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Platform



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Annex and glossary

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Measuring Women's Empowerment in Agriculture: Innovations and Evidence

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ABOUT THIS SERIES

This annex for a working paper, produced by the CGIAR GENDER Impact Platform, is one in a [series of analytical working papers](#) by our researchers. They were produced to inform the Food and Agriculture Organization of the United Nations to write the 2023 report on the *Status of Rural Women in Agrifood Systems*.*

These evidence-based papers address key themes important for gender and social equality, and women's empowerment in agriculture and food systems. They each discuss:

- current status and emerging thinking
- the theme's relevance for transformative change toward more inclusive food systems
- the evolution of equality in agriculture and food systems over the past 10 years in low- and middle-income countries
- what has proved effective to ease structural constraints, and promote equality and empowerment
- specific suggestions about interventions, programs and policies that can help make agriculture and food systems more inclusive.

COVER PHOTO CREDIT: CIMMYT/M. DeFreese. *Farmer weeding maize field in Bihar, India.*

ABOUT CGIAR GENDER IMPACT PLATFORM

Generating Evidence and New Directions for Equitable Results (GENDER) is CGIAR's impact platform designed to put equality and inclusion at the forefront of global agricultural research for development. The Platform is transforming the way gender research is done, both within and beyond CGIAR, to kick-start a process of genuine change toward greater gender equality and better lives for smallholder farmers everywhere. gender.cgiar.org.

DISCLAIMER

The working paper has gone through a process of nonblinded peer review by two reviewers external to the CGIAR GENDER Impact Platform, and has also been reviewed by the FAO team working on the 2023 FAO report on the *Status of Rural Women in Agri-food Systems*. The views expressed in this publication are those of the author(s) and do not necessarily reflect the views or policies of the Food and Agriculture Organization of the United Nations nor of the CGIAR GENDER Impact Platform.

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* FAO. 2023. *The Status of Women in Agri-food Systems*. Rome.

Abstract of the working paper

This paper addresses women’s empowerment in agriculture and discusses innovations in measuring it and emerging evidence on its relationship to development outcomes. Women’s empowerment and gender equality are at the core of gender-transformative change in agriculture and a more holistic and inclusive approach to how we address gender in agriculture. We discuss the evolution of our conceptualization and measurement of women’s empowerment and how thinking about gender equality and women’s empowerment has advanced in the decade since the 2010–2011 SOFA. Recent empowerment measures draw upon Kabeer’s definition of empowerment as a process that expands a person’s strategic life choices, particularly for those who had been denied this opportunity. Using a Gendered Food Systems framework and a standardized measure of women’s empowerment, the Women’s Empowerment in Agriculture Index (WEAI), we review the evidence on “what works” to empower women based on impact evaluations of a portfolio of 11 agricultural development projects with empowerment objectives and a scoping review of livestock interventions. We then review the evidence on associations between empowering women and societal benefits in terms of agricultural productivity, incomes, food security, and nutrition. We conclude with recommendations for measurement and policy.

Keywords: gender equality, social equality, women’s empowerment, intersectionality, food systems, livestock, nutrition, food security, agricultural productivity

1. Search and literature review strategy

Correlates of empowerment and relationships between empowerment and other outcomes

While the development of tools and approaches for measuring women’s empowerment is an active research area (see Elias et al. 2021 for a review), our search focuses on the studies using the standard Women’s Empowerment in Agriculture Index (WEAI) to allow us to make meaningful comparisons of findings across studies. Recent reviews highlight the difficulty in making comparisons across studies owing to the wide variation in the approaches and operationalization of empowerment indicators (Santoso et al. 2019).

Between 2012 and 2022, the use of the WEAI has grown significantly to 232 organizations in 58 countries, providing a sizable set of studies for the review—whereas other tools are still in their early stages of development.

Search methodology and inclusion/exclusion criteria

To determine which studies to include in our review, we conducted an initial search for all publications that cited the original WEAI paper, Alkire et al. (2013), from 2013 through June 2020 via Google Scholar. Out of the 626 total records found, we then restricted these publications to include only peer-reviewed literature published in English; working papers, theses, and reports were excluded. To facilitate the comparison of findings, we further restricted the papers included to only those that calculated a WEAI metric such as the 5DE, 3DE, GPI, a singular WEAI indicator, a subset of indicators, or a combination thereof. We did not include papers that used individual WEAI survey items or those that greatly adapted WEAI survey items and/or indicators. Nor did we include papers that did not report significance levels of their quantitative findings. To account for papers published after June 2020, we conducted an additional search for publications that also cited the original WEAI paper or the original pro-WEAI paper, Malapit et al. (2019b), from 2020 through April 2022 via Google Search.

This search yielded 434 results, which we further restricted to only peer-reviewed literature in English and, as before, those that used a WEAI metric either from the original WEAI tool, A-WEAI or pro-WEAI. We reviewed a total of 44 publications that fit all of the above criteria. Note that majority of the papers reviewed use observational data, and therefore the results reported should be interpreted as associational rather than causal. See section 6 for a discussion of related literature that provide evidence on the impacts of livestock interventions (Baltenweck et al. forthcoming) and a synthesis of impact evaluations conducted across the portfolio of 13 agricultural development projects under the Gender, Agriculture, and Assets Project, Phase 2 (GAAP2) (Quisumbing et al. forthcoming).

Results

In section 7 we report on the 27 studies that examine how gender equality and women’s empowerment, as measured by the WEAI metrics, influences other outcomes of interest—including diet, nutrition and food-security outcomes (including WASH), economic and livelihood outcomes (primarily in agriculture), and other well-being outcomes such as life satisfaction and children’s education (see annex table 1). Note that none of the studies analyzed environmental outcomes.

As other empowerment metrics are developed, we expect to see more studies relating these measures with other development outcomes. One such example is presented in annex table 2, based on the Women's Empowerment in Livestock Index (WELI).

