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Investing in rural people

Women's empowerment, food systems, and nutrition

by
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The pro-WEAI for Market Inclusion Study Team

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About the authors

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Jessica Heckert is a research fellow in the Poverty, Health and Nutrition Division at IFPRI. Using both quantitative and qualitative methods, she addresses research questions related to (1) adolescent/youth health and well-being, (2) the development of metrics to measure women's empowerment, (3) the impact of agricultural development interventions on women's empowerment and other gender-related outcomes, and (4) the intersection of household gender dynamics and health outcomes. She is a social demographer and earned a PhD in demography and human development and family studies from Pennsylvania State University in 2013.

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Kalyani Raghunathan is a research fellow in the PHND at IFPRI. Her areas of interest are development and labour economics, with a specific focus on South Asia. Some examples of her work include studies of women's collectives in India and the role they play in improving rural agriculture and livelihoods, nutrition and women's empowerment; evaluations of the impacts of several large nutrition and food security-related social protection programmes in Bangladesh, including on child growth and cognitive development; and secondary data analysis on food prices, market integration and the affordability of nutritious diets in India. Kalyani holds a PhD in economics from Cornell University, an MA in quantitative economics from the Indian Statistical Institute in New Delhi and a BA in economics from Delhi University.

Hazel Malapit is a senior research coordinator at IFPRI, based in Washington, DC. She coordinates research, training and technical assistance on the implementation of the WEAI, including refinement and adaptations of the tools for project-level use, and for capturing empowerment across the value chain. She is co-principal investigator for the "Gender, Agriculture & Assets Project" (GAAP, Phase 2), and leads the Methods Module for the CGIAR Generating Evidence and New Directions for Equitable Results (GENDER) Platform. She manages and coordinates the integration of gender, equity and empowerment into the "CGIAR Research Program on Agriculture for Nutrition and Health" (A4NH), and conducts research on gender, women's empowerment, agriculture, health and nutrition.

Contents

Abstract

This background paper for the 2021 Rural Development Report on Food Systems examines the linkages and interactions among women's empowerment, food systems, and nutrition. It is divided into three parts. The first part examines how women's empowerment and gender equality, measured using the Women's Empowerment in Agriculture Index (WEAI), relate to a range of household-, woman- and child-level nutrition outcomes in six countries in Asia and Africa (Bangladesh, Cambodia, Nepal, Ghana, Mozambique, and Tanzania). Across the six countries, women's empowerment is positively associated only with children's long-term nutritional status, while greater equality within the household is associated with a higher likelihood of exclusive breastfeeding and children's long-term nutritional status but lower women's BMI. Unpacking the results to examine the component indicators, we find evidence of tradeoffs between women's time use and her own nutritional status: women who are more empowered in agriculture may spend more time in it, with consequences for her own nutritional status.

The second part examines factors that are conducive to greater empowerment of women and gender equality based on a literature review and analysis of data on women's empowerment in agricultural value chains in Bangladesh, the Philippines, Benin, and Malawi. Key findings are: (1) education is associated with greater empowerment of both men and women, but the "empowerment returns" to education vary across contexts; (2) greater wealth is not always positively correlated with women's empowerment; (3) entrepreneurship is not necessarily empowering for rural women, if they are involved in small-scale, low-return enterprises; (4) some commodity value chains may provide more opportunities for empowerment; and (5) training and extension services are usually associated with greater empowerment but may differentially benefit men and women.

The third part presents case studies from three interventions – in rural Burkina Faso, Kenya, and Nigeria – that were gender sensitive and aimed to improve nutritional status or food security. Lessons learned from these case studies are: (1) women's control over assets is necessary but not sufficient for success; (2) interventions need to explicitly address intrahousehold gender dynamics; and (3) not all interventions can be gender transformative and might only be gender accommodative. Engaging in formative research to understand the challenges women face and explicitly including gender-transformative strategies in the design of the intervention can improve the performance of these interventions.

Key words: women empowerment, gender equality, value chains, nutrition, food security

1.   Overview and objectives

Food systems are the sum of actors and interactions along the food value chain, from input supply and the production of crops, livestock, fish and other agricultural commodities to transportation, processing, retailing, wholesaling and the preparation of foods to their consumption and disposal (Fan and Swinnen 2020). Across the world, men and women participate in food systems, but the extent of their participation varies depending on the structure of the economy and gender norms that influence labour force participation. Being grounded in time and place, food systems also change as a result of broader processes such as structural transformation and urbanization. As economies transform and a higher proportion of GDP is produced by the manufacturing and services sectors, employment shifts from agriculture to non-agriculture, often accompanied by urbanization, migration and the nutrition transition. Global experience shows that, as countries develop, off-farm components of food systems become more important, creating new job opportunities in sectors like food processing and trading (Mueller et al. 2020).

Women are actively involved in food systems in a range of roles, from production and processing to retailing and consumption. Women grow and manage crops, tend livestock, work in agribusinesses and food retailing, prepare food for their families, and much more (Malapit et al. 2020). But women's contributions to food systems are often not formally recognized and women often face constraints that prevent them from engaging on terms that are equitable and fair. In many countries, women have less schooling than men, control fewer resources, have less decision-making power over household income, and face time constraints because of their triple burden of productive, domestic and community responsibilities. The transformation of food systems toward more efficient and sustainable production processes and longer value chains, in combination with shifts in diets toward greater consumption of processed foods and foods away from home, offers a range of new opportunities for women, but may also create new barriers to participation. Growth in the off-farm components of food systems may create opportunities for women to become more involved in other stages of the value chain, but data on this are surprisingly scarce. Based on data from six African countries (Ghana, Kenya, Malawi, Mozambique, Tanzania, Zambia), Djurfeldt et al. (2018) argue that the prospects of linking women smallholders to markets are limited not by the structural characteristics of markets, but by the inability of women farmers to produce a marketable surplus. Changes in the demand for different types of agricultural products, both food and non-food, may affect women's involvement in different value chains. Moreover, as more people migrate to urban areas, women may increasingly work outside the home and families may rely more on the market, rather than their own produce, for food. Women's work outside the home has implications for childcare, which may determine children's diets and nutritional status, especially in contexts where the gendered division of responsibilities places childcare squarely within the woman's domain. Women's increased involvement in food systems is also associated with diets and nutrition outcomes for women themselves and other household members, although the direction of the association and the pathways to impact are not yet fully understood.

In examining the linkages among women's empowerment, food systems and nutrition, we begin by defining empowerment. An oft-used definition is from Kabeer (1999), who defines empowerment as the process by which people expand their ability to make strategic life choices, particularly in contexts in which this ability has previously been denied them. In Kabeer's definition, the ability to exercise choice encompasses three dimensions: resources (defined to include not only access but also future claims to material, human and social resources), agency (including processes of decision-making, negotiation, and even deception and manipulation), and achievements (well-being outcomes). We operationalize this definition of empowerment in the Women's Empowerment in Agriculture Index (WEAI) (Alkire et al. 2013) and its counterpart for project use, the project-level WEAI (pro-WEAI) (Malapit et al. 2019), the empowerment metrics we use (see box 1 for a definition of the WEAI measures).

Box 1: The Women's Empowerment in Agriculture Index

The Women's Empowerment in Agriculture Index (WEAI) is a multidimensional index reported at the country or regional level, using data from interviews of women and men within the same households. WEAI measures empowerment in agriculture along five equally weighted domains: Production, Resources, Income, Leadership and Time, measured by 10 indicators, weighted equally within each domain. The Index is composed of two sub-indices: the Five Domains of Empowerment (5DE), which reflects the extent of women's empowerment as measured by the five domains; and the Gender Parity Index (GPI), which reflects women's empowerment in relation to the lead male decision maker in their household. The overall WEAI is a weighted sum of the 5DE (90 per cent) and the GPI (10 per cent), and higher values represent greater empowerment. As an additive, decomposable index, WEAI can be used to diagnose areas of disempowerment and design development programmes to address those areas.

New versions of the WEAI have been developed to address the needs of different users. The Abbreviated WEAI (A-WEAI) was designed for users who want to measure empowerment but do not have the resources to implement the full WEAI. A-WEAI measures six instead of 10 indicators in the same five domains and takes about 30 per cent less time to implement.

The project-level WEAI (pro-WEAI) is designed for measuring the impact of agricultural development projects on women's empowerment. The core pro-WEAI is composed of 12 equally weighted indicators that measure empowerment along three dimensions: Intrinsic Agency (power within), Instrumental Agency (power to) and Collective Agency (power with). Similar to the original WEAI, pro-WEAI is a weighted sum of the Three Domains of Empowerment sub-index (90 per cent), and the GPI (10 per cent). In addition to the core pro-WEAI, optional add-on modules for Health and Nutrition, Market Inclusion (also known as WEAI for Value Chains, WEAI4VC), and Livestock are under development. Each add-on module collects data for constructing complementary indicators that can be used alongside the core pro-WEAI.

Sources: Alkire et al. (2013); Malapit et al. (2017); Malapit et al. (2019). https://weai.ifpri.info.

This background paper for the 2021 Rural Development Report on Food Systems examines the linkages and interactions among women's empowerment, food systems, and nutrition. We aim to answer the following questions:

1. How do women's empowerment and gender equality relate to food systems outcomes such as household, maternal and child nutrition?

2. What factors are conducive to greater empowerment of women and gender equality within the value chains that comprise food systems?

3. What kinds of food systems interventions, across a range of developing country settings, empower women AND improve health and nutrition outcomes?

We draw on value chain analysis in this background paper because it provides tools and insights that help to answer our questions. Value chain analysis is an approach that examines each step from production and consumption and provides an inclusive framework for characterizing the many dimensions of a food system, including agricultural production, food supply and food affordability (Gelli et al. 2015). Although a food system can comprise many value chains, the focus on specific value chains can help identify specific characteristics of different value chains (different commodities) or different nodes of a value chain that are differentially associated with women's empowerment and gender equality. The sections of this background paper are broadly organized according to the questions raised above.

2. How do women's empowerment and gender equality relate to nutrition outcomes?

Women's empowerment and gender equality are important in their own right and are linked to achieving other development goals, such as eliminating poverty (sustainable development goal [SDG] 1), achieving zero hunger and malnutrition (SDG 2) and good health and well-being for women and children (SDG 3) (Cunningham et al. 2015; Heckert, Olney and Ruel 2019; Malapit et al. 2015; Ruel, Quisumbing and Balagamwala, 2018; Sraboni et al. 2014). In the context of food systems transformation, women's empowerment is key to achieving the objectives of: (1) healthy, safe and diverse diets that meet the nutrient requirements of all household members; and (2) inclusive food systems that engage smallholder farmers in food production and ensure affordable access to diets by disadvantaged groups of consumers.

A large body of empirical evidence documents the links between greater control of resources by women and improved human capital outcomes for children, as shown by reviews of observational studies (Quisumbing, 2003) and experimental studies (Yoong, Rabinovich and Diepeveen 2012). Several well-cited studies based on cross-sectional data also find positive associations between women's empowerment and child nutritional status (e.g. Hindin 2000; Shroff et al. 2009; Shroff et al. 2011). However, a recent systematic review finds that empirical evidence supporting the link between empowerment itself and nutritional outcomes is inconclusive (Santoso et al. 2019). Santoso et al. (2019) find that the limited evidence is likely not due to the absence of an underlying relationship between women's empowerment and child nutrition, but to flawed measurement and study design. These flaws involve the measurement and aggregation of quantitative indicators of women's empowerment; complexity in measuring a multidimensional concept; the situational, context-dependent nature of the empowerment process (Pratley 2016); measurement of autonomy and the limitations of cross-cultural comparability (Carlson et al. 2015); and inadequate attention to time allocation, reproductive decisions and indicators of men's engagement in women's empowerment and child nutrition (Santoso et al. 2019). Moreover, most indicators of empowerment, such as those based on the Demographic and Health Surveys (DHS), focus on the reproductive (or domestic) sphere, not on women's productive or market-oriented activities. Beyond the shortcomings pointed out by Santoso et al. (2019), however, most studies exploring the link between women's empowerment and nutrition outcomes have focused on child nutrition, not that of the woman herself. This emphasis treats women's empowerment only as an instrument in achieving child health and nutrition, not as an intrinsic valuable outcome.

Our analysis of the links between women's empowerment and nutrition improves on existing analyses by: (1) using a standardized measure of women's empowerment, the WEAI; (2) examining the correlates of women's empowerment and gender equality with a range of household-, woman- and child-level nutrition outcomes in six countries in Asia and Africa (Bangladesh, Cambodia, Nepal, Ghana, Mozambique and Tanzania); and (3) paying close attention to tradeoffs among different dimensions of empowerment.

The availability of a standardized measure of women's empowerment, the WEAI, which has been collected in large-scale population-based surveys in 19 countries, provides an opportunity to examine how women's empowerment in the productive sphere in agricultural settings affects food and nutrition security in many contexts. Because both the primary female and male respondents are interviewed in WEAI surveys, the data can also be used to examine women's relative to men's empowerment within the same household, allowing us to analyze intrahousehold gender inequality (box 1).

In Bangladesh, using nationally representative data, Sraboni et al. (2014) show that women's empowerment is associated with household calorie availability and household dietary diversity. Sraboni and Quisumbing (2018) also find that women's empowerment is associated with better diet quality of individuals within the household, but the strength of this association varies across the life course: women's empowerment is correlated with more diverse diets of children under five, and with adult men's and women's dietary diversity and nutrient intakes. However, women's empowerment does not benefit all individuals within the household equally; adolescent girls who are children of the household head do worse than boys of the same age if their mothers are more empowered. In Nepal, aggregate empowerment, as well as aspects of women's empowerment – group membership, control over income, reduced workload – are positively associated with better maternal nutrition (Malapit et al. 2015). Control over income is positively associated with height-for-

age z-scores (HAZ), and a lower gender parity gap improves children's diets and HAZ. Women's empowerment also mitigates the negative effect of low production diversity on maternal and child dietary diversity and HAZ. In Maharashtra, India, higher women's empowerment scores are associated with a lower probability of poor iron status (anaemia) among women (Gupta et al. 2019); this finding is robust to different ways of measuring iron status. In Ghana, women's empowerment is more strongly associated with the quality of infant and young child feeding practices and only weakly associated with child nutrition status (Malapit and Quisumbing 2015). Women's empowerment in credit decisions is positively and significantly correlated with women's dietary diversity, but not body mass index. This suggests that improved nutritional status is not necessarily correlated with empowerment across all domains and that these domains may have different impacts on nutrition.

2.1   Empowerment and nutrition outcomes

Expanding upon the analysis conducted in single-country studies, Quisumbing et al. (2020a) pool six datasets with WEAI data from Asia (Bangladesh, Cambodia, Nepal) and Africa south of the Sahara (Ghana, Mozambique, Tanzania) to examine the correlation of women's empowerment with a range of household, maternal and child nutritional outcomes. Figures 1 and 2 present the results from regressions of the household dietary diversity score (HDDS), women's dietary diversity score (WDDS) and body mass index (BMI), exclusive breastfeeding (EBF), child dietary diversity score (CDDS), and child anthropometrics (HAZ and weight-for-age z-score [WAZ]) on measures of empowerment. Figure 1 presents standardized coefficients using the women's empowerment score based on 5DE, while figure 2 is based on the intrahousehold inequality score. The standardized coefficients, defined as the number of standard deviations in the outcome variable that are associated with a 1.0-SD change in the empowerment variable, enable us to compare outcomes that are measured using different units. In both figures, statistically significant associations are highlighted in brighter colours for emphasis and labelled with asterisks that correspond with the level of significance (*p<0.10, **p<0.05, ***p<0.01).

