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Empowerment in Agricultural Value Chains

Mixed Methods Evidence from the Philippines

Hazel Malapit

Catherine Ragasa

Elena M. Martinez

Deborah Rubin

Greg Seymour

Agnes Quisumbing

Poverty, Health, and Nutrition Division

Development Strategy and Governance Division

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

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AUTHORS

Hazel Malapit (h.malapit@cgiar.org) is a senior research coordinator in the Poverty, Health, and Nutrition Division of the International Food Policy Research Institute (IFPRI), Washington, DC.

Catherine Ragasa (c.ragasa@cgiar.org) is a senior research fellow in the Development Strategy and Governance Division of IFPRI, Washington, DC.

Elena M. Martinez (elena.martinez@tufts.edu) is a doctoral student at the Friedman School of Nutrition Science and Policy at Tufts University, and was a senior research analyst at the CGIAR Research Program on Agriculture for Nutrition and Health led by IFPRI when this work was written.

Deborah Rubin (drubin@culturalpractice.com) is Co-Director at Cultural Practice, LLC, Bethesda, MD.

Greg Seymour (g.seymour@cgiar.org) is a research fellow in the Environment and Production Technology Division of IFPRI, Washington, DC.

Agnes Quisumbing (a.quisumbing@cgiar.org) is a senior research fellow in the Poverty, Health, and Nutrition Division of IFPRI, Washington, DC.

Empowerment in agricultural value chains: Mixed methods evidence from the Philippines

Hazel Malapit[1] (h.malapit@cgiar.org), Catherine Ragasa[1] (c.ragasa@cgiar.org), Elena M. Martinez[2] (elena.martinez@tufts.edu) [2], Deborah Rubin[3] (drubin@culturalpractice.com), Greg Seymour[1] (g.seymour@cgiar.org), and Agnes Quisumbing[1] (a.quisumbing@cgiar.org)

[1] International Food Policy Research Institute, Washington, DC
[2] Tufts University, Medford, MA
[3] Cultural Practice, LLC, Bethesda, MD

Corresponding author: Hazel Malapit (h.malapit@cgiar.org)
Postal address: International Food Policy Research Institute
1201 Eye Street, NW, Washington, DC
20005-3915 USA

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Abstract

Women's participation and empowerment in value chains are goals that concern many development organizations, but there has been limited systematic, rigorous research to track these goals between and within value chains (VCs). We use the survey-based project-level Women's Empowerment in Agriculture Index (pro-WEAI) to measure women's and men's empowerment in the abaca, coconut, seaweed, and swine VCs in the Philippines. Results show that most women and men in all four VCs are disempowered, but unlike in many other countries, Filipino women in this sample are generally as empowered as men. Pro-WEAI results suggest that respect within the household and attitudes about gender-based violence (GBV) 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. Across all four VCs, access to community programs is associated with higher women's empowerment, and access to extension services and education are associated with higher men's empowerment. Our results show that, despite the egalitarian gender norms in the Philippines, persistent gender stereotypes influence men's and women's empowerment and VC participation.

Keywords: gender, value chains, agricultural markets, livelihoods, women's empowerment

1. Introduction

Over the last three decades, agricultural value chain (VC)[1] development and interventions have proliferated as instruments for rural transformation and poverty reduction. However, achieving development outcomes while making VCs pro-poor, inclusive, and empowering to women and disadvantaged groups is challenging (Dolan and Humphrey 2000; Barrientos, Dolan, and Tallontire 2003; Minten, Randrianarison, and Swinnen 2009; Maertens, Colen, and Swinnen 2011; Dedehouanou, Swinnen, and Maertens 2013; Schuster and Maertens 2013; Reardon et al. 2015). Tools and methods to analyze economic dimensions, particularly efficiency and profitability of VCs have been the focus of VC analysis for decades. Only recently have equity and distributional impacts been included in the VC analysis. An increasing number of studies are explicitly incorporating gender issues in value chain analysis (Getahun and Villanger 2018; Said-Allsopp and Tallontire 2015; Van den Broeck, Van Hoyweghen, and Maertens 2018; Barrientos, Dolan, and Tallontire 2003) and the methodological 'toolbox' for gendered value chain analysis is expanding (Riisgaard et al. 2008, 2010; Rubin, Manfre, and Nichols Barrett 2009; Mayoux and Mackie 2009; Mayoux 2012; Senders et al. 2014). The early work on gender in VCs uncovered important insights into the unintended consequences of VC participation. Much of this work consisted of narrative and qualitative case studies and rapid assessments, rather than statistical inference and quantitative impact evaluation.