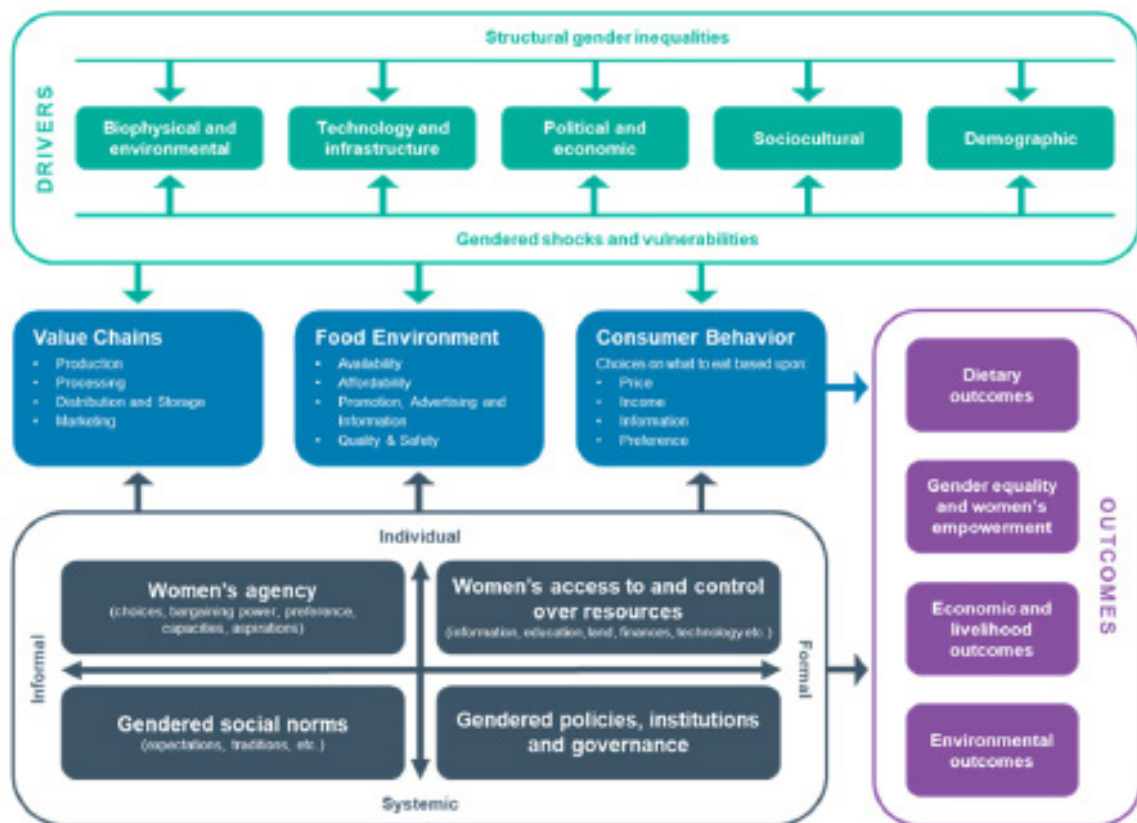


Figure 1. Gender and Food Systems Framework. Adapted from Njuki et al. 2021.

Table 1. Empowerment as a determinant of outcomes

Outcome	Study	Country	Empowerment measure(s)	Result (statistically significant results only)
Nutrition, diet and food-security outcomes				
Nutrition	Bonis-Profumo et al. 2021	Timor-Leste	5DE	Both measures of empowerment—binary and aggregate score—as well as access to and decisions over credit, were significantly and positively associated with improved women's DDS.
	Cunningham et al 2015	Nepal	5DE	Children 12–59 months whose mothers were empowered, participated in groups, and/or owned more assets were moderately more likely to achieve higher DDS.
	Cunningham et al 2019	Nepal	5DE	WEAI 5DE was positively associated with LAZ ($\beta=0.20$, $P=0.04$).
			10 WEAI indicators	Three component indicators were also positively associated with LAZ: satisfaction with leisure time ($\beta=0.27$, $P<0.01$), access to and decisions regarding credit ($\beta=0.20$, $P=0.02$) and autonomy in production ($\beta=0.10$, $P=0.04$).
			5DE	Women's empowerment positively associated with child (<2 years) length-for-age z-scores (LAZ).
	Gupta, Pingali and Pinstrup-Andersen 2019	India	5DE	Log odds of a poor iron status in women decline as women's empowerment levels in agriculture improve.
	Holland and Rammohan 2019	Bangladesh	5DE 10 WEAI indicators	Women's 5DE score positively associated with better height-for-age z-scores (HAZ) for children aged between six and 59 months.
	Malapit and Quisumbing 2015	Ghana	5DE Intrahousehold empowerment gap 10 WEAI indicators	Specific indicators positively associated with children's height-for age z-scores and a lower probability of stunting: (1) Input into productive decisions; (2) Speaking in public.
			5DE	Greater equality within the household favors boys' HAZ, e.g., reducing the gender parity gap by 10% points is associated with a 0.10 increase in boys' HAZ.
	Malapit et al. 2015	Nepal	5DE Intrahousehold empowerment gap 10 WEAI indicators	Women's group membership, control over income, reduced workload, and overall empowerment are associated with lower BMI. Control over income is positively associated with height-for-age z-scores (HAZ), and a lower gender parity gap improves children's HAZ. Women's empowerment mitigates the negative effect of low production diversity on HAZ.
Malapit et al. 2019a	Bangladesh	5DE Intrahousehold empowerment gap	Empowerment gaps weakly correlated with children's HAZ, WHZ and WAZ: <ul style="list-style-type: none"> Increase in women's credit decision-making (smaller gender gap), improves HAZ for girls Increase in women's participation in groups is likely to improve children's WAZ, favoring boys rather than girls.	

Cont.

Outcome	Study	Country	Empowerment measure(s)	Result (statistically significant results only)
Nutrition (cont.)	Quisumbing et al. 2021b	Bangladesh, Cambodia, Ghana, Mozambique, Nepal, Tanzania	SDE Intrahousehold empowerment gap 10 WEAI indicators	Women's empowerment and gender equality are positively associated with child HAZ. Lower intrahousehold inequality (smaller gender gap) is associated with lower women's BMI. A greater number of agricultural decisions, more autonomy in production, and a higher number of hours worked are associated with lower BMI, while comfort with speaking in public and satisfaction with leisure are associated with higher BMI. Trade-offs exist between domains of empowerment and women's nutritional outcomes; few significant associations between the aggregate empowerment scores and nutritional outcomes but analysis of the subdomain indicators finds more significant associations.
	Ross et al. 2015	Ghana	SDE 10 WEAI indicators	Women's BMI is negatively associated with: (1) autonomy in production and positively associated, (2) ownership of assets, (3) access to and decisions on credit, (4) group membership and (5) leisure.
	Sraboni and Quisumbing 2018	Bangladesh	SDE	Women's empowerment is positively and significantly associated with adult men's and women's nutrient intakes.
	Zereyesus 2017	Ghana	SDE 10 WEAI indicators	Women's empowerment has a positive effect on household health status (i.e., the number of stunted children, the number of wasted children and the number of underweight women).
	Kassie et al. 2020	Kenya	6 A-WEAI indicators	Women's empowerment has a positive and significant effect on women's dietary diversity scores.
	Malapit and Quisumbing 2015	Ghana	SDE Intrahousehold empowerment gap 10 WEAI indicators	Women's empowerment is more strongly associated with the quality of infant and young child feeding practices. Women's empowerment in credit decisions is positively and significantly correlated with women's dietary diversity.
	Malapit et al. 2015	Nepal	SDE Intrahousehold empowerment 10 WEAI indicators	Lower gender parity gaps improve children's diets. Women's group membership, control over income, reduced workload, and overall empowerment are positively associated with improved maternal dietary diversity.
	Onah, Horton and Hoddinott 2021	Uganda, Rwanda, Malawi, Zambia, Mozambique	SDE scores 10 WEAI indicators	Women's empowerment mitigates the negative effect of low production diversity on maternal and child dietary diversity. The two indicators in the production domain (autonomy in production decision, and input in production decisions and activities) and one leadership domain indicator (comfortable speaking in public) exhibited significant positive associations with improved Women's DDS.
	Quisumbing et al. 2021b	Bangladesh, Cambodia, Ghana, Mozambique, Nepal, Tanzania	SDE Intrahousehold empowerment gap 10 WEAI indicators	Improved autonomy in production and input in production were associated with improved likelihoods of consumption of dairy products, and fruits and vegetables including vitamin A-rich produce. Higher workload is associated with more diverse child diets. Lower intrahousehold inequality (smaller gender gap) is associated with a higher likelihood of exclusive breastfeeding. A greater number of agricultural decisions, greater autonomy in production, a greater number of agricultural assets owned, and a greater number of income decisions are associated with lower women's dietary diversity score (WDDS), while greater confidence in speaking in public is associated with higher women's dietary diversity score.

Cont.