Figure 1: Women's empowerment score and nutrition outcomes

Note: Solid colors depict statistically significant coefficients with standardized coefficients reported, * p < 0.10, ** p < 0.05, *** p < 0.01. Household Dietary Diversity Score (HDDS) includes 5,892 households from Bangladesh, Ghana and Tanzania. Women's Dietary Diversity Score (WDDS) includes 11,276 women from Bangladesh, Cambodia, Nepal, Ghana, Mozambique and Tanzania. Women's Body Mass Index (BMI) includes 9,390 women from Bangladesh, Cambodia, Nepal, Ghana, and Tanzania. Height-for-age Z-score (HAZ) includes 2,483 children 0-23 months from Bangladesh, Cambodia, Nepal and Ghana. Weight-for-height Z-score (WHZ) includes 2,438 children 0-23 months from Bangladesh, Cambodia, Nepal and Ghana. Exclusive breastfeeding (EBF) includes 902 children 0-6 months from Bangladesh, Cambodia, Nepal and Ghana. Child's Dietary Diversity Score (CDDS) includes 2,237 children 6-23 months from Bangladesh, Cambodia, Nepal, Ghana, and Mozambique.

Figure 2: Intrahousehold inequality score and nutrition outcomes
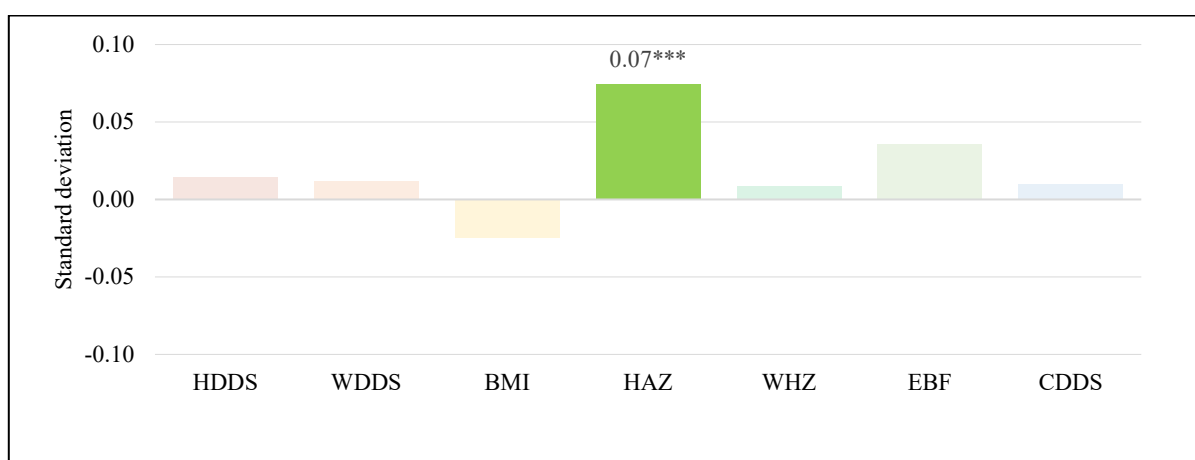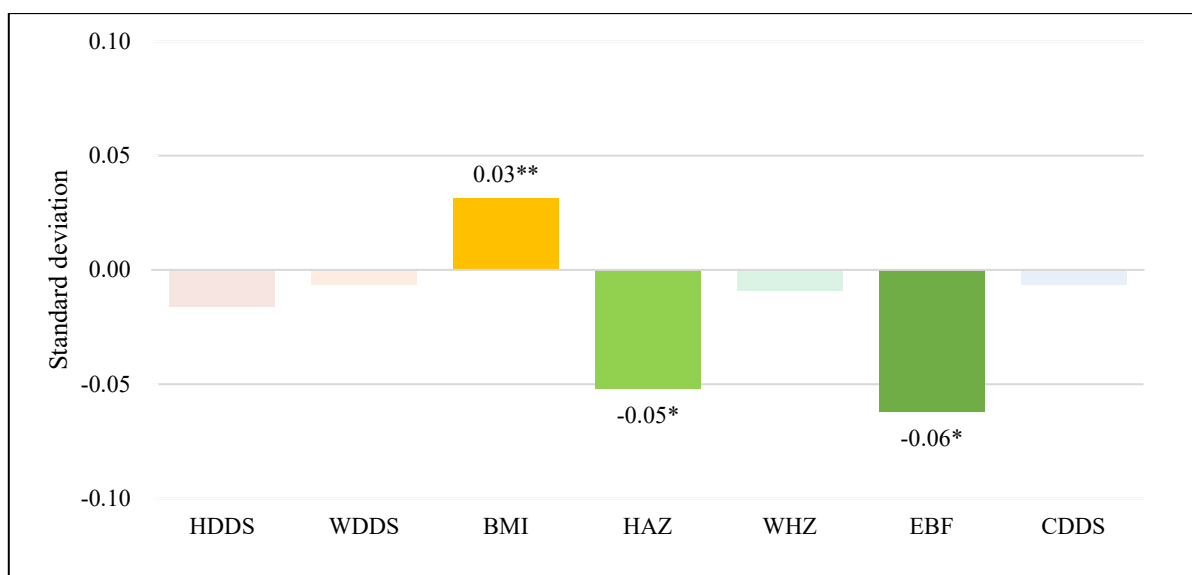
Note: Solid colors depict statistically significant coefficients with standardized coefficients reported, * p < 0.10, ** p < 0.05, *** p < 0.01. Household Dietary Diversity Score (HDDS) includes 4,976 households from Bangladesh, Ghana and Tanzania. Women's Dietary Diversity Score (WDDS) includes 8,797 women from Bangladesh, Cambodia, Nepal, Ghana, Mozambique and Tanzania. Women's Body Mass Index (BMI) includes 7,331 women from Bangladesh, Cambodia, Nepal, Ghana and Tanzania. Height-for-age Z-score (HAZ) includes 1,817 children 0-23 months from Bangladesh, Cambodia, Nepal and Ghana. Weight-for-height Z-score (WHZ) includes 1,782 children 0-23 months from Bangladesh, Cambodia, Nepal and Ghana. Exclusive breastfeeding (EBF) includes 730 children 0-6 months from Bangladesh, Cambodia, Nepal and Ghana. Child's Dietary Diversity Score (CDDS) includes 1,628 children 6-23 months from Bangladesh, Cambodia, Nepal, Ghana, and Mozambique.

The most striking result is the lack of significant association between the empowerment indicators (women's empowerment score and the intrahousehold inequality score) and most of the nutrition outcomes. The only significant associations are those of the women's empowerment score with child HAZ (positive, implying that a higher empowerment score is associated with higher HAZ), the intrahousehold inequality score with women's BMI (positive, implying that higher intrahousehold inequality increases BMI) and exclusive breastfeeding and HAZ (both negative, meaning that higher inequality is associated with lower likelihood of EBF and lower HAZ).

Relationships between empowerment measures and nutrition outcomes are more evident when we analyze the data separately by country (Quisumbing et al. 2020b). We find that overall women's empowerment scores are more important in relation to nutrition outcomes in the South Asian countries in our sample compared with the African ones and that higher women's empowerment scores are associated with better nutrition outcomes, particularly for children. The strong associations in South Asia are consistent with Carlson et al. (2015), who attribute the consistent positive associations between women's autonomy and child nutrition outcomes in South Asia to the generally lower rates of women's autonomy in this region compared with others. Moreover, where significant in our country-by-country analysis, greater equality between the primary man and woman within the same household was associated with better nutrition outcomes. In this paper, both the specification (using pooled regressions with country fixed effects) and the nature of WEAI as an aggregate index may have obscured the influence of gender norms that is evident in the country-by-country analysis.

2.2 Trade-offs among dimensions of empowerment and nutrition outcomes

As changes in the component subdomain indicators of the WEAI may offset each other, indicating possible trade-offs between various dimensions of empowerment, the relationship between the indicators and the WEAI is not necessarily monotonic. For example, increased participation in agricultural production or in groups may increase workload. The offsetting effects may explain the lack of statistically significant relationships between the aggregate score and nutrition outcomes, necessitating the "unpacking" of the

results by indicator. Thus, we estimate a third version of the regressions, which is run separately on each of the 10 WEAI subdomain indicators (expressed as count variables) with the same household, individual, and country controls as the regressions described in figures 1 and 2. Standardized coefficients are presented in figures 3 and 4 for household and maternal outcomes, respectively, figure 5 for infant and young child feeding (IYCF) outcomes and figure 6 for child anthropometric outcomes.

Household dietary diversity

Figure 3 presents standardized coefficients for the regression of the household dietary diversity score on the 10 WEAI subdomain indicators, estimated by pooling observations across Bangladesh, Ghana and Tanzania. Autonomy in production, control over income decisions and satisfaction with leisure are all positively associated with HDDS, suggesting that trade-offs do not exist among these dimensions of empowerment, at least so far as household outcomes are concerned.

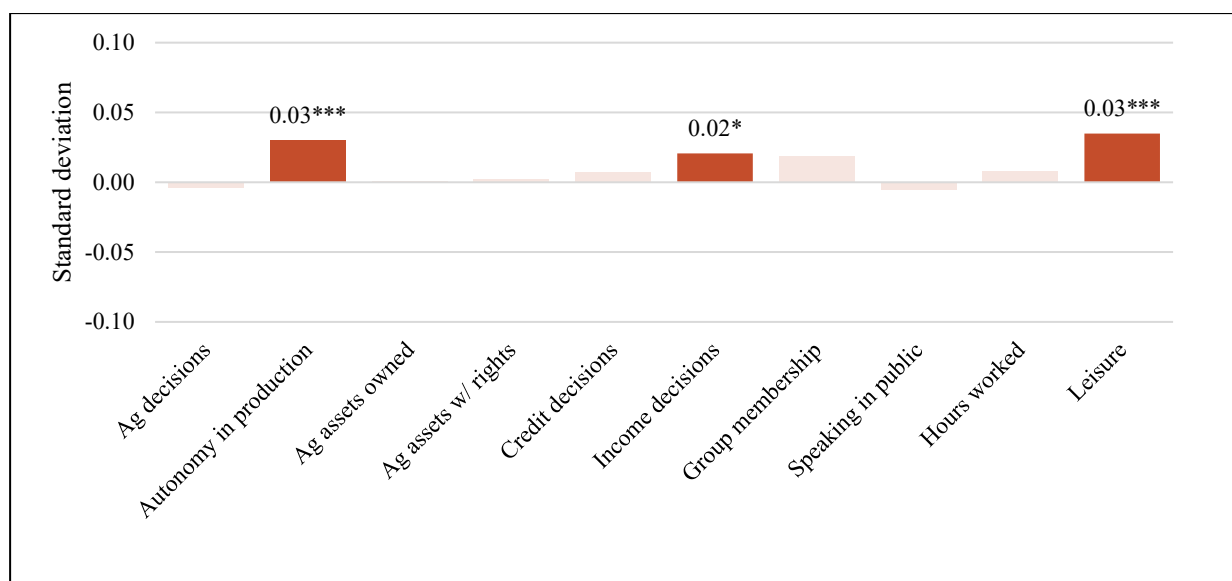**Figure 3: WEAI indicators and Household Dietary Diversity Score**

Note: Solid colours depict statistically significant coefficients with standardized coefficients reported, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Household Dietary Diversity Score (HDDS) includes 5,982 household from Bangladesh, Ghana and Tanzania.
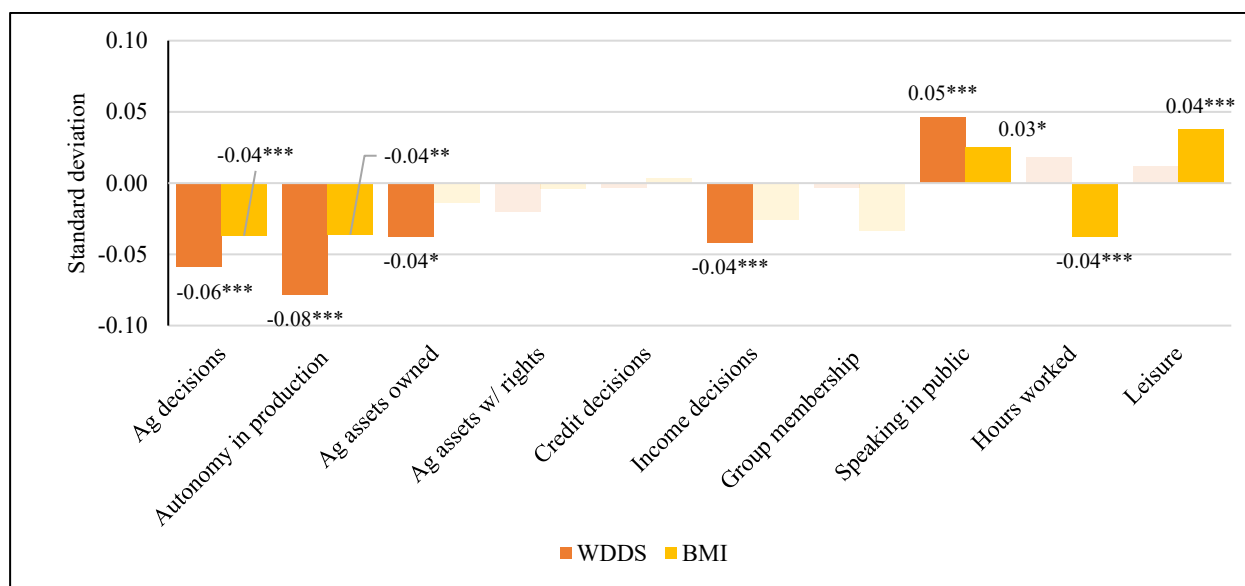

Figure 4: WEAI indicators and women's dietary diversity score and body mass index

Note: Solid colours depict statistically significant coefficients with standardized coefficients reported, * p < 0.10, ** p < 0.05, *** p < 0.01. Women's Dietary Diversity Score (WDDS) includes 11,276 women from Bangladesh, Cambodia, Nepal, Ghana, Mozambique and Tanzania. Women's Body Mass Index (BMI) includes 9,390 women from Bangladesh, Cambodia, Nepal, Ghana and Tanzania.

Women's outcomes

Figure 4 graphs the standardized coefficients for the 10 WEAI subdomain indicators and WDDS and BMI. Unlike the results for HDDS, we find a more nuanced pattern of associations compared with those using the aggregate scores, indicating that some dimensions of women's empowerment may be negatively associated with better nutrition outcomes for women. 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 WDDS, while greater confidence in speaking in public is associated with higher WDDS. 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. Most of the subdomain indicators that are associated with worse outcomes are those that are typically linked with greater direct involvement in agriculture. Potential trade-offs between empowerment and nutrition outcomes may arise because more involvement in agriculture, which improves women's empowerment scores, also increases women's workload. Time use (workload + leisure) shows the most consistent associations with nutrition outcomes across countries in our country-by-country analysis. In the country-specific analysis, higher workloads are associated with higher WDDS in Mozambique and Tanzania, and with lower women's BMI in Bangladesh, Nepal and Ghana. In Cambodia and Ghana, higher workload is associated with worse child anthropometric outcomes.

Figure 5: WEAI indicators and infant and young child feeding outcomes.

Note: Solid colours depict statistically significant coefficients with standardized coefficients reported, * p < 0.10, ** p < 0.05, *** p < 0.01. Exclusive breastfeeding (EBF) includes 902 children 0-6 months from Bangladesh, Cambodia, Nepal and Ghana. Child Dietary Diversity Score (CDDS) includes 2,237 children 6-23 months from Bangladesh, Cambodia, Nepal, Ghana, and Mozambique.

Child outcomes

Figure 5 presents standardized coefficients for the 10 WEAI subdomain indicators and two measures of IYCF: EBF and CDDS. Unlike the results with the empowerment aggregates, some significant associations emerge. A higher number of agricultural decisions is associated with a greater likelihood that the index child is exclusively breastfed, but greater autonomy in production lowers that likelihood. A greater number of agricultural assets over which the woman has rights is associated with a lower dietary diversity score, but

greater comfort speaking in public and more hours worked is linked with higher CDDS. This suggests that trade-offs exist among empowerment indicators with respect to these two IYCF outcomes.

