overview of case

Increasing numbers of development agencies and individual projects include objectives of women's empowerment and there is a growing body of conceptual and empirical work on how to define and measure empowerment. What is missing is an evidence base on how, and how much, agricultural development projects can contribute to empowerment. What activities or combinations of activities contribute to empowerment, through what mechanisms, and in what contexts? While it will take time to fill that gap, research work carried out by Flagship 4 and the GEE unit, within the framework of the GAAP 2 project has led to the development of a framework for clarifying the objectives of development projects that differentiates between projects that seek to Reach, Benefit or Empower women (the RBE Framework), where

- Reaching women means including women in program activities
- Benefiting women means increasing their well-being in specific ways – like improving their income, diets, health outcomes and
- Empowering women means strengthening their ability to make and act on important decisions related to three dimensions: resources (defined to include not only access but also future claims to material, human, and social resources), agency (including processes of decision making, negotiation, and even deception and manipulation), and achievements (well-being outcomes)[16].

A key finding of the research is that projects often lack clarity as regards what they are aiming to achieve; simply reaching women does not ensure that they will benefit from a project, and even if women benefit (e.g. from increased income or better nutrition), that does not ensure that they will be empowered (e.g. through control over that income or greater participation in decision making). Similarly, empowerment may not necessarily require reach and benefit approaches. To be effective, projects need be clear about their objectives related to women and make sure that their planned strategies and activities are consistent with those objectives. In theory, therefore the RBE framework will allow them to do this, thus leading to improved project quality.

The researchers then went on to analyze the empowerment strategies of 13 projects that are part of the GAAP2 project. To quantitatively measure women's empowerment, GAAP2 is developing a project-level Women's Empowerment in Agriculture Index, or pro-WEAI. This index builds on the Women's

[14] There is a total of 6 projects in this programme
15 Johnson, N., M. Balagamwala, C. Pinkstaff, S. Theis, R. Meinzen-Dick, and A. Quisumbing. 2018. How do agricultural development projects empower women? What hasn't worked and what might. Journal of Agriculture, Gender, and Food Security 3(2):1-19.
http://agrigender.net/views/agricultural-development-projects-empowering-women-JGAFS-322018-1.
[16] Kabeer, N. 1999. "Resources, Agency, Achievements: Reflections on the Measurement of Women's Empowerment." Development and Change 30 (3): 435–464. doi:10.1111/1467-7660.00125.

Empowerment in Agriculture Index (WEAI), which was developed by IFPRI, the Oxford Poverty and Human Development Initiative, and USAID to monitor progress toward women's empowerment in the US government's Feed the Future Initiative[17]. To measure women's empowerment in agriculture at the level of a project, pro-WEAI expands on the five domains of the original WEAI—input into production, access to resources, control over income, leadership, and time use—to include additional domains that projects with explicit empowerment objectives identified as important, namely physical mobility, intra-household relationships, individual empowerment, gender-based violence, and nutrition. Revisions have also been made to some of the questions in the original five domains to make them more sensitive to the types of changes that projects seek to make. To test pro-WEAI, the draft modules are being integrated into the impact assessment plans of each of the 13 projects; all projects in the GAAP2 portfolio will have rigorous, mixed-methods impact evaluations to quantify and understand their contributions to a range of outcomes including women's empowerment. Of the 13 projects in the portfolio, 10 have now completed their evaluations. As regards the pilot exercises being conducted on the Agricultural Technical Vocational Education and Training (ATVET) for Women projects in Malawi and Benin using the WEAI4VC index, these are now completed. A validation workshop was scheduled for May of this year but due to COVID has been postponed.

Review of publications and other materials

The subject matter of this OICR i.e. the RBE framework, was actually an (unintended) byproduct of the work being carried out by GAAP2, which as noted above, is focused on the development of the project-level Women's Empowerment in Agriculture Index, or the pro-WEAI, hence the number of publications referring to RBE are somewhat limited. The original article on RBE was published in the Journal of Agriculture, Gender, and Food Security (but does not have a DOI) and was followed up by references to the tool by GiZ, NEPAD, USAID, IDRC, as well as a blog by the gender scientist at ICRISAT (all of which are referenced below). The work being done on pro WEAI is the subject of an article published in World Development as well as a number of blogs (also cited below).

Role of external/internal partnerships/support

As noted above, the development of the RBE framework emerged from the work being done by GAAP2 and entailed the active involvement of the Oxford Poverty and Human Development Initiative as well as partners from all 13 of the projects making up the portfolio such as Helen Keller International, the Grameen Foundation, Heifer International and More Milk. It is very much perceived as a collective effort with all these partners.

The GiZ-NEPAD-IFPRI partnership in Malawi and Benin is assessed very positively as a good collaborative effort between researchers and practitioners that allowed for constructive learning across these two categories of stakeholders. The collaboration with AUDA NEPAD has been key as this has ensured that research findings are brought to the African continent. AUDA NEPAD has played a lead role in the exercise and is taking the lead in the development of knowledge products that will be shared with the 54 members of the AU.

Cross Cutting Dimensions

The OICR gives a gender relevance marker of 2 i.e. principal objective, but zero (not targeted) for the other three i.e. youth, capacity development and climate change. Other cross-cutting dimensions are identified such as the RBE framework's potential to improve understanding of the approaches that projects and programs use to address other marginalized groups according to social categories such as caste, ethnicity, race, age, and religion.

[17] Alkire, S., R. Meinzen-Dick, A. Peterman, A. Quisumbing, G. Seymour, and A. Vaz. 2013. "The Women's Empowerment in Agriculture Index." *World Development* 52: 71–91. doi:10.1016/j.worlddev.2013.06.007.

