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Uncovering the Pathways to Gender Equality and Women's Empowerment through Agricultural Research for Development

Lessons from the Feed the Future Innovation Labs

Sarah Eissler

Elizabeth Bryan

Marilia Magalhaes

Natural Resources and Resilience Unit

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

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AUTHORS

Sarah Eissler (sarah.e.eissler@gmail.com) is an Independent Consultant.

Elizabeth Bryan (e.bryan@cgiar.org) is a Research Fellow in the Natural Resources and Resilience (NRR) Unit of the International Food Policy Research Institute (IFPRI), Washington, DC.

Marilia Magalhaes (m.magalhaes@cgiar.org) is a Senior Research Analyst in IFPRI's NRR Unit, Washington, DC.

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ABSTRACT

Gender equality and women's empowerment are important development goals for their intrinsic value as well as for achieving other important wellbeing outcomes, such as improved health, nutrition, and food security. Agricultural research for development plays an important role in understanding gender relations, dynamics, and inequalities and in identifying effective strategies and interventions to achieve these goals. The Feed the Future Innovation Labs (ILs) were initiatives supported by the United States Agency for International Development (USAID) and led by U.S. universities, in partnership with international and national research institutes, with the aim to achieve poverty reduction, food security, nutrition, and resilience objectives. The ILs also aimed to facilitate women's empowerment and address gender inequality in agri-food systems (AFS).

This study aims to document, categorize, and identify learnings from gender-related research produced by the ILs through an extensive desk review and key informant interviews (KIIs) with gender focal points, researchers, and directors at the ILs. While recognizing the importance of capacity building for gender-related research, we only look at research products and do not review capacity building or other training materials for gender-related research produced by the ILs. As this study is focused on understanding gender-related learnings, we also do not include gender-blind research products produced by the ILs. Based on the final set of research outputs that have at least some focus on gender, we then analyze the gender-related research findings using the reach, benefit, empower, and transform framework. In addition, we also explore the factors that enabled ILs to prioritize and produce gender-related research and learnings.

We draw lessons about the types of research studies that have been carried out under the ILs and the insights that can be gleaned from these studies for designing agricultural innovations and interventions and understanding what works to address gender inequalities in agrifood systems. Much of this work was gender focused and diagnostic or formative. Fewer research studies employed causal methods to understand how interventions are influencing gender equality and women's empowerment in agriculture. Only a subset of research focused on specific innovations or interventions, which suggests more research is needed in this area, particularly as new innovations are being tested and scaled, as was the objective of many of the ILs. We highlight areas where additional research is needed to inform investments and interventions going forward, such as an increase in integrating gender-informed approaches in research across disciplines, gender-related research that employs causal methods, and in understanding the impacts of interventions that are gender-transformative. Finally, we identify key enabling factors that helped ILs prioritize gender integration, such as institutional leadership's support for gender integration, sufficient time and budgets earmarked for gender work and staff, and ensuring staff responsible for gender-related research have requisite skills, expertise, and communication skills to work across interdisciplinary teams. Current and future agricultural research for development projects should prioritize gender-related research across their portfolios to strengthen attention to understanding how innovations and interventions can influence gender equality and women's empowerment in agriculture.

Keywords: Innovation labs, gender equality, women's empowerment, agricultural research for development

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ACRONYMS

AFS	Agri-food systems
CCD	Community Concept Drawing
DEC	Development Experience Clearinghouse
FTF	Feed the Future
GCAN	Gender, Climate Change, and Nutrition
IFPRI	International Food Policy Research Institute
ILs	Innovation Labs
KII	Key Informant Interview
LAC	Latin America and the Caribbean
PEEP	Participatory Ex-antE framework for Plant breeding
PRCI	The Innovation Lab for Food Policy Research, Capacity, and Influence
RBET	Reach, Benefit, Empower and Transform
RCT	Randomized control trial
SBCC	Social and behavior change communication
SDG	Sustainable Development Goals
USAID	United States Agency for International Development
WEAI	Women's Empowerment in Agriculture Index
WEFI	Women's Empowerment in Fisheries Index
WELI	Women's Empowerment in Livestock Index
WEE	Women's Economic Empowerment

INTRODUCTION

Gender equality and women's empowerment are important goals of the sustainable development agenda. Sustainable Development Goal (SDG) 5 targets specific goals related to these issues, while other gender equality objectives are integrated across the other SDGs, including ending hunger, achieving food security, and improving nutrition. The United States Agency for International Development's (USAID) 2023 *Gender Equality and Women's Empowerment Policy* emphasized that "gender equality and women's and girls' empowerment are fundamental for the realization of human rights and key to effective and sustainable development outcomes" and that USAID's work should "advance gender equality and women's empowerment around the world." While gender equality and women's empowerment are important aims for their intrinsic value, research shows that women's empowerment is also an instrument for achieving other development outcomes, especially improved economic outcomes, household diets and children's nutrition (Quisumbing et al. 2023a; Anderson et al. 2021). Yet, gender inequality has remained a persistent challenge despite decades of effort to address this problem. Reviews of agricultural development interventions that aimed to strengthen women's empowerment found that few projects actually had significant impacts (Quisumbing et al. 2024; Johnson et al. 2018). The authors concluded that the strategies of this, albeit small, sample of interventions, which mostly aimed to reach women with resources and services or ensure that activities benefitted women, were insufficient to support increases in women's agency (ibid). In a separate study, Quisumbing et al. (2023b) found that among another set of interventions, group-based approaches and household decision-making interventions had more notable impacts on indicators of women's empowerment by directly addressing unequal decision-making dynamics and creating enabling conditions for women's empowerment (Quisumbing et al. 2023b).

These reviews led to the development of the reach, benefit, empower, and transform (RBET) framework, which highlights how programming approaches must align with the outcomes they wish to achieve and select indicators that measure progress towards those outcomes. Interventions that ensure women have equal opportunity to participate in activities (reach) may not improve women's welfare (benefit) or increase their agency (empower). Similarly, interventions that increase women's welfare (benefit), such as their diet diversity, may not increase women's ability to make strategic decisions in their own lives (empower). Facilitating women's empowerment likely goes beyond focusing on women program participants by directly supporting women's decision-making authority (empower), addressing unequal gender norms and structural inequalities on a larger scale, working with men, and mobilizing collective action (transform).

USAID's Feed the Future (FTF) Innovation Labs (ILs) were launched in 2010 as a core component of the Feed the Future program, focused on agricultural research for development. In alignment with Feed the Future's Global Food Security Strategy, the ILs aimed to reduce poverty, hunger and malnutrition in low-income countries through research and innovation led by U.S. universities, in partnership with international and national research institutes. The ILs were a network of research programs that targeted critical challenges in agriculture and food systems research, from nutrition and food safety to livestock and pest management, and have generated applied research, technologies, and policy recommendations based on work in over 30 countries. While consistent in their overall goal to reduce poverty, global hunger, and

malnutrition, they did not follow a specific implementation model. As such, the gendered research components were integrated in different ways and were not always tied to a specific intervention. But strengthening women's empowerment was an additional aim of the ILs, and many of them had developed and/or piloted various approaches that aimed to enhance women's economic security in agri-food systems (AFS). These include engaging women in agri-food supply chains (Rubin et al. 2010; Rubin et al. 2019), building women's climate resilience capacities (Muhanguzi et al. 2023), and facilitating the development and adoption of agricultural technologies and practices that women prefer (Manfre et al. 2017). Because the ILs were research programs that generated technologies and approaches, we would expect that much of their research is concentrated at the earlier stages of the innovation design cycle, such as formative research or pilot studies. Approaches to increase women's active engagement in the innovation design cycle and the diffusion of technologies were also explored. While a lot of gender-related research was carried out across ILs, these efforts were not been well documented or mapped to an overall strategy for women's economic empowerment (WEE) in AFS.

With the recent reductions in funding for US foreign assistance and the dissolution of USAID under the second Trump Administration, the vast majority of ILs were terminated in early 2025. While the lessons from this review will not inform the future direction of the ILs, the learnings from this long-running agricultural research for development program are applicable and relevant to a wide range of research programs. In this study, the Gender, Climate Change, and Nutrition Integration (GCAN) Initiative, under the International Food Policy Research Institute (IFPRI), seeks to document, categorize, and highlight efforts to integrate gender into USAID's FTF ILs, using the RBET framework. Using an extensive desk review and targeted key informant interviews (KIIs) with gender focal points and IL directors, this study has three overall objectives:

1) Classify the type of gender-related research generated under the FTF ILs,
2) Document key learnings from gender research under the FTF ILs, and
3) Understand the factors that have enabled ILs to prioritize and produce gender-related research and learnings.