Embedded within broader social and economic institutions, VCs are not gender neutral. Several studies illustrate the contributions as well as limitations of VCs to reach and benefit women, and highlight that VCs can also play a role in exacerbating gender inequalities (Dolan and Humphrey 2000; Dolan 2001; Kidder and Raworth 2004; Raworth and Kidder 2009; Bain 2010). In global agricultural VCs, the increasing use of standards and codes of conduct can help protect poor and marginalized VC employees and actors (Said-Allsopp and Tallontire 2015). However, employment in global agricultural VCs is mostly informal, particularly for women (Barrientos, Dolan, and Tallontire 2003; Shackleton et al. 2011).

Nevertheless, VCs can be a lever for gender equality and women's empowerment, stemming from greater entrepreneurship and employment opportunities (Maertens and Verhofstadt 2013; Arnold 2008; Barrientos, Dolan, and Tallontire 2003; Said-Allsopp and Tallontire 2015; Getahun and Villanger 2018; Van den Broeck, Van Hoyweghen, and Maertens 2018). Recent studies on the horticulture boom in Kenya, Ethiopia, Senegal, Chile, Thailand, Vietnam and several other countries in Africa, Latin America and Asia find positive impacts on rural employment, especially women's employment, which contributes to poverty reduction (Maertens and Swinnen 2009, 2012; M. Maertens, Colen, and Swinnen 2011). Further, Maertens and Verhofstadt (2013) show that women's wage employment in the horticultural export sector improved child outcomes, especially primary school enrollment of boys and girls.

Gendered responsibilities and time burdens may change with greater commercialization and can also impact domestic care, food production, or food security (Lyon, Mutersbaugh, and Worthen 2017; Forsythe, Martin, and Posthumus 2015; Filipski et al. 2017; Arndt, Benfica, and Thurlow 2011; Shackleton et al. 2011). A large body of evidence shows that women have limited access to resources and information, weaker control over assets and land, less ability to demand fair prices, and greater workload compared to men, which constrain their capacity to engage and expand into higher value agri-entreprises that often require a minimum amount of resources and training (Meinzen-Dick et al. 2011; Quisumbing et al. 2015; Handschuch and Wollni 2015; Forsythe, Posthumus and Martin 2016). An

[1] A value chain is the sequence of interlinked agents and markets that transforms inputs and services into products with attributes for which consumers are prepared to pay. VC development often involves subsidies or competitive grants, capacity or skills development, inputs or information provision, policy or institutional innovations, and other types of support aimed at different actors or aspects of the enabling environment.

emerging literature also shows that as commercialization intensifies and a commodity gains higher value, women start losing control over its production and marketing and men start taking charge (Ashby et al. 2019; Forsythe, Posthumus, and Martin 2016). These studies highlight the need to assess not only patterns of participation of women and men in VCs but also in which VCs and at what stage they participate, how they benefit from participation, and how it impacts workload and empowerment.

Empirical studies, both quantitative and qualitative, across different VCs show mixed results and various trade-offs in women's participation, empowerment, wellbeing, and development outcomes, making it difficult to generalize and identify patterns. Schumacher (2014) further notes that gendered VC research tends to focus exclusively on women and on producers and laborers, with rare mention or analysis of men or of intermediary actors of the VC (e.g., processors, traders). This paper aims to fill these gaps by using an index-based measure of empowerment, and its dimensions, to analyze and compare women's and men's empowerment along multiple stages of the VC—production, processing, and trading/marketing—in four Philippine VCs.