Contribution to SRF and IDOs, including policies and innovations

As reported in the OICR, this research for development effort is expected to contribute to two Sub-IDOs:

- Improved capacity of women and young people to participate in decision-making (i.e. empowerment) and
- Enhanced institutional capacity of partner research organizations

The RBE framework is expected to contribute to these two objectives by encouraging projects to be clearer about their objectives related to women and making sure that their activities and indicators of success are consistent with those objectives. Without this clarity there is a real risk that projects will nominally espouse empowerment objectives, but not implement strategies to empower women, or measure whether they are achieving these stated objectives, thus contributing to the evidence base and learning. Through using the RBE framework projects are expected to be in a position to better address women's empowerment. This is reported to have been the case for the GAAP2 projects as well as GiZ/NEPAD who, on the basis of the insights derived from the application of the tool, redesigned their initial project to better address empowerment. Secondly, by better matching interventions to expected outcomes, the RBE framework will support more rigorous evaluation design and synthesis. The better projects can articulate their objectives, design strategies that align with them, and measure the outcomes with suitable indicators, the more they will be able to add to the evidence base about what works to empower women. In the case of GiZ, they have been able to draw on the findings from the application of the WEAI4VC to their two pilot projects in Benin and Malawi to improve the design of subsequent phases of those projects as well as applying the acquired learning to the other four projects making up this programme. The same will happen with the 13 GAAP2 projects which will have the results of their impact evaluations shortly. Thirdly, through its development of the pro-WEAI and the assessment of GAAP2 contributions to a range of outcomes including women's empowerment, this research work will provide a better understanding of what works and what doesn't in terms of increasing women's empowerment thus facilitating further work in this area by other concerned research organisations. And finally, through its partnership with various external partners such as AUDA NEPAD and the GAAP2 partners, relevant research has been brought to the attention of key stakeholders in developing counties thus facilitating the uptake of this research by numerous other organizations. In summary, the combination of these tools can help improve both the quality of project design as well as effectiveness and impact.

The OICR lists one associated level 4 "innovation" (589) i.e. uptake by next user and this is confirmed by the evidence that the framework has been published in a journal article and has been used by GIZ and IDRC in presentations. It is reported to have since been taken up by other donors such as USAID and the World Bank.

This OICR does not report any policies.

Relevance of outcomes to ToC for flagship

The RBE Framework, the impact assessments of GAAP2 projects and the work on WEAI4VC are in line with the ToC for Flagship 4 insofar as they contribute to three of the five stated outcomes, namely OC1: Development program implementers and investors (governments, non-governmental organizations [NGOs], United Nations [UN] institutions) use evidence, tools and methods to design and implement cost-effective nutrition- sensitive agricultural programs at scale; OC2: Researchers and evaluators, including in CGIAR and other CRPs, use evidence, tools, and methods to design high- quality evaluations of a range of nutrition-sensitive agricultural and other multisectoral programs, and continue to build evidence and OC3: Regional, international, and UN agencies and initiatives, and investors use evidence, tools, and methods to inform decisions and investment strategies to guide nutrition-sensitive agriculture programming and nutrition-sensitive policies.

Comparative Advantage and public goods

The comparative advantage of A4NH work in this area is the role it plays as an interface between research and agricultural development. Whilst implementing agencies are focused on their own portfolio of operations, A4NG can cut across project and geographical boundaries to identify gaps in research that ultimately serve the purposes of a broad spectrum of users such as project developers, funders, partner governments and evaluators. The positive experiences of GiZ-NEPAD-IFPRI noted above are a good

example of this collaborative effort between researchers and practitioners that allowed for constructive learning across these two categories of stakeholders.

Lessons learned/ Future Prospects

The RBE framework is reported to be gaining ground and is already being used by other organisations even though no active measures to increase uptake are being undertaken. In the case of the WEAI adaptations, a key issue to be addressed will be the cost of the use of WEAI4VC or pro WEAI on the project level. Although there is no doubt as to the usefulness of these indexes to measure empowerment and to feed into better designed projects, the cost of the exercise as well as the technical capacity to do this systematically is questionable. Options being considered are to build in-house capacity, reserving IFPRI input for the more technical aspects such as design of baseline and data analysis, or to apply an "abbreviated" version of the index e.g. with less indicators. Aware of this potential constraint, IFPRI is currently in the process of developing a leaner/shorter version of pro-WEAI.

Annex 6.4 OICR Template Reports[18]

OICR Number & Title OICR 3293 Innovative Delivery Models for Iron Beans Resulted in Adoption by an Estimated 442,000 Households in Rwanda

Year reported: 2019 Maturity level: 2 # Years of programmatic work: 10

Geographic location(s): Rwanda

Populations covered, estimated size and socio-demographic categories (e.g., subsistence farmers, women, adolescents, etc.) Farmers, market traders, agro dealers, food processor; women and children with iron deficiency

Key contributors to the outcome

CGIAR (FPs, other CRPs/Platforms and FPs, centers) A4NH/FP2, IFPRI/HarvestPlus, CIAT

External partners Rwanda Agricultural Board, NGOs, Agro-dealers, Min. Local Govts, Min. Health

Links to the CGIAR Strategic Results Framework: (IDOs and sub-IDOs)

SLO 2: Improved Food Security and Nutrition. As reported, it contributes towards these Sub-IDOs:

- Increased access to diverse nutrient-rich foods
- Conducive agricultural policy environment

And to these SRF 2022/2030 targets:

- # of more people, of which 50% are women, without deficiencies of one or more of the following essentials micronutrients: iron, zinc, iodine, vitamin A, folate and vitamin B12
- # of more farm households have adopted improved varieties, breeds or trees

A4NH CRP contributions to the outcome *(list any of the following)*

Innovations: Ten iron bean varieties have been developed, released, and promoted in Rwanda since 2010 through a collaborative effort the Rwanda Agricultural Board, HarvestPlus, and CIAT: RWR 2245 (bush), RWR 2154 (bush), CAB 2 (climber), MAC 44 (climber), RWV 1129 (climber), RWV 3006 (climber), RWV 3316 (climber), RWV 3317 (climber), MAC 42 (climber), RWV 2887 (climber).

Policies: Although not reported in the OICR, this delivery effort included development of a new seed certification system to support production and distribution of seed for the iron biofortified bean varieties.

Key CRP publications supporting the OICR:

[18] This template was not provided to the review team until after the first draft was due and hence was completed after the team had created their own outline.

Vaiknoras, K., Larochelle, C., Birol, E., Asare-Marfo, D., & Herrington, C. (2019). Promoting rapid and sustained adoption of biofortified crops: What we learned from iron-biofortified bean delivery approaches in Rwanda. Food Policy, 83, 271?284. https://doi.org/10.1016/j.foodpol.2018.11.003.

Haas, J. D., Luna, S. V, Lung?aho, M. G., Wenger, M. J., Murray-Kolb, L. E., Beebe, S., Egli, I. M. (2016). Consuming Iron Biofortified Beans Increases Iron Status in Rwandan Women after 128 Days in a Randomized Controlled Feeding Trial. The Journal of Nutrition, 146(8), 1586?1592. https://doi.org/10.3945/jn.115.224741.