Outcome	Study	Country	Empowerment measure(s)	Result (statistically significant results only)
Diet (cont.)	Ross et al 2015	Ghana	5DE 10 WEAI indicators	Women's dietary diversity is negatively associated with Autonomy in production and positively associated with ownership of assets, access to and decisions on credit, group membership and leisure.
	Sraboni and Quisumbing 2018	Bangladesh	5DE	Women's empowerment is correlated with more diverse diets of children under five. Women's empowerment is positively and significantly associated with adult men's and women's dietary diversity.
	Wouterse 2017	Niger	5DE	Women's empowerment has a positive and significant effect on women's dietary diversity scores.
	Chitja and Murugani 2018	South Africa	5DE	Empowerment in agriculture and food security weakly associated.
	Clement et al. 2019	Nepal	A-WEAI 5DE 6 A-WEAI indicators	Autonomy in production indicator for female farmers in this sample had a statistically significant positive effect on the HDDS. When women have achieved adequacy in access to and decisions about credit, a significantly larger share of both vegetable and cereal production is kept for home consumption. However, when women were empowered in term have achieved adequacy in control over the income, the share of vegetables retained for household consumption drops significantly. Women's adequacy in access to and decisions about credit is both significantly correlated with lower wheat productivity and a greater share of cereals kept for own consumption.
	Holland and Rammohan 2019	Bangladesh	5DE 10 WEAI indicators	Women's 5DE score positively associated with better household dietary diversity.
Household-level food security	Seymour et al. 2019	Bangladesh	4DE (excluding time domain)	Larger empowerment gaps are associated with marginally lower household dietary diversity scores among nonpoor, time-poor, and doubly-poor households.
	Sraboni et al 2014	Bangladesh	5DE GPI	Women's empowerment is positively associated with calorie availability and dietary diversity at the household level.
	Quisumbing et al. 2021b	Bangladesh, Cambodia, Ghana, Mozambique, Nepal, Tanzania	5DE Intrahousehold empowerment gap 10 WEAI indicators	Autonomy in production, control over income decisions, and satisfaction with time spent or leisure are all positively associated with HDDS.
	Wouterse 2017	Niger	5DE	Women's empowerment has a positive and significant effect on household's dietary diversity scores.
	Cunningham et al. 2019	Nepal	5DE 10 WEAI indicators	Empowered women had better WASH practices than disempowered women.
	WASH			

Cont.

Outcome	Study	Country	Empowerment measure(s)	Result (statistically significant results only)	
Economic and livelihood outcomes					
Agricultural production	Anik and Rahman 2021	Bangladesh	SDE Score Intrahousehold empowerment gap	Both women's empowerment in agriculture and a reduction in the gender gap in empowerment significantly increase production efficiency as expected.	
	Clement et al. 2019	Nepal	A-WEAI 5DE 6 A-WEAI indicators	Women's adequacy in access to and decisions about credit is both significantly correlated with lower wheat productivity and a greater share of cereals kept for own consumption.	
	De Pinto et al. 2020	Bangladesh	SDE score 10 WEAI indicators	As women's input in decision-making increases, less land is allocated to cereals and more land is allocated to vegetables and fruits, and women's participation in economic or social groups appears to favor a greater allocation of land to vegetables and fruits and less to cereals (i.e., greater crop diversification). As women's share of household assets increases, more land is allocated to cereals and fruits and less land is allocated to vegetables (i.e., reduction in crop diversification).	
	Diuro et al. 2018	Kenya		Women's empowerment in agriculture significantly increases maize productivity. Female- and male-managed plots experience significant improvements in productivity when the women who tend them are empowered.	
	Mponela et al. 2021	Malawi	3 of the SDE (production, resources and income)	As women become increasingly empowered in decision-making, there are significant trade-offs: a percentage point increase in WEAI potentially leads to a one-third percentage point increase in the area allocated to legumes but reduces the amount of organic manure applied with higher elasticity of two percentage points.	
	Seymour 2017	Bangladesh	SDE	Reduced gender disparities within households (measured in terms of the empowerment gap between spouses) are associated with higher levels of technical efficiency. This result extends to plots that women jointly manage with their spouses, as well as those that women do not actively manage.	
	Wouterse 2017	Niger	SDE 10 WEAI indicators	More empowered households are more likely to have zai pits, and empowerment is associated with higher agricultural yields.	
	Wouterse 2019	Niger	SDE 10 WEAI indicators	Empowerment scores positively affect the quantity of agricultural output. An increase of 1.0% in average empowerment would increase output by almost 1.0%. Empowerment interacts positively with returns to equipment and negatively with returns to fertilizer.	
	Well-being outcomes				
	Life satisfaction	Hossain, Asadullah and Kambhampati 2019	Bangladesh	SDE 10 WEAI indicators	Empowerment (SDE score) and life satisfaction are positively associated among women and men. Specific indicators positively associated with life satisfaction among women and men: (1) input in productive decisions; (2) purchase, sale or transfer of assets; (3) ownership of assets; (4) access to and decisions about credit; (5) control over use of income; (6) leisure; and (7) group membership.
Malapit et al. 2019a		Bangladesh	SDE Intrahousehold empowerment gap	Fathers' empowerment is positively associated with younger children's schooling, while mothers' empowerment is more important for girls' education in general and in keeping older boys and girls in school.	

Table 2. WEAI- Adapted Empowerment Tools

Tool	Study	Country	Empowerment measure(s)	Result (statistically significant results only)
Women's Empowerment in Livestock Index	Mwambi, Bijman and Galiè 2021	Kenya	WEI six dimensions of empowerment	When a household joins any PO, regardless of whether the man or the woman in the household is the registered member, women achieve a higher control over production decisions, buying and selling of land and cows, use of loans and receiving dairy income. Distinguishing by gender of membership, there is stronger women empowerment when the woman in the household is a member.

Scoping review of livestock interventions

This section draws on a scoping review conducted in 2021 and 2022 on the impact of livestock interventions on women's empowerment (and gender equality) that identified 106 studies on the topic, mostly published after 2010 (Baltenweck et al. forthcoming). Table 3 provides an overview of geographical location and species characterizing these interventions.

Table 3. Number of included studies, study region, and species

	Cattle	Cattle and small ruminants	Small ruminants	Small ruminants and poultry	Poultry	Pigs	Multiple species	Total
America (Central and South)							2	2
Eastern Africa	24	3	2		1	1	8	39
Africa (Central, South, West)	2		1	1	4	2	2	12
South Asia	30	1	4		5		7	47
Asia (East, Southeast, West)	1		1			2	2	6
Total	57	4	8	1	10	5	21	106

The authors adopted 'decision-making', 'division of labor' and 'control over assets' as three broad outcomes to identify changes in women's empowerment. Because of the varied ways in which women's empowerment was conceptualized and operationalized into indicators across the articles, the authors adopted a deductive approach to identifying intermediate indicators of progress toward women's empowerment (i.e., they built indicators of empowerment around those that emerged from the studies).

Most of the reviewed studies focused on 'women's access to and control over income from livestock,' followed by 'women's access to and control over livestock assets' and 'women's labor or workload' as indicators of women's empowerment. The most common livestock interventions that positively impacted women's empowerment include cooperatives and groups, followed by extension, credit and education (see table 2 in the main text).