This paper adapts the survey-based project-level Women's Empowerment in Agricultural Index (pro-WEAI) to quantify and compare women's and men's empowerment in four agricultural VCs in the Philippines (Malapit et al., 2019). In this paper, empowerment is defined as the process by which people expand their ability to make strategic life choices, particularly in contexts in which this ability had been denied to them (Kabeer 1999). The ability to exercise choice encompasses three dimensions: resources, agency, and achievements. Many studies have attempted to collect and operationalize these concepts; some focus on one or limited dimensions while others are more comprehensive. In VCs, an increasing number of studies attempt to operationalize this concept using narrative and qualitative approaches (Shackleton et al. 2011; Said-Allsopp and Tallontire 2015; Forsythe, Martin, and Posthumus 2015; Akter et al. 2017). This paper is the first to our knowledge to measure, quantify, and compare women's and men's empowerment within and across different agricultural VCs using both quantitative and qualitative methods. Using the quantitative and qualitative pro-WEAI data, this paper addresses the following questions:

- How empowered are women and men participants in four agricultural value chains?
- What gender-based constraints do women and men face within each VC?
- What factors are associated with disempowerment of women and men in these VCs?
- Are some VCs and higher nodes of the VCs more empowering than others?

This paper is structured as follows. Section 2 presents the Philippine context, the focus VCs, data sources, and methods. Section 3 presents the results, organized by respondents' characteristics, level and sources of (dis)empowerment, and correlates of empowerment of women and men. Section 4 discusses the implications of these results. Section 5 concludes with some key messages and areas for future research.

2. Context, data, and methods

2.1. Context and study sites

The Philippines is one of the fastest growing economies in Southeast Asia, growing by 6.8 percent in 2016, driven by robust domestic demand, increased consumer confidence, a healthy job market, and effective social protection programs (World Bank 2017). Despite this positive economic outlook, the agriculture sector continues to underperform, with production contracting by 1.3 percent and shedding 0.5 million jobs in 2016 (World Bank 2017). Severe typhoons have further weakened an agricultural sector besieged by poor infrastructure, land-tenure issues, and other structural constraints that limit productivity. However, agriculture remains central to achieving inclusive and sustainable growth in the country. In

2015, the agriculture sector employed 11.3 million people (30 percent of total employment), of which a quarter were women (Philippine Statistics Authority 2016).

This study focuses on abaca, coconut, seaweed, and swine VCs—all commodities with high potential for growth and interventions from government and partners.[2] The study data were collected in March–August 2017 using a purposive sampling design focusing on top-producing provinces and villages and ensuring sufficient respondents for each VC and node.[3] Information on these four VCs was collected in six provinces in the Bicol and Visayas regions of the Philippines. These regions are major producers of abaca, supplying an average of 39 and 24 percent, respectively, of domestic abaca production between 2009 and 2013 (Department of Agriculture 2013a). Coconut, swine, and seaweed are produced across the country and are major activities in Bicol and Visayas. Data on each VC was collected in two provinces, selected based on presence of production and processing activities. Abaca and coconut data were collected in the provinces of Sorsogon and Leyte. During the field work, additional survey areas in Albay and Southern Leyte were added due to difficulties in locating abaca VC participants in Sorsogon and Leyte. Seaweed and swine data were collected in Bohol and Cebu (Figure 1).

Abaca, known internationally as "Manila hemp," is an indigenous plant that is grown primarily for its fiber. About three quarters of abaca production goes to the domestic market for cordage and handicrafts, while abaca pulp, used for specialty papers, tea bags, and other products, is exported. The shift away from synthetics and towards natural fibers helped boost global demand (Briones 2014); and the Philippines is the leading producer of abaca fiber, supplying 87 percent of global output (Philippine Statistics Authority 2016).

Coconut products, in various forms, are major exports of the Philippines. Over a quarter of agricultural land was devoted to coconut farming in 2015, covering 3.5 million hectares and producing 15 billion coconuts per year on average (Philippine Statistics Authority 2016).

Seaweed is another major agricultural export. The Philippines is the third largest producer of farmed seaweed globally, mainly producing *Eucheuma cottonii*, which can be processed to extract carrageenan (Department of Agriculture 2013b). An estimated 200,000 coastal families, comprising 1.2 million people, are involved in seaweed production nationwide (Department of Agriculture 2013b).