Murray-Kolb, L. E., Wenger, M. J., Scott, S. P., Rhoten, S. E., Lungaho, M. G., & Haas, J. D. (2017). Consumption of Iron-Biofortified Beans Positively Affects Cognitive Performance in 18- to 27-Year-Old Rwandan Female College Students in an 18-Week Randomized Controlled Efficacy Trial. The Journal of Nutrition, 147(11), jn255356. https://doi.org/10.3945/jn.117.255356.

Luna, S. V, Pompano, L. M., Lung?aho, M., Gahutu, J. B., & Haas, J. D. (2020). Increased Iron Status during a Feeding Trial of Iron-Biofortified Beans Increases Physical Work Efficiency in Rwandan Women. The Journal of Nutrition. https://doi.org/10.1093/jn/nxaa016.

OICR relationship with CGIAR cross-cutting issues

Capacity development had multiple dimensions over a nine year time span. Training of different value chain actors took place relevant to their role (eg., seed multiplication, marketing). The national bean breeding program benefited from training and technical support. The national seed certification agency received special training associated with the new program for bean seed certification.

Climate change is addressed as the beans are bred to be heat and drought tolerant. Increased iron levels will offset some of the expected losses in nutrients with increased drought in the region (nutrient loss is a known climate change risk for many crops).

Gender Adoption studies took into account gender control over production and marketing. Both women and men were included in agronomic training, which was found to improve adoption.

Youth relevance is claimed due to the prevalence of anemia among young children and the potential of this technology to alleviate this deficiency and promote healthier growth and development.

Partnerships

Key partners (A4NH's engagement with each partner, and extent to which partner expectations/needs were met or not) The successful uptake of iron biofortified beans in Rwanda is the result of many different kinds of partnerships, beginning with the HarvestPlus partnership with CIAT for bean breeding with biofortification. In Rwanda, the most important partnership is with the RAB for the development and dissemination of locally adapted varieties. As discussed above, partnerships were also forged with other government programs. But beyond these fairly traditional partnerships for a CGIAR program, HarvestPlus also worked with the private sector, including seed dealers, food processors, and market vendors. The breadth of these partnerships, and the relatively speedy handoff to a new Bean Alliance group is a notable achievement.

Brief reviewer's description of the outcome (based on OICR report, documents cited, original data collected/interviews and other references)

This OICR reports on successful delivery and education efforts to promote adoption, marketing, and consumption of iron biofortified beans in Rwanda. Several iron biofortified bean varieties were released between 2010 and 2014 in Rwanda, but there were challenges in the seed delivery system that required intervention. A variety of seed distribution systems were used, including a seed payback program; a seed swap program; distribution through NGOs; and sales through agro-dealers. The latter required the establishment of seed standards for beans, as well as programs to educate farmers and ag input suppliers about the benefits of iron biofortified beans. At the same time, HarvestPlus carried out public information campaigns with consumers and bean vendors. HarvestPlus worked with policy makers at the national level to support these efforts through nutrition messaging provided by the Ministry of Health and through a "farmer promoter" program through the Ministry of Local Governments. HarvestPlus carried a number of rigorous M&E studies to document the impact of these efforts. The many complementary activities in seed dissemination and promotion led to successful adoption by over 440,000 farm households. Furthermore, iron biofortified beans account for 15 to 20% of total consumption and most consumers are aware of their nutritional benefits. Most

consumption is in farm households although there is also a premium market for sales of iron biofortified beans, and a processed product for urban consumers.

Analysis Clearly the outcomes reported in this OICR contribute directly to the SRF, IDOs, and sub-IDOs noted above. Adoption of iron biofortified beans led to reduced micronutrient deficiencies among either farm households or purchasing consumers. Because they are higher yielding and drought resistant, they provide higher incomes to adopters. The process of development and dissemination brought about a conducive policy environment for future biofortification efforts. The development of these varieties constitutes an important international public good, with dissemination now underway in neighboring countries.

Conclusions The Rwanda story shows that many different elements -- public to private, farmer to consumer -- are needed for success in delivering biofortification to the consumers who will benefit from it. HarvestPlus has developed the capacity to bring those elements together. It will be useful to continue to monitor the progress of iron biofortified beans in Rwanda, and the activities of the new Rwanda Bean Alliance, to understand the sustainability of this success. The Rwanda effort can be seen as strong proof of concept for biofortification approaches. For similar success in the future, HarvestPlus must succeed in persuading others to continue the momentum from past biofortification efforts.

OICR 2782 Aflasafe biocontrol products to reduce aflatoxin contamination are now registered in nine African countries and available at more than 30 distribution points in seven countries

Year reported: 2019 Maturity level: 1 # Years of programmatic work: approx 20

Geographic location(s): Mozambique, Nigeria, Zambia, Gambia, Burkina Faso, United Republic of Tanzania, Senegal, Kenya, Ghana

Populations covered, estimated size and socio-demographic categories (e.g., subsistence farmers, women, adolescents, etc.) Maize and groundnut farmers in the nine countries, food and feed processors, maize and groundnut consumers

Key contributors to the outcome

CGIAR (FPs, other CRPs/Platforms and FPs, centers) A4NH/FP3; IITA; MAIZE

External partners

A to Z Textile Mills Ltd., Tanzania

MAAH - Ministère de l'Agriculture et des Aménagements Hydrauliques (Burkina Faso)

MECCNAR - Ministry of Environment, Climate Change and Natural Resources (Gambia)

BAMTAARE SA

FMARD - Federal Ministry of Agriculture and Rural Development (Nigeria)

MASA - Ministério da Agricultura e Segurança Alimentar (Mozambique) / Ministry of Agriculture and Food Security

USDA - U.S. Department of Agriculture

MALF - Ministry of Agriculture, Livestock and Fisheries (Kenya)

MoA - Ministry of Agriculture (United Republic of Tanzania)

KALRO - Kenya Agricultural and Livestock Research Organization

MoFA - Ministry of Food and Agriculture (Ghana)

Ministry of Agriculture (Zambia)

MAER - Ministère de l'Agriculture et de l'Equipment Rural (Senegal)

USAID - U.S. Agency for International Development

Links to the CGIAR Strategic Results Framework: (IDOs and sub-IDOs)

This research contributes to the SLO Outcome 1 Reduced Poverty, and the 2022 Target of 100 million HH adopt improved management practices, which is directly reflected in the A4NH Phase II target: 20 million more farm households in at least 12 countries will have adopted improved varieties, breeds or trees and/or improved management practices.