2. Tables

Table 4. Projects in the GAAP2 portfolio

Project acronym	Project name and years	Implementer and evaluator	Project modality/goal	Project objective	Project approach and evaluation design
South Asia/Bangladesh					
ANGeL	Agriculture, Nutrition, and Gender Linkages	Ministry of Agriculture (Bangladesh) and IFPRI	Crops/nutrition	To pilot alternative approaches to integrating agriculture, nutrition and women's empowerment, the most effective of which will be scaled up	Implement three approaches in different combinations: facilitating production of nutrient-rich food, conducting high-quality behavior-change communication (BCC), and undertaking gender-sensitization activities; randomized controlled trial
AVC	Impact Evaluation of the Bangladesh Agricultural Value Chains Program	DAI and IFPRI	Crops/income and nutrition	To increase agricultural output and income, and improve food and nutrition security through strengthened agricultural value chains	Conduct training aimed at building farmers' capacity in using improved seed varieties and cultivation practices, along with basic training on gender and nutrition issues and provision of promotional discounts to incentivize technology adoption; RCT
FAARM	Food and Agricultural Approaches to Reducing Malnutrition	Helen Keller International (HKI) and University of Heidelberg	Crops and livestock/nutrition	To reduce undernutrition among women and young children through a food-based dietary-diversification strategy and to increase the status of women within the household	Intervention based on HKI's enhanced homestead food production model involves training rural women's groups in vegetable gardening, fruit tree production, and poultry rearing, along with nutrition and hygiene; RCT
TRAIN	Targeting and Realigning Agriculture to Improve Nutrition	BRAC and IFPRI	Crops and livestock/nutrition	To increase dietary diversity by increasing production diversity of poor rural producers or indirectly via increased incomes; improve child feeding, health and sanitation practices through a strong BCC component; and (3) empower women directly, by facilitating greater control over agricultural income and its allocation toward health and nutrition; and indirectly by sensitizing their husbands to support them in their productive and reproductive tasks)	Assess the impact of incorporating agricultural interventions to promote production, production diversity and income-generation into a strong state-of-the-art maternal and child health and nutrition behavior-change communication platform; RCT (endline completed in 2022 because of COVID-19)
South Asia/India					
WINGS	Women Improving Nutrition through Group-Based Strategies	Professional Assistance for Development Action (PRADAN) and IFPRI	Crops and livestock/nutrition	To improve women's and children's diets and nutrition outcomes through increasing own consumption and income	Uses existing women's self-help groups to deliver BCC and training on nutrition-sensitive agricultural planning, and works with the community and public systems/institutions to ensure that services of public health and nutrition programs are available and accessible in the project area; matching
South Asia/Nepal					
Heifer	Empowerment, Resilience, and Livestock Transfers	Heifer International and Montana State University	Livestock/income and nutrition	To increase income, food security and nutrition, and women's empowerment, and improve aspirations, hope, and economic resilience among the chronically poor by building physical, human and social capital	Provides women with livestock transfers and training related to nutrition, home gardening, and livestock management; forms self-help groups through which women receive empowerment training; RCT

Cont.

Project acronym	Project name and years	Implementer and evaluator	Project modality/goal	Project objective	Project approach and evaluation design
West Africa/Burkina Faso					
Grameen Foundation	Building Resilience of Vulnerable Communities in Burkina Faso	Grameen Foundation and Brigham Young University	Crops and livestock/income and nutrition	To increase the resilience of vulnerable communities in disaster-affected regions by building women's economic empowerment, and to strengthen women's capacity to make decisions about children's nutrition	Uses community-based women's savings groups as a sustainable platform for improving livelihoods through training, education on agriculture as a business, linkages to agricultural services, financing for common agricultural activities, nutrition education, and gender dialogues; matching
SE LEVER	Integrated poultry value chain and nutrition intervention	Agribusiness Systems International, AfricSanté, and IFPRI	Livestock/income and nutrition	To increase poultry production and improve the nutritional status of women and children in the Centre-Ouest, Hauts-Bassins and Boucle de Mouhoun regions of Burkina Faso	Uses an integrated market-facilitation approach combining revenue generation, women's empowerment, and nutritional behavior-change interventions; RCT
West Africa/Ghana					
iDE	Small-Scale Irrigation and Women's Empowerment in Northern Ghana	iDE and IFPRI	Crops/income and nutrition	To expand production of food during the lean season and reduce production risks during rainy seasons through small-scale irrigation—which will increase income—food security, nutrition, and health	Provides women access to motor pumps along with training, access to credit, and other agricultural inputs; lottery
West Africa/Mali					
WorldVeg		World Vegetable Center	Crops/income and nutrition	To improve nutritional status and dietary diversity by increasing vegetable production and consumption	Integrated home-garden project—combining training in gardening with nutrition behavior-change communication and training in water, sanitation and hygiene (WASH). Difference-in-difference weighted with entropy balancing
East Africa/Ethiopia					
JP-RWEE	UN Joint Programme on Accelerating Progress toward the Economic Empowerment of Rural Women in Ethiopia	Food and Agriculture Organization of the United Nations (FAO) and International Fund for Agricultural Development (IFAD)	Crops and livestock/income and nutrition	To reduce gender inequalities in pastoralist communities related to access to resources, credit, and financial services in order to improve household food security, women's decision-making within the household, and women's participation in the community	Interventions include strengthening associations and cooperatives to offer financial products to women farmers, providing credit to women farmers, and giving women financial literacy and entrepreneurship training. Propensity: inverse probability weighted difference-in-difference
East Africa/Kenya					
MoreMilk	MoreMilk: Making the most of milk	International Livestock Research Institute	Livestock/income and nutrition	To enhance milk safety and child nutrition in peri-urban Nairobi	Training milk traders to improve their milk-handling and business practices (endline not completed because of COVID-19; intervention to restart in another site)
East Africa/Tanzania					
Maisha Bora	Evaluation of Women's Food Security Program for Impoverished Maasai Households	Savannas Forever and University of Minnesota	Livestock/income and nutrition	To increase food security of semipastoralist communities through a more diversified and secure income from improvements in livestock	Builds capacity of pastoralists' organizations to provide entrepreneurship training, business skills training, and advocacy for women; forms savings and credit groups and female-only farms; provides training on household budgeting and gender awareness. Propensity score weighted difference-in-difference regressions

Source: Johnson et al. (2018)

Table 5. Comparison of pro-WEAI and A-WEAI for all indicators

Pro-WEAI domain	Pro-WEAI indicator name	Pro-WEAI definition	Difference compared to WEAI versions	WEAI and A-WEAI domain	WEAI and A-WEAI indicator name	WEAI definition	A-WEAI definition
Intrinsic agency	Autonomy in income	More motivated by own values than by coercion or fear of others' disapproval: <i>Relative Autonomy Index</i> ^a score >=1 RAI score is calculated by summing responses to the three vignettes about a person's motivation for how they use income generated from agricultural and non-agricultural activities (yes=1; no=0), using the following weighting scheme: 0 for vignette 1 (no alternative), -2 for vignette 2 (external motivation), -1 for vignette 3 (introjected motivation), and +3 for vignette 4 (autonomous motivation) <i>Weight = 1/12</i>	Based on "Autonomy in production" indicator in the WEAI; pro-WEAI focuses exclusively on the use of income generated from agricultural and non-agricultural activities and uses a new vignette-based survey instrument. Not included in A-WEAI	Production	Autonomy in production	Adequate if individual has a Relative Autonomy Indicator is greater than 1 in at least one domain/ activity linked to production <i>Weight = 1/10</i>	Not included
Intrinsic agency	Self-efficacy	"Agree" or greater on average with self-efficacy questions: New General Self-Efficacy Scale ^c score >=32 <i>Weight = 1/12</i>	Not included in WEAI or A-WEAI				
Intrinsic agency	Attitudes about intimate partner violence against women	Believes husband is NOT justified in hitting or beating his wife in all five scenarios: ^b 1) She goes out without telling him 2) She neglects the children 3) She argues with him 4) She refuses to have sex with him 5) She burns the food <i>Weight = 1/12</i>	Not included in WEAI or A-WEAI				

Cont.