Trade-offs also exist with respect to child anthropometry (figure 6). Higher HAZ, an indicator of long-term nutritional status, is positively associated with more agricultural decisions, a higher number of agricultural assets with rights, and greater satisfaction with leisure, but greater autonomy in production is associated with lower WHZ, which proxies short-term nutritional status. This result, which is consistent with the positive association of HAZ with the aggregate women's empowerment score, suggests that women's empowerment is important for children's long-term nutritional status, but that trade-offs may exist in the short run.

The trade-offs that we uncover are consistent with the findings of the systematic reviews (Carlson et al. 2015; Pratley 2016; Santoso et al. 2019) that not all empowerment domains are positively correlated with better nutrition. Women may work more to increase the quantity and quality of food available to their households, but longer work hours may also increase her energy expenditure, with consequences of lower maternal BMI and less time for childcare. Analysis of time use data from the WEAI in the same countries (except Tanzania) shows that women's domestic work and cooking time are positively correlated with more diverse diets (Komatsu et al. 2018), but that effects differ according to asset poverty status, with long hours spent in agriculture more likely to be important as a source of food and income for the poor. It is possible that very poor women are unable to afford the labour- and time-saving technologies that could reduce the drudgery of household work (cooking, cleaning, obtaining safe water). Komatsu et al. (2018) conclude that women's time allocation and nutrition responses to agricultural interventions are likely to vary by socio-economic status and local context.
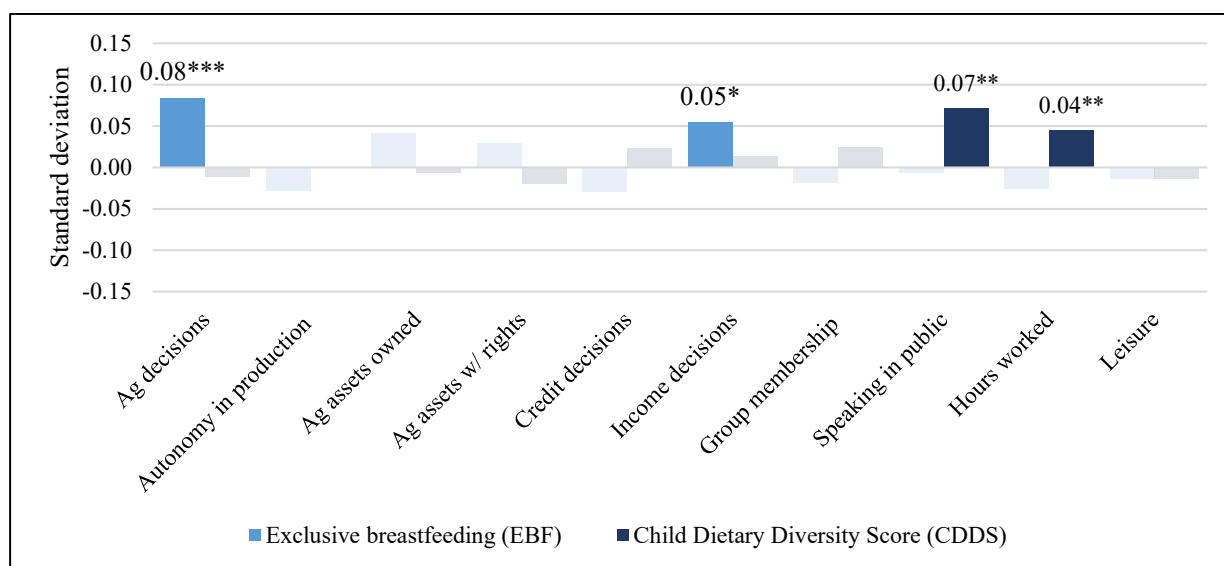

Figure 6: WEAI indicators and child anthropometric outcomes.
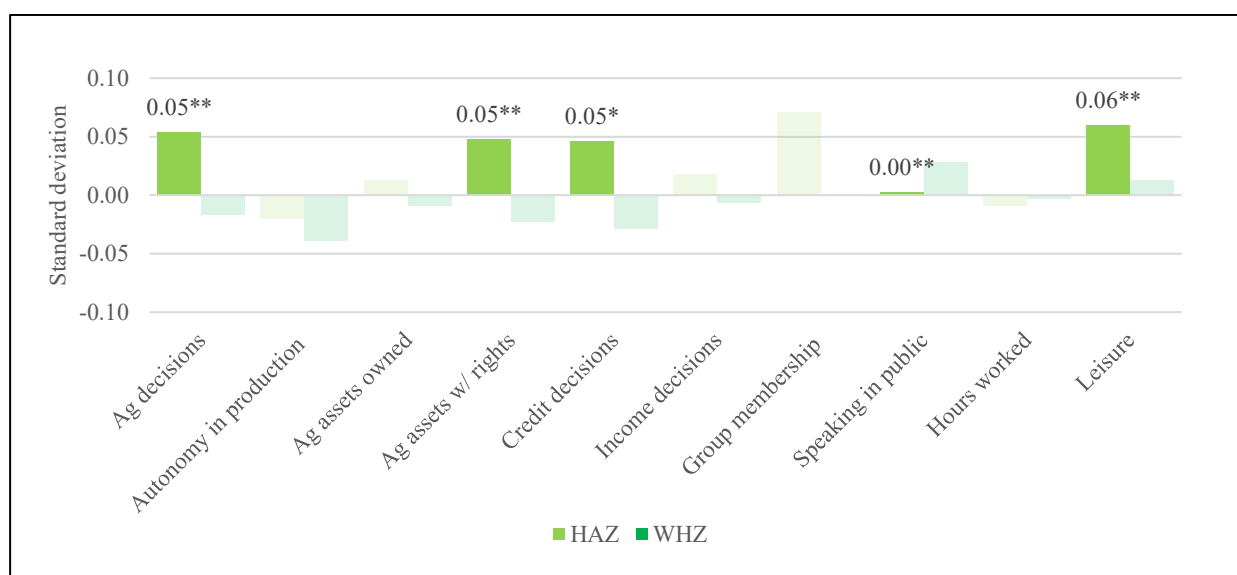
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3.   What factors are conducive to greater empowerment of women and gender equality within the value chains that comprise food systems?

3.1   Review of literature

Since the 1990s, there has been an increased interest in the understanding and development of food systems, following food and other products from planting to consumption. Many governments, organizations and researchers have asserted that there are opportunities to use the commercialization of food systems to reduce poverty, improve malnutrition and create employment along the value chain from producers, to processors, to retailers. For food systems transformations to be inclusive, it is necessary to acknowledge the gender disparities along the corresponding value chains and identify potential areas for these transformations to reach, benefit and empower women (Malapit et al. 2020; Johnson et al. 2018). Despite there being established methods to analyse profitability and efficiency throughout food systems, the inclusion of equity dimensions and development of gender-sensitive tools have only recently grown in food systems research (Getahun and Villanger 2018; Said-Allsopp and Tallontire 2015; Barrientos, Dolan and Tallontire 2003; Graef et al. 2018; Riisgaard et al. 2008; Rubin, Manfre and Barrett 2009; Mayoux 2012).

While there is limited literature focused on traditional – or even high-value – crops and the engagement of women along the related value chains, some studies have identified pathways whereby there may be improvements of women's involvement in food system commercialization (David 2015; Djurfeldt 2018; Forsythe, Posthumus and Martin 2016; Getahun and Villanger 2018; Handschuch and Wollni 2013; Quisumbing et al., 2015). In Northern Nigeria, David (2015) finds that the relatively flexible gender division of labour and women's autonomy over decisions and income regarding personal farming plots were key factors which allowed women to successfully engage in income generation through increased commercialization of sweet potato production, which was traditionally viewed as a "male" crop. Similarly, female respondents in a case study of smallholder farmers in Myanmar (Herens et al., 2018) emphasized the ability of women to buy and inherit land and manage the farm as an important component to their engagement in crop commercialization.

When women are able to engage either more directly or more extensively in food system activities through formal employment or increased participation in high-value products or value-adding activities, various studies have found they can increase their contributions to household incomes and resources (Handschuch and Wollni 2013; Said-Allsopp and Tallontire 2015; Quisumbing et al. 2015). Increasing opportunities for women's engagement in food system commercialization improves equality and empowerment and is often correlated with increasing their control over income and, relatedly, bargaining power within their household relationships (Rubin, Manfre and Barret, 2009; Getahun and Villanger, 2018). In Maharashtra, India, for example, Gupta et al. (2017) use data on the WEAI to examine women's empowerment in households with different degrees of market orientation. They find that empowerment levels were significantly higher for women belonging to households that produced cash crops for the market, followed by food-cropping and landless households. They also find women's empowerment in agriculture was also significantly associated with their decision-making in non-agricultural domains. The strong relationship between market orientation and empowerment levels in this specific context suggests that linking women to markets can be a pathway to enhancing their empowerment in agricultural domains, but whether this generalizes to other contexts needs to be investigated.

In addition to identifying opportunities for increased engagement, studies have also highlighted the constraints which many women face when seeking employment or expanding their participation in value chains to activities such as processing, marketing and enhanced commercialization (Ashby et al. 2008; Barrientos, Dolan and Tallontire 2003; Forsythe, Posthumus and Martin 2016; Mayoux 2012; Said-Allsopp and Tallontire 2015). Across value chains and geographies, many women face similar barriers to greater engagement: cultural norms, asset constraints (especially land and money) and a lack of gender-sensitive employment terms often limit the ways in which women participate in food systems (Ashby et al. 2008;

Barrientos, Dolan and Tallontire 2003; David 2015; Djurfeldt 2018; Forsythe, Posthumus and Martin 2016; Mayoux 2012; Quisumbing et al. 2015).

While increasing gender equality in the labour market has been found to improve economic efficiency, in some cases of increased commercialization and commodification of staple crops there is also a trend of women losing control over assets as men take over production and marketing of higher-value products and activities, and for women in male-headed households, this lack of control over their earned income may disincentivize their efforts to increase engagement. (Ashby et al. 2008; Djurfeldt 2018; Forsythe, Posthumus and Martin 2016). While Djurfeldt (2018) found in a long-term analysis of six African countries that the commercialization of food crops did not necessarily lead to male dominance over the related markets and men and women act more fluidly in markets as opportunities change and develop, results suggest that gender differentials still exist. As increased agricultural commercialization benefited female farm managers, it also disproportionately advantaged their male counterparts.

The conditions and expectations of women's labour are also identified as constraints to women's increased engagement in food systems (David 2015; Poole et al. 2013). In Zambia, male cassava farmers did not cite labour as a constraint to expanded production, while female farmers disagreed; agricultural officers interviewed in the same study confirmed that household gender expectations conflicted with the expansion of cassava production, suggesting that women would be expected to have a potentially disproportionately increased labour load if the household increased their cassava cultivation (Poole et al. 2013). Forsythe, Posthumus and Martin (2016) found that in both Nigeria and Malawi, while cassava processing depended on women's labour, children were not allowed at cassava processing centres, therefore there were rarely women of childbearing age involved in the processing activities and older women dominated this area of the value chain. They also found that in Nigeria, women were expected to maintain their husband's cassava plots, as well as their own, without the anticipation of reciprocity of labour or payment; this type of labour expectation limits a woman's time availability for commercial activities. Interventions that recognize and address non-farm sources of women's labour and mobility constraints, such as insufficient access to medical resources for children or access to safe drinking water sources, could improve women's availability to engage more intensively in profitable production. As it stands in many regions, the inability of female farmers to produce a marketable surplus due to labour and resource constraints is the primary challenge to their engagement in commercialization (Djurfeldt, 2018).

Membership in various groups has been identified as important for women's involvement and success in commercial activities, as groups may provide access to knowledge and marketing networks, as well as processing equipment and group negotiation power (Forsythe, Posthumus and Martin 2016; Quisumbing et al. 2015). Handschuch and Wollni (2013) found that Kenyan women who are members of finger millet-focused agricultural groups are more likely to participate in market activities and receive better selling prices at the market. Among households that have no men or women participating in a finger millet group, female sellers receive significantly lower prices. In a dairy value chain project in Bangladesh, Quisumbing et al. (2015) identified that dairy producer groups were mostly composed of women, that there were positive effects from the broadened social network and greater access to capital due to the group savings programme. Some institutional barriers persist, however, where membership criteria of marketing groups, such as tobacco groups in Malawi, discriminate against women and prevent them from accessing some channels of buyers (Djurfeldt, 2018).

More research is needed to understand the pathways of empowerment for women in food systems and how women's involvement at various points along value chains contributes to their empowerment, as well as what barriers exist restricting women from specific activities and how to overcome these. In particular, there is a distinct dearth of literature centred around food system interventions which employ gender-sensitive implementation. Most studies related to women's engagement in agricultural commercialization and food systems are based on observational surveys, and there are very few studies that have used food system interventions to better understand the relationships between women's empowerment and their participation in value chain activities. The research presented in this paper aims to contribute to the knowledge of factors associated with women's agency in food systems in developing regions.

3.2   Insights from value chain studies in four countries in Asia and Africa

What factors in different value chains, contexts and countries are conducive to greater empowerment of women and greater gender equality? To answer this question, we examine the correlates of women's and men's empowerment and gender equality using data from the four countries in which pro-WEAI for market inclusion was collected. The full analysis is found in appendix 1; the main text presents key findings across the four countries.

To examine how women's empowerment varies across value chains and nodes within value chains, IFPRI piloted the pro-WEAI for Market Inclusion[1] in two countries in Asia (Bangladesh and the Philippines), and two countries in Africa (Benin and Malawi), all with very different sociocultural contexts. The pro-WEAI for Market Inclusion adapts the pro-WEAI approach, which focuses primarily on agricultural production, to account for men and women who are active in processing and marketing nodes of the value chains (Malapit et al. 2019). We computed pro-WEAI metrics based on the data collected in all four countries. Sampling for these studies varied according to the purpose of the study and is not nationally representative. The Bangladesh and Philippines studies were conducted as standalone pilots, while the Benin and Malawi studies were conducted as part of mixed-methods evaluations of the same vocational training programme targeted to women (Agricultural Technical and Vocational Education Training for Women Program, ATVET4W). Although some of these value chains are not food value chains (abaca, for example), the findings illustrate some of the opportunities and challenges that women face in the process of market inclusion. We use regression analysis employing a common specification to examine the correlates of women's and men's empowerment and of intrahousehold inequality measures in the four countries.

Education is associated with greater empowerment of both men and women, but the "empowerment returns" to education vary across contexts. In Bangladesh, for example, both men's and women's education levels are associated with a higher empowerment score, but this association is only weakly significant for women, but highly significant for men. In the Philippines, education is more strongly associated with men's than women's empowerment. Although earlier studies in similar contexts (e.g. Samarakoon and Parinduri 2015, for Indonesia) point to the positive association between education and women's empowerment, in our study setting, the weaker correlation of education to women's empowerment is likely attributable to the higher proportion of women who have completed secondary schooling or higher compared to men, which is not unusual in the Philippines. In Benin and Malawi, higher education levels are associated with higher women's empowerment scores, but not with men's empowerment scores in Benin. With the exception of the Philippines, where women's education is positively associated with achieving gender parity, men's and women's schooling is not significantly associated with the likelihood that a woman is as empowered or more empowered than the man in her household.

Greater wealth is not always correlated with empowerment for women. Women's empowerment is inversely related to wealth in our Bangladesh sample, but positively correlated in the Philippines and Benin samples. This implies that we cannot assume that women are going to become more empowered and that intrahousehold relationships become more equal if households become more prosperous as they engage with markets. In our Bangladesh sample, being in the top two wealth quintiles is associated both with a lower likelihood that the household attains gender parity and a higher likelihood that the man is more empowered. The lower levels of empowerment of women in the highest wealth quintile in Bangladesh is a pattern that has been observed in South Asia. In contrast, there is no wealth gradient with respect to intrahousehold inequality measures in the other three countries in our sample.