This research for development effort contributes to these Sub-IDOs:

- Reduced biological and chemical hazards in the food system
- Reduced market barriers

A4NH CRP contributions to the outcome *(list any of the following)*

Innovations

152 - Aflasafe KE01 for Kenya

730 - Aflasafe GH01 and Aflasafe GH02 for Ghana

733 - Aflasafe TZ01 and Aflasafe TZ02 for Tanzania

719 - Aflasafe MWMZ01 and Aflasafe MZ02 for Mozambique

731 - Aflasafe product for Nigeria

732 - Aflasafe product ZM01 and ZM02 for Zambia

151 - Aflasafe product for the Gambia and Senegal made available for commercial use

729 - Aflasafe BF01 for Burkina Faso and potentially 10 other countries in the Sahel

Policies None reported in this OICR, but this program provided research to support policies to the Partnership for Aflatoxin Control in Africa (PACA) and to the East Africa Commission (see OICR #2780).

Key CRP publications supporting the OICR

Schreurs, F., R. Bandyopadhyay, C. Kooyman, A. Ortega-Beltran, A. Akande, et al. 2019. *Commercial products promoting plant health in African agriculture*. In: Neuenschwander, P., Tamò, M., editors. Critical issues in plant health: 50 years of research in African agriculture Burleigh Dodds Science Publishing, Cambridge, UK. p. 345–364 doi: 10.19103/AS.2018.0043.14

A. Ortega-Beltran, M. Konlambigue, T. Falade, J. Atehnkeng, J.Augusto, C. Mutegi, L.A. Senghor, A. Akande, J. Akello, G. Mahuku, A. Mauro, P.J. Cotty, and R. Bandyopadhyay. 2018. *Managing Aflatoxins with Aflasafe: A Training of Trainers Manual*. IITA, Ibadan, Nigeria. 71pp

IITA, Chemonics, and Dalberg. December 2019. *Guides to the commercialization process: Market Assessment and Strategy Development, Investor Selection, Structuring of the Business Relationship, and Implementation of the Business Development Strategy*. Unpublished papers from the ATTC project.

Konlambigue, et al. November 2019. *Our journey from incubation to market: Status of Aflasafe Commercialisation in Africa*, Brief prepared by the ATTC project team for the first Aflasafe for Africa Conference.

R. Bandyopadhyay1, A. Ortega-Beltran, A. Akande, C. Mutegi, J. Atehnkeng, L. Kaptoge, A.L. Senghor, B.N. Adhikari, and P.J. Cotty. Biological control of aflatoxins in Africa: current status and potential challenges in the face of climate change. World Mycotoxin Journal, 2016; 9 (5): 771-789.

L. A. Senghor, A. Ortega-Beltran, J. Atehnkeng, K. A. Callicott, P. J. Cotty, and R. Bandyopadhyay. The Atoxigenic Biocontrol Product Aflasafe SN01 Is a Valuable Tool to Mitigate Aflatoxin Contamination of Both Maize and Groundnut Cultivated in Senegal. Plant Disease. 2020. 104:510-520. https://doi.org/10.1094/PDIS-03-19-0575-RE

OICR relationship with CGIAR cross-cutting issues

Capacity development

Training workshops for regulators to provide education about issues involved in biopesticide registration were held in three regions across Africa. Biopesticides had not been approved before in many countries, and training of regulators provided them with the appropriate background in risk assessment and understanding of the technology. This capacity development can serve as a foundation for future regulation of biocontrol products.

Adaptive research in each country was carried out in collaboration with the NARS. One example is Senegal, where 5 years of trials were carried out to identify local strains and to test their effectiveness in collaboration with the NARS plant pathology unit (Direction de Protection Vegetaux). The result was a new product, information to support product registration, and a collaborative publication (Senghor et. al, 2020).

Climate change none reported

Gender none reported

Youth none reported

Partnerships

External partnerships have been key to this effort, beginning with NARS in the nine countries, national policy makers, regional policy organizations, sub-contractors in the commercialization project, and private sector firms. This OICR success story is notable for the number of successful partnerships that have supported it in different ways. Threading together so many different kinds of support and

collaboration required a strong vision for how to proceed through the research for development process.

Brief reviewer's description of the outcome (based on OICR report, documents cited, original data collected/interviews and other references)

Starting in the 1990s, researchers at IITA began adapting a natural control method for aflatoxins on maize that had been developed by the USDA-ARS.[19] In simple lay terms, the aflasafe technology uses non-toxic strains of the fungus to crowd out the toxic strains. Basic research to identify strains in Africa that are non-toxic and to characterize the genetic determinants of atoxicity was carried out at IITA. Then adapting this knowledge to create a product that could be used in farmer's fields required further applied research, including understanding the sustainability of the approach, its impact on post-harvest emergence of aflatoxins, and its role in integrated management. IITA began manufacturing Aflasafe in Nigeria, and now uses that plant as a training facility. During A4NH Phase I, a major World Bank project in Nigeria subsidized marketing and adoption there for use in maize production (reported in OICR #3351). This OICR reports on the more recent evolution of this technology towards adoption and scale under Phase II. As aflasafe is introduced into new countries and/or for use on different crops, new adaptive research is required to identify and test atoxic strains. IITA has carried out this research in cooperation with national systems. The data are developed to support registration of the product for use as a biological control. An donor funded project has supported a commercialization effort to identify manufacturers and distributors, and assist with market development. As the OICR reports, Aflasafe is now registered for use in 9 countries, and is distributed in 7 countries.

Analysis

Aflasafe can reduce aflatoxins, lead to higher yields, and/or reduced storage losses. Increased incomes (reduced poverty) can result from market access or price premiums associated with these outcomes. Reduction of aflatoxins improves human and animal health and improves food safety, both of which are sub-IDOs to SLO 2: Improved Food and Nutrition Security for Health.

According the A4NH 2019 Annual report, approximately 95,000 farmers treated more than 120,000 hectares with Aflasafe™ in 2019, supporting production of maize and groundnut with safe aflatoxin levels across nine countries in sub-Saharan Africa. This fairly modest uptake reflects the very recent opening of manufacturing in most of the countries listed in the OICR. There is preliminary evidence based on the Nigeria experience, that higher crop yields, increased farm incomes, and consumption of safer food might be outcomes that could be expected in the future. But to track these outcomes would require greater M&E efforts than currently envisioned.