This study aims to document both how gender was integrated into IL research and what we have learned about how to strengthen women's empowerment from IL-funded research since the program's inception. Focusing only the gender-informed or gender-focused research published with IL funding, we first categorize the types of research to understand what has emerged with respect to gender research under the ILs. We then synthesize the learnings of what does or does not work to strengthen women's empowerment from the few causal studies addressing gender published with IL funding. Lastly, we document the lessons learned from integrating gender into IL programming.

In this paper, we document the process in which the GCAN Initiative engaged with FTF IL directors and gender focal points to identify gender-related research initiatives under the ILs and the learnings that have emerged thus far. This paper is not an assessment, measurement, or evaluation of the ILs and their ability to produce gender-related work. Rather it is an effort to review and document the type of work ILs produced related to gender and identifying factors that enable gender integration in the ILs.

This paper is organized as follows. The next section describes the methods and process used to conduct this review. The following section describes the overall results, including the sample description of the research products identified and reviewed, the key learnings from this research thus far, and a discussion of the enabling factors to integrate and prioritize gender into the ILs. We discuss the overall takeaways of this paper in the final section. Annex A presents a list of all research outputs reviewed and considered as part of this review.

METHODS

1. Data Collection Methods

1.1 Desk Review

This study employed an in-depth desk review of published and unpublished gender-related research from across the ILs. The team identified over 130 gender-related products published with support from the respective ILs (see Annex 1 for the list of research products reviewed). The team collected research products from the respective IL websites, from IL gender focal points convened as part of the IL Gender Affinity Group, and from key informants. All identified gender-related products published with funding from an IL were initially selected, including both research and non-research outputs, such as blog posts, project summaries, capacity building materials or success stories. The products presenting original research were then prioritized as the focus of this study is to understand research findings related to gender produced by the ILs. This list was circulated to the gender focal points and IL directors to solicit additional research products from the ILs. This resulted in 99 gender-related research products that the team reviewed. The team then identified duplicates, research studies that were not yet available to share with the team (i.e., manuscripts still pending or under review), or research that was not focused on gender or gender-related issues. This resulted in a total of 76 research outputs that were included in the final review (Annex A), which include published and accepted (i.e., forthcoming) journal articles, research papers, conference presentations, and project reports. Table 1 presents our final selection criteria for including or excluding a research product.

Table 1 Summary of Inclusion and Exclusion Criteria

Criteria for Inclusion	Criteria for Exclusion
• Original research • Full research results made available to the study team • Research published under an IL • Research was either gender-informed or gender-focused	• Project summaries, blogs, or other materials that did not present original research • Results were unavailable to the study team • Research was not published under an IL • Duplicates (if a working paper and journal article presented the same research, only the journal article was selected) • Research was gender-blind

We only included research products that were either gender-focused or gender-informed and those that could be made fully available to the research team. We caution that we did not systematically review the extent to which gender has been integrated across all research produced by the ILs. We specifically only considered research products that were gender-focused or informed, and excluding gender-blind research studies. This study is not intended to be an assessment of all IL research products.

1.2 Key Informant Interviews

The team also conducted KIIs with gender focal points, study leads, and directors to discuss the gender-related research developed under each IL and to better understand the enabling factors to promote gender-related research under the ILs. The team reached out to the Gender Affinity

Group to present the purpose of our study, request documents, and to interview key stakeholders from each IL. The team reached out to 24 individuals – including gender focal points, gender researchers, and IL directors – across the 21 ILs to request an interview with them or other researchers at the respective IL. The team completed interviews with 16 individuals representing 9 ILs (Table 2).

The interviews were conducted remotely using Google Meet from February to April 2024. The interviews took approximately 1 hour and were not recorded. The interviewer took diligent notes of each participant's responses. We asked interviewees to share additional research products beyond what the team had already collected. The interviews included questions about the key gender-related research outputs of the IL and asked informants to describe the findings and to categorize them according to the analysis framework (see below). Key informants were also asked to describe any issues and challenges with integrating gender in the respective IL and to identify opportunities for improvement. Two individuals interviewed worked across multiple ILs, thus their interview covered more than one IL.

1.3 Sample Summary

Table 2 presents the number of research outputs reviewed by IL as well as the number of individuals interviewed per IL (typically IL directors and/or gender researchers).

Table 2 Summary of KIIs and Research Products Reviewed by Innovation Lab

Innovation Lab [Years of Implementation]	**Number of Research Outputs Reviewed***	**Number of Individuals Interviewed per IL****
Animal Health [2020–2025]	0	0
Applied Wheat Genomics [2013-2023]	0	0
Climate-Resilient Beans [2012-2021]	0	0
Current and Emerging Threats to Crops	0	1
Fish [2018-2025]	3	0
Food Processing and Post-Harvest Handling [2015-2025]	2	1
Food Safety [2011-2025]	3	0
Food Security Policy, Research, Capacity, and Influence [2019-2025]	2	0
Genomics to Improve Poultry [2014-2025]	0	0
Horticulture [2009-2025]	6	1
Innovation Lab for Crop Improvement [2020-2025]	4	2
Integrated Pest Management [2004-2020]	5	1
Legume Systems [2018-2025]	2	6
Livestock Systems [2017-2025]	18	1
Markets, Risk, Resilience [2019-2024]	3	0
Nutrition [2021-2025]	3	0
Peanut [2015-2025]	3	2

Innovation Lab [Years of Implementation]	Number of Research Outputs Reviewed*	Number of Individuals Interviewed per IL**
Post-Harvest Loss Reduction [2009-2025]	2	1
Small-Scale Irrigation [2013-2023]	9	0
Sorghum and Millet [2023-2025]	6	0
Soybean Value Chain Research	4	0
Sustainable Intensification	1	0
Total	**76**	**16**

*This reflects the total number of research outputs reviewed. The team collected and reviewed a broader set of gender-related outputs, including capacity building materials, blog posts, project briefs and summaries, and success stories. However, this review focuses only on the outputs that describe original research results.
**Note: Some individuals have worked across ILs, and their interviews focused on each IL with which they have worked.

1.4 Analysis Framework

We reviewed the 76 research outputs to understand the findings and outcomes of the gender-related research produced with funding from the ILs. We then categorized these outputs by the type of research conducted, the stage of the respective innovation (if applicable), and where the research fell within the RBET framework. Together with key informants, when applicable and available, we categorized research by the type of innovation and approaches. We adopted the CGIAR approach to categorizing innovations by stage and type: Stage: 1) Research/proof of concept, 2) Piloting, 3) Available for use, 4) Taken up by "next users" and Type: 1) Literature review, 2) Method (development, testing, validation), 3) Diagnostic (observational, descriptive) 4) Formative (exploratory, correlational), 5) Casual impact assessment (experimental, quasi-experimental). These labels were applied to all research products where applicable.

All research outputs were categorized based on whether they were gender-focused or gender-informed research products, following the definition provided by Rubin (2016). Gender-focused research aims to expand

> "*knowledge about both men's and women's behaviors, values, constraints, and opportunities. It seeks to document, for example, men's and women's different types of work; areas of knowledge; patterns of time allocation; use of, control over, and ownership of diverse productive assets; and levels of participation in the community or in agricultural value chains, among other aspects of social life*" (Rubin 2016, 6).

Gender-informed research "*uses information such as that generated by gender-focused research about gender relations, roles, and responsibilities in investigating other questions*" (Rubin 2016, 6). For this review, we considered research as "gender-focused" if the central research questions focused on understanding differences in outcomes, patterns of power or decision-making, time use, roles and responsibilities, or other differences between genders. Research was considered "gender-informed" if the study itself was designed and analyzed considering such differences in gender but central research questions were focused on topics other than differences in gendered outcomes. A third category of research – gender blind – is that that does not consider gender at

all; however, gender blind research was beyond the scope of this study and, therefore, not included.

Second, the team identified whether or not the research product was tied to a specific innovation or intervention, and if so, where that innovation fell within the RBET framework (Johnson et al., 2018; Quisumbing et al., 2023b). This framework, presented in Table 3, considers the extent to which programs or innovations may affect those targeted and what strategies are used to achieve gender equality and women's empowerment outcomes. Specifically, an intervention was considered as "reach" if it focused on including women in its activities; was considered "benefit" if it focused on improving women's well-being; was considered "empower" if it focused on different elements influencing gender relations among intervention recipients and increasing women's agency, such as decision-making patterns or power dynamics; and was considered "transform" if it focused on addressing structural inequalities such as constraining gender norms, attitudes, behaviors, and/or rules/laws to in ways that would promote gender equality and enable women's empowerment. It is helpful to understand the types of strategies employed by these interventions to address women's empowerment as previous research has indicated programming strategies are often not aligned with their goals and therefore have more limited impacts (Quisumbing et al. 2023a; 2023b). That is, while programs may aim to facilitate women's empowerment, the strategies they employ only reach or benefit women, and may not be sufficient for supporting women's empowerment or addressing gender inequalities in society (ibid). Such outcomes would require strategies directly aimed at increasing women's agency or transforming gender relations (ibid).