Entrepreneurship is not necessarily empowering for rural women. In our Bangladesh sample, for example, men in entrepreneurial households are more likely to be empowered, but women in those households are not. This may relate to gender norms in Bangladesh as well as the scale of the enterprise in which women entrepreneurs are involved. Small-scale enterprises with low returns (like trading) may not be empowering. Greater involvement in the market is also not necessarily associated with gender equality. For example, in

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[1] The pilot studies originally referred to the surveys as WEAI for Value Chains (WEAI4VC). These are now called pro-WEAI for market inclusion, to emphasize that it collects the core pro-WEAI module together with complementary information related to market inclusion.

our Malawi sample, an increase in the amount of the household's main commodity sold was associated with lower gender equality, even if there was no association with the empowerment scores of women and men.

Some commodities may provide more opportunities for empowerment. For example, high return export sectors (seaweed in the Philippines) or those which do not require large scale or which can be grown close to the home (swine in the Philippines), could reduce trade-offs between market and caregiving work.

Training and extension services are usually associated with greater empowerment but may differentially benefit men and women. In the Philippines, access to extension services seems to have a stronger correlation with men's than women's empowerment. Access to extension services is associated with a 12 per cent increase in the likelihood of men being empowered and a 7 per cent increase in their empowerment score; and a 5 per cent increase in the likelihood of women being empowered and a 4 per cent increase in their empowerment score. In Benin, receiving ATVET4W training was associated with a higher likelihood of the woman being empowered, with higher empowerment scores for both men and women. These associations were only weakly significant, however. In Malawi, perhaps because ATVET4W was a new programme, no significant associations were observed. However, receiving any type of agricultural training was positively associated with the probability of being empowered and with higher empowerment scores for both men and women. Interestingly, despite not having significant associations with the empowerment score itself, receiving ATVET4W training is associated with a higher likelihood that the woman is more empowered and a higher likelihood that the man is less empowered.

All in all, culture and context determine whether participation in value chains – and which node of the value chain – is empowering. This suggests that food systems and value chains interventions that seek to empower women should consider the social and cultural contexts in which these food systems operate, so that interventions "do no harm" and do not exacerbate existing gender inequalities.

4. Emerging evidence on impact evaluations of food systems interventions that aim to increase women's empowerment

In this section we identify lessons learned from the emerging literature on food systems interventions that are gender-sensitive and aim to improve either nutritional status or food security. We define food systems interventions as those that go beyond increasing household consumption and aim to increase the marketable surplus. Many food systems interventions specifically target local or regional markets, but some may address larger markets. A precursor to food systems interventions is a body of research on homestead food production interventions, which primarily focused on examining the impact of producing nutritious foods for household consumption. (See Ruel, Quisumbing and Balagamwala 2018 for a recent review of homestead food production interventions that summarizes the conditions under which homestead food production interventions have demonstrated impact on diets and women's empowerment.) The evidence on what works to empower women in food systems is still relatively nascent. Herein we draw findings primarily from mid-term evaluations and qualitative studies linked to in-progress impact evaluations of food systems interventions.

We focus on three interventions that were gender sensitive, aimed to improve nutritional status or food security and featured a combination of intervention components (appendix 2). In rural Burkina Faso, the Soutenir l'Exploitation Familiale pour Lancer l'Élevage des Volailles et Valoriser l'Économie Rurale (SELEVER) intervention aims to improve the health and nutritional status of women and children in both producing households and the larger community through three main components (Gelli et al. 2017). First, to enhance poultry production through vaccination services, financing opportunities, and providing training on poultry flock management. Second, to introduce a behaviour change communication strategy that focuses on increasing demand for poultry products and mitigating the potential negative consequences of poultry on human hygiene. Third, a gender strategy that focuses on sensitizing community and other household members to women's heavy labour burdens in the household and the importance of including women in the decision-making process. Additionally, the programme focuses on income generation activities in a sector

where women are already active (poultry production), with the intention that it will increase women's ability to maintain control over the profits earned from the activities.

The second is the trader intervention of MoreMilk: Making the Most out of Milk, which trains milk retailers operating in the informal dairy sector in peri-urban Nairobi, Kenya to improve the safety of milk (Alonso et al. 2018). The intervention is delivered to milk retailers, with the expectation that the benefits of safe and hygienic milk will be passed on to consumer households, even though consumers are not directly engaged. The intervention trains milk retailers to increase hygienic milk handling practices and thus the safety of milk. The training includes content on how to test for common milk safety risks, negotiating with suppliers to ensure retailers receive safe milk from suppliers, and how to promote the benefits of safe and hygienic milk to consumers to increase their demand for the product. Additionally, to reduce turnover among milk retailers and ensure the sustainability of the intervention, the intervention also includes training on best business practices. Through these trainings, MoreMilk aims to help empower women retailers, who comprise approximately half of the operators, but have a higher turnover rate.

The third is the Value Chain Development Programme (VCDP) that aims to enhance productivity, promote agroprocessing and integrate activities across production, processing and marketing nodes of the rice and cassava value chains in multiple states in Nigeria. This intervention has two primary components. The first is an agricultural marketing development component that includes infrastructure development, business management capacity, promoting the adoption of improved processing practices, creating linkages to financial service providers, developing quality control and standardization systems, and enhancing market information systems. The second is a smallholder productivity enhancement component that includes management training, production extension services, disseminating improved seeds and planting materials, establishing youth-run seed enterprises, providing matching grants to acquire inputs and machinery, and developing arable land under an irrigation scheme. All activities are delivered through local farmer organizations, which include groups that focus on the production, processing and marketing of rice and cassava. Depending on the crop and the region, women are often most heavily involved in the processing and marketing nodes, but they also engage in production despite typically experiencing lower access to their own high-quality farmland in these areas. To address gender constraints, the project aimed to facilitate women's access to assets, strengthen the governance of women's groups active in the value chains and ease women's workloads by increasing their access to mechanization and labour and sensitizing community members to women's high labour burdens.

4.1 Lesson: women's control over productive assets and access to services is necessary, but not sufficient, for successful food systems interventions

The first emerging lesson is that strengthening women's control and ownership of productive assets, including livestock and equipment, and securing their access to services such as extension training, is an essential starting point for ensuring the success of gender-sensitive food systems interventions. Yet, such interventions cannot rely exclusively on asset transfers and need gender-sensitive intervention components that ensure women can maintain control over their assets. Overall, this lesson is in line with earlier work, which has concluded that targeted asset transfers have an important role in increasing women's agricultural production and that gender-sensitive approaches can help women maintain control over these assets (Quisumbing et al. 2015).

Drawing on evidence from the SELEVER study, findings from the mid-project qualitative study conclude that the programme has facilitated changing some gender norms; for example, men are generally supportive of their wives' income-generating activities and state that they help mitigate women's time constraints and labour burden (Eissler et al. 2020a). However, despite women's time and financial investments in poultry, husbands typically still maintain control over poultry profits, especially because poultry purchasing is dominated by men. Women are often unable to interact freely with men from outside the household or to travel freely, thus limiting direct interactions with poultry buyers. Women's lack of control over profits limits their ability to reap the full benefits of their efforts. Additionally, a quantitative study of mid-project impacts, as measured in the lean season, found that the project led to a significant increase in the use of poultry inputs (e.g. veterinary services) and that poultry generated more revenue, but the increased revenue was not large enough to increase profits (Leight et al. 2020).

Additionally, evidence from qualitative work conducted at the end of the VCDP intervention in Nigeria (Eissler 2020) found that although training activities and extension services were available to both men and women, in some parts of the intervention area, local gender dynamics, including the need to get approval from husbands, limited interactions between men extension agents and women beneficiaries. As a result, women often could not maximize the benefits of trainings and interactions with extension agents.

4.2 Lesson: household gender dynamics must be addressed

The second emerging lesson is that despite the focus on women's activities outside the home, like processing and marketing, food systems interventions must consider intrahousehold barriers. Women face obstacles, such as needing their husband's permission to participate in income-generating activities, difficulty maintaining control over income and limitations on their freedom of movement, that may limit their ability to successfully integrate into food systems.

Building on findings that inform the first lesson, in the SELEVER study, household dynamics often limit women's ability to maintain control over assets and profits from poultry sales. Despite successfully addressing some aspects of household dynamics, the project was not able to address household dynamics related to women's interactions with poultry buyers, making it difficult for women to control profits. Given the intervention's successful approach to other aspects of household dynamics, it is possible that dynamics related to interactions with buyers or maintaining control over money are especially difficult to change. Similarly, in the VCDP intervention, the dynamics that limit interactions between women beneficiaries and men extension agents need to be carefully addressed at the household level.

Furthermore, in formative research for the MoreMilk study, it was found that milk retail is more lucrative for older men, compared with women and younger men (Galiè et al. 2020). Women retailers typically source milk from brokers because constraints on their time and freedom of movement, often put in place by husbands, limit their ability to source milk from farmers. This leads them to purchase milk at higher prices and run a greater risk of receiving spoiled milk, which they are not compensated for. Overall, their businesses are less likely to thrive, leading to high turnover rates. Younger men can overcome these constraints with time and experience. Women, however, cannot.

4.3 Lesson: not all food systems interventions can be gender transformative

The third emerging lesson is that not all food systems interventions have the potential to be gender transformative (i.e. aim to transform the root causes of gender inequalities). Some interventions may be limited to gender-accommodative approaches (i.e. those that aim to be gender sensitive within the existing systems of social norms).

Even though all three interventions highlighted have a specific goal of empowering women, their programmatic approaches for doing so are quite different. SELEVER, in rural Burkina Faso, aims to include gender-transformative strategies by engaging in community-level dialogues, sensitizing men to women's heavy household labour burdens and training a cohort of women village vaccinators, who stretch gender barriers by travelling alone and filling a position that was previously only held by men. Conversely, MoreMilk is only able to include gender-accommodative approaches that ensure women can fully participate in trainings and that the training materials include content that is especially important to women retailers. VCDP integrates gender into a project with a broader approach of strengthening the rice and cassava value chains, but the gender-related activities are additional to the primary objectives of the project. As the studies for each of these projects are completed, it will be important to compare the project impacts on women's empowerment and gender-related outcomes.

To identify and potentially mitigate gender-based constraints to maintaining a successful milk retail business, MoreMilk engaged in qualitative formative research, which has informed the project's gender strategy (Galiè et al, 2020). Based on the findings of this work, MoreMilk determined that it is only possible to take on gender accommodative approaches as part of the training. These approaches include targeting women, ensuring that the trainings are held at a time and place that is suitable for women, and designing training to include topics where women retailers need support (e.g. negotiating with vendors), gender-

related content and gender-sensitive instructors. However, these approaches do not address or attempt to change the root causes of gender inequality, as a gender-transformative approach would. A gender-transformative approach in this area of the food system might include a women-producers to women-retailers link, cooperatives or contracting arrangements that do not leave women at a disadvantage, and technologies that can enhance milk safety. It remains to be determined whether any of these gender-transformative approaches are feasible.

In continuing work, it will be important to compare the outcomes of food systems approaches that take different routes to integrate gender. Even food systems interventions without an explicit focus on gender run the risk of increasing gender inequality or disempowering women, an unintended consequence that should be taken into consideration.

5. Concluding remarks

5.1 Key findings

This paper set out to answer three questions. We summarize our findings under the broad question headings and point to some areas for future research.

How do women's empowerment and gender equality relate to nutrition outcomes?

Much of the work in this area has focused on women's empowerment as an instrument to achieve better child outcomes. As a result, there exists a large body of evidence from both observational and experimental studies that has documented a link between women's control over resources and improved nutrition outcomes for children. While a recent review by Santoso et al. (2019) concluded that this link is less conclusive than previously believed, the review suggests that this was not because of the absence of an underlying relationship, but because the measurement of the complex multidimensional context-dependent concept of women's empowerment is often flawed. The recent development of the WEAI, an internationally validated measure of women's empowerment grounded in theories of agency and empowerment, has helped improve upon previous work.

Previous studies using the WEAI, though limited in number, have found evidence of a positive association between women's empowerment and household-level diet-related outcomes, better maternal nutrition (both diets as well as outcomes, such as anaemia), select child anthropometric indicators, child diets and infant and young child feeding practices. The strength and magnitude of the association varies across country contexts, as might be expected, and further investigation of the underlying domains suggests that nutritional status might be more closely related to empowerment in some domains than in others.

The results from a pooled analysis of six countries from South Asia and Africa (Bangladesh, Cambodia, Nepal, Ghana, Mozambique, Tanzania) corroborate these findings. The aggregate empowerment indicators – both the individual empowerment scores from the 5DE and the intrahousehold inequality scores – show limited associations with nutrition outcomes for the household, woman or child, although the strongest associations are with child HAZ, an indicator of long-term nutritional status. However, unpacking these results by country and by WEAI domain yields interesting insights. Patterns vary between South Asia and Africa, with the former showing greater positive associations between women's empowerment and nutrition outcomes, perhaps since the overall levels of women's empowerment are much lower than in Africa. Disaggregating associations by domains is also informative: while analysis of household dietary diversity does not suggest any obvious trade-offs between aspects of empowerment, the same is not true of women's outcomes, where increased participation in agriculture could serve to simultaneously increase workload, leading to two offsetting effects on overall empowerment. Similar trade-offs are also seen in the analysis of child outcomes.

In sum, the answer to the first question we posed is "it depends". Context, empowerment domain, and the nature of intervention will all affect nutrition outcomes in different ways, indicating the need for thoughtful detailed research. Designing gender- and nutrition-sensitive interventions will also need to pay closer

attention to trade-offs among different dimensions of empowerment, particularly those related to women's time use.

What factors are conducive to greater empowerment of women and gender equality within the value chains that comprise food systems?

Our review identifies several factors that are conducive to greater empowerment of women within food system value chains. The first relates to participation. Unsurprisingly, factors that enable women to participate more actively in these value chains – such as formal employment, market orientation, increasing opportunities for engagement and so on – all serve to improve women's control over income and decision-making. However, "sticky" barriers to the expansion of women's participation do exist, like cultural norms, terms of employment and asset constraints, which need to be adequately accounted for in designing and evaluating interventions. The unintended consequence of women ceding or losing control over assets to men, especially as men take over production and marketing for higher-value products, is another limiting factor to improving women's empowerment in these value chains. Group membership can confer benefits such as increased access to knowledge and marketing networks, as well as greater power to negotiate. Overall, the evidence on this front is small – but growing – and much remains to be understood.

Using data from four countries – Bangladesh and the Philippines in Asia, and Benin and Malawi in Africa – we provided some additional insight into correlates of aggregate empowerment measures. Once again, findings often varied by context. Education was positively associated with higher empowerment of both men and women, but the strength of this association varied; being strong in the Philippines and Malawi, and weaker in Bangladesh and Benin. Surprisingly, the gap between men's and women's empowerment scores is less sensitive to education than the absolute empowerment scores for both genders. Greater wealth is not always more empowering for women, as seen from the inverse association of wealth with empowerment in Bangladesh, suggesting caution in assuming that women in more prosperous households would automatically be more empowered. On the same note, entrepreneurship – often engaged in by wealthier households who are better able to take risks – is also not necessarily empowering for women. Training and extension services are generally positively associated with empowerment but could in some circumstances serve to exacerbate the inequality in empowerment between men and women in the same household.

Finally, what kinds of food systems interventions, across a range of developing country settings, empower women AND improve health and nutrition outcomes?

To answer the last question, we presented evidence from three interventions – in rural Burkina Faso, Kenya and Nigeria – that were gender sensitive and aimed to improve nutritional status or food security. The interventions combined different types of components, such as training and extension, agricultural marketing development, dissemination of inputs and so on. One of the interventions, SELEVER in Burkina Faso, also incorporated an explicit gender strategy aimed at sensitizing members of the community and the household to women's heavy workloads.

The first lesson from these three interventions is that women's control over assets is necessary but not sufficient for success. Gender-sensitive intervention components must be included as well to ensure that women are able to retain control over their assets. Local gender dynamics – such as needing the husband's permission to participate in training – can often limit the positive impacts of these interventions. Second, interventions need to explicitly address intrahousehold gender dynamics. This is often unattractive for those designing interventions, as these dynamics are hard to change, and the more intangible impacts are hard also to measure. However, without actively intervening to engage husbands and other members of the community, it is possible that gains emerging from these interventions will either be short-lived or usurped by the men. Third, not all interventions can be gender transformative, i.e. able to change root causes of gender inequalities, and might only be gender accommodative. Engaging in formative research to understand the challenges women face and explicitly including gender-transformative strategies into the design of the intervention (rather than leaving them to chance) are two ways to help improve impact.