The swine industry is one of the most important segments of Philippine agriculture. It is the second largest revenue earner, valued at 207 billion pesos in 2015 (Philippine Statistics Authority 2016). Pork is the main meat consumed in the Philippines, with per capita consumption of 15 kilograms per year compared with 8 kilograms of chicken and 0.9 kilograms of beef (Department of Agriculture 2014). In 2013, around 65 percent of the swine population were being raised in backyard farms and only 35 percent were produced on commercial farms (Department of Agriculture 2014). Although backyard hog-raising has been declining due to rising input costs, many still view it as a way to save money and build assets (Perey 2017; Department of Agriculture 2014).

The target sample size for each province-commodity was 200 households, totaling 400 households per commodity and 1,600 households for the entire survey (Figure 2). The actual sample households surveyed were 1624 (see Table 3 for their characteristics); and the actual individuals interviewed were 2,811 (see

[2] The selection of commodities, provinces, and regions for data collection was informed by consultations with the Philippine government.

[3] The purposive non-random selection of households could result in sample bias. Selected households were better connected to barangay leaders and located in relatively accessible areas of the barangay, so women in these households may be more empowered than women elsewhere. This suggests that our results should be interpreted as the higher bound of the empowerment distribution in the population.

Table 2 for their characteristics).[4] These households were distributed into 10 barangays in each of the two provinces for each commodity. The selected barangays have the highest commodity production volume and/or land area in the province, according to the 2012 Census of Agriculture and Fisheries (Philippine Statistical Authority 2016). We used this sampling criterion since high production areas are also more likely to also have households engaged in other VC activities.

In each barangay, approximately 20 households were surveyed. Producers were selected based on a listing of producers compiled with the assistance of barangay leaders rather than through random sampling. The purposive sampling design was used to ensure that the sample represented various VC roles, including production, processing, and trading or marketing.[5] A screening questionnaire was used to identify households that represent these three activities, as well as households with an adult woman and man (dual-adult households [DHH]) and households with only an adult woman (no adult man) (woman-only households [WOH]). All households sampled included at least one adult involved in one of the target VCs.

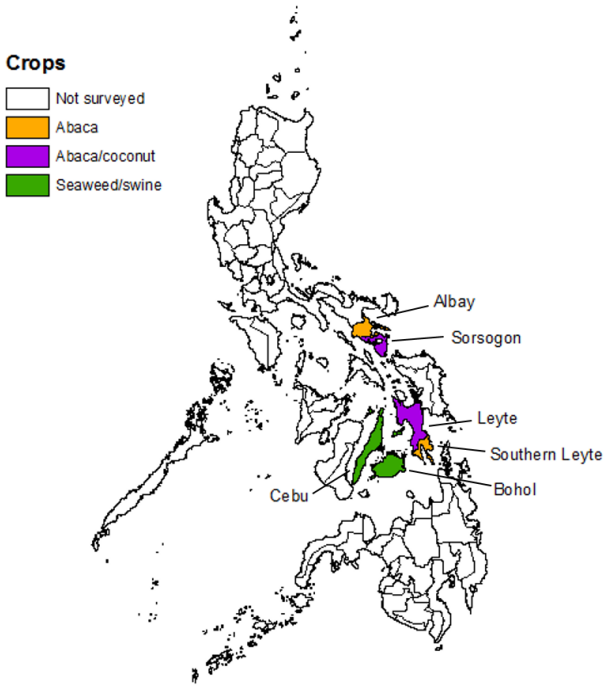
In 2012, 16 percent of farm holders and operators were women (Philippine Statistical Authority 2016). Women made up 25 percent of the agricultural workforce, and 17 percent of employed women worked in agriculture. Both women and men are involved in different stages of agricultural VCs, although specialized gender roles in agriculture are prominent in the Philippines, as in broader Southeast Asia (Akter et al. 2017). Wage discrimination is pervasive and persistent in the agricultural labor market in the Philippines. For example, Valientes (2015) shows that men wage workers in agriculture were paid 13 to 18 percent more, on average, than women between 2006 and 2009, and 74 percent of this gap was due to a gender gap rather than human capital differences. Other studies show that the relative wage of women is 6 to 8 percent lower across all activities for all farms (rice, corn, coconut, sugarcane) (PIDS 2019). Women's employment in these VCs is as low as six percent in coconut production and immediate postharvest activities and as high as 18 to 19 percent for rice and corn; men dominate as workers in these VCs (Philippine Statistical Authority 2016). Overall, while Filipino culture is relatively egalitarian and exhibits greater gender equality compared to other neighboring countries and globally,[6] gendered stereotypes persist and affect women's and men's participation and roles in VCs.