Table 3 RBET Framework

Category	Definition
Reach	Including women in program or research activities
Benefit	Improving women's well-being outcomes, such as income, health, and nutrition
Empower	Increasing women's agency, their ability to make and act upon strategic life choices (Kabeer 1999)
Transform	Transforming constraining gender norms, attitudes, behaviors, and rules/laws towards those that promote gender equality

Source: Adapted from Quisumbing et al. 2023b.

1.5 Limitations

This review was subject to several limitations. First, while the team made several attempts to reach gender focal points, directors, or other researchers across the ILs, not all individuals were available or responded to requests for interviews. Thus, there are gaps with respect to the perspective of several ILs. Second, the team recognizes the lag between when research is conducted and when the results are published and made publicly available. Several key informants also raised this issue, where they had conducted large research studies but the results of which were not yet available for circulation or published, and, therefore, could not be shared with our team. During KIIs, the team was able to access several research products – namely conference presentations – where preliminary or initial results were presented and thus the presentation was able to be shared with the team. The team included these as part of our review but recognizes that there may be gaps in the research products reviewed as part of this study compared to what exists. Given many of these research products may not be published on the

IL's website nor are available to the public, the team acknowledges that this review may be missing certain gender-related research products. While the team conducted extensive secondary searches on IL websites and requested research outputs from multiple different stakeholders, this paper may not include all research produced. Finally, selection bias should be considered when reviewing the results of this study. We intentionally only selected studies that were either gender-focused or gender-informed, and therefore did not include gender blind research products published by the ILs. We cannot make inferences or conclusions about all research produced by the ILs with respect to gender integration.

RESULTS

In this section, we present the findings of this review. First, we categorize the types of gender-related research products identified as part of this review published under the ILs. We then discuss a synthesis of learnings from the casual studies that demonstrate what works (or does not work) to address or strengthen women's empowerment and gender equality. We then discuss the factors that influence how gender is integrated into program and research implementation.

2. IL Gender-Related Research Outputs

2.1 Summary of Gender-Related Research Reviewed

Figure 1 presents the total number of research products by year published. Most outputs (70 percent) reviewed were published more recently between 2021 and 2024. The team received several citations of upcoming research products from key informants but were unable to access drafts of manuscripts to include in this review.

Figure 1 Research Outputs by Year

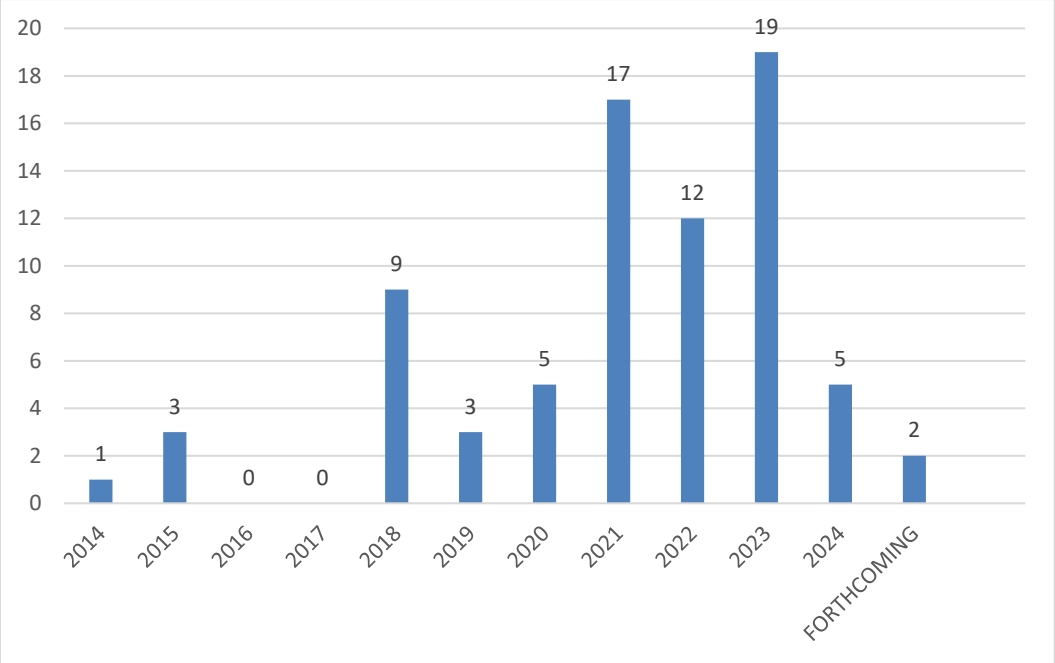


Figure 2 presents the total number of research products by type, where a vast majority (75 percent) are journal articles, followed by project reports (11 percent), research papers (9 percent), and conference presentations (5 percent).

Figure 2 Research Outputs by Type

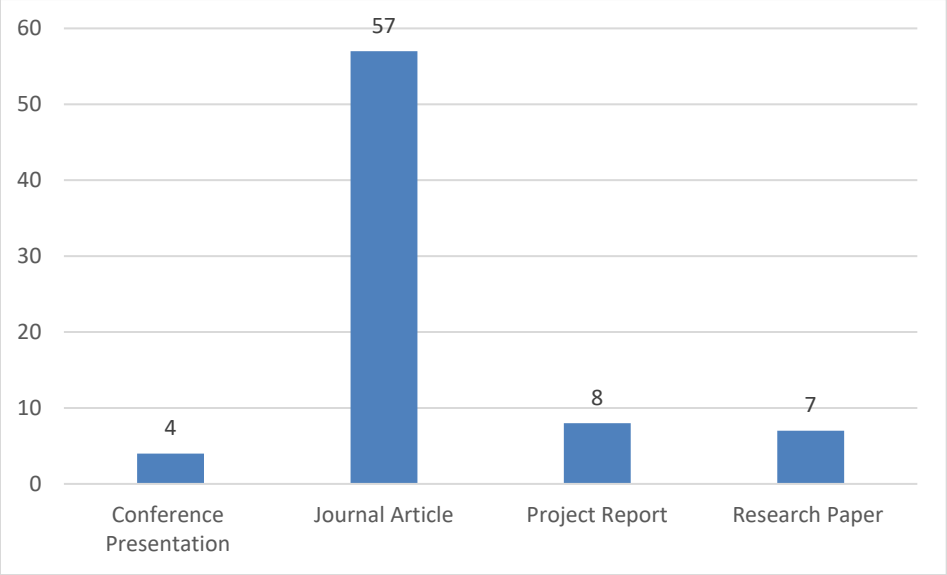
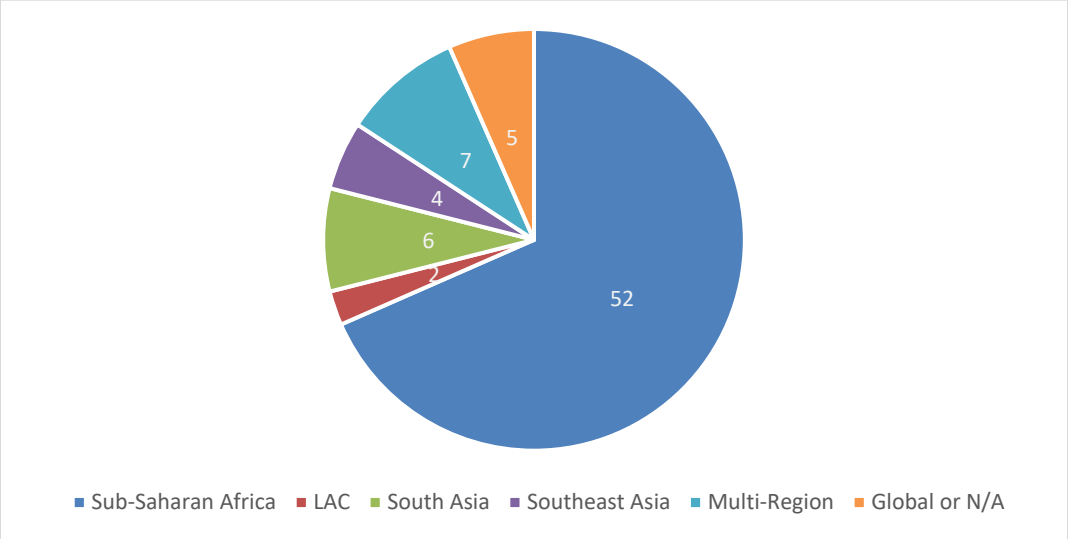