The answer to this last question, therefore, is that food systems interventions that take gender seriously and make the effort to transform and change existing gender norms and barriers may be more successful than interventions that target women but do not engage with the system as a whole. Tracking the performance of

these three interventions – only one of which included an explicit gender strategy as part of the set of interventions – will provide crucial information on what works and why.

5.2   Limitations and areas for future research

Our conclusions are based on empirical analysis of household datasets and ongoing impact evaluations, focusing on small-scale producers and entrepreneurs. One limitation of our observational analysis is that we are unable to attribute causation, so the relationships estimated should be interpreted as associations or correlations. As the impact evaluations on which the case studies were based are completed, we will be better able to know what strategies work to both empower women and improve nutrition outcomes in nutrition-sensitive agricultural interventions.

Another limitation is our focus on Asia and Africa. The Latin America and the Caribbean region is an obvious exclusion, despite the high degree of women's involvement in agriculture and integration into markets. Further work in this geographic area is needed.

Another limitation of our analysis is our focus on small-scale producers and entrepreneurs, owing to the sampling design of our value chain studies. Gender dynamics may change as these small-scale food systems actors become more integrated into the market and increase the scale of their enterprises. In some markets, such as export markets for key agricultural commodities and markets for organically grown agricultural products, private sector initiatives, such as Voluntary Sustainability Standards (VSS), have arisen to promote economically, environmentally and socially sustainable production and trade practices. These VSS can be leveraged to promote gender equality; Sexsmith (2019) provides helpful guidelines that are applicable to a broad range of food systems actors. These guidelines, which are consistent with our findings, cover household food security, women's rights to agricultural productive resources, gender equality in education, women's unpaid domestic labour, women's decision-making and empowerment, and decent work. A promising area of future work will be to see whether and how the application of these guidelines across a range of private sector actors affects gender dynamics and women's empowerment within the participating households and producer and marketing organizations.

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Appendix 1. Women's empowerment in four value chains in Asia and Africa: Bangladesh, Philippines, Benin and Malawi

This section presents pro-WEAI results on how women's empowerment varies across value chains and nodes within value chains, based on the pro-WEAI for Market Inclusion pilot data in two countries in Asia (Bangladesh and the Philippines), and two countries in Africa (Benin and Malawi), all with very different sociocultural contexts. Note that sampling for these studies varied according to the purpose of the study and is not nationally representative. Unlike the Bangladesh and Philippines studies, which were conducted as standalone pilots, the Benin and Malawi studies were conducted as part of mixed-methods evaluations of the ATVET4W programme. These findings illustrate some of the opportunities and challenges that women face in the process of market inclusion.

Appendix Table 1
Empowerment headcounts and average empowerment scores from pro-WEAI for Market Inclusion studies: Bangladesh, Philippines, Benin, Malawi.

Country/value chain or type of value chain actor	Sample size	Empowerment headcount (% empowered)	Average empowerment score
Bangladesh (pro-WEAI)			
Producers			
Men (DHH)	327	15	0.62
Women (DHH)	329	12	0.57
Women (WOH)	56	36	0.69
Entrepreneurs			
Men (DHH)	396	21	0.68
Women (DHH)	395	4	0.47
Women (WOH)	2	50	0.65
Wage workers			
Men (DHH)	340	10	0.64
Women (DHH)	343	3	0.44
Women (WHO)	19	11	0.59
Philippines (pro-WEAI)			
Abaca			
Men (DHH)	323	34	0.67
Women (DHH)	338	32	0.68
Women (WOH)	78	29	0.67
Coconut			
Men (DHH)	307	23	0.64
Women (DHH)	318	29	0.64
Women (WOH)	88	13	0.63
Seaweed			
Men (DHH)	282	47	0.72
Women (DHH)	303	47	0.73
Women (WOH)	95	36	0.70
Swine			
Men (DHH)	279	29	0.67
Women (DHH)	315	27	0.66
Women (WOH)	85	36	0.70
Benin (pro-WEAI)			
Rice			
Men (DHH)	80	50	0.70
Women (DHH)	98	12	0.60
Women (WOH)	14	43	0.73
Soya			
Men (DHH)	199	33	0.70
Women (DHH)	231	10	0.57
Women (WOH)	34	21	0.61
Compost			

Men (DHH)	28	25	0.70
Women (DHH)	35	37	0.69
Women (WOH)	22	32	0.67
Poultry			
Men (DHH)	97	34	0.72
Women (DHH)	128	9	0.57
Women (WOH)	49	22	0.68
Malawi (pro-WEAI)			
Mango			
Men (DHH)	87	74	0.82
Women (DHH)	93	44	0.75
Women (WOH)	11	64	0.79
Vegetables			
Men (DHH)	163	61	0.79
Women (DHH)	216	47	0.75
Women (WOH)	12	83	0.84
Other commodities			
Men (DHH)	113	73	0.82
Women (DHH)	157	50	0.75
Women (WOH)	21	86	0.85

Notes: DHH: dual-headed households, WOH: women-only households
Source: Authors' computations for Bangladesh, Benin, Malawi; Malapit et al. (2020) for Philippines.

Bangladesh and the Philippines

The Bangladesh study (Ahmed et al. 2018) explored empowerment among different actors (producers, entrepreneurs and wage workers), and included a sample of 1,200 rural households from five districts (Ahmed et al. 2018). In Bangladesh, women participate in value chains by providing household labour, for which they are not individually compensated. Bangladeshi women do not typically maintain control over the income generated by their work, and their heavy workload is a major contributor to making them less empowered. Women in Bangladesh are less empowered than men, and women's empowerment varies greatly with livelihood activity, while men's empowerment is relatively similar across livelihood activities (appendix figure 1). In this figure, a longer bar indicates greater disempowerment and the shaded bars show the contribution of each indicator to disempowerment. Women are most empowered as producers and most disempowered as wage workers; men are most empowered as entrepreneurs and least empowered as producers.
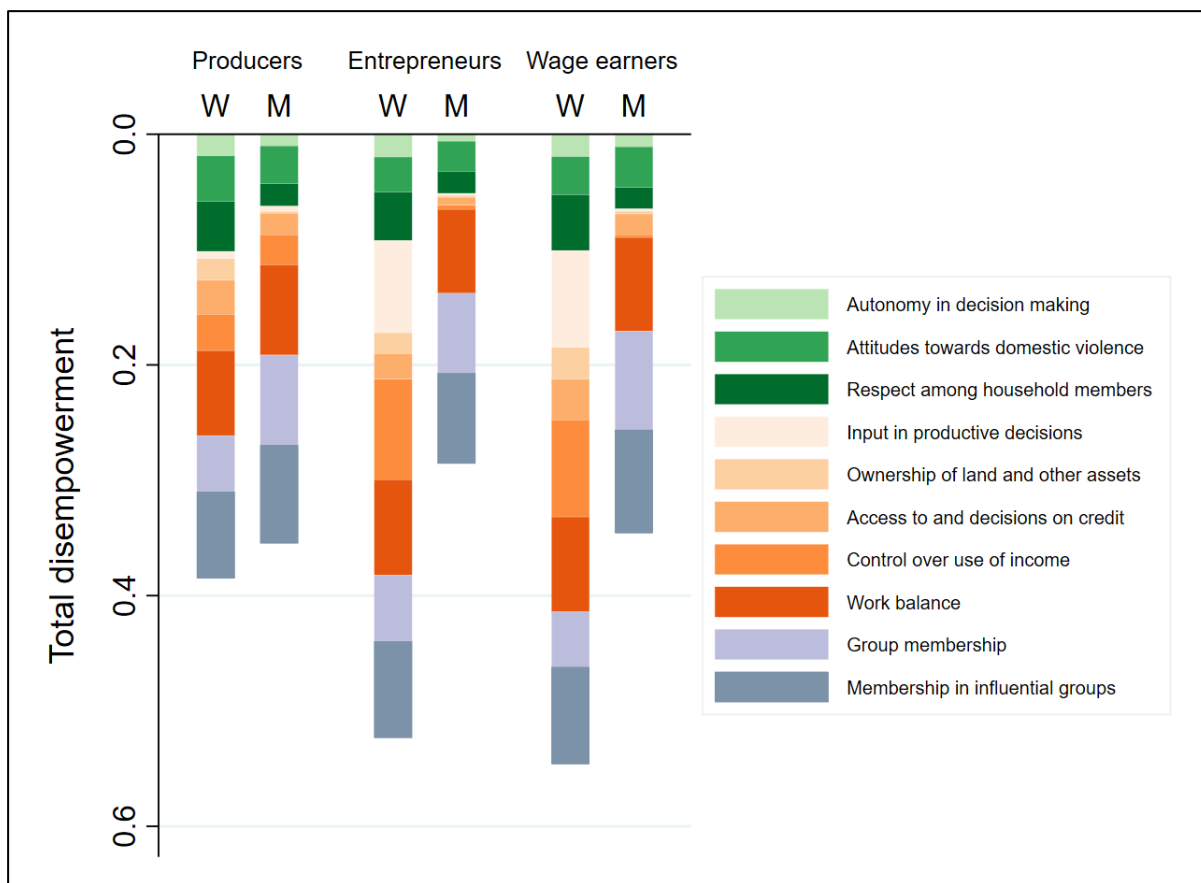
Appendix Figure 1: Contributors to women's and men's disempowerment, Bangladesh.

Source: Authors' calculations

Entrepreneurship is often viewed as a pathway to empowerment. However, the reality may be different. In the Bangladesh study, women in producer households were found to be more empowered than those in entrepreneur or wage-work households. Because working away from home is less socially desirable, female entrepreneurs and wage workers may be more susceptible to losing the respect of community members. Compared to women in producer households, women in entrepreneur and wage-work households had little say in productive decisions. This illustrates that whether a specific role in the value chain is empowering can depend on culture and context and the structure of local labour markets.

In the Philippines (Malapit et al. 2020), the survey focused on the empowerment and inclusion of women in four agricultural value chains – abaca, coconut, seaweed and swine – in a sample of 1,600 households from six provinces. Results show most women and men in all four VCs are disempowered. Empowerment is lowest in the coconut value chain (23 per cent of men, 29 per cent of women) and highest in the seaweed value chain (47 per cent of women and men). Unlike many other countries for which we have WEAI data, however, Filipino women in this sample are generally as empowered as men. A decomposition of the factors contributing to disempowerment suggests that respect within the household and attitudes about gender-based violence are the largest sources of disempowerment for both women and men, followed by control over use of income and autonomy in income-related decisions. Excessive workload and lack of group membership are other important sources of disempowerment, with some variation across VCs and nodes along VCs (appendix figure 2).
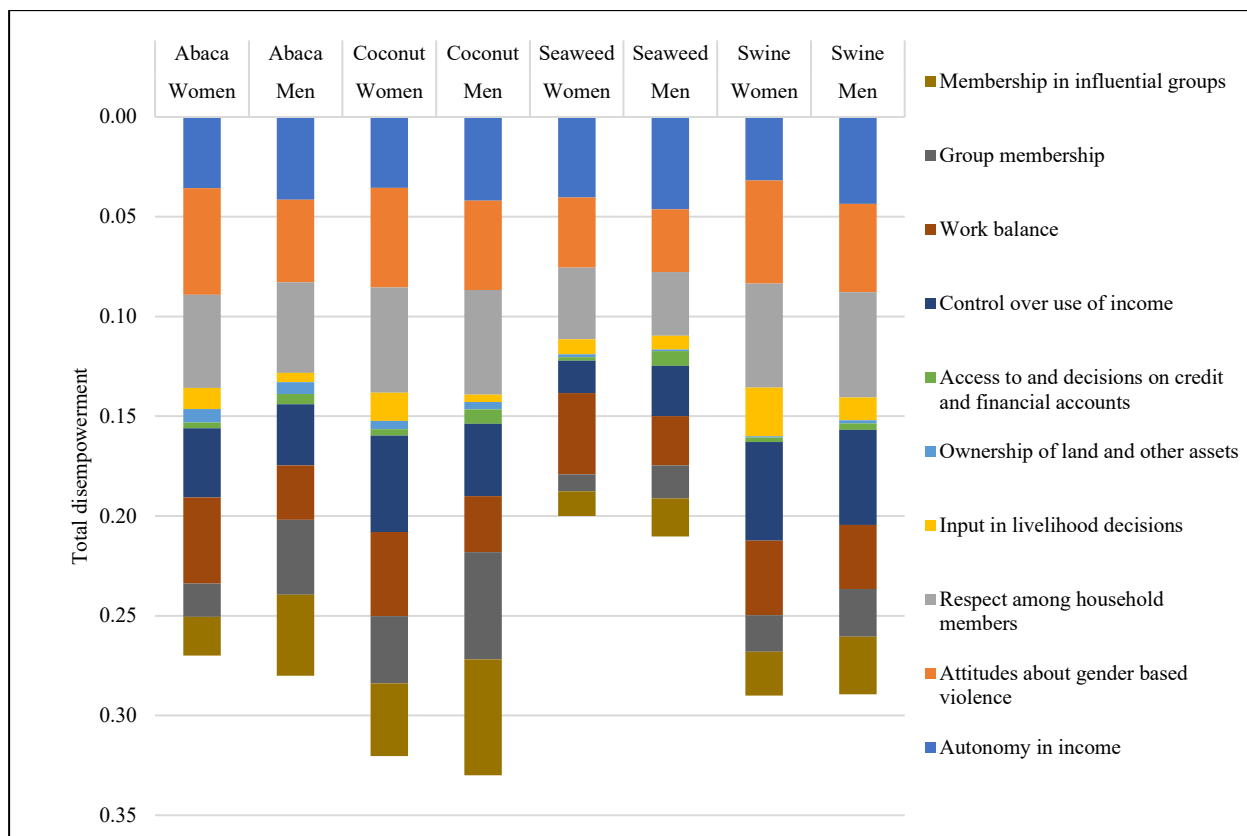
Appendix Figure 2: Sources of men's and women's disempowerment in four Philippine value chains.

Source: Malapit et al. (2020)

Is participation in value chains empowering? Investigation across four Philippine value chains indicates that participation alone cannot ensure increased empowerment. Gendered stereotypes contribute to disparate workloads and inhibit women from seeking jobs in other nodes of the chain. For example, women are often engaged in tying, planting and drying seaweed and earn lower incomes based on piece rates, while men do the more strenuous work of diving to attach seaweed lines to stakes and earn a higher daily rate. Gender norms related to mobility and heavy labour also intersect with women's more limited access to capital and knowledge of specialized markets, which make it more difficult for individual women than men to expand a trading business in the coconut and seaweed chains.

In the Philippines study, women in the abaca and coconut value chains are less empowered relative to those working in swine and seaweed, but the specific areas of empowerment vary from chain to chain. However, some of the same gender issues exist across value chains, which highlights the need for transformative approaches that can address structural social and gender norms, such as promoting gender awareness in communities and school, targeting not only women and girls, but also men and boys.

Benin and Malawi

Another opportunity to further develop and test the pro-WEAI for market inclusion arose with the mixed-methods evaluations of the ATVET4 programme in Benin and Malawi. The ATVET4Women programme is designed as a gender-sensitive approach that aims to increase women's access to, benefits from and empowerment from value chains in the agri-food sector by offering formal and informal trainings to women smallholders and small and micro-entrepreneurs. The approach aims to consider women's roles and positions in society by offering a variety of learning strategies and forms of support to meet their needs. In Benin, the ATVET4Women programme focuses on four high-priority value chains: rice, soy, chicken and compost (Heckert et al. 2020). In Malawi, the programme provides training on vegetable value chains (Ragasa et al. 2020).