[4] Regression results in Tables 5-8 have slightly fewer number of observations due to some missing values in some of the variables. In Table 6, number of observations under autonomy in wage work and in work conditions are much less and are restricted to those individuals who reported and participated in wage work.

[5] VC activities were defined as: **Production** – Respondents who work in production activities from farming to harvesting, including feeding and care of swine before consumption or sale. **Processing** – Respondents who process raw materials at home or through processing or agribusiness, including animal slaughter and simple to complex processing. **Trading and marketing** – Input sellers, traders, wholesalers, retailers, and employees working in businesses that conduct these activities. Respondents who were involved in multiple VCs and/or activities were categorized by the VC/activity that was their primary source of income.

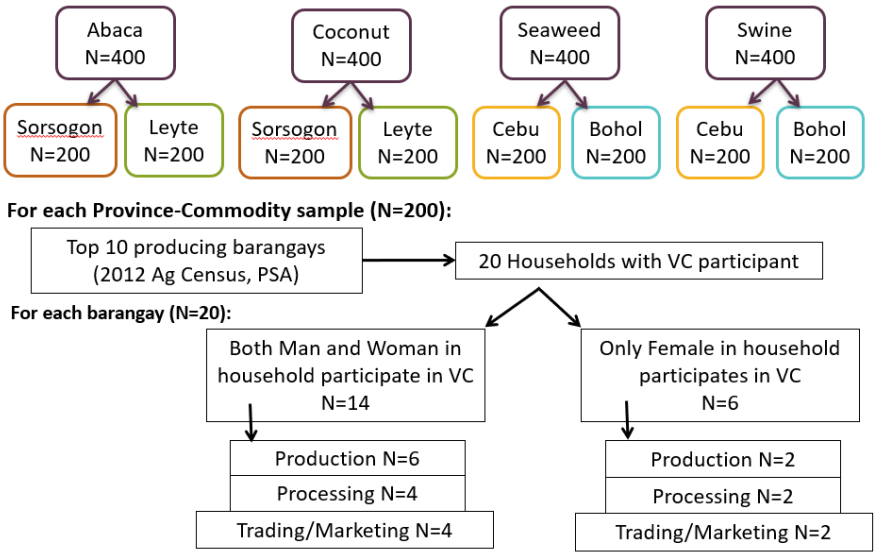
[6] Out of 144 countries, the Philippines ranks 10th in the Global Gender Gap score (World Economic Forum [WEF], 2017), with high rankings in educational attainment (1st), political empowerment (13th), and economic participation and opportunity (25th).

Figure 1. Map of provinces and value chains surveyed



Source: IFPRI survey (2017)

Figure 2. Survey design



Source: Authors' illustration. N=number of observations; VC=value chain, PSA=Philippine Statistics Authority