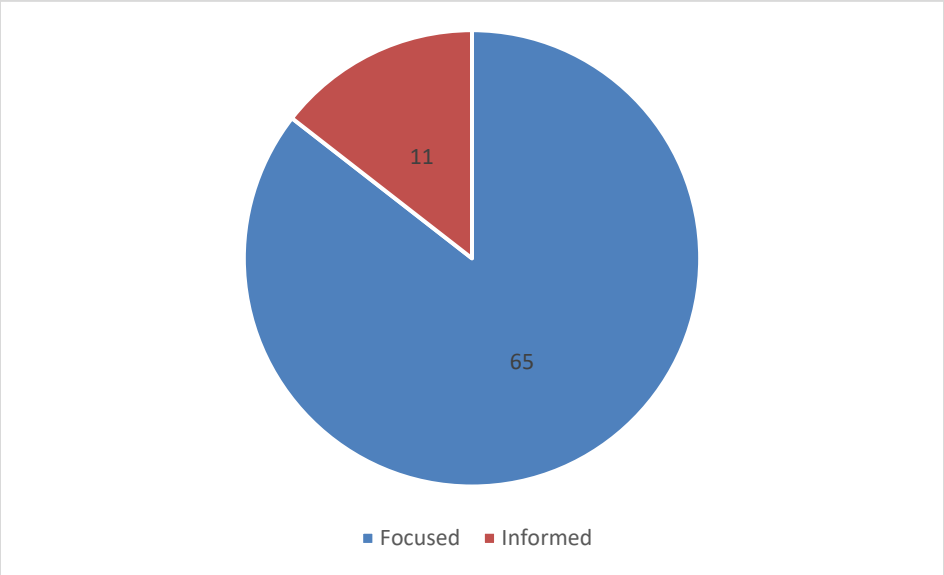
Figure 3 presents the regional breakdown of studies conducted, highlighting that most studies emerged from sub-Saharan Africa (68 percent) and fewer percentages of studies focused on South Asia, Southeast Asia, Latin America and the Caribbean (LAC), across regions, or did not specify a geographic focus. Studies conducted in South Asia primarily focused on Nepal (one study also focused on India) and studies in Southeast Asia were focused on Cambodia. Those conducted in LAC were primarily focused on Honduras. The regional distribution and country focus of the studies largely reflects the priority countries of the Feed the Future Program (the program under which the Innovation Labs operate). Feed the Future countries are concentrated in sub-Saharan Africa, with a couple of countries in South Asia (Bangladesh and Nepal) and 2 countries in Central America (Guatemala and Honduras).

Figure 3 Research Outputs by Region



Of the gender-related research products reviewed, most were gender-focused meaning that the central research questions centered on differences between genders on a range of outcomes or issues. Fewer studies were gender informed, meaning that gender considerations were integrated into the design and analysis of the study (Figure 4). None were gender blind per this study's selection criteria.

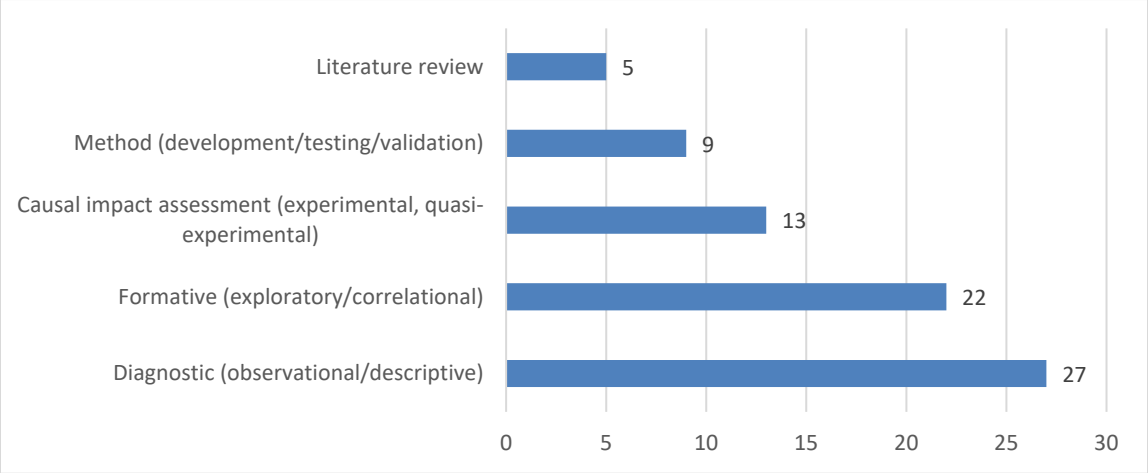
Figure 4 Gender Informed versus Gender Focused



2.2 Research and Innovation Type

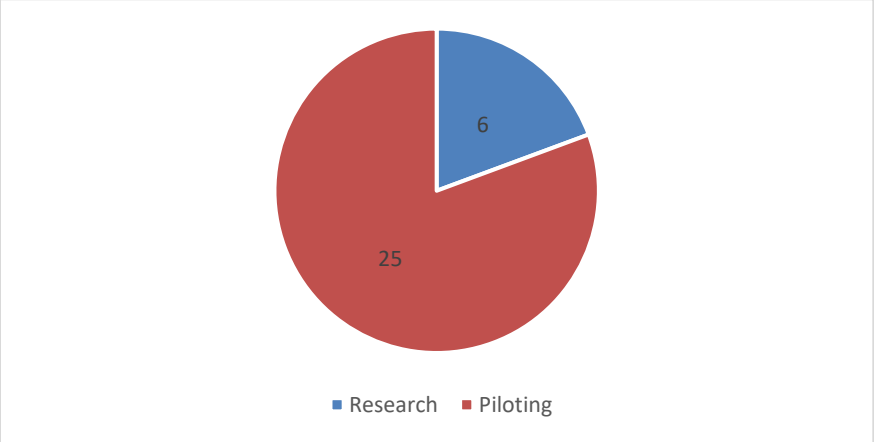
Most of the research outputs included in this review were formative (exploratory or correlational) or diagnostic (observational or descriptive) (Figure 5). Only 13 of the research outputs were causal impact assessments, 9 were focused on methods or tool development, and 5 were reviews of the literature. Of all studies, 21 apply various forms of the Women's Empowerment in Agriculture Index (WEAI). Among these, WEAI tools are used in 5 diagnostic, 6 formative, and 7 impact assessments. Three of these studies focused on the development or application of newer versions of the WEAI for different value chains.

Figure 5 Research Output by Research Type



We further then assessed the number of studies that examined an actual intervention or innovation compared to those that did not. We identified 31 of the 76 research outputs directly related to an intervention, and of these outputs, most were focused on analyzing interventions at the pilot stage (Figure 6), meaning these studies were assessing initial outcomes or impacts of innovations that were being tried and tested. For example, several studies looked at how small-scale irrigation technologies were influencing outcomes for women and men who used these technologies. Fewer studies (n=6) were focused on innovations in the research or proof of concept phase. For example, one study in Zambia used food sensory panels to assess the acceptability of a fortified fish powder to strengthen micronutrient and protein uptake in local diets, testing whether the developed product could be piloted and implemented for uptake and scale (Ragsdale et al., 2023). None of the studies reviewed focused on innovations or interventions at the uptake or scaling phase.

Figure 6 Innovations by Stage (n=31)



2.3 Summary of Learnings by Research Type

Diagnostic and Formative Research
Most of the reviewed studies were **diagnostic** or **formative** research (n=49), which are essential to inform the design and development of new programs, interventions, and innovations to be more gender-responsive. Only a subset of the identified diagnostic or formative research studies (n=14) were directly tied to a specific intervention or innovation. For example, two studies published with funding from the Innovation Lab for Crop Improvement presented new evidence of gender differences in crop variety preferences to contribute to more inclusive priority setting in plant breeding. One such study laid the foundation for designing a gender-responsive finger millet product profile to guide gender-sensitive varietal development (Hamba et al., 2024) and another informed more inclusive perspectives and preferences into cowpea breeding (Chipeta et al. 2024).