Pro-WEAI domain	Pro-WEAI indicator name	Pro-WEAI definition	Difference compared to WEAI versions	WEAI and A-WEAI domain	WEAI and A-WEAI indicator name	WEAI definition	A-WEAI definition
Intrinsic agency	Respect among household members	Meets ALL of the following conditions related to their spouse, the other respondent, or another household member: 1) Respondent respects relation (MOST of the time) AND 2) Relation respects respondent (MOST of the time) AND 3) Respondent trusts relation (MOST of the time) AND 4) Respondent is comfortable disagreeing with relation (MOST of the time) <i>Weight = 1/12</i>	Not included in WEAI or A-WEAI				
Instrumental Agency	Input in productive decisions	Meets at least ONE of the following conditions for ALL of the agricultural activities they participate in 1) Makes related decision solely, 2) Makes the decision jointly and has at least some input into the decisions 3) Feels could make decision if wanted to (to at least a MEDIUM extent) <i>Weight = 1/12</i>	Included in the WEAI and A-WEAI; pro-WEAI uses a stricter adequacy cutoff	Production	Input in productive decisions	Adequate if individual participates in and makes decisions, has input in decisions, or feels she could make decisions (if desired) about at least two agricultural activities*	Adequate if individual participates in and makes decisions, has input in decisions, or feels she could make decisions (if desired) about at least two agricultural activities
Instrumental Agency	Ownership of land and other assets	Owns, either solely or jointly, at least ONE of the following: (updated March 2020) 1) Any three assets 2) Land <i>Weight = 1/12</i>	Included in the WEAI and A-WEAI; pro-WEAI uses a stricter adequacy cutoff	Resources	Ownership of assets	Adequate if individual owns at least one major asset or at least two minor assets <i>Weight = 1/15</i>	Adequate if individual owns at least one major asset or at least two minor assets <i>Weight = 2/15</i>

Cont.

Pro-WEAI domain	Pro-WEAI indicator name	Pro-WEAI definition	Difference compared to WEAI versions	WEAI and A-WEAI domain	WEAI and A-WEAI indicator name	WEAI definition	A-WEAI definition
Instrumental Agency	Access to and decisions on financial services	Meets at least ONE of the following conditions: 1) Belongs to a household that used a source of credit in the past year AND participated in at least ONE sole or joint decision about it 2) Belongs to a household that did not use credit in the past year but could have if wanted to from at least ONE source 3) Has access, solely or jointly, to a financial account <i>Weight = 1/12</i>	Based on "Access to and decisions on credit" indicator in the WEAI and A-WEAI; pro-WEAI includes access to financial accounts	Resources	Access to and decisions about credit	Adequate if individual makes decisions about at least one source of credit accessed by her/his household <i>Weight = 1/15</i>	Adequate if individual makes decisions about at least one source of credit accessed by her/his household <i>Weight = 1/15</i>
Instrumental Agency	Control over use of income	Has input in decisions related to how to use BOTH income and output from ALL of the agricultural activities they participate in AND has input in decisions related to income from ALL non-agricultural activities they participate in, unless no decision was made <i>Weight = 1/12</i>	Included in the WEAI and A-WEAI; pro-WEAI uses a stricter adequacy cutoff	Income	Control over use of income	Adequate if individual participates in and has input in decisions about income generated from an activity or she/he makes decisions, or has input in decisions, or feels she/he could make decisions (if desired) about employment or major household expenditures <i>Weight = 1/5</i>	Adequate if individual participates in and has input in decisions about income generated from an activity or she/he makes decisions, has input in decisions, or feels she/he could make decisions (if desired) about employment or major household expenditures <i>Weight = 1/5</i>
Instrumental Agency	Work balance	Works less than 10.5 hours per day: Workload = time spent in primary activity + (1/2) time spent in childcare as a secondary activity <i>Weight = 1/12</i>	Similar to 'Workload' indicator in the WEAI and A-WEAI; pro-WEAI restricts the measurement of secondary activities to a single activity: childcare. Secondary activities not collected in A-WEAI	Time	Workload	Adequate if individual worked fewer than 10.5 hours during the previous day <i>Weight = 1/10</i>	Adequate if individual worked fewer than 10.5 hours during the previous day <i>Weight = 1/5</i>

Cont.

Pro-WEAI domain	Pro-WEAI indicator name	Pro-WEAI definition	Difference compared to WEAI versions	WEAI and A-WEAI domain	WEAI and A-WEAI indicator name	WEAI definition	A-WEAI definition
Instrumental Agency	Visiting important locations	Meets at least ONE of the following conditions: 1) Visits at least TWO locations at least ONCE PER WEEK of [city, market, family/relative], or 2) Visits least ONE location at least ONCE PER MONTH of [health facility, public meeting] Weight = 1/12	Not included in the WEAI or A-WEAI				
		Active member of at least ONE group Weight = 1/12	Same as in the WEAI and A-WEAI	Leadership	Group member	Adequate if individual is an active member of at least one group Weight = 1/10	Adequate if individual is an active member of at least one group Weight = 1/5
Collective Agency	Group membership	Active member of at least ONE group that can influence the community to at least a MEDIUM extent Weight = 1/12	Not included in the WEAI or A-WEAI				
		Membership in influential groups	Not included in pro-WEAI	Time	Leisure	Inadequate if not satisfied with leisure Weight = 1/10	Not included
Collective Agency	Resources	Active member of at least ONE group that can influence the community to at least a MEDIUM extent Weight = 1/12	Not included in pro-WEAI	Resources	Purchase, sale, or transfer of assets	Adequate if individual participates or can participate in decisions to buy, sell or transfer the at least one asset either individually or jointly, conditional on the household's owning it (excludes chickens and nonmechanized farming equipment) Weight = 1/15	Not included
		Speaking in public	Not included in pro-WEAI	Leadership	Speaking in public	Adequate if individual is comfortable speaking in public Weight = 1/10	Not included

Table 6. Project impacts on women's and men's empowerment (whether empowered, and empowerment score) and gender parity

	Women				Men				Whether household achieved gender parity	
	Whether empowered		Empowerment score		Whether empowered		Empowerment score		Endline control mean	Impact
	Endline control mean	Impact	Endline control mean	Impact	Endline control mean	Impact	Endline control mean	Impact		
South Asia										
Bangladesh										
<i>ANGeL^{1,2}</i>										
Control mean	0.25		0.59		0.39		0.67		0.47	
T-N		0.08**		0.04***		0.10**		0.03**		0.05
T-A		0.07*		0.04**		0.02		0.01		0.05
T-AN		0.08**		0.04***		-0.01		-0.00		0.08*
T-ANG		0.13***		0.07***		0.01		0.00		0.13***
<i>AVC^{2,3}</i>										
Control mean	0.232		0.534		0.414		0.184		0.310	
NGO training only		0.012		0.019		0.018		-0.002		0.117*
NAAFCO promotions only		-0.029		0.015		0.080		0.020		-0.051
Training + promotions		-0.088*		0.010		-0.019		-0.022		0.016
<i>FAARM⁴</i>										
Control mean	0.04		0.50		0.19		0.65		0.29	
Intervention	0.24	7.7 (OR)***	0.67	1.51***	0.25	1.5 (OR)	0.68	0.30**	0.54	3.5*** (OR)
India										
<i>WINGS</i>										
<i>A-WEAI⁵</i>										
Control (Standard)	0.132		0.79		0.293		0.90		0.507	
Nutrition-intensification		-0.22		0.014		-0.049		-0.021		-0.008
<i>Pro-WEAI⁶</i>										
Control (Standard)	0.571		0.65		0.718		0.79		0.696	
Nutrition-intensification		0.018		-0.024		-0.043		-0.017		0.023

Cont.