2.2. Quantitative methodology

We use an adapted form of pro-WEAI, a survey-based tool to measure women's and men's empowerment and inclusion in agricultural development projects (Malapit et al. 2019). Unlike other empowerment measures (e.g., based on Demographic and Health Surveys) which do not typically cover both men and women, pro-WEAI allows for direct comparison between women and men in the same household. The index is comprised of two sub-indices: (1) the Three Domains of Empowerment index (3DE) and the Gender Parity Index (GPI). The 3DE aggregates women's and men's achievements across 12 equally-weighted indicators that measure three types of agency: intrinsic, instrumental, and collective. Indicators of intrinsic agency include autonomy in income, attitudes about gender-based violence (GBV), and respect among household members; indicators of instrumental agency include input in productive decisions, ownership of land and other assets, control over use of income, access to and decisions on financial services, and work balance; indicators of collective agency include group membership and membership in influential groups. Two pro-WEAI indicators—self-efficacy (intrinsic agency) and visiting important locations (instrumental agency)—were excluded from our survey. When this survey was designed, self-efficacy was not a required indicator for pro-WEAI and was excluded to minimize costs. Visiting important locations was excluded because mobility was not prioritized by our local partners given that women have more freedom of movement in the Philippines compared to other Asian contexts where pro-WEAI has been collected. Table 1 provides the definitions and adequacy cut-offs for each indicator. The GPI compares the achievements of women and men in the same household (for dual-adult households only). To capture empowerment across VCs, we included additional questions about the empowerment and inclusion of women and men in multiple nodes of the VC.

Table 1. Pro-WEAI indicators and definitions of adequacy cut-off

Indicator	Definition of adequacy cut-off
	Intrinsic Agency Domain
Autonomy in income	More motivated by own values than by coercion or fear of others' disapproval: *Relative Autonomy Index* (RAI) score >=1, where RAI score is calculated by summing responses to the three vignettes (yes=1; no=0), using the following weighting scheme: -2 for vignette 2 (external motivation), -1 for vignette 3 (introjected motivation), and +3 for vignette 4 (autonomous motivation)
Self-efficacy*	"Agree" or greater on average with self-efficacy questions: *New General Self-Efficacy Scale* score >=32
Attitudes about gender-based violence against women	Believes husband is NOT justified in hitting or beating his wife in all 5 scenarios
Respect among household members	Meets all of the following conditions related to another household member: 1) Respondent respects relation (MOST of the time) AND 2) Relation respects respondent (MOST of the time) AND 3) Respondent trusts relation (MOST of the time) AND 4) Respondent is comfortable disagreeing with relation (MOST of the time)
	Instrumental Agency Domain
Input in productive decisions	Meets one or more of the following conditions for ALL of the agricultural activities they participate in 1) Makes related decision solely, 2) Makes the decision jointly and has at least some input into the decisions 3) Feels could make decision if wanted to (to at least a MEDIUM extent)
Ownership of land and other assets	Owns, either solely or jointly, one or more of the following: 1) At least THREE small assets (poultry, nonmechanized equipment, or small consumer durables) 2) At least TWO large assets 3) Land
Access to and decisions on financial services	Meets one or more of the following conditions: 1) Belongs to a household that used a source of credit in the past year AND participated in at least ONE sole or joint decision about it 2) Belongs to a household that did not use credit in the past year but could have if wanted to from at least ONE source 3) Has access, solely or jointly, to a financial account
Control over use of income	Has input in decisions related to how to use BOTH income and output from ALL of the agricultural activities they participate in (unless no sale was made) AND has input in decisions related to income from ALL non-agricultural activities they participate in (unless no decision was made)
Work balance	Works less than 10.5 hours per day: Workload = time spent in primary activity + (1/2) time spent in childcare as a secondary activity
	Collective Agency Domain
Visiting important locations*	Meets one or more of the following conditions: 1) Visits at least TWO locations at least ONCE PER WEEK of [city, market, family/relative], or 2) Visits least ONE location at least ONCE PER MONTH of [health facility, public meeting]
Group membership	Active member of at least ONE group
Membership in influential groups	Active member of at least ONE group that can influence the community to at least a MEDIUM extent

Source: Malapit et al. (2019). The Philippines survey excluded self-efficacy and visiting important locations because they were not considered relevant in this context. The remaining 10 indicators were weighted 1/10 each.

We use regression analysis to examine the factors correlated with different empowerment outcomes of individuals *i* (*Empowerment*), and intrahousehold inequality outcomes of the household *j* (*Inequality*) (for dual-adult households, DHHs, only) presented as

Individual: $Empowerment_i = \beta'_{ind}\boldsymbol{X}_i + \varepsilon_i$ (1)

Household: $Inequality_j = \beta'_{hh}\boldsymbol{Z}_j + \varepsilon_j$ (2)

Where $\boldsymbol{X}_i$ are individual- and household-level factors explaining *Empowerment* (details in Annex Table 1); $\boldsymbol{Z}_j$ are household-level factors explaining *Inequality* (details in Annex Table 2); β'_{ind} and β'_{hh} are coefficients to be estimated; and $\varepsilon_i$and ε_j are error terms.