Other studies focused on formative or diagnostic research aiming to understand key gender differences, issues, opportunities, or constraints to build an evidence base respective to the IL's topic or topics of interest. For example, the Sorghum and Millet Innovation Lab produced six project reports that detailed gender differences in the sorghum value chains in different districts and regions across Ethiopia. While these reports were not directly tied to a specific intervention or innovation, they provided insights into how women participate in the sorghum value chain across different regions, highlighting nuanced differences that are important for context. Overall, these reports found that despite high levels of contribution to sorghum production and processing activities, women had disproportionately lower levels of access to key resources and lower levels of influence over sorghum-related decisions (Bekele et al., 2021; Dessalegn et al., 2021; Desta et al., 2021; Feyso et al., 2021; Getu et al., 2021; Hagos et al 2021).

Other formative research explored gender differences in men's and women's access to resources (Ragsdale et al., 2018; Mubichi-Kut et al., 2018), leadership positions in agricultural cooperatives (Huot et al., 2023), and time use (Glenna et al., 2023; Picchioni et al., 2020). For example, several studies in northern Ghana explored levels of time poverty among men and women in peanut producing communities and surveyed multiple wives within polygynous households as a novel approach to collecting this time-use data. Larson et al. (2023) explored these differences in time use and other elements of empowerment among and between polygynous and monogamous households, finding that empowerment and time use outcomes vary by co-wife rank. Glenna et al. (2023) described results related to time use and the high levels of time poverty experienced by both men and women, although women experienced higher levels than men consistently across seasons. Picchioni et al. (2020) combined time use and energy expenditure data to assess gender differences in work burdens associated with productive and reproductive activities in Nepal and India, finding that men and women contribute almost equal levels of productive labor but women shoulder reproductive labor burdens at the expense of leisure time.

Causal Impact Assessments
Fewer studies (n=13) conducted **causal impact assessments** of interventions or innovations. Evidence from a pilot study in Ghana conducted with funding from the Soybean Innovation Lab demonstrated that providing women smallholder farmers with low-cost input bundles (i.e., those less than $6 USD) can help eliminate the gender gap in agricultural productivity (Ragsdale et al.

2022). Research from the Livestock Innovation Lab assessing the impact of the *Un Oeuf* project in Burkina Faso highlighted the importance of women's decision-making influence as a key entry point for improving household nutritional outcomes and egg consumption (Moore et al. 2022).

Research from the Innovation Lab for Small-Scale Irrigation explored the impact of small-scale irrigation intervention on women's empowerment (Bryan and Mekonnen 2023) and pathways for nutritional outcomes (Baye et al. 2022; Mekonnen et al. 2022; Passarelli et al. 2018) finding that, while irrigation provides benefits for household and women's diet diversity and child nutrition, providing irrigation technologies to men and women farmers alone does not influence women's empowerment.

Research conducted under the Innovation Lab for Food Policy Research, Capacity, and Influence (PRCI) explored the extent to which an intervention which provided women's cashew processing groups with improved equipment and training contributed to increased productivity of these operations and facilitated women's empowerment (Aku et al. 2023). This study found that while the processing intervention improved the productivity and profitability of women's cashew processing groups, constraints related to accessing inputs (raw cashew), selling processed cashew, and challenging group dynamics limited the effectiveness of the intervention. However, this assessment points to gaps where more research is needed, specifically around casual impact assessments to rigorously analyze and demonstrate to what extent and how interventions and innovations are (or are not) impacting women, men, boys, and girls differently.

Methods and Tools

Finally, nine studies focused on the development, testing, or validation of new **methods or tools** to measure gender or women's empowerment-related outcomes in research. Researchers from the Livestock and Fish Innovation Labs, respectively, tested new iterations of the WEAI to apply the tool for livestock and fisheries sectors. Gailè et al. (2018) present the development of the Women's Empowerment in Livestock Index (WELI) and Colverson et al. (2020) described results of a pilot test of the WELI in Tanzania and Uganda. Ragsdale et al. (2022) described the results of a pilot test of the Women's Empowerment in Fisheries Index (WEFI) in Zambia. The results of these studies confirmed both tools were useful adaptations to understand gender differences in both sectors and to capture the nuances of the livestock and fisheries sector that the original WEAI does not capture.

Research from the Livestock Innovation Lab also introduces a new methodological tool, Community Concept Drawing (CCD), which is a "participatory visual method aimed at facilitating a deep understanding of how local communities make sense of complex concepts often central to social research" (McOmber et al. 2021a). McOmber et al. (2021a; 2021b) present results from a pilot test of CCD used in Senegal, Nepal, Morocco, and Kenya to explore concepts related to "empowerment" but offer ways in which the tool can be used in other fields of study.

The Innovation Lab for Crop Improvement published new tools to enable more inclusive approaches to crop breeding practices. Occelli et al. (2023) present the Participatory Ex-antE framework for Plant breeding (PEEP) as a scalable, gender-inclusive, and crop-agnostic tool for a priority setting in crop breeding that leverages two elements, such as the "usage of a heterodox methodological approach and the strong emphasis on the participation of knowledge-rich

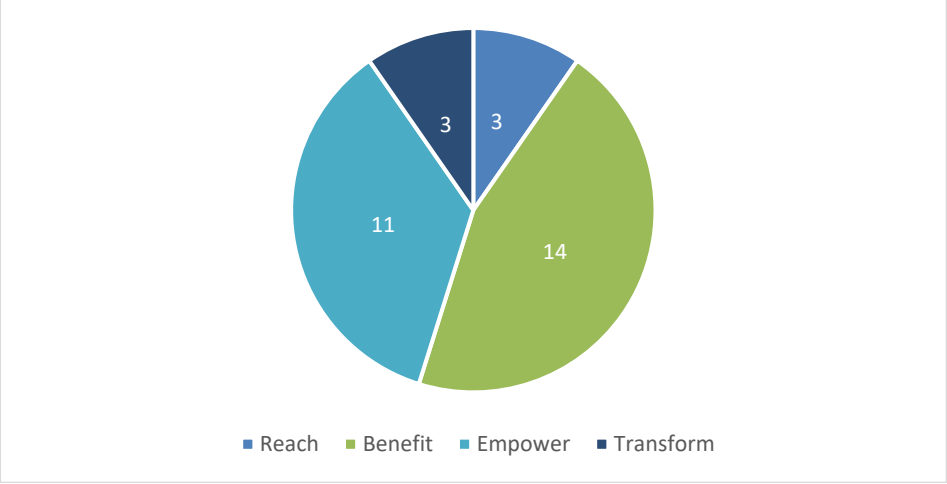
stakeholders" (Occelli et al. 2023). Mukerjee et al. (2023) present a discrete choice experiment method to explore intra-household differences in trait preferences, enabling researchers to understand what drives intra-household heterogeneity in trait preferences, decision-making, and time spent working with the respective crop. The results of this method can inform more inclusive priority setting in crop breeding practices.

2.4 Innovations with Respect to Reach, Benefit, Empower, Transform

Thirty-one of the reviewed studies focused on a specific intervention or innovation, each of which had different potential pathways to influence gender equality and women's empowerment. Thus, we classified each of these interventions or innovations using the RBET framework pending their specific intended pathway to influence gender equality and/or women's empowerment. We categorize these studies by the RBET framework using each study's findings and results presented associated with the different interventions, but not necessarily according to the intervention strategies or design. In doing so, we acknowledge that these descriptions presented in this section do not necessarily reflect how well interventions are or are not designed to "reach, benefit, empower, transform." Rather we aim to characterize the types of findings emerging from these interventions.

As previous studies have noted, the indicators selected to measure progress towards RBET goals often do not align with the intervention strategies (Quisumbing et al. 2024). Hence, programs that simply reached women (e.g., by involving women in program activities) may not have supported women's empowerment, and empowerment indicators may be inappropriate measures of success for those types of interventions. When we look at the outcomes measured across the set of gender-related IL studies, only three used indicators aligning with transformative outcomes and three studies used indicators aligning with reach outcomes. Most interventions reviewed were focused on outcomes related to benefitting or empowering women (Figure 7).

Figure 7 Research Outputs by RBET Framework



Specifically, only 3 of the 31 studies reviewed presented data regarding whether women were **reached** or not, meaning most studies went a step further to articulate whether or how women (and/or men) benefitted from an intervention in some way (or did not). Given this study's focus on learnings from research considered either gender-focused or -informed from the ILs, it is

likely that research on interventions that only "reach" women were not fully captured from all interventions across the ILs. That is, among the sample of studies collected for this review that were considered by the IL researchers as having a primary or significant focus on gender, most went beyond measuring the extent to which interventions or innovations simply reached women to explore benefits and empowerment outcomes. One study that did focus on "reach" examined the extent to which a training approach influenced men's and women's knowledge, attitudes, and practices about hygienic handling and safe consumption of milk (Amenu et al., 2020). The authors found that effects of the intervention diminished six months post and recommended that such interventions should include locally adaptable technologies, incentives, and a strengthened enabling environment that improves access to clean water and sanitation facilities to increase sustained uptake.