Overall, the studies found that both men and women in the Benin study have low levels of empowerment; 33 per cent of women and 59 per cent of men achieved empowerment, with a sizeable difference between men and women. The largest contributors to women's disempowerment are work balance, membership in influential groups, access to and decisions on credit, and autonomy in income. The largest contributors to men's disempowerment are membership in influential groups, group membership, access to and decisions on credit and autonomy in income (appendix figure 3). These findings were reinforced by qualitative findings that illustrated how women were unable to allocate their time as they wished because it was expected that household responsibilities take priority. Additionally, women had difficulty accessing financial services and credit and often were thought to be a credit risk. Furthermore, women, especially married women, were forced to conduct their activities, including their business activities, according to their husbands' preferences and permission.
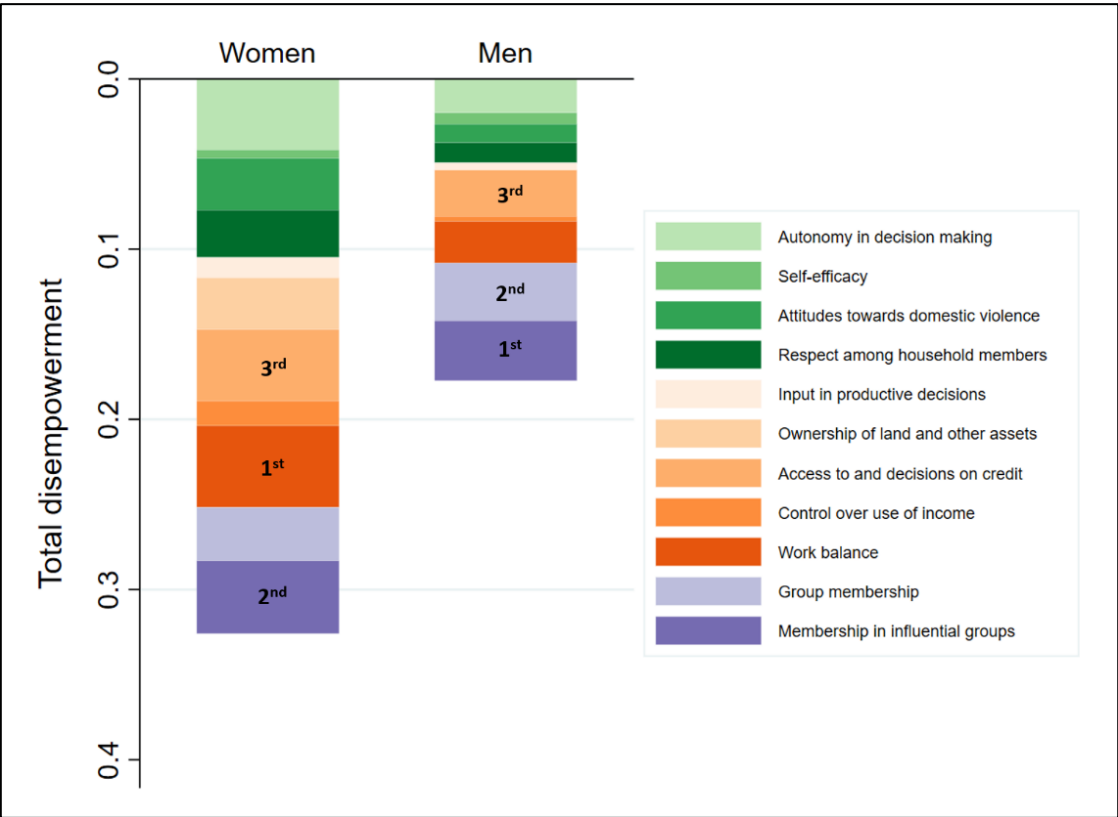
Appendix Figure 3: Contributors to women's and men's disempowerment in the ATVET4W study in Benin.
Source: Heckert et al. (2019)

Relatively high proportions of both men (85 per cent) and women (73 per cent) in the Malawi study sample are empowered and 73 per cent of the sample households achieved gender parity. The main contributors to disempowerment among women and men are a lack of autonomy in decision-making and work balance. Fewer women achieved adequacy in work balance than men. Adequacies in attitudes about domestic violence, respect among household members, input in productive decisions, and asset ownership are generally high for both women and men, but significantly lower for women (appendix figure 4).
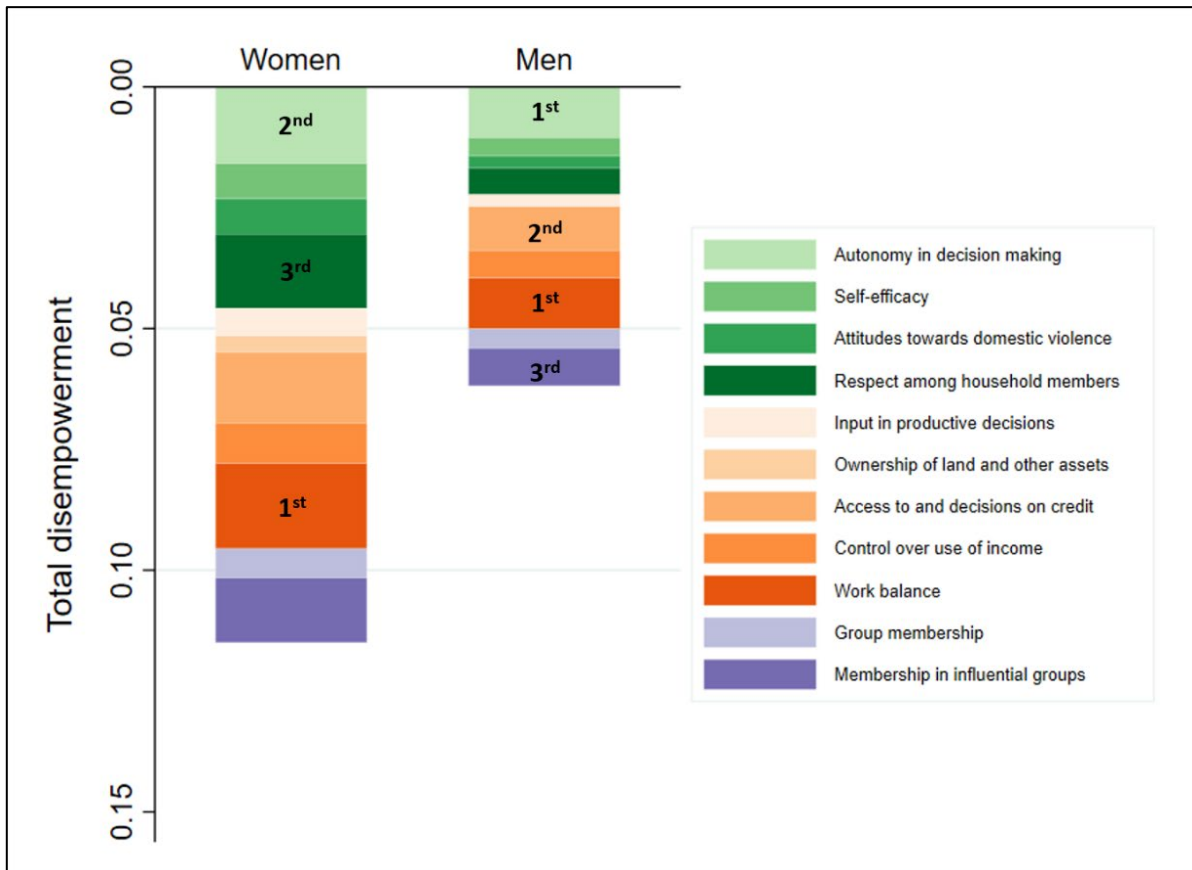
Appendix Figure 4: Contributors to women's and men's disempowerment in the ATVET4W study in Malawi.

Source: Ragasa et al. (2019)

Correlates of empowerment in value chains

We use regression analysis to examine the correlates of women's and men's empowerment and of intrahousehold inequality measures in the four countries. We discuss Bangladesh and the Philippines together, and Benin and Malawi together, to make comparisons within regions and also because the Benin and Malawi samples were taken from an intervention study and would therefore be less likely to be representative of the rural population in those areas.

Bangladesh

Appendix tables 2 and 3 present the correlates of women's and men's empowerment and intrahousehold inequality in Bangladesh. Women's and men's empowerment is positively correlated with educational attainment in our Bangladesh sample (appendix table 2), but marital status, household size and receipt of cash or in-kind transfers are not significantly correlated with empowerment for either gender. Though small in number, women in women-only households (WOHs) are more likely to be empowered and have a slightly higher empowerment score relative to women in dual-headed households (DHHs).

Other correlates of empowerment differ across genders. Relative to the base category of agricultural producer households, women in both entrepreneur and wage-earner households have lower empowerment scores and are significantly less likely to be empowered. In contrast, men in both entrepreneur and wage-earner households are significantly more likely to be empowered and to have higher empowerment scores than men in producer households.

Women and men in wealth quintiles 2, 3 and 4 do not differ significantly from their counterparts in the poorest wealth quintile, either in the likelihood of being empowered or in the empowerment scores, with the exception of the empowerment score for men in wealth quintiles 3 and 4. However, women in the richest

quintile are 6 percentage points less likely to be empowered than women in the poorest quintile (p<0.01) and have an empowerment score that is 0.011 points lower (p<0.01). In contrast, men in the richest quintile have, on average, an empowerment score that is 0.013 (p<0.01) points higher than that of men in the poorest quintile. The decrease in women's empowerment across the wealth gradient is a pattern that is commonly observed in South Asia.

Compared to the base category of producer households, entrepreneur and wage earner households perform worse on intrahousehold measures (appendix table 3). Entrepreneur households are 21 percentage points (pp) less likely to achieve parity (p<0.01) and have an intrahousehold inequality score that is 11.9 points higher (p<0.01). It is also 21 pp more likely that the men in the entrepreneur households are more empowered than the women (p<0.01), 13 pp less likely that the man and woman are equally empowered (p<0.01) and 9 pp less likely that the woman is more empowered than the man. The patterns for wage earner households are very similar, though the magnitudes are larger for every outcome measure. This, therefore, corroborates our interpretation above, that producer households in the middle of the wealth spectrum display greater equity between men and women.

We find no association between intrahousehold measures of empowerment and man or woman levels of education, household size or receipt of cash or in-kind transfers. Once again, however, we see some evidence that wealth is negatively associated with intrahousehold empowerment measures. Compared with the poorest quintile, households in the richest quintile are 20 pp less likely to achieve parity (p<0.01), have an intrahousehold inequality measure that is 13 points higher (p<0.01), 27 pp more likely to have a man who is more empowered than the woman and 21 pp (p<0.01) less likely to have men and women who are equally empowered. Households in quintile 4 display similar trends, though with smaller magnitudes – they are 9 pp less likely to achieve parity (p<0.05), have an intrahousehold inequality score that is higher than that of the poorest quintile by 6 points (p<0.05) and are 12 pp (p<0.05) more likely to have a man who is more empowered than the woman. Quintiles 2 and 3 are, for the most part, indistinguishable from the poorest quintile on intrahousehold measures of empowerment.

Appendix Table 2
Correlates of women's and men's empowerment, Bangladesh.

	Whether empowered (=1 if empowered)a		Empowerment score (continuous)b	
	Women	Men	Women	Men
Respondent is in a woman-only household (WOH)	0.107* (0.057)		0.007*** (0.001)	
Highest educational level	-0.004 (0.006)	0.012** (0.006)	0.019* (0.010)	0.015*** (0.005)
Married (=1)	0.015 (0.023)	0.047 (0.055)	0.012 (0.030)	0.039* (0.021)
Age (years)	0.006 (0.004)	0.003 (0.004)	0.636*** (0.086)	-0.022 (0.072)
Age squared	-0.000* (0.000)	-0.000 (0.000)	-0.291*** (0.042)	0.016 (0.036)
Household type (ref.=household is a producer)				
Household is an entrepreneur (=1)	-0.049*** (0.014)	0.058* (0.032)	-0.027*** (0.005)	0.014*** (0.003)
Household is a wage earner (=1)	-0.083*** (0.016)	-0.018 (0.030)	-0.042*** (0.004)	0.009*** (0.003)
Household size	-0.002 (0.005)	-0.009 (0.006)	-0.020 (0.013)	-0.012 (0.009)
Household received cash assistance/transfer (=1)	-0.011 (0.014)	0.014 (0.025)	0.001 (0.003)	0.002 (0.002)
Household received in-kind assistance/transfer (=1)	-0.014 (0.013)	0.059* (0.030)	0.003 (0.003)	0.003 (0.002)
Asset/wealth quintile (ref.=poorest)				
Quintile 2	-0.006 (0.020)	-0.006 (0.047)	0.002 (0.003)	0.004 (0.002)
Quintile 3	-0.007 (0.017)	0.012 (0.047)	-0.002 (0.004)	0.005* (0.003)
Quintile 4	-0.016 (0.018)	-0.026 (0.042)	-0.005 (0.004)	0.005* (0.003)

Quintile 5 (Richest)	-0.056***	0.081	-0.011***	0.013***
	(0.017)	(0.055)	(0.004)	(0.003)
Observations	1144	1063	1144	1063
Pseudo R-squared	0.192	0.065	0.024	0.005

Source: Authors' calculations.
[a]Estimated using logit regression.
[b]Estimated using fractional regression.
Note: Marginal effects reported, standard errors in parentheses. (=1) represents dummy variables and coefficients denote the effect of a discrete change in the dummy variable from 0 to 1. Asset index was calculated using principal components analysis based on roof material, floor material, number of bedrooms, improved toilet, access to electricity, improved cook fuel source, dwelling in excellent state, and ownership of land, large livestock, fishing equipment, mechanized farm equipment, inventory/stock business, non-agricultural land, mechanized means of transport, shop facility, and storage facility
Significant at * $p<0.10$, ** $p<0.05$, ***$p<0.01$.

Appendix Table 3
Correlates of intrahousehold measures of empowerment (dual-headed households only), Bangladesh.

	Gender parity achieved=1a	Whether man more empowered (=1)b	Whether woman more empowered (=1)b
Highest educational level, male respondent	-0.003	0.003	-0.006
	(0.009)	(0.009)	(0.005)
Highest educational level, female respondent	0.001	-0.008	0.001
	(0.011)	(0.011)	(0.006)
Married (=1), male respondent	0.124	-0.002	0.044
	(0.102)	(0.141)	(0.088)
Married (=1), female respondent	0.100	-0.141	1.007***
	(0.137)	(0.192)	(0.161)
Age (years), male respondent	-0.000	0.006	-0.006
	(0.013)	(0.013)	(0.008)
Age (years), female respondent	0.031*	-0.046***	0.010
	(0.017)	(0.014)	(0.009)
Age squared, male respondent	-0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)
Age squared, female respondent	-0.000	0.001***	-0.000
	(0.000)	(0.000)	(0.000)
Household type (ref.=household is a producer)			
Household is an entrepreneur (=1)	-0.207***	0.212***	-0.086***
	(0.040)	(0.035)	(0.020)
Household is a wage earner (=1)	-0.266***	0.357***	-0.151***
	(0.037)	(0.034)	(0.028)
Household size	-0.001	-0.002	-0.002
	(0.008)	(0.008)	(0.005)
Household received cash assistance/transfer (=1)	0.036	-0.017	-0.037*
	(0.033)	(0.033)	(0.020)
Household received in-kind assistance/transfer (=1)	-0.038	-0.039	-0.005
	(0.036)	(0.037)	(0.020)
Asset/wealth quintile (ref=poorest)			
Quintile 2	-0.016	0.003	-0.051*
	(0.038)	(0.049)	(0.027)
Quintile 3	-0.065	0.055	-0.040
	(0.042)	(0.051)	(0.027)
Quintile 4	-0.092**	0.119**	-0.037
	(0.042)	(0.055)	(0.027)
Quintile 5 (Richest)	-0.201***	0.265***	-0.055
	(0.044)	(0.064)	(0.035)
Constant			
Observations	1069	1059	1059
Pseudo R-squared	0.121	0.127	0.127
Households in which empowerment scores are equal (% of total)	*426 (40.19)*		
Households in which man is more empowered (% of total)	*559 (52.74)*		
Households in which woman is more empowered (% of total)	*75 (7.08)*		

[a]Gender parity is defined as the woman being equally or more empowered than the primary male adult in the household; estimated using logit.

bEstimated using multinomial logit, with base defined as households where woman and man are equally empowered.
Note: Marginal effects reported, standard errors in parentheses. (=1) represents dummy variables and coefficients denote the effect of a discrete change in the dummy variable from 0 to 1.
Significant at * p<0.10, ** p<0.05, ***p<0.01.
See notes to Appendix Table 2.