Conclusions

Adapting and developing this technology for its use throughout Africa is certainly well within the comparative advantage of the CGIAR and constitutes a significant global public good. It has the potential to provide expanded benefits to African producers and consumers in the future.

The Aflasafe commercialization project can be considered an important test for a particular strategy, with potential lessons for delivery of other technologies. As adoption evolves in countries where Aflasafe is available, it would be valuable to monitor how Aflasafe influences farm household income and the safety of the food supply. Understanding this final step towards the outcomes envisioned in the ToC should be a high priority. At the same time, there is a clear need to carry out an evaluation of the commercialization effort in order to better inform future delivery strategies.

[19] Aflatoxins are a naturally occurring food safety hazard on many crops, and occur more frequently in the tropics. High levels of aflatoxin can be deadly, but the more important health impacts come through long term exposure that has been linked to liver cancer and possibly to child stunting. Aflatoxins on animal feedstuffs are known to reduce animal growth and productivity.

OICR 2734: "Reach, Benefit, Empower Framework of indicators for monitoring programs and policies incorporated into trainings conducted by partners"

Year reported: 2018 Maturity level:1 # Years of programmatic work: 4

Geographic location(s): global

Populations covered: mainly targets women

Key contributors to the outcome

Flagship 4 and GEE

GAAP 2 projects, GiZ and NEPAD

Links to the CGIAR Strategic Results Framework: (IDOs and sub-IDOs)

As reported in the OICR, this research for development effort is expected to contribute to two Sub-IDOs: Improved capacity of women and young people to participate in decision-making (i.e. empowerment) and Enhanced institutional capacity of partner research organizations

A4NH CRP contributions to the outcome *(list any of the following)*

Innovations: one associated level 4 "innovation" (589) i.e. uptake by next user and this is confirmed by the evidence that the framework has been published in a journal article and has been used by GIZ and IDRC in presentations. It is reported to have since been taken up by other donors such as USAID and the World Bank.

Policies: no policies reported

Key CRP publications supporting the OICR: The subject matter of this OICR i.e. the RBE framework, was actually an (unintended) byproduct of the work being carried out by GAAP2, which is focused on the development of the project-level Women's Empowerment in Agriculture Index, or the pro-WEAI, hence the number of publications referring to RBE are somewhat limited. The original article on RBE was published in the Journal of Agriculture, Gender, and Food Security (but does not have a DOI) and was followed up by references to the tool by GiZ, NEPAD, USAID, IDRC, as well as a blog by the gender scientist at ICRISAT[20].

OICR relationship with CGIAR cross-cutting issues

Capacity development: not targeted

Climate change: not targeted

Gender: relevance marker level 2

Youth: not targeted

Partnerships

The development of the RBE Framework emerged from the work being done by GAAP2 and entailed the active involvement of the Oxford Poverty and Human Development Initiative as well as partners from all 13 of the projects making up the portfolio such as Helen Keller International, the Grameen Foundation, Heifer International and More Milk. It is very much perceived as a collective effort with all these partners. The GiZ-NEPAD-IFPRI partnership in Malawi and Benin is assessed very positively and

[20] References listed in OICR:
Johnson, N., M. Balagamwala, C. Pinkstaff, S. Theis, R. Meinzen-Dick, and A. Quisumbing. 2018. How do agricultural development projects empower women? What hasn't worked and what might. Journal of Agriculture, Gender, and Food Security 3(2):1-19.
http://agrigender.net/views/agricultural-development-projects-empowering-women-JGAFS-322018-1.
https://www.nepad.org/cop/agricultural-technical-vocational-education-and-training-atvet-and-atvet-
Doing things differently: gender-transformative skills development in agriculture
By Miriam Heidtmann https://www.rural21.com/english/current-issue/detail/article/doing-things-differently-gender-transfor mative-skills-development-in-agriculture-00002938/
Misuse of the term 'empowerment' in daily conversations. Esther Njuguna-Mungai, Gender Scientist, ICRISAT
http://tropicallegumes.icrisat.org/misuse-of-the-term-empowerment-in-daily-conversations/

the collaboration with AUDA NEPAD has been key as this has ensured that research findings are brought to the African continent. AUDA NEPAD has played a lead role in the exercise and is taking the lead in the development of knowledge products that will be shared with the 54 members of the AU.

Brief reviewer's description of the outcome (based on OICR report, documents cited, original data collected/interviews and other references)

The RBE Framework will allow projects to be clearer about their objectives related to women and to make sure their activities are consistent with those objectives. Through using the RBE framework projects are expected to be in a position to better address women's empowerment. This is reported to have been the case for the GAAP2 projects as well as GiZ/NEPAD who, on the basis of the insights derived from the application of the tool, redesigned their initial project to better address empowerment. Secondly, by better matching interventions to expected outcomes, the RBE framework will support more rigorous evaluation design and synthesis. The better projects can articulate their objectives, design strategies that align with them, and measure the outcomes with suitable indicators, the more they will be able to add to the evidence base about what works to empower women. In the case of GiZ, they have been able to draw on the findings from the application of the WEAI4VC to their two pilot projects in Benin and Malawi to improve the design of subsequent phases of those projects as well as applying the acquired learning to the other four projects making up this programme. The same will happen with the 13 GAAP2 projects which will have the results of their impact evaluations shortly. Thirdly, through its development of the pro-WEAI and the assessment of GAAP2 contributions to a range of outcomes including women's empowerment, this research work will provide a better understanding of what works and what doesn't in terms of increasing women's empowerment. And finally, through its partnership with various external partners such as AUDA NEPAD and the GAAP2 partners, relevant research has been brought to the attention of key stakeholders in developing counties.

Analysis

The RBE Framework, the impact assessments of GAAP2 projects and the work on WEAI4VC are in line with the ToC for Flagship 4 insofar as they contribute to three of the five stated outcomes, namely OC1: Development program implementers and investors (governments, non-governmental organizations [NGOs], United Nations [UN] institutions) use evidence, tools and methods to design and implement cost-effective nutrition- sensitive agricultural programs at scale; OC2: Researchers and evaluators, including in CGIAR and other CRPs, use evidence, tools, and methods to design high-quality evaluations of a range of nutrition-sensitive agricultural and other multisectoral programs, and continue to build evidence and OC3: Regional, international, and UN agencies and initiatives, and investors use evidence, tools, and methods to inform decisions and investment strategies to guide nutrition-sensitive agriculture programming and nutrition-sensitive policies.