	Women				Men				Whether household achieved gender parity	
	Whether empowered		Empowerment score		Whether empowered		Empowerment score		Endline control mean	Impact
	Endline control mean	Impact	Endline control mean	Impact	Endline control mean	Impact	Endline control mean	Impact		
Nepal										
Heifer ^{2,6}										
Heifer Direct beneficiaries										
Control	0.54		0.75							
Full treatment		0.096*		0.055***						
No goats		0.063		0.049**						
No values-based training		0.082		0.049**						
Heifer Indirect beneficiaries										
Control	0.48		0.71							
Full treatment		0.07		0.073***						
No goats		0.13**		0.077***						
No values-based training		0.065		0.034						
West Africa										
Burkina Faso										
Grameen ⁷										
SE LEVER ⁸		-0.084		0.003		0.151**		0.062***		-0.056
Control	0.14		0.53		0.43		0.68		0.29	
SE LEVER		0.03		0.00		0.03		0.01		0.02
SE LEVER+		-0.02		-0.02		0.04		0.01		-0.06
Ghana										
iDE ⁹										
Control 1 (A-WEAI)			.745							
Motor pump				-0.000181						
Control 2 (A-WEAI)			.752							
Motor pump				-0.0223						
Spillover control (A-WEAI)			.752							
Spillover effect				-0.0673*						

Cont.

	Women				Men				Whether household achieved gender parity	
	Whether empowered		Empowerment score		Whether empowered		Empowerment score		Endline control mean	Impact
	Endline control mean	Impact	Endline control mean	Impact	Endline control mean	Impact	Endline control mean	Impact		
Control 1 (Pro-WEAI)			.687							
Motor pump			0.0237							
Control 2 (Pro-WEAI)			.694							
Motor pump			-0.0300							
Spillover control (Pro-WEAI)			.694							
Spillover effect			-0.0523							
Mali										
WorldVeg ¹⁰										
Control	0.29		0.65		0.70		0.89		0.36	
Intervention ITT ²		0.19****		0.04		-0.25****		-0.12****		0.25****
Intervention ToT ⁶		0.16**		0.09**		-0.25**		-0.09**		0.24****
East Africa										
Ethiopia										
JP-RWEE										
Oromia ¹¹										
Control										
Beneficiaries with access to credit		0.0311		0.0330		0.0682		0.0459**		-0.00278
Beneficiaries who lost access to credit		-0.463***		-0.117***		-0.470**		-0.117**		-0.389**
Tanzania										
Maisha Bora ¹²										
Control	0.206		0.540		0.377		0.637		0.394	
Intervention		0.095		0.058		0.120		0.023		-0.48

* P < 0.10; ** P < 0.05; *** P < 0.01

Notes: 1 Single difference estimates, endline; 2 Intent to treat (ITT) estimates; 3 Double-difference estimates, midline and endline; 4 Multilevel logistic regression with random effects, OR=odds ratio; 5 Double-difference estimates, baseline and endline, nearest neighbor estimates; 6 Treatment of the treated (ToT) estimates; 7 (Grameen); 8 Intent to treat, ANCOVA regression; 9 (IDE); 10 Difference-in-differences weighted with entropy balancing method and selection of control variables with post-double-selection method via Lasso regressions, baseline and endline using machine learning methods. † q < 0.10; †† q < 0.05; ††† q < 0.01. Q-values estimated following Benjamini and Hochberg (1995); 11 Inverse probability weighted, single difference; significant + after controlling for false discovery rate; 12 Propensity score weighted difference-in-difference regressions.

Table 7. Associations between project strategies and estimated impacts on women's continuous indicators (insignificant coefficients set to zero)

Instrumental agency						
	Number of productive activities with input in decisions	Number of asset types (including agricultural land) solely or jointly owned	Number of credit sources, plus access to financial account	Number of activities with control over use of income	Time spent on paid and unpaid work, plus 0.5 x time spent on childcare	Number of important locations visited
Whether project has strategy to:						
Build capacity	0.018	-0.107	0.138**	0.007	0.077	0.085**
	(0.060)	(0.111)	(0.057)	(0.069)	(0.117)	(0.032)
	<1.000>	<1.000>	<1.000>	<1.000>	<1.000>	<1.000>
Change gender norms	0.072	-0.055	-0.063	0.006	0.095	0.010
	(0.053)	(0.099)	(0.051)	(0.062)	(0.105)	(0.032)
	<1.000>	<1.000>	<1.000>	<1.000>	<1.000>	<1.000>
Strengthen organizations	-0.018	0.082	-0.104	0.155	-0.115	-0.010
	(0.088)	(0.163)	(0.084)	(0.102)	(0.172)	(0.083)
	<1.000>	<1.000>	<1.000>	<1.000>	<1.000>	<1.000>
Provide goods and services	0.026	-0.018	-0.088	-0.055	0.023	0.011
	(0.079)	(0.146)	(0.076)	(0.092)	(0.155)	(0.064)
	<1.000>	<1.000>	<1.000>	<1.000>	<1.000>	<1.000>
Region (South Asia is excluded category)						
East Africa	-0.092	0.051	-0.058	-0.096	0.078	0.000
	(0.074)	(0.138)	(0.071)	(0.086)	(0.145)	(0.041)
West Africa	0.023	-0.085	0.131**	-0.073	0.256**	0.011
	(0.063)	(0.117)	(0.061)	(0.073)	(0.124)	(0.045)
Constant	-0.007	0.085	0.081	0.035	-0.085	-0.096***
	(0.056)	(0.105)	(0.054)	(0.065)	(0.110)	(0.029)
Observations	31	31	31	31	31	22
Adjusted R-squared	-0.088	-0.146	0.304	-0.082	-0.002	0.178
Intrinsic agency				Collective agency		
	Relative autonomy index score	Self-efficacy scale score	Number of situations in which intimate partner violence is not justified	Number of conditions met defining respect	Number of groups to which respondent belongs	Number of groups regarded as influential to which respondent belongs
Whether project has strategy to:						
Build capacity	0.038	0.014	-0.019	0.000	0.114	0.056
	(0.173)	(0.054)	(0.109)	(0.018)	(0.101)	(0.089)
	<1.000>	<1.000>	<1.000>	<1.000>	<1.000>	<1.000>
Change gender norms	0.042	-0.014	-0.014	0.000	0.119	0.056
	(0.173)	(0.054)	(0.109)	(0.018)	(0.101)	(0.089)
	<1.000>	<1.000>	<1.000>	<1.000>	<1.000>	<1.000>
Strengthen organizations	0.266	0.099	0.126	0.028	-0.207	-0.040
	(0.325)	(0.146)	(0.279)	(0.033)	(0.266)	(0.226)
	<1.000>	<1.000>	<1.000>	<1.000>	<1.000>	<1.000>
Provide goods and services	-0.264	0.000	-0.142	0.000	0.245	0.130
	(0.238)	(0.108)	(0.216)	(0.025)	(0.207)	(0.176)
	<1.000>	<1.000>	<1.000>	<1.000>	<1.000>	<1.000>

Cont.

	Intrinsic agency				Collective agency	
	Relative autonomy index score	Self-efficacy scale score	Number of situations in which intimate partner violence is not justified	Number of conditions met defining respect	Number of groups to which respondent belongs	Number of groups regarded as influential to which respondent belongs
Region (South Asia is excluded category)						
East Africa	-0.125 (0.172)	-0.109 (0.112)	-0.053 (0.139)	-0.028 (0.018)	-0.194 (0.133)	-0.149 (0.141)
West Africa	-0.317 (0.188)	-0.109 (0.087)	-0.122 (0.150)	-0.028 (0.018)	0.077 (0.144)	-0.016 (0.122)
Constant	-0.028 (0.166)	0.009 (0.049)	0.028 (0.099)	-0.000 (0.018)	-0.103 (0.090)	-0.056 (0.081)
Observations	18	16	22	17	25	19
Adjusted R-squared	-0.093	-0.316	-0.239	-0.133	0.041	-0.170

Notes: Marginal effects; standard errors in parentheses. (d) for discrete change of dummy variable from 0 to 1. Anderson (2008) sharpened q-values in triangular brackets. * P < 0.10, +q < 0.10.