Philippines

Appendix tables 4 and 5 present similar regressions for the Philippines. Women's and men's empowerment is positively associated with education, age, being married, access to extension services and access to community programmes and projects, but some correlates of men's and women's empowerment differ. Both women and men are least empowered in the coconut VC, and most empowered in the seaweed VC. No statistical difference exists between men's and women's empowerment scores and between women in DHH and in WOH. Older women have higher empowerment scores, while those engaged mainly in processing have lower empowerment scores compared with those engaged mainly in production or trading. The low scores of women processors may arise from their engagement in low-value and time-demanding processing activities in coconut and abaca and the poor work conditions in abattoirs. Women who are in the richest quintile have a higher likelihood of being empowered than those in other asset groups. Men who are labourers or wage earners are less empowered than those who are not, likely due to preferences for having one's own business, which may involve greater autonomy than wage work.

Community programmes and projects are common in the study sites and at least three quarters of women and men reported accessing and participating in community programmes or projects. Access is weakest among swine VC participants (50 per cent of men and 61 per cent of women participating), and highest in seaweed VCs (more than 90 per cent of women and men participating), probably due to the role of community projects in allocating seaweed plots and other resources. A much greater proportion of seaweed VC participants report access to other programmes, including on agricultural inputs and agricultural livelihoods training programmes, compared with other VCs. The main programme is the conditional cash transfer programme (Pantawid Pamilyang Pilipino Program, 4P), to which the majority of VC participants, except those in swine VC, have access. Greater access to community programmes is associated with greater empowerment among women, but not for men.

We see strong positive association of access to extension services with both women's and men's empowerment. Access to extension services is weak, with only about 26 to 44 per cent of women and men reporting having access. This is lowest in coconut VCs. Women generally have weaker access to extension in abaca and coconut VCs, but generally more equal access in seaweed and swine VCs. However, interviews with men and women seaweed VC participants reveal limited training in seaweed production or processing. As farming is inherently risky, early warning systems and weather forecasts are reported by interviewees as being particularly useful. New practices to cope with extreme weather events, such as submerging seaweed deeper into the water before the start of typhoon, will help save the farms, according to some respondents.

Education and extension services are more strongly associated with men's empowerment than women's. Although earlier studies in similar contexts (e.g. Samarakoon and Parinduri, 2015 for Indonesia) point to the positive association between education and women's empowerment, in our study setting, the weaker correlation of education to women's empowerment is likely attributable to the higher proportion of women who have completed secondary schooling or higher compared to men, which is not unusual in the Philippines. Similarly, access to extension services seems to have a stronger correlation with men's rather than women's empowerment. Access to extension services is associated with the increased likelihood of men being empowered by 12 per cent and a 7 per cent increase in their empowerment score; and of women being empowered by 5 per cent and a 4 per cent increase in their empowerment score. Even if education increases women's bargaining power within their households, it may be insufficient to change deeply rooted societal attitudes. Many women respondents in the coconut and seaweed VCs wanted their daughters to get an education to obtain salaried employment in women-dominated sectors such as teaching, nursing, and clerical work. Thus, education may not improve outcomes that require transformation of gender relations such as agency, asset ownership and community participation. Interestingly, there is no

strong relationship with household wealth; a woman is more likely to be empowered if she belongs to the top wealth quintile, but none of the other wealth categories are significant.

Appendix Table 4
Correlates of women's and men's empowerment, Philippines.

	Whether empowered (=1)a				Empowerment score (continuous)b			
	Women		Men		Women		Men	
Respondent is in a	-0.022				0.003			
woman-only household (WOH)	(0.039)				(0.011)			
Highest educational	0.013	*	0.024	***	0.090	**	0.135	***
Level	(0.007)		(0.008)		(0.038)		(0.041)	
Married (=1)	0.067	*	0.065		0.081	**	0.122	**
	(0.036)		(0.045)		(0.036)		(0.052)	
Age (years)	0.001		0.001		0.118	*	0.157	*
	(0.001)		(0.001)		(0.070)		(0.091)	
Access to extension	0.050	*	0.123	***	0.039	***	0.074	***
(=1)	(0.027)		(0.032)		(0.013)		(0.017)	
Access to community	0.060	*	0.045		0.133	***	0.128	***
programs (=1)	(0.031)		(0.035)		(0.031)		(0.033)	
Participates non-farm	-0.001		0.004		0.004		-0.014	
activities (=1)	(0.027)		(0.034)		(0.012)		(0.014)	
Participates in wage	0.008		-0.077	**	0.001		-0.036	*
employment (=1)	(0.029)		(0.031)		(0.011)		(0.019)	
VC main activity (reference=production)								
Processing	-0.043		0.010		-0.023	**	-0.013	
	(0.029)		(0.035)		(0.011)		(0.014)	
Trading	-0.006		-0.082	**	-0.002		-0.009	
	(0.035)		(0.041)		(0.009)		(0.010)	
Main VC (reference=seaweed)								
Abaca	-0.076	**	-0.099	**	-0.037	***	-0.053	***
	(0.035)		(0.040)		(0.013)		(0.016)	
Coconut	-0.138	***	-0.212	***	-0.081	***	-0.085	***
	(0.034)		(0.037)		(0.012)		(0.016)	
Swine	-0.134	***	-0.140	***	-0.057	***	-0.046	***
	(0.034)		(0.041)		(0.013)		(0.015)	
Asset/wealth quintile† (reference=poorest)								
Quintile 2	-0.013		-0.070		-0.013		0.003	
	(0.041)		(0.045)		(0.011)		(0.013)	
Quintile 3	0.040		-0.014		-0.001		0.007	
	(0.043)		(0.049)		(0.011)		(0.013)	
Quintile 4	0.043		-0.050		0.006		0.001	
	(0.043)		(0.048)		(0.011)		(0.013)	
Quintile 5	0.094	**	0.013		0.003		-0.003	
	(0.046)		(0.053)		(0.012)		(0.013)	
Observations	1410		1041		1410		1041	
Pseudo R-squared	0.037		0.064		0.13		0.11	

Source: Malapit et al. (2020) =
[a]Estimated using logit regression
[b]Estimated using fractional regression.
Marginal effects reported, standard errors in parentheses. (=1) represents dummy variables and coefficients denote the effect of a discrete change in the dummy variable from 0 to 1. Estimates using municipality and province fixed effects were largely consistent. Asset index was calculated using principal components analysis based on roof material, floor material, people per sleeping room, state of dwelling, type of toilet, source of water and drinking water, electricity, source of cooking fuel, and ownership of land, boats, fishponds, farm equipment, business equipment, consumer durables, cell phones, houses, and means of transportation.
Significant at * $p<0.05$, ** $p<0.01$, *** $p<0.001$.

Appendix table 5 presents regressions on the correlates of intrahousehold inequality measures in the Philippine sample. The first regression examines the probability that the household achieves gender parity (the woman is at least as empowered as the man). A household is likely to achieve gender parity if the woman is more educated, the woman has access to extension services and the man participated in non-

farm activities and wage employment (coefficients on men's participation in non-farm activities and wage employment are only weakly significant). Women's access to community programmes is associated with a lower likelihood of achieving parity. Interestingly, men's participation in trading is associated with a lower likelihood of achieving gender parity, whereas women's participation in trading is associated with a higher likelihood of achieving parity.

Multinomial logit regressions allow us to examine the likelihoods of the man (woman) being more empowered relative to the excluded category, where they are similarly empowered. Results show that age and education have marginal effects that are small in magnitude. However, the marginal effects of men's and women's participation and access to public services and different types of employment often show opposite signs, which suggests offsetting associations between men's and women's access to services and achieving greater equality. Men's access to extension services increases the likelihood that the man is more empowered by 6.5 per cent (and lowers the likelihood that the woman is more empowered by 9.6 per cent), and therefore is correlated with greater likelihood of inequality. Women's access to extension services is associated with a 5.4 per cent reduced likelihood that the man is more empowered, and therefore greater likelihood that men and women are equally empowered. Surprisingly, women's own access to community programmes is associated with a 6.9 per cent increased likelihood that the man is more empowered, whereas men's access to community programmes does not appear to be significant. If extension services and community programmes are targeted to specific individuals but run the risk of worsening gender inequality and disempowering their partners, this may limit households' participation in these programmes compared with those that could potentially empower both men and women.

The male respondent's participation in nonfarm activities and wage employment (relative to agricultural production) is associated with a lower likelihood that he is more empowered relative to a condition of gender equality. Non-farm work and wage employment may be relatively low-return sectors for men in these contexts. The node of the value chain also matters: men's participation in trading is associated with a higher likelihood of his being more empowered, whereas the woman's participation in trading is associated with a lower likelihood that the man is more empowered to a condition of gender equality. Participation in trading may involve more direct access to sales proceeds on higher value products, as well as more engagement with other market actors. Among the four value chains, participation in the abaca value chain is associated with a higher likelihood of the man being more empowered, relative to a condition of gender equality.

Appendix Table 5
Correlates of intrahousehold measures of empowerment, (dual-adult households only), Philippines.

	Whether gender parity is achieved (=1) a	Whether man is more empowered (=1)b	Whether woman is more empowered (=1)b
Household size	0.003 (0.006)	-0.027 (0.040)	-0.034 (0.039)
Highest educational level of man respondent	-0.008 (0.008)	0.034 (0.050)	-0.092* (0.051)
Highest educational level of woman respondent	0.015* (0.008)	-0.088* (0.053)	0.012 (0.050)
Age of man respondent (years)	-0.002 (0.002)	0.012 (0.012)	-0.014 (0.011)
Age of woman respondent (years)	0.003* (0.002)	-0.020* (0.012)	-0.004 (0.011)
Man respondent has access to extension services (=1)	-0.066** (0.027)	0.281* (0.167)	-0.521*** (0.176)
Woman respondent has access to extension services (=1)	0.052** (0.025)	-0.320* (0.177)	0.095 (0.171)
Man respondent has access to community programs (=1)	0.030 (0.030)	-0.268 (0.188)	-0.322* (0.180)
Woman respondent has access to community programs (=1)	-0.063** (0.028)	0.400* (0.213)	-0.143 (0.199)
Man respondent participated in non-farm activities (=1)	0.058* (0.034)	-0.430* (0.243)	-0.097 (0.230)

Woman respondent participated in non-farm activities (=1)	-0.013 (0.035)	0.183 (0.230)	0.291 (0.221)
Man respondent participated in wage employment (=1)	0.046* (0.025)	-0.372** (0.170)	-0.259 (0.166)
Woman respondent participated in wage employment (=1)	0.038 (0.027)	-0.217 (0.190)	0.071 (0.176)
Man's participation in different nodes of the VC (reference=production)			
Processing	0.032 (0.070)	-0.358 (0.599)	-0.564 (0.550)
Trading	-0.269** (0.126)	1.416** (0.629)	0.049 (0.584)
Woman's participation in different nodes of the VC (reference=production)			
Processing	-0.039 (0.077)	0.352 (0.599)	0.399 (0.551)
Trading	0.181*** (0.053)	-1.517** (0.634)	-0.164 (0.574)
Main VC (reference=seaweed)			
Abaca	-0.051 (0.036)	0.374* (0.222)	0.283 (0.220)
Coconut	0.021 (0.035)	-0.143 (0.243)	-0.008 (0.236)
Swine	-0.045 (0.038)	0.278 (0.237)	0.019 (0.233)
Asset/wealth quintile † (reference=poorest quintile)			
Asset quintile 2	-0.025 (0.039)	0.174 (0.249)	0.097 (0.237)
Asset quintile 3	-0.064 (0.043)	0.466* (0.258)	0.306 (0.249)
Asset quintile 4	-0.043 (0.042)	0.287 (0.264)	0.109 (0.257)
Asset quintile 5 (richest)	-0.027 (0.045)	0.131 (0.283)	-0.133 (0.278)
Constant		-0.491 (0.613)	0.688 (0.587)
Observations (total number of households)	**1134**	**1134**	
Households in which empowerment scores are equal (% of total)	664 (58.6)		
Households in which man is more empowered (% of total)		230 (20.2)	
Households in which woman is more empowered (% of total)			240 (21.2)
Pseudo R-squared	**0.036**	**0.036**	

Source: Malapit et al. (2020)

[a]Gender parity is defined as the woman being equally or more empowered than the main man in the household; estimated using logistic regression.

[b]Estimated using multinomial logit, with base defined as households where woman and man are equally empowered. Marginal effects reported, standard errors in parentheses. (=1) represents dummy variables and coefficients denote the effect of a discrete change in the dummy variable from 0 to 1.

Significant at * $p<0.10$, ** $p<0.05$, ***$p<0.01$. $p<0.01$.

See additional notes to Appendix Table 4.

Benin

Appendix table 6 presents regressions on women's and men's empowerment scores, as a function of individual and household characteristics, including indicators of access to agricultural training, food security and changes in the amount sold in the past 12 months. These regressions are meant to capture associations, not causation, and should be interpreted accordingly.

Women are more likely to be empowered if they are in a woman-only household and if they have higher educational attainment (there is no association between educational attainment and men's empowerment). Receiving training has a positive, albeit only weakly significant, association with the likelihood of the woman's being empowered, as well as the empowerment score of both women and men. A decrease in the quantity sold in the past year is associated with a lower empowerment score for women but a higher empowerment score for men (albeit weakly significant). Surprisingly, having experienced a food shortage in

the past 12 months is associated with a higher empowerment score for women; it is possible that this may be linked to receipt of social protection transfers, an issue that deserves investigation.

Household characteristics also matter: a larger household is associated with a higher score for men, and a lower likelihood that the woman is empowered. This may be because having a larger household may imply a greater burden of reproductive tasks for women (cooking, cleaning) and more drudgery. In future work, we will explore whether this differs depending on the demographic composition of the household. Greater household wealth is associated with empowerment for men; it is only in the top two quintiles that we observe positive associations between wealth and women's empowerment (both the likelihood of being empowered and the empowerment score).

There do not appear to be strong effects of type of crop produced on empowerment scores. There is a weak negative association with producing soya and a strong (albeit small magnitude) association with producing compost, but only for men.

Appendix Table 6
Correlates of women's and men's empowerment, Benin.