Conclusions

The combined use of the RBE Framework and the adapted versions of the WEAI will help improve both the quality of project design as well as effectiveness and impact. This work represents a good example of the practical benefits to be derived from collaborative efforts between researchers and practitioners that has allowed for constructive learning across these two categories of stakeholders.

Annex 7: Theory of Change Analysis and Recommendations for Flagships 1 and 4

Annex 7.1 Assessment of the ToC for Flagship 1 Food Systems for Healthier Diets

FP 1's Theory of Change (ToC) is presented in various formats[21].

According to the narrative provided in the "Reference Document for Phase II Theories of Change" (January 2019), 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.

The four **outcomes** to be achieved by 2022 are listed as:

- Partners and other CRPs incorporate nutrition, health, and gender in agri-food value chains and food system programs.
- Partners, including value chain actors, use evidence from impact evaluations when making operational and investment decisions.
- Public-private partnerships formed to promote implementation of A4NH strategies for agri-food value chain/food system innovations and
- Key partners, stakeholders, and institutions (including national and local policy makers, private sector, consumer organizations, and other CRPs) are effectively implementing the evidence and lessons learned at scale in their food system related strategies and policy agenda.

And in turn, these outcomes are to be achieved 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
- 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
- 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

The link between FP1's ToC and the overall ToC for A4NH is described as:

This flagship's contribution to CGIAR's 2022 target will be 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.

And in terms of contributions to System Level Outcomes (SLOs) and Intermediate Development Outcomes (IDOs) and sub IDOs, "FP 1 will directly address 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 defined by corresponding IDOs as: equity and inclusion achieved; enabling environment improved and national partners and beneficiaries enabled".

[21] Information sourced from the document entitled "REFERENCE DOCUMENT for PHASE II THEORIES OF CHANGE" (January 2019)

There are a number of weaknesses in this version of the ToC. In the first place, the overarching goal: "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" is a lower level result than the stated outcomes e.g. "key partners, stakeholders, and institutions (including national and local policy makers, private sector, consumer organizations, and other CRPs) are effectively implementing the evidence and lessons learned at scale in their food system related strategies and policy agenda". Similarly, in the case of the "outputs" that will deliver these outcomes, "improving the performance of multiple nutrient-rich agri-food value chains" is a higher level result than some of the stated outcomes e.g. partners, including value chain actors, use evidence from impact evaluations when making operational and investment decisions. In the logic of a ToC, outputs lead to outcomes which in turn contribute to an overall objective (or overarching goal), whereas in this case, as currently formulated this logic is skewed. Another weakness identified is the gap between the stated overarching goal and outcomes, and the broader SLO and IDO goals e.g. in what way will understanding how changes in food systems can lead to healthier diets, and identifying and testing entry points for interventions to make those changes (OO), contribute to 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. The leap between these two results is huge. Also the link between the identified outputs, outcomes and overarching goal on the one hand and SLO1 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) is not clear either i.e. there are no explicit outputs or outcomes addressing any of these issues. Confusingly, in the table that maps the different flagships to the SLOs, IDOs and sub IDOs[22], FP1 is not mapped to any of the results linked to SLO1.

The ToC is then presented as a Results Framework with a different set of outputs[23] (which are formulated as clusters of activities rather than outputs) namely:

1. Analysis of the interactions between food systems transformations and current transitions in diets, and implications for nutrition and health outcomes at national and subnational level in target countries
2. Interventions identified, designed and tested with platforms, partners and stakeholders
3. Support to scaling up through targeted capacity building, knowledge, dissemination, policy engagement

And a different set of "research outcomes" which will be achieved through an "agri-food value chains" pathway and a "policies" pathway. These research outcomes are then linked to 9 sub IDOs and 3 IDOs. Here again, the links between the levels of the results framework (output – outcome- IDO) are not always clear e.g. how will the planned outputs bring about a change in consumer behaviour and how will the stated outcomes lead to enhanced adaptive capacity to climate risks or improved capacity of women and young people to participate?

This FP theory of change is then broken down into ToC for three (alternative) "Impact Pathways", namely a "Diagnosis and Foresight Impact Pathway"; an "Agri-Food Value Chains Pathway" and a "Policies Impact Pathway".

This results in an additional complication as the FPs are structured around clearly defined "Clusters of Activities" (CoA) rather than these "Impact Pathways" which further undermines their operational value. In the case of FP1 these CoA are:

CoA 1.1: Diagnosis and Foresight: Linking Dietary and Food Systems Transformation

CoA 1.2: Food System Innovations and

CoA 1.3: Upscaling and Anchoring of Food System Transformation

Furthermore, there are weaknesses in each of these Impact Pathway ToC and a lack of clear linkages with what is presented as the overall ToC for FP1. Weaknesses include the poor formulation and incorrect

[22] Table 1 AN4H contributions by flagship to the 2030 Agenda for Sustainable Development and the CGIAR Strategy and Results Framework
[23] These "outputs" largely reflect the three "Clusters of Activities" (CoA) of the flagship.

identification of the different results levels in the ToC e.g. in the case of the ToC for Diagnosis and Foresight, impact is defined as: Research partner outputs are more likely to generate understanding, evidence and leverage points for improving diets through a food system perspective. In the first place, it is not clear what is meant by "more likely" (more likely than what?), and in the second place, this is not an impact level statement as it is a means to an end, rather than an end in and of itself. A more appropriate impact statement would have been to contribute to improved diets (through a food system approach). On the other hand, the impact statements for the second and third impact pathways are both related to improved diets (increased diet quality of young women, children and vulnerable populations in the case of the former, and increased diet quality of consumers in the case of the latter). It is not clear why the Agri-Food Value Chains impact pathway will only lead to increased diet quality of young women, children and vulnerable populations rather than the population at large (or "consumers") as in the case of the policies impact pathway.

Another major weakness is that no indicators are identified to measure progress along the ToCs. Each of the result statements in the ToC i.e. impact, outcomes and outputs should have included at least one indicator to measure progress. The lack of associated indicators means that tracking progress towards achievement of goals is not possible thus compromising effective project monitoring and learning as well as reporting.