Table 8. Distribution of livestock interventions by sign and significance of impact

Indicators of empowerment	Productivity or husbandry	Loans, microcredit	Asset transfer	Extension, training, education	Groups or cooperatives	Access to inputs or services	Access to output market	Other intervention
Access to and control over income from livestock	11 P; 0 NE; 6 N; 7 U	5 P; 0 NE; 1 N; 2 U	5 P; 3 NE; 2 N; 1 U	12 P; 1 NE; 5 N; 4 U	16 P; 0 NE; 4 N; 9 U	7 P; 0 NE; 5 N; 2 U	9 P; 0 NE; 8 N; 5 U	2 P; 0 NE; 3 N; 3 U
Access to and control over livestock assets	8 P; 2 NE; 0 N; 3 U	5 P; 0 NE; 0 N; 2 U	8 P; 1 NE; 1 N; 2 U	14 P; 3 NE; 0 N; 3 U	10 P; 2 NE; 0 N; 6 U	7 P; 0 NE; 0 N; 0 U	8 P; 1 NE; 0 N; 3 U	1 P; 0 NE; 0 N; 1 U
Labor or workload	1 P; 0 NE; 9 N; 6 U	0 P; 0 NE; 3 N; 0 U	1 P; 1 NE; 3 N; 0 U	2 P; 0 NE; 8 N; 0 U	0 P; 0 NE; 7 N; 6 U	1 P; 0 NE; 4 N; 3 U	0 P; 0 NE; 10 N; 2 U	1 P; 0 NE; 3 N; 0 U
Women empowerment index	3 P; 0 NE; 0 N; 1 U	0 P; 0 NE; 0 N; 0 U	5 P; 0 NE; 0 N; 0 U	8 P; 1 NE; 0 N; 1 U	6 P; 1 NE; 0 N; 3 U	3 P; 1 NE; 0 N; 1 U	3 P; 1 NE; 0 N; 1 U	0 P; 0 NE; 0 N; 1 U

P = positive; NE = no effect; N = negative; U = unclear

Glossary of terms in gender equality in agri-food systems work

Adaptation (to climate change) for human systems refers to the process of adjusting to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities (IPCC 2018). The options, strategies and measures for adaptation can be categorized as structural, institutional, ecological or behavioral (IPCC 2018).

Adaptive capacity is the ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities or to respond to consequences (IPCC 2018; MEA 2005).

Agroforestry is “a collective name for land-use systems and technologies where woody perennials (trees, shrubs, palms, bamboos, etc.) are deliberately used on the same land-management units as agricultural crops and/or animals, in some form of spatial arrangement or temporal sequence. In agroforestry systems there are both ecological and economical interactions between the different components. Agroforestry can also be defined as a dynamic, ecology-based natural resource management system that, through the integration of trees on farms and in the agricultural landscape, diversifies and sustains production for increased social, economic and environmental benefits for land users at all levels. In particular, agroforestry is crucial to smallholder farmers and other rural people because it can enhance their food supply, income and health. Agroforestry systems are multifunctional systems that can provide a wide range of economic, sociocultural and environmental benefits” (FAO 2015).

Aquaculture, or farming in water, “is the aquatic equivalent of agriculture, or farming on land. Defined broadly, agriculture includes farming both animals (animal husbandry) and plants (agronomy, horticulture and forestry in part). Similarly, aquaculture covers the farming of both animals (including crustaceans, finfish and molluscs) and plants (including seaweeds and freshwater macrophytes). While agriculture is predominantly based on use of freshwater, aquaculture occurs in both inland (freshwater) and coastal (brackish water, seawater) areas” (FAO n.d.a).

Aspirations are defined as forward-looking goals or targets (Locke and Latham 2002) and as orientations toward a desired future, where such futures may be individual or collective projects, more immediate or longer term, and pertain to imaginations, affect as well as material practices (Huijsmans, Ansell and Froerer 2021).

Climate-smart agriculture (CSA) is a framework that is used to promote coordinated efforts to achieve three objectives (pillars): (1) increasing agricultural productivity and incomes, (2) adapting and building resilience to climate change at multiple scales, and (3) mitigating greenhouse gas emissions (GHG) from agriculture (Lipper et al. 2014). CSA provides a basis to evaluate alternative strategies and approaches to address climate change across the three pillars. It is often criticized for its lack of attention to political and equity dimensions.

Crop productivity or yield is the output of either a particular crop or all crops produced on a unit of land. It is usually presented in physical weight (kilograms) per hectare.

Endowment effects are the component of the gender productivity gap that is accounted for or explained by farmer characteristics and the unequal access to production inputs.

Empowerment is the process by which people who have been denied the ability to make strategic life choices acquire such an ability. It encompasses three dimensions: resources (economic, human and social preconditions), agency (power-related processes), and achievements (well-being outcomes) (Kabeer 1999).

Social empowerment entails receiving recognition in one's community.

Economic empowerment entails generating income and purchasing of assets.

Exposure and **sensitivity** to climate shocks and stressors are properties of a system, community or individual that are dependent on the interaction between the characteristics of the system (e.g., livelihood characteristics) and on the attributes of the climate stimulus (severity, duration, scale, etc.) (Smit and Wandel 2006).

Fisheries refers to the capture of aquatic organisms in marine, coastal and inland areas, as well as their processing, marketing and distribution.

Forest: "Land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds *in situ*. It does not include land that is predominantly under agricultural or urban land use." (FAO 2022)

Gender differences arise from the socially constructed relationship between women and men (Oakley 1972; Quisumbing and McClafferty, 2006). **Sex differences**, on the other hand, are biological and innate. The roles that women and men play in society show similarities and differences across classes and societies. Since the definition of men's and women's roles is specific to time and place, gender divisions are not as simple as 'ticking a box' (Moser 1989; Quisumbing and McClafferty, 2006). Gender differences affect the distribution of resources between women and men and are shaped by ideological, religious, ethnic, economic and social determinants (Moser 1989; Quisumbing and McClafferty, 2006). Being socially rather than innately determined, this distribution can be changed through conscious social action, including public policy.

Gender gaps in productivity refer to either within-household or between-household differences in productivity between women and men. Broadly, two types of gender-based farming practices exist: individual and joint production units (farms). Intrahousehold gender productivity differences involve individual farms wherein plots are distinguished by the sex (female and male) of the plot owner or manager or decision-maker, usually wife and husband who are part of the same household; interhousehold gender gaps involve productivity differences (at plot or household level) between joint farms wherein households are distinguished by the sex of the household head or farm decision-maker in the household. Interhousehold gaps also involve productivity differences between households (joint farms irrespective of the gender of household head).

Conditional gender productivity gap refers, in this report, to gendered productivity gaps reported after factoring in the gendered differences in access to and control over key agricultural resources such as land, agricultural inputs (fertilizer, improved seeds, plot area, climatic conditions, etc.).

Unconditional gender productivity gap refers to reported gender difference in productivity after taking into consideration the gendered differences in access to and use of key agricultural resources such as land and inputs (inorganic fertilizer, improved seeds, etc.).