Seven measures of individual empowerment outcomes (*Empowerment*) are modeled: (1) whether the individual is empowered or not (a binary variable, 0/1); (2) empowerment score based on 3DE (continuous variable, from 0 to 1); and additional indicators that focus on empowerment within VCs. These include (1) autonomy in in wage work, measured in terms of Relative Autonomy Index for the type of wage work the individual does (count variable, range=[1,7]); (2) autonomy in work conditions, measured in terms of Relative Autonomy Index for working conditions (count variable, range=[1,7]); (3) attitudes about GBV perpetrated by the employer or landlord, measured by the number of situations in which respondent says it is not acceptable for an employer/landlord to hit a woman employee/tenant (count variable, range=[1,4]; (4) input in decisions about the main VC (binary variable, 0/1), and (5) control over the use of output and income from the main VC (binary variable, 0/1). Regressions are estimated for a pooled sample containing both men's and women's observations and separately for women and men.

The outcomes are regressed on the following variables ($\boldsymbol{X}_i$): whether the respondent is a man (in the pooled regression), whether the woman lives in a household with both a man and woman (dual-adult household, DHH), or household with only a woman present (woman-only household, WOH; in the women's regression), the household's asset quintile, whether married, age in years, education level, and a set of dummy variables that capture access to extension, access to community programs, participation in nonfarm activities, participation in wage and salary employment, the main activity in the VC, and the main VC of the respondent. The coefficient on the "man respondent" dummy variable indicates whether there are significant differences in empowerment associated with being a man or a woman, whereas the woman-only household dummy captures whether empowerment may differ for women depending on whether they live in a dual-adult household (with an adult woman and man present) or one with only a woman adult present. Municipality (town) or province fixed effects were also used in some of the models to control for location-related factors; and the results are largely robust to the inclusion of location-specific variables. Annex Table 1 presents the definitions and descriptive statistics of these individual-level outcomes and explanatory variables at the individual level, and Annex Table 2 for the household-level explanatory variables.

We use two measures of intrahousehold inequality at the household level: (1) whether a dual-adult household (DHH) achieved gender parity, defined as whether the woman respondent has equal or higher empowerment score than the man respondent (a binary variable, 0/1); and (2) intrahousehold inequality score (the difference between men's and women's empowerment scores; a continuous variable, from -1 to 1).

The outcomes are regressed on the following variables ($\boldsymbol{Z}_j$): the household's asset quintile, age and education of the woman and man respondents, and a set of dummy variables that capture access to extension, access to community programs, participation in nonfarm activities, participation in wage and salary employment, the main activity in the VC, and the main VC of the man and woman respondents

within the household. Annex Table 2 presents the definitions and descriptive statistics of these household-level outcomes and explanatory variables.

Regressions on whether the individual is empowered are estimated using logistic regression (Models 1-3 in Table 5) and the regressions on empowerment scores (Models 4-6) using fractional regression. Both are common statistical methods to identify significant factors associated with a binary response (0/1) and fractional response (0-1), respectively. Table 6 examines the correlates of the additional VC outcomes related to autonomy in wage work and work conditions, and attitudes about GBV perpetrated by the employer or landlord, all of which are count data and are therefore estimated using Poisson regression. Table 7 shows input in decisions and control over the use of outputs and income, which are all binary variables estimated using logistic regression. Table 8 presents the regressions on the correlates of (1) whether a dual-adult household (DHH) achieved intrahousehold equality estimated using logistic regression (Model 1); and (2) which category a DHH belongs to (whether man is more empowered than woman, whether woman is more empowered than man, or whether man and woman achieve similar levels of empowerment) using multinomial logit (Model 2).

2.3. Qualitative methodology

The survey design was informed by initial qualitative interviews, including probing about empowerment and gender