Conclusion

The ToC (s) for FP1 are not well developed and instead of facilitating understanding and serving as useful management tools, they are adding unnecessary layers of complexity and confusion. This complexity is reflected in the equally complex and burdensome reporting system which is discussed separately.

Recommendation

Although there is little purpose in adapting the ToCs now, lessons learnt should be drawn from this experience with a view to improving the future generation of ToCs for CGIAR research programmes. By way of feeding into this learning process, the alternative, broad outlines of a more streamlined and operational ToC for FP1 are put forward:

In the first place, it is not considered advisable to have developed specific ToCs for each impact pathway as this encourages a more siloed approach to project planning and management. It also tends to obscure the sequential nature of different work or activity clusters e.g. the obvious sequential links between CoA 1.1 and CoA 1.2 and between CoA 1.2 and CoA 1.3. One of the main benefits of a well-defined ToC is to ensure linkages between different project or programme components are kept visible thus encouraging a holistic approach.

A more appropriate overarching goal for FP1 would therefore have been to contribute to improved diets for poor and vulnerable people (IDO 4).

Planned outcomes would have been:

Outcome 1: increased demand for healthier food

Outcome 2: improved performance of multiple nutrient-rich, agri-food value chains

Outcome 3: improved policy environment

And outputs would include a.o.: suite of metrics, analytical methods and tools for food system-diets diagnosis, foresight and impact assessments (including environmental I.A.), diet quality indicators, food-based dietary guidelines, increased awareness (of the importance of incorporation of diet considerations within a food system approach), food system innovations, policy analyses, policy debates ..

The assumptions associated with this ToC i.e. the assumptions that need to hold for this theory of change to deliver as planned would include a.o.: continuation of the strong (inter) national priority given to diets and nutrition, and food system approaches; willingness of partners (CRPs, CGIAR centres, local research partners) to use the proposed metrics, methods and tools; willingness of farmers to produce healthier foods; information about healthier diets reaches targeted population, affordability and accessibility of healthier foods.

Using the ToC for planning and management

Once the ToC is developed it can be used to ensure the relevance of all planned activities and outputs e.g. the annual POWB exercise, by mapping them to agreed results. It also helps to identify any gaps in the proposed workplan e.g. insufficient activities or outputs to deliver on a planned outcome. The ToC also serves project management functions such as monitoring and reporting. Once the different levels of results in the ToC are agreed, indicators need to be established to measure progress towards their achievement. By way of example, an indicator to measure Outcome 1: increased demand for healthier food could be volume or value of sales of healthier food products; for Outcome 2: improved performance of multiple nutrient-rich, agri-food value chains, it could be number of value chains with improved nutritional value while Outcome 3: improved policy environment could be measured by number of target countries with improved policy environments. For outputs, indicators would be e.g. number of food-based dietary guidelines developed, number of food system innovations etc. For each indicator, realistic targets (to be achieved by the end of the project cycle) need to be set e.g. 4 food based dietary guidelines developed or value chain partners from all 4 targeted countries implement at least 2 interventions per country etc.. It is only once these targets are established that milestones can be identified e.g. if the target is 8 nutrient-rich, agri-food value chains in all four countries by 2021 then milestones for 2018 might be 2 nutrient-rich, agri-food value chains in 2 countries, 6 nutrient-rich, agri-food value chains in 3 countries by 2019 etc. It is important to note that milestones without end targets are meaningless as milestones simply indicate progress along a trajectory towards a final goal.

Annex 7.2 Assessment of the ToC for Flagship 4 SPEAR

FP 4's Theory of Change (ToC) is presented in various formats[24].

According to the narrative provided in the "Reference Document for Phase II Theories of Change" (January 2019), the main objective of Flagship 4 is to understand and enhance agriculture's contribution to improving nutrition at scale, aiming to:

1. Understand, document, and enhance the impact of nutrition-sensitive agricultural programs on dietary quality and health- and nutrition-related outcomes in children, adolescent girls, and women of reproductive age;
2. Understand and document the barriers and opportunities, and test approaches for strengthening enabling environments for agriculture to support nutrition and health goals; and
3. Strengthen capacity and leadership to promote evidence-informed decision making along the policy, program development, and implementation continuum, to enhance the impact of agriculture on nutrition- and health- relevant policy and programming.

The narrative then goes on to identify five **outcomes** to be achieved by 2022:

OC1: Development program implementers and investors (governments, non-governmental organizations [NGOs], United Nations [UN] institutions) use evidence, tools and methods to design and implement cost-effective nutrition- sensitive agricultural programs at scale.

OC2: Researchers and evaluators, including in CGIAR and other CRPs, use evidence, tools, and methods to design high- quality evaluations of a range of nutrition-sensitive agricultural and other multisectoral programs, and continue to build evidence.

OC3: Regional, international, and UN agencies and initiatives, and investors use evidence, tools, and methods to inform decisions and investment strategies to guide nutrition-sensitive agriculture programming and nutrition-sensitive policies.

OC4: National policymakers and shapers from different sectors, civil society, and industry engage in policy environment analysis/stories of change in 7 focal countries: Bangladesh, Ethiopia, India (state level), Nepal, Tanzania, Viet Nam, and Zambia.

[24] Information sourced from the document entitled "REFERENCE DOCUMENT for PHASE II THEORIES OF CHANGE" (January 2019)

OC5: Stakeholders from different sectors, governments, UN institutions, civil society, and industry, including CGIAR and other CRPs, have improved capacity to generate and use evidence to improve nutrition-sensitive agricultural programming, nutrition-sensitive policymaking, and implementation.

No outputs are identified in this section.

The link between FP4's ToC and the overall ToC for A4NH is described as:

"These outcomes will contribute to the 2022 CGIAR target of 73 million people being without deficiencies in key micronutrients in 10 focal countries".

And in terms of contributions to System Level Outcomes (SLOs) and Intermediate Development Outcomes (IDOs) and sub IDOs, "This flagship will impact the second system-level outcome (SLO2) on improved food and nutrition security for health, with the potential to contribute to SLO1 on reduced poverty. We will focus primarily on undernutrition, and also consider the growing challenge of overweight and obesity. The three CoAs will contribute indirectly to all three intermediate development outcomes (IDOs) under SLO2. We envision short term impact through the IDO on increased incomes and employment and long-term impact by building human capita".