Most of the gender-related research on interventions centered on how the intervention benefitted or empowered women. Those focused on **benefit** generally explored or assessed the extent to which interventions led to gender differences in key outcomes, such as increased productivity (both income and harvests) (Aku et al., 2022; Smale and Theriault, 2021; Edralin 2014; Ragsdale et al., 2022), nutrition and health outcomes (Snider et al., 2023; Ragsdale et al., 2023; Baye et al., 2021; Colverson 2018; Mekonnen et al., 2022), and food security (Snider et al., 2023; Ragsdale et al. 2022; 2023; Domenech 2015). Most of these studies examined how different types of technologies benefitted women. One example found that although certain post-harvesting technologies were controlled by men, they yielded benefits to men and women, including reduced time burdens and positive impacts on food and nutrition security in Ghana (Snider et al., 2023). Ragsdale et al. (2022) found that low-input bundles (i.e., Soybean Kits) targeted at women producers can help close the gender productivity gap among small-scale soybean producers in Ghana by improving women producers' overall productivity and highlighted the need for adapting and scaling such technology throughout the region. Other examples demonstrated how small-scale irrigation technologies offset seasonal variations in women's nutrition outcomes in Ethiopia (Baye et al., 2021), and yielded positive influence on women's income and health in Cambodia (Edralin 2014) and impacts for women's and children's health and nutrition outcomes in Tanzania and Ethiopia (Mekonnen et al., 2022).

Eleven studies explored outcomes or approaches deployed by innovations seeking to **empower** women, focusing mainly on small-scale irrigation technologies as well as livelihood program interventions. Two studies examined empowerment outcomes for different livelihood programs (Moore et al., 2022; Janzen, et al., 2021). In Nepal, Janzen et al. (2021) found RCT evidence that a Heifer asset transfer program translated to bigger livestock herds, improved rearing practices, increased sales, higher profit from production, and increased women's empowerment outcomes and financial inclusion. The intervention increased the likelihood that participating women take on leadership positions, but it did not have any impact on women's access to and control over credit. Moore et al. (2022) found that the *Un Oeuf* program in Burkina Faso significantly improved women's decision-making power around what is done with household eggs as well as how foods are portioned within the household, highlighting interventions that target women's decision-making as an entry point to improving nutritional outcomes.

Five studies explored empowerment outcomes from various small-scale irrigation technologies or innovations (Bryan and Lefore, 2021; Theis et al., 2018; Bryan and Garner, 2022; Bryan and

Mekonnen, 2023; Lee et al., *forthcoming*). Theis et al. (2018) develop a framework to understand intrahousehold distribution of benefits from small-scale irrigation technology adoption, an important contribution to better understand how technology adoption may or may not contribute to women's control or influence over technology within the same household. Bryan and Garner (2022) explore the pathways through which small-scale irrigation technologies contribute to women's empowerment in northern Ghana, highlighting key structural and normative barriers women face from benefitting from such technologies, as well as the indirect ways in which these technologies also contribute to women's empowerment (through redistribution of time saved on preferred activities, for example). Lee et al. (unpublished) similarly find shifts in women's time allocation with the use of motorized pumps for irrigation away from production activities towards off farm work and leisure. However, Bryan and Mekonnen (2023) found null effects on women's empowerment of motor pumps to support small-scale irrigation, and in fact found negative spillover effects on women from households that did not receive pumps, highlighting the need for interventions that aim to provide agricultural technologies with "*complementary investments in infrastructure that increase access to water for irrigation*".

Only three studies focused on **transformative** approaches employed by interventions. These were categorized as transformative if they included outcomes or findings related to shifting gendered norms or expected behaviors of men and women or the rules/laws to promote gender equality, in addition to discussions of empowerment. Two studies focused on transformative approaches to addressing household, and specifically, children's nutrition outcomes. One such intervention explored the effect of a social and behavior change communication (SBCC) intervention, the Girinka Dairy Project, following Rwanda's "One Cow Per Poor Family" program on children's intake of animal source foods and child nutrition outcomes, specifically looking at whether outcomes differed when the intervention targeted fathers (in addition to mothers – which was a previous study) (Flax et al. 2023). Flax et al. (2023) found that SBCC materials targeted towards fathers can improve children's nutrition outcomes as well as increase fathers' knowledge, awareness, and support for children's nutrition. A second study tied to the same intervention explored normative roles and responsibilities of men and women relating to children's consumption of animal source foods and children's nutrition outcomes, concluding that SBCC training need to engage with local concepts of masculinity to help men adopt new behaviors (Farnworth et al., 2023). A third example assessed differences in outcomes employed by gender accommodative[1] versus gender transformative approaches as part of the "Women Rear Project" in northern Ghana to include women in livestock vaccine systems (Njiru et al., 2024). The authors found that gender transformative approaches had significantly higher impacts on women's empowerment than gender accommodative approaches, signaling the importance of interventions addressing and reducing restrictive gender norms.

3. Lessons Learned from ILs: Enabling Factors to Promote Gender Research

Following interviews with key informants, we synthesized key lessons learned and factors that enable the promotion of gender research in the ILs. These factors echoed those documented by other research assessing lessons learned and best practices for integrating gender in research and institutions (Bryan et al., 2024).

[1] Gender accommodative refers to approaches that are aware of and adapt to gender differences, but do not attempt to address the underlying root causes or structural factors that contribute to these inequalities (Cole et al., 2020).

Overall, there are two broad models of gender integration in the ILs, one that establishes gender research as a standalone objective (such as the Peanut Innovation Lab) and the second that centralizes gender and inclusion-related research as part of either a core team of scientists (often referred to as a cross-cutting themes team) or to a single gender specialist responsible for integrating gender throughout the IL work. The former model includes a dedicated budget to conducting gender focused research to achieve the specific stand-alone objective, whereas the latter model includes a budget for the core team and/or specialist to conduct their own research (to some extent) and to primarily support the integration of gender into research conducted across the IL. This includes targeted capacity building efforts for non-gender focused IL scientists and partners to strengthen their own ability to integrate and analyze gender considerations into their work.

The key enabling factors as described by informants include institutional and leadership support for gender-related research, adequate budget and time to conduct research or strengthen capacity of other scientists to integrate gender and social inclusion perspectives into their work, ensuring gender specialists and core team members have appropriate and requisite expertise and experience, and including reporting requirements that clearly articulate expectations for producing gender-related research. These enabling factors were described as essential for promoting and prioritizing gender-related research in the ILs. They were often interrelated, as often institutional and leadership support for gender-related research translated into adequate budgets and time for gender work, for example.

Informants emphasized that **institutional and leadership support** for gender-related research were essential to provide scientists the time, resources, and a clear role to develop gender-related research topics or capacity-building materials to provide support to other scientists to integrate gender into their own work. It also ensures that gender research and interdisciplinary scholarship are valued among the research team. Prioritizing gender in institutional practice and as a cross-cutting theme throughout all research is challenging. Recent research published under the Innovation Lab for Crop Improvement identified and elaborated on how power dynamics and complex interdisciplinary hierarchies contribute to and exacerbate challenges interdisciplinary scientists face to collaborate across disciplines (Cullen et al. 2023). Thus, prioritizing gender integration requires strong leadership and political will to ensure all scientists and staff place an equal priority on adequately integrating gender into their work. This is particularly important for the IL models that centralize gender-related research to a core team or gender specialist as it places an importance on integrating gender into all research across the IL, reinforcing the core gender team or gender specialist's role and work in supporting other scientists to integrate gender into their work. This helps to prioritize gender work across the IL, particularly when resources are already constrained and there may be hesitation among biophysical or other social scientists to dedicate time to prioritizing gender integration into their work. With respect to the first model – where gender is a standalone priority – it's important to maintain leadership support for gender integration throughout the IL's work as key informants explained when gender is a standalone objective, it can sometimes be considered "covered" and there is less attention to integrating gender perspectives across other social and biophysical research.