	Whether empowered (=1)a		Empowerment score (continuous)b	
	Women	Men	Women	Men
Respondent is in a woman-only household (WOH)	0.068		0.008**	
	(0.052)		(0.004)	
Highest educational level	0.055*	0.024	0.051***	0.012
	(0.030)	(0.042)	(0.012)	(0.013)
Married (=1)	0.026	+	-0.022	0.010
	(0.045)		(0.017)	(0.027)
Age (years)	0.010	-0.010	0.202*	0.008
	(0.007)	(0.015)	(0.116)	(0.108)
Age squared	-0.000	0.000	-0.050	0.018
	(0.000)	(0.000)	(0.057)	(0.052)
Received ATVET4W training? (=1)	0.084*	0.214	0.006*	0.001*
	(0.045)	(0.173)	(0.003)	(0.001)
Quantity sold of main commodity increased from the past year (=1)	0.056	-0.071	0.004	-0.000
	(0.074)	(0.181)	(0.002)	(0.003)
Quantity sold of main commodity decreased from the past year (=1)	-0.012	-0.012	-0.007**	0.006*
	(0.060)	(0.142)	(0.003)	(0.003)
Ever no food in HH b/c no resources in past 12 months?	-0.016	-0.182	0.005**	-0.001
	(0.057)	(0.142)	(0.002)	(0.002)
Household type (reference=Rice)				
Soya	-0.002	-0.130	-0.001	-0.018*
	(0.052)	(0.134)	(0.009)	(0.011)
Compost	0.098	-0.168	0.005	0.005**
	(0.091)	(0.140)	(0.003)	(0.002)
Poultry	-0.017	-0.207	-0.001	-0.009
	(0.062)	(0.128)	(0.006)	(0.006)
Household size	-0.010*	0.009	-0.014	0.035***
	(0.005)	(0.007)	(0.012)	(0.013)
Asset/Wealth Quintile (reference = poorest)				
Quintile 2	-0.047	0.387***	0.004	0.008***
	(0.047)	(0.095)	(0.004)	(0.003)
Quintile 3	-0.015	0.373***	0.004	0.003
	(0.049)	(0.120)	(0.004)	(0.004)
Quintile 4	0.019	0.390***	0.009**	0.009**

	(0.054)	(0.110)	(0.004)	(0.004)
Quintile 5 (Richest)	0.015	0.461***	0.009**	0.012***
	(0.055)	(0.108)	(0.004)	(0.003)
Observations	580	380	804	535
Pseudo R-squared	0.114	0.143	0.016	0.022

Source: Authors' calculations.
[a]Estimated using logit regression.
[b]Estimated using fractional regression. Marginal effects reported, standard errors in parentheses. (=1) represents dummy variables and coefficients denote the effect of a discrete change in the dummy variable from 0 to 1. Asset index was calculated using principal components analysis based on roof material, floor material, number of bedrooms, improved toilet, access to electricity, improved cook fuel source, dwelling in excellent state, and ownership of land, large livestock, fishing equipment, mechanized farm equipment, inventory/stock business, non-agricultural land, mechanized means of transport, shop facility, and storage facility.
Significant at * $p<0.10$, ** $p<0.05$, ***$p<0.01$. $p<0.01$.

None of the covariates have significant associations with the household achieving gender parity (appendix table 7). However, a higher educational attainment of the female respondent is associated with a lower likelihood of the man being more empowered. An increase in the quantity sold in the past year and experiencing a food shortage are both negatively associated with the likelihood that the man is more empowered. Relatively few variables are associated with the likelihood that the woman is more empowered (this may be because this type of household comprises a small proportion of the sample). Interestingly, a woman is more likely to be more empowered than the man, the higher the educational level of the male respondent, and older women are also more likely be more empowered than the man. Being involved in compositing is weakly associated with the woman being less empowered.

Appendix Table 7
Correlates of intrahousehold inequality (dual-headed households), Benin.

	Whether gender parity is achieved (=1) a	*Whether man is more empowered (=1)b*	*Whether woman is more empowered (=1)b*
Highest educational level, male respondent	-0.044	0.042	0.032*
	(0.039)	(0.038)	(0.019)
Highest educational level, female respondent	0.108	-0.227***	0.008
	(0.069)	(0.076)	(0.032)
Married status (=1), male respondent	0.001	-0.022	-0.036
	(0.139)	(0.160)	(0.085)
Married status (=1), female respondent	0.065	-0.040	-0.128*
	(0.151)	(0.148)	(0.074)
Age (years), male respondent	0.005	-0.002	-0.009
	(0.017)	(0.016)	(0.009)
Age (years), female respondent	-0.005	0.006	0.024**
	(0.019)	(0.018)	(0.010)
Age squared, male respondent	-0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
Age squared, female respondent	0.000	-0.000	-0.000**
	(0.000)	(0.000)	(0.000)
Received ATVET4W training (=1)	0.048	0.116	0.062
	(0.089)	(0.080)	(0.051)
Quantity sold of main commodity increased from the past year	0.101	-0.207*	-0.001
	(0.136)	(0.117)	(0.070)
Quantity sold of main commodity decreased from the past year	-0.098	-0.110	-0.026
	(0.126)	(0.104)	(0.070)
Ever no food in HH b/c no resources-12 months	0.122	-0.253**	-0.020
	(0.104)	(0.100)	(0.063)
Commodity household produces (rice is reference)			
Soya	0.120	-0.155**	-0.041
	(0.106)	(0.070)	(0.043)
Compost	0.149	-0.107	-0.121*
	(0.153)	(0.121)	(0.068)

	Women	Men	Women	Men
Poultry	0.048	-0.099	-0.050	
	(0.130)	(0.094)	(0.056)	
Household size	-0.011	0.006	-0.009	
	(0.007)	(0.009)	(0.006)	
Asset/wealth quintile (reference=poorest)				
Quintile 2	0.101	-0.055	-0.002	
	(0.124)	(0.097)	(0.057)	
Quintile 3	0.114	-0.095	0.018	
	(0.125)	(0.097)	(0.056)	
Quintile 4	0.043	-0.105	-0.060	
	(0.102)	(0.097)	(0.056)	
Quintile 5 (Richest)	0.015	-0.019	-0.048	
	(0.109)	(0.099)	(0.054)	
Observations	531	531	531	
Adjusted R-squared				
Pseudo R-squared	0.102	0.121	0.119	
Households in which empowerment scores are equal (% of total)	245 (41.6)			
Households in which man is more empowered (% of total)		282(47.88)		
Households in which woman is more empowered (% of total)			63 (10.53)	

Source: Authors calculations

[a]Gender parity is defined as the woman being equally or more empowered than the main man in the household; estimated using logistic regression.

[b]Estimated using multinomial logit, with base defined as households where woman and man are equally empowered. Marginal effects reported, standard errors in parentheses. (=1) represents dummy variables and coefficients denote the effect of a discrete change in the dummy variable from 0 to 1.

Significant at * $p<0.10$, ** $p<0.05$, ***$p<0.01$. $p<0.01$.

See additional notes to Appendix Table 6.

Malawi

Women in our Malawian sample are more likely to be empowered if they live in a woman-only household and if they are older (appendix table 8). Higher educational levels are empowering for both women and men alike. Interestingly, being married is associated with a lower likelihood of being empowered and a lower empowerment score for men. This may reflect the matrilineal lineage system in four out of the five districts in the sample.

ATVET4W is relatively new, so receiving this training does not seem to be significantly associated with women's empowerment in this early phase of implementation, although having received other agricultural training is associated with greater empowerment for both men and women. Fluctuations in the quantity of the main commodity sold do not appear to be correlated with empowerment of either men or women but having experienced food scarcity is surprisingly associated with greater empowerment for men. Finally, there does not appear to be a wealth gradient with respect to empowerment for both men and women.

Appendix Table 8
Correlates of women's and men's empowerment, Malawi.

	Whether empowered (=1)[a]		Empowerment score (continuous)[b]	
	Women	Men	Women	Men
Respondent is in a woman-only household (WOH)	0.238**		0.005*	
	(0.101)		(0.002)	
Highest educational level	0.110**	0.136***	0.034**	0.062***
	(0.045)	(0.041)	(0.015)	(0.014)
Married (=1)	-0.016	-0.221**	-0.027	-0.052*
	(0.090)	(0.106)	(0.021)	(0.030)
Age (years)	0.041***	0.027**	0.536***	0.092
	(0.014)	(0.013)	(0.120)	(0.114)
Age squared	-0.000***	-0.000**	-0.243***	-0.054
	(0.000)	(0.000)	(0.059)	(0.054)

Ever received ATVET4W (=1)	-0.088	0.007	0.001	0.003
	(0.061)	(0.061)	(0.003)	(0.004)
Received other agricultural training (=1)	0.185***	0.209***	0.016***	0.011**
	(0.050)	(0.053)	(0.004)	(0.004)
Quantity sold of main commodity increased (=1)	-0.018	0.115	0.000	0.001
	(0.090)	(0.073)	(0.002)	(0.003)
Quantity sold of main commodity decreased (=1)	-0.056	0.043	-0.002	-0.004
	(0.081)	(0.066)	(0.004)	(0.004)
Ever no food in HH b/c no resources-12 months	0.036	0.173**	-0.001	0.010**
	(0.072)	(0.082)	(0.005)	(0.005)
Household Main Value Chain				
Mango Producers (=1)	0.041	-0.156	-0.001	-0.009
	(0.160)	(0.144)	(0.007)	(0.006)
Vegetable Producers (=1)	0.036	-0.042	0.003	-0.004
	(0.070)	(0.079)	(0.008)	(0.009)
Household size	-0.020	-0.009	-0.041*	-0.004
	(0.013)	(0.013)	(0.021)	(0.018)
Asset/Wealth Quintile (reference = poorest)				
Quintile 2	-0.045	-0.022	0.000	-0.002
	(0.076)	(0.085)	(0.003)	(0.003)
Quintile 3	0.047	-0.154	0.001	-0.003
	(0.074)	(0.094)	(0.004)	(0.004)
Quintile 4	-0.095	-0.035	-0.001	0.000
	(0.081)	(0.087)	(0.004)	(0.004)
Quintile 5 (Richest)	0.013	0.002	0.003	0.003
	(0.086)	(0.099)	(0.004)	(0.003)
Observations	510	362	542	394
Pseudo R-squared	0.088	0.168	0.016	0.02

Source: Authors' calculations.
[a]Estimated using logit regression.
[b]Estimated using fractional regression. Marginal effects reported, standard errors in parentheses. (=1) represents dummy variables and coefficients denote the effect of a discrete change in the dummy variable from 0 to 1. Asset index was calculated using principal components analysis based on roof material, floor material, number of bedrooms, improved toilet, access to electricity, improved cook fuel source, dwelling in excellent state, and ownership of land, large livestock, fishing equipment, mechanized farm equipment, inventory/stock business, non-agricultural land, mechanized means of transport, shop facility, and storage facility.
Significant at * $p<0.10$, ** $p<0.05$, ***$p<0.01$. $p<0.01$.

Finally, we examine correlates of various intrahousehold inequality measures in appendix table 9. Gender parity is more likely to be achieved in households where the female respondent is married. Women's age is also an important factor that is correlated with gender parity; a household where the female respondent is older is more likely to be one where the woman is more empowered than the man. An increase in the quantity of the commodity sold is associated with a lower likelihood of gender parity, which may signal the possibility of intrahousehold tensions once the marketable surplus increases.

Providing agricultural training – particularly ATVET4W – is associated with the woman being more empowered than the man; provision of other agricultural training also is associated with the man being less empowered. This may occur if training programmes target women, but not men. Food scarcity is associated with the woman being less empowered than the man. Similar to the Benin example, there is no significant association between wealth and any of the intrahousehold inequality measures.

Appendix Table 9
Correlates of intrahousehold inequality (dual-headed households), Malawi.

	Whether gender parity is achieved (=1) a	Whether man is more empowered (=1)b	Whether woman is more empowered (=1)b
Highest educational level, male respondent	0.000	0.023	-0.110***
	(0.041)	(0.037)	(0.031)
Highest educational level, female respondent	0.020	-0.020	0.011
	(0.056)	(0.049)	(0.034)
Married (=1), male respondent	-0.017	2.366	1.151
	(0.024)	(177.769)	(98.465)
Married (=1), female respondent	0.059**	-0.386	0.933
	(0.028)	(35.366)	(95.807)
Age (years), male respondent	0.000	0.016	-0.027**
	(0.000)	(0.020)	(0.014)
Age (years), female respondent	-0.001**	-0.056***	0.033**
	(0.000)	(0.020)	(0.016)
Age squared, male respondent	0.169	-0.000	0.000*
	(0.127)	(0.000)	(0.000)
Age squared, female respondent	0.151*	0.001***	-0.000*
	(0.088)	(0.000)	(0.000)
Ever received ATVET4W (=1)	-0.088	-0.240*	0.180***
	(0.099)	(0.126)	(0.065)
Received other agricultural training (=1)	-0.067	-0.136*	0.016
	(0.087)	(0.078)	(0.051)
Quantity sold of main commodity increased (=1)	-0.219**	-0.014	-0.075
	(0.094)	(0.090)	(0.060)
Quantity sold of main commodity decreased (=1)	0.098	-0.083	0.002
	(0.156)	(0.081)	(0.049)
Ever no food in HH b/c no resources-12 months	0.041	0.079	-0.141**
	(0.089)	(0.079)	(0.055)
Household type (reference=household is a producer of other commodities)			
Household produces mangoes	-0.014	-0.125	0.000
	(0.014)	(0.146)	(0.116)
Household produces vegetables	-0.010	0.003	0.014
	(0.109)	(0.080)	(0.054)
Household size	0.002	0.018	0.004
	(0.098)	(0.013)	(0.008)
Asset/wealth quintile (reference=poorest)			
Quintile 2	-0.086	-0.047	0.021
	(0.103)	(0.089)	(0.055)
Quintile 3	0.039	-0.002	0.067
	(0.104)	(0.086)	(0.057)
Quintile 4	-0.041	0.035	0.053
	(0.100)	(0.085)	(0.057)
Quintile 5 (Richest)	0.121	-0.087	0.023
	(0.099)	(0.093)	(0.062)
Observations	388	393	393
Pseudo R-squared	0.057	0.100	0.100
Households in which empowerment scores are equal (% of total)	210 (53.30)		
Households in which man is more empowered (% of total)		137 (34.77)	
Households in which woman is more empowered (% of total)			47 (11.93)

Source: Authors calculations

aGender parity is defined as the woman being equally or more empowered than the main man in the household; estimated using logistic regression.

bEstimated using multinomial logit, with base defined as households where woman and man are equally empowered. Marginal effects reported, standard errors in parentheses. (=1) represents dummy variables and coefficients denote the effect of a discrete change in the dummy variable from 0 to 1.

Significant at * $p<0.10$, ** $p<0.05$, ***$p<0.01$. $p<0.01$.

See additional notes to Appendix Table 8.

Appendix 2. Summary of Case Studies

	Case 1: Soutenir l'Exploitation Familiale pour Lancer l'Élevage des Volailles et Valoriser l'Économie Rurale (SELEVER)	Case 2: MoreMilk:Making the Most out of Milk, trader intervention	Case 3: Value Chain Development Programme (VCDP)
Location	Burkina Faso (eastern)	Peri-urban Nairobi, Kenya	Nigeria (Anambra, Benue, Ebonyi, Niger, Ogun, and Taraba states)
Implementation partners	Tanager, ASI	ILRI, Kenya Dairy Board	IFAD and the Federal Government of Nigeria
Research partners	IFPRI,	ILRI, IFPRI, International Institute for Environment and Development	IFPRI
Primary goal	Use poultry value chains to improve the health and nutritional status of women and children	Enhance milk safety and child nutrition by training milk retailers in the informal sector	Enhance productivity, promote agro-processing, and integrate activities across production, processing, and marketing nodes of the rice and cassava value chains
Intervention	Vaccines, financing, and training on poultry flock management Behavior change communication component to promote demand for poultry products and mitigate negative consequences of poultry on hygiene Gender sensitization activities at the community level	Training milk retailers to increase hygienic milk handling practices, and thus the safety of milk Training milk retailers in best business practices to decrease retailer turnover and enhance the sustainability of the intervention	Agricultural Marketing Development component, which includes infrastructure development, business management capacity, promoting adoption of improved processing practices, creating linkages to financial service providers, quality control and standardization systems, and market information systems. Smallholder Productivity Enhancement component, which includes management training, production extension services, dissemination of improved seeds and planting materials, establishing youth-run seed enterprises, providing matching grants to acquire inputs and machinery, and developing arable land under irrigation scheme
Gender-sensitive program components	Focusing on an income generating activity where (poultry production) where women are active Delivering community-level gender sensitization Training women as service delivery providers	Selecting a node of the value chain where women are approximately half of traders Including business development training to mitigate women's tenure in the sector Conducted formative research to identify barriers to women's business success to attempt to address them in the training curriculum	Facilitating women's access to assets Strengthening governance of women's groups that are linked to the value chains Easing women's workloads by increasing their access to mechanization and labour
Key citations	Eissler et al, 2020a Eissler et al, 2020b Gelli et al, 2017 Gelli et al, 2019 Leight et al, 2020	Galiè et al, 2020 Alonso et al. 2018	Eissler, 2020

List of papers in this series