There are a number of weaknesses in this version of the ToC. In the first place, the "main objective" should be the higher-level objective to which this programme will contribute (this is the generally accepted definition of overall or main, or overarching, objective). However, in this case, the main objective is a relatively "low level" result e.g. it refers to "understanding" which is a means to an end rather than an end in and of itself. This incorrect formulation leads to the identification of a further series of results to which this main objective will lead which are also lower level results i.e. understanding, documenting and strengthened capacities and leadership etc. which are more on output than overall objective level. As regards the planned outcomes, whilst OC1 and OC3 can be considered as outcomes as they refer to a change in behaviour, the other three: "Researchers and evaluators, including in CGIAR and other CRPs, use evidence, tools, and methods to design high- quality evaluations of a range of nutrition-sensitive agricultural and other multisectoral programs, and continue to build evidence"; "National policymakers and shapers from different sectors, civil society, and industry engage in policy environment analysis/stories of change in 7 focal countries" and "Stakeholders from different sectors, governments, UN institutions, civil society, and industry, including CGIAR and other CRPs, have improved capacity to generate and use evidence to improve nutrition-sensitive agricultural programming, nutrition-sensitive policymaking, and implementation" are outputs; the latter is in fact identified as an output in the Results Framework for FP4 (see below). In summary, in the logic of a ToC, outputs lead to outcomes which in turn contribute to an overall objective (or main goal), whereas in this case, as currently formulated this logic is skewed. Another weakness identified is the gap between the stated main objective and outcomes, and the broader SLO and IDO goals e.g. in what way will stories of change in 7 focal countries, contribute to the target of 73 million people being without deficiencies in key micronutrients in 10 focal countries?

The ToC is then presented as a Results Framework which includes 4 well-defined outputs namely:

1. Strong evidence on impacts of IAN programs and policies and on program cost effectiveness
2. Better understanding of the pathways of impact and synergies in IAN programs, policies and policy processes
3. New tools and methods to assess the impact of IAN programs. policies and policy processes
4. Enhanced capacity, leadership and engagement at country level with key stakeholders in the design, implementation and evaluation of IAN programs and policies

Research outcomes are presented using the alternative methodology of a "policies" pathway and a "development programs" pathway. These research outcomes (which are largely consistent with the previously identified outcomes), are then linked to 15 sub IDOs (plus " all sub IDOs for National partners and beneficiaries enabled although this does not appear in the CGIAR as an IDO) and 5 IDOs. Here again, the links between the levels of the results framework (outcome- IDO) are not always clear.

An additional complication is that the FPs are structured around clearly defined "Clusters of Activities" (CoA) rather than these "Impact Pathways" which further undermines the operational value of the ToC. In the case of FP4 these CoA are:

CoA 4.1: Nutrition sensitive agricultural programmes (NSAP)

CoA 4.2: Supporting country outcomes through research on enabling environments (SCORE)

CoA 4.3: Capacity, Collaboration, Convening (CCC)

Although there was an intention to develop more elaborate theories of change (ToCs) in which the roles of, and synergies between, the three CoAs will clarified this was not carried out.

Another major weakness is that no indicators are identified to measure progress along the ToCs. Each of the result statements in the ToC i.e. impact, outcomes and outputs should have included at least one indicator to measure progress. The lack of associated indicators means that tracking progress towards achievement of goals is not possible thus compromising effective project monitoring and learning as well as reporting.

Conclusion

Due to the weaknesses and complexities identified above, the ToC for FP4 is not currently used by FP staff and is not perceived as a useful working tool to support management and learning.

Recommendation

Although there is little purpose in adapting the ToCs now, lessons learnt should be drawn from this experience with a view to improving the future generation of ToCs for CGIAR research programmes. By way of feeding into this learning process, the alternative, broad outlines of a more streamlined and operational ToC for FP4 are put forward:

A more appropriate overall objective for FP4 would have been to contribute to improved food and nutrition security for health (SLO 2).

Planned outcomes[25] would have included:

Outcome 1: Implementation of cost-effective nutrition- (and health) sensitive agricultural programs at scale

Outcome 2: Evidence based nutrition-sensitive agriculture programming and nutrition- (and health) sensitive policies

And outputs would include a.o.: quality evaluations (of a range of nutrition- (and health) sensitive agricultural and other multisectoral programs); policy environment analysis/stories of change; tools and methods to assess the impact of programs. policies and policy processes and enhanced capacity, leadership and engagement at country level with key stakeholders in the design, implementation and evaluation of IAN programs and policies.

The assumptions associated with this ToC i.e. the assumptions that need to hold for this theory of change to deliver as planned would include a.o.: continuation of the strong (inter) national priority given to diets and nutrition, and food system approaches; willingness of partners (CRPs, CGIAR centres, local research partners) to use the proposed metrics, methods and tools and willingness of national and sub national counterparts to engage in policy dialogue.

Using the ToC for planning and management

Once the ToC is developed it can be used to ensure the relevance of all planned activities and outputs e.g. the annual POWB exercise, by mapping them to agreed results. It also helps to identify any gaps in the proposed workplan e.g. insufficient activities or outputs to deliver on a planned outcome. The ToC also serves project management functions such as monitoring and reporting. Once the different levels of results in the ToC are agreed, indicators need to be established to measure progress towards their achievement. By way of example, an indicator to measure Outcome 1: Implementation of cost-effective nutrition- (and health) sensitive agricultural programs at scale could be number of cost-effective nutrition- (and health) sensitive agricultural programs implemented at scale; for Outcome 2: Evidence based nutrition-sensitive agriculture programming and nutrition- (and health) sensitive policies, it could

[25] Other outcomes related to the work of this FP on cross cutting issues such as gender and equity and climate change.

be number of governments implementing evidence based nutrition-sensitive agriculture programming and nutrition- (and health)sensitive policies and/or number of proposals developed in collaboration with program implementers, relying on A4NH results on (gendered) impacts and cost-effectiveness in nutrition-sensitive agricultural programs. For outputs, indicators would be e.g. number of policy environment analysis/stories of change developed etc. For each indicator, realistic targets (to be achieved by the end of the project cycle) need to be set e.g. stories of change completed in 7 focal countries. It is only once these targets are established that milestones can be identified e.g. if the target is stories of change in 7 focal countries by 2021 then milestones might be 2 by 2019, 5 by 2020 etc. It is important to note that milestones without end targets are meaningless as milestones simply indicate progress along a trajectory towards a final goal.

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