Structural effects are the component of the gender productivity gap which is residual or unexplained by the observable factors and is due to unequal returns to production factors.

Gender integration refers to the process of applying strategies in policy and program planning, assessment, design, implementation, and monitoring and evaluation to consider gender norms and to compensate for gender-based inequalities (Catacutan and Naz 2015; Njuki et al. 2013).

Along the gender integration continuum, **gender-blind** programs are programs that ignore gender, gender differences and gender relations. **Gender-accommodating** programs acknowledge gender, gender differences and gender relations. They seek to ensure that women benefit but do not necessarily attempt to reduce gender inequality or address the

gendered systems that contribute to the differences and inequalities. **Gender-responsive/gender-sensitive** programs acknowledge gender differences in barriers and outcomes related to specific program objectives that aim to address gender inequalities in the local context through program design and implementation. **Gender-transformative** programs (such as gender-transformative approaches below) seek to address structural barriers and transform gender relations to promote gender equality (USAID 2017; ICO 2022).

Gender-transformative approaches actively strive to examine, question and change rigid gender norms and imbalances of power. They encourage critical awareness among women and men of gender roles and norms, promote the position of women, challenge the distribution of resources and allocation of duties between women and men, and/or address the unequal power relationships between women and others in the community (Rottach, Schuler and Hardee 2009).

The ultimate goal of gender-transformative approaches is to catalyze **gender-transformative change** whereby norms and other structural barriers to gender equality are removed and more equal power relationships emerge.

Hazard refers to the potential occurrence of a natural or human-induced physical event or trend that may cause loss of life, injury or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems and environmental resources (IPCC 2018).

Institutions, as commonly defined in economic and political sciences, are the “rules of the game” of a society or, in other words, the rules, norms and conventions that people devise to guide, constrain or enable human interaction and behaviors. Institutions can be established formally, through rules such as statute law, common law, regulations and the enforcement mechanisms of these, or informally, through more informal conventions, normative or self-imposed rules of behavior, traditions and their enforcement mechanisms (North 1990; IPCC 2022). From a post-institutionalist perspective, institutions are defined as “regularised patterns of behavior that are made and remade through people’s practices but emerge from underlying structures and sets of ‘rules in use’” (Leach, Mearns and Scoones 1999, 237).

Discriminatory social institutions are formal and informal laws, social norms and practices that restrict or exclude women and consequently curtail their access to rights, justice, resources and empowerment opportunities (OECD 2018). They consist of both formal constraints (sanctions, taboos, customs, traditions, codes of conduct/norms) and formal rules (constitutions, laws, property rights). They influence decisions, choices, and behaviors of groups, communities and individuals (OECD 2018).

Social norm is a rule of behavior that individuals prefer to conform to if they believe that most people in their reference network (i.e., people whose behaviors and beliefs matter to their own behavior) conform to it (empirical expectations) and most people in their reference network believe they ought to conform to it (normative expectations) (Bicchieri 2006). Social norms can be held in place, at least in part, by anticipation of positive and negative sanctions (Cislaghi and Heise 2018).

Gender norms are a subset of social norms defining acceptable and appropriate actions for women and men and governing behaviors and practices in a particular social context and at a particular time in a given group or society. They are informal, deeply entrenched and widely held beliefs about gender roles, power relations and standards or expectations that people tend to internalize and learn early in life. They are embedded in formal and informal institutions, nested in the mind and produced and reproduced through social interaction. Gender norms play a role in shaping women and men’s (often unequal) access to resources and freedoms, thus affecting their voice, power and sense of self. They sustain a hierarchy of power and privilege that typically favours what is considered male or masculine over that which is female or feminine, reinforcing a systemic inequality that undermines the rights of women and girls and restricts opportunity for women, men and gender minorities to express their authentic selves (Cislaghi and Heise 2020; UNICEF 2020).

Laws: Rules of conduct formally recognized as binding or enforceable by an established authority. Laws relating to gender issues include personal property and inheritance laws and laws prohibiting gender-based violence, sexual harassment and discrimination (Markel and Jones 2014).

Livestock are “domesticated terrestrial animals that are raised to provide a diverse array of goods and services such as traction, meat, milk, eggs, hides, fibres and feathers. The term livestock systems embraces all aspects of the supply and use of livestock commodities, including the distribution and abundance of livestock, the different production systems in which they are raised, estimates of consumption and production now and in the future, the people engaged in livestock production and the benefits and impacts of keeping livestock.” (FAO n.d.b).

Mitigation (of climate change) refers to a human intervention to reduce emissions or enhance the sinks of greenhouse gases (IPCC 2018). Mitigation measures are technologies, processes or practices that contribute to mitigation, such as renewable energy technologies, afforestation and soil carbon sequestration.

Policies are statements by a government of what it intends to do or not to do, including laws, regulations, decisions or orders. Markel and Jones (2014) note that policies differ from laws in that they do not have legal standing; however, they govern the management, decisions and actions of institutions.

Relations are the expectations and cooperative or negotiation dynamics embedded within relationships between people in the home, market, community, groups and organizations (Hillenbrand, Karim and Wu 2015).

Resilience, broadly defined, is the capacity of social, economic and environmental systems to cope with a hazardous event, trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity and structure while also maintaining the capacity for adaptation, learning and transformation (IPCC 2018). Most definitions of human resilience focus on the ability of people, households, communities, countries and systems to act upon a set of capacities to mitigate, adapt to and recover from shocks and stresses in a manner that reduces chronic vulnerability and maintains or improves well-being outcomes, such as food security (Frankenberger et al. 2014; Mercy Corps 2016; USAID 2012, 2017).

Resilience capacities include absorptive, adaptive and transformative capacities. These are subject to gender and other social distinctions as well as the intersection of these identities, including those related to age, class, caste, ethnicity, marital status and sexual identity (Béné et al. 2014; Djoudi et al. 2016).

Responses to climate change are broadly defined to include adaptation, mitigation, climate-smart or climate-resilient approaches. They can also be categorized in several different ways as coping, risk management, adaptive and transformative responses (Bryan et al. 2017; Theis, Bryan and Ringler 2019). Coping responses are usually short-term, ex post responses to experienced shocks or stresses and include actions like selling assets or changing consumption patterns and, at larger scales, humanitarian interventions (Corbett 1988; Dercon 2002). While coping responses may aim to maintain well-being at pre-shock levels, they are often associated with a deterioration in well-being, such as poorer diets and increased indebtedness. Risk management strategies, like diversifying production or livelihood activities, and adaptive responses, like adopting new agronomic practices, tend to be proactive and aimed at avoiding or minimizing harmful impacts of shocks and stresses over the medium to long term (Jost et al. 2016; Corcoran-Nantes and Roy 2018; Lawson et al. 2020). Transformative responses aim to change the fundamental attributes of a system or context to improve well-being outcomes, such as actions that directly address underlying social inequalities (McOmber, Audia and Crowley 2019; Carr 2020).

Role models are defined as individuals who inspire people to make similar choices or adopt a similar set of values and to achieve comparable results (Madhavan and Crowell 2014; Porter and Serra 2020).

Structural constraints on equality (by gender and other sources of social differentiation) are features of the institutional or normative environments (at any of multiple scales) that tend to restrain women from exerting agency and achieving their full potential.

Technical efficiency is the effectiveness with which a given set of inputs is used to produce an output. A farm is said to be technically efficient if it is producing the maximum output from the minimum quantity of inputs, such as labor, capital and technology.

Vulnerability encompasses a variety of concepts, including exposure and sensitivity to climate hazards and adaptive capacity (Adger 2006; IPCC 2018; Smit and Wandel 2006).

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