Institutional and leadership support to prioritize gender-related research in the IL likely translates into **sufficient budgets and time** for gender specialists and scientists to both integrate gender into their own research or strengthen the capacity of others to integrate gender into research. For gender specialists and scientists to strengthen the capacity of others to understand how gender relates to their work and to adequately collaborate with interdisciplinary teams to integrate gender into research portfolios and studies takes considerable time. Gender specialists and scientists who are focused on capacity building of other researchers require the time and budget to develop capacity strengthening materials, to review proposals, and work closely with other scientists to effectively integrate gender considerations into their research design, implementation, and analysis. To be successful in strengthening the capacity of scientists to promote gender-focused and -informed research, there needs to be sufficient budgets and time allocated to accommodate for this initial investment into capacity strengthening.

It was important for those staffed as gender specialists on core teams or within partner scientist teams to have **expertise and experience** specifically in gender-related research to ensure appropriate theories, concepts, and frameworks are applied to integrate gender into research. A social science background alone is often not adequate to ensure the staff member has requisite experience applying gender and social inclusion topics into research proposals, designs, and analysis.

Additionally, for those serving in a capacity building role, it was essential that these staff – particularly those on the core team - also possess the **communication skills** to translate the importance and applicability of a gender lens to other social and non-social scientists. A repeated challenge is the communication between social and biophysical scientists to ensure they are "speaking the same language" and have enough understanding of each other's work to facilitate effective collaboration. A key informant shared, "*Interdisciplinary communication is essential. You need to understand a little about their topic enough to speak their language and then they should be doing the same to you. There needs to be a mutual understanding of each other's work to be effective."* Sometimes researchers with deep technical gender expertise may not possess the right communication skills or knowledge to communicate why gender matters and explain how gender should be integrated into technical research.

Finally, key informants repeatedly emphasized the need to have clear reporting and budget requirements for how the ILs should integrate and report on their gender-related work. It was suggested that clear and direct expectations communicated by the donor to report on gender-integration throughout the IL's work would translate to increase institutional and leadership support and political will to strengthen the integration and prioritization of gender into research across the IL. Additionally, minimum budget quotas or clear expectations around minimum budgets for gender integration – including staff and necessary activities – would also signal to leadership the importance of gender integration, which would support its reflection in the budget and staffing plan.

DISCUSSION

Through this review of gender-related research produced across the FTF ILs since 2014, we aimed to document, categorize, and highlight efforts to integrate gender into IL research and intervention design. This paper does not assess the effectiveness of the ILs or their ability to produce gender-related research. Rather, we aimed to understand the extent to which gender-focused research emerging from the ILs has produced new evidence on what works to promote women's empowerment and gender equality and to document lessons learned from various approaches to integrate gender into the ILs. We rely on an extensive desk review and KIIs with IL directors and gender focal points to inform this study and elucidate key factors that enable stronger gender integration into IL research portfolios. We also note that this review may not reflect all possible gender-related research published by the ILs since 2014 as not all products are systematically published on the IL website or USAID's Development Experience Clearinghouse (DEC) or made publicly available. USAID and similar funders may want to consider systematically tracking and making publicly available all research produced by funded research programs, such as the ILs.

Most of the research products reviewed were either formative or diagnostic type research studies. However, it is unclear from this review the extent to which this formative or diagnostic research is being used to inform the design or development of future, gender-informed research, innovations, or interventions, save for a few examples. Such examples included gender-informed research – such as choice experiments for trait preferences to inform priority setting in crop breeding – that demonstrated the process for integrating gender differences in perspectives to inform the development of new tools and interventions.

Additionally, much of the research collected and reviewed for this paper were not tied to specific interventions or innovations. There were limited studies that employed a causal approach to understand what does and does not work and there is a need for more impact assessment research from the ILs to understand what works to reach, benefit, and empower women and transform enabling conditions for gender equality. We also caution that this study does not systematically review the extent to which gender has been integrating across *all* research coming from the ILs, specifically only considering research that focused on gender as a primary or significant topic of inquiry (as identified by the review team and shared by gender focal points). Future research could consider conducting a review of all interventions developed, tested, and scaled from the ILs to assess the extent to which they employ a gender-sensitive or inclusive approach, and where these fall along the RBET framework (and how many do not).

Most of the studies tied to a specific intervention or innovation reported outcomes that benefitted women, such as increases in productivity, nutrition and health outcomes, and food security. Fewer interventions targeted empowerment outcomes for women, mostly concentrated on small-scale irrigation technologies or livelihoods programs. Small-scale irrigation techniques yield positive outcomes that were found to both benefit women in the areas in which they are tested, such as improving nutrition outcomes for women and children in Ethiopia, Cambodia, and Tanzania, while potential impacts on women's empowerment were indirect, related to shifting time allocation in Ghana and Ethiopia. However, one study found null effects, highlighting the need for agricultural technology interventions to be coupled with investments in infrastructure to

increase women's overall access to water for irrigation and complementary interventions aimed at addressing gender norms and relations (e.g. norms about ownership of agricultural equipment). Finally, a few studies did explore transformative approaches, first finding that addressing restrictive gender norms is an effective approach to facilitating to women's empowerment, and second, identifying that engaging men in nutrition-related SBCC models had positive impacts on children's consumption of animal source foods.

Finally, this study identified key enabling factors that KIs described as allowing for strengthened gender integration and prioritization in research portfolios across the ILs. The lessons learned and factors identified, such as institutional leadership and support for gender integration, sufficient time and budgets earmarked for gender work, and ensuring gender staff have requisite skills, expertise, and communication skills to work across interdisciplinary teams. These lessons echo those from other studies and reports of integrating gender into ILs and institutions/research (Bryan et al., 2024; Cullen et al. 2023). These lessons learned highlight the need for continued capacity building, prioritization, and interdisciplinary communication for integrating gender throughout ILs to promote and prioritize gender informed research.

Overall, we observed a wide range in the types of gender-related research products produced under the ILs and institutional commitment to gender-related research, signaling a need for more consistent requirements for conducting rigorous research to understand what works to advance women's empowerment and gender equality in the agriculture and food sectors. At the program and donor level, there needs to be a clearly defined learning objective to understand what works to increase women's empowerment and gender equality across the portfolio. Without this level of intentionality, the portfolio of projects may not consistently contribute to research addressing this objective or may not contribute research at all towards this objective. From this review, there was a lack of *consistent* focus and intentionality across ILs towards addressing gender. In some cases, addressing gender inequality in practice was often ensuring women participated in project and research activities and less on contributing to the evidence base about what works with respect to advancing gender equality. There were notable exceptions, such as those highlighted in this review that focused research on outcomes related to empowerment and transforming structural inequalities.

The established Gender Affinity Group operated as a community of practice to convene gender focal points from the ILs to informally share learning and set expectations, but without clear guidelines from USAID. The lack of guidelines and expectations for how to address gender in IL research agendas meant that a wide range of approaches were adopted and the results were not easily comparable or synthesized. Future agricultural research for development programs that aim to meaningfully address gender inequalities and promote women's empowerment should establish clear and well-defined learning objectives that guide expectations for how to contribute research on what works to advance these goals. Communities of practices, such as the Gender Affinity Group, can serve as useful tools to foster learning across ILs to reach common objectives.

CONCLUSION

In conclusion, this study presents results that synthesize learnings from the gender-related research produced across the USAID ILs and the different factors that supported the integration of gender in IL research. Gender-related research produced from the ILs were mostly gender-focused and were either diagnostic or formative, and it is unclear to the extent these studies have informed the design of new tools or interventions to strengthen women's empowerment or gender equality in agriculture. Fewer studies employed causal empirical approaches and a majority were not tied to specific innovations or interventions. Those that did focus on the impact of specific interventions or innovations demonstrated the different pathways through which such innovations or interventions influenced gender equality or women's empowerment. There was a lack of clear objectives and consistency from the donor in outlining expectations for how ILs should integrate gender into their research agendas and portfolios, which may have contributed to a wide range of gender-related research objectives and various types of research outputs being produced. While this study yielded important insights into what evidence is available from the ILs, it calls attention to current and future ILs to prioritize gender integration into research portfolios to fill evidence gaps using clear guidelines and expectations from the donor to answer questions about what works to promote women's empowerment and gender equality in agriculture and food systems.

We identified that ILs need to have sufficient budget and resources dedicated to prioritizing and strengthening gender integration across research conducted at the ILs, as well as staff with the right types of technical expertise and interdisciplinary communication skills. Staff dedicated to gender research must be able to work with biophysical and other social scientists to translate and apply gender concepts across disciplines, and there should be mutual respect among interdisciplinary scientists to collaborate on integrating gender into research. And above all, it is essential for leadership to prioritize gender integration in order to equip scientists with the capacity and resources to effectively integrate gender into their own work or build the capacity of others to address gender-related concepts, and for donors to require ILs to report on gender-related research activities.

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ANNEXES

ANNEX A: List of Research Outputs Reviewed

Innovation Lab	Reference
Crop Improvement	Chipeta, M., Kampanje-Phiri, J., Moyo, D., Colial, H., Tamba, M., Belarmino, D., Hella, J., Yohane, E., Mvula, N. and Kafwambira, J. 2023. Understanding specific gender dynamics in the cowpea value chain for key traits to inform cowpea breeding programs in Malawi, Mozambique and Tanzania. *Frontiers in Sociology,* https://doi.org/10.3389/fsoc.2024.1254292
Crop Improvement	Cullen, B., Snyder, K., Rubin, D., and Tufan, H. 2023. 'They think we are delaying their outputs'. The challenges of interdisciplinary research: understanding power dynamics between social and biophysical scientists in international crop breeding teams. *Frontiers in Sustainable Food Systems,* DOI: 10.3389/fsufs.2023.1250709
Crop Improvement	Hamba, S., Kasule, F., Mayanja, I., Biruma, M., Natabirwa, H., Sanya, L., Rubin, D., Occelli, M., and Adikini, S. 2024. Farmer-preferred traits and variety choices for finger millet in Uganda. *Frontiers in Sustainable Food Systems,* https://doi.org/10.3389/fsufs.2024.1282268
Crop Improvement	Mukerjee, R., Faye, N., Badji, M., Gomez, M., Rubin, D., Tufan, H., and Occelli, M. 2023. Intra-household discrete choice experiment for trait preferences: a new method. *Frontiers in Sustainable Food Systems*, DOI: 10.3389/fsufs.2023.1257076
Crop Improvement	Occelli, M., Rubin, D., and Tufan, H. 2023. Crowdsourcing priorities: a new participatory ex-ante framework for crop improvement. *Frontiers in Sustainable Food Systems*, DOI: 10.3389/fsufs.2023.1265109
Crop Improvement	Tarjem, I. and Tufan, H. 2023. The men who feed the world? Putting masculinities on the agenda for crop breeding research for development. *Frontiers in Sustainable Food Systems*, DOI: 10.3389/fsufs.2023.1243217
Fish	Ragsdale, K., Read-Wahidi, M., Marinda, P., Pincus, L., Torell, E., and Kolibila, R. 2022. Adapting the WEAI to explore gender equity among Fishers, Processors, and sellers at Zambia's Lake Bangweulu. *World Development*, https://doi.org/10.1016/j.worlddev.2022.105821
Fish	Ragsdale, K., Read-Wahidi, M., Mudege, N., Iannotti, L., Muzungaire, L., and Funduluka, P. 2023. Sensory panel results of a dried fish powder supplement among caregivers and young children in Zambia. *Public Health Nutrition*, DOI: 10.1017/S1368980023002586
Fish	USAID. 2021. FISH4ZAMBIA: RESEARCH AMONG MEN AND WOMEN FISHERS, PROCESSORS, AND SELLERS AT ZAMBIA'S LAKE BANGWEULU. (Project Brief). Feed the Future Innovation Lab for Fish. www.fishinnovationlab.msstate.edu
Food Processing and Post-Harvest Handling Innovation Lab	Ferruzzi, M., Taylor, J., Ndiaye, C., Mugalavai, V., De Groote, H., O'Brien, C., Rendell, T., and Hamaker, B. 2023. Entrepreneur-led food fortification: A complementary approach for nutritious diets in developing countries. *Global Food Security,* 36:100674+.

Food Processing and Post-Harvest Handling Innovation Lab	O'Brien, C., Leavens, L., Nidaye, C., and Traore, D. 2022. Women's Empowerment, Income, and Nutrition in a Food Processing Value Chain Development Project in Touba, Senegal. *International Journal of Environmental Research in Public Health*, 19(15): 9526. https://doi.org/10.3390/ijerph19159526
Food Processing and Post-Harvest Handling Innovation Lab	Snider, A., Adraki, P., Lolig, V., and McNamara, P. 2023. Assessing gendered impacts of post-harvest technologies in Northern Ghana: gender equity and food security. *Gender, Technology and Development*, DOI: 10.1080/09718524.2023.2273153
Food Safety Innovation Lab	Garsow, A.V., Biondi, M., Kowalcyk, B., Vipham, J., Kovac, J., Amenu, K., Zewdu, A., and Colverson, K. 2022. Exploring the relationship between gender and food safety risks in the dairy value chain in Ethiopia. *International Dairy Journal,* 124: 105173. Doi.org/10.1016/j.idairyj.2021.105173
Food Safety Innovation Lab	Garsow, A., Kim, E., Colverson, K., Ilic, S., Kunyanga, C., Bainah, A., and Kowalcyk, B. 2022. A review of the roles of men, women, and youth in ensuring food safety in the smallholder poultry value chain in Kenya. *Frontiers in Sustainable Food Systems,* DOI:10.3389/fsufs.2022.1041472
Food Safety Innovation Lab	Khanal, A., Gurung, R., Timilsina, R., and Poudel, S. 2023. Food Safety Awareness, Food Policies, and Gender: A Review and an Empirical Examination from Nepal. *Nepal Public Policy Review*, 3(1). https://doi.org/10.59552/nppr.v3i1.62
Food Security Policy, Research, Capacity and Influence	Aku, A., Mpenda, Z., Mpunde, V., Bryan, E., and Mather, S. 2023. Opportunities for and Constraints to Women's Empowerment in Tanzania's Cashew Value Chain. *Research Paper #22, Feed the Future Innovation Lab for Food Security Policy Research, Capacity, and Influence*.
Food Security Policy, Research, Capacity and Influence	Guloba, M., Mbowa, S., Makazi., Mather, D., and Bryan, E. 2023. Sugarcane Production and Food Security in Uganda. *Research Paper #23, Feed the Future Innovation Lab for Food Security Policy Research, Capacity, and Influence.*
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Horticulture	Larson, J., Castellanos, P., and Jensen, L. 2019. Gender, household food security, and dietary diversity in western Honduras. *Global Food Security*, 20:170-179. https://doi.org/10.1016/j.gfs.2019.01.005
Horticulture	McGuire, E., Leeuwis, C., Rietveld, A., and Teeken, B. 2023. Anticipating Social Differentiation and Unintended Consequences in Scaling Initiatives Using Genderup, a Method to Support Responsible Scaling. *Agricultural Systems*, http://dx.doi.org/10.2139/ssrn.4409468

Horticulture	McGuire, E., Al-Zu'bi, M., Boa-Alvarado, M., Luu, T., Sylvester, J., and Leñero, E. Forthcoming. X Equity Principles for Social Traformation.
Horticulture	McGuire, E., Rietveld, A., Crump, A., and Leeuwis, C. 2021. Anticipating gender impacts in scaling innovations for agriculture: Insights from the literature. *World Development Perspectives*, https://doi.org/10.1016/j.wdp.2021.100386
Horticulture	Santana, A., Ramos, C., Arrivillaga, J., Cantarero, V., and Mejia, J. 2019. Situación nutricional y de seguridad alimentaria de la población étnica lenca (Intibucá, Honduras). *Community Nutrition*, DOI:10.14642/RENC.2019.25.2.5280
Integrated Pest Management	Christie, M., Houweling, E., and Zseleczky, L. 2015. Mapping gendered pest management knowledge, practices, and pesticide exposure pathways in Ghana and Mali. *Agric Hum Values,* 32:761-775. https://doi.org/10.1007/s10460-015-9590-2
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Integrated Pest Management	Sumner, D., Christie, M., Mersie, W., and Alemayhu, L. 2021. "Gender, livelihoods, labor and invasive pest management in a rural Ethiopian community". (Presentation). Feed the Future Innovation Lab for Integrated Pest Management, Virginia Tech and Virginia State University, February 2021.
Integrated Pest Management	Sumner, D., Flor, R., Then, R., Keo, M., Tong, C., and Hadi, B. 2021. "Access, labor, and decision-making: Lessons learned from engaging the gendered dimensions of pest management in Cambodia's rice sector". (Presentation). Feed the Future Innovation Lab for Integrated Pest Management, Virginia Tech and Virginia State University, February 2021.
Integrated Pest Management	Zseleczky, L., Christie, M., and Haleegoah, J. 2017. Embodied Livelihoods and Tomato Farmers' Gendered Experience of Pesticides in Tuobodom, Ghana. *Gender, Technology, and Development*, 18(2): 249-274. https://doi.org/10.1177/0971852414529483
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Tel.: +1-202-862-5600
Fax: +1-202-862-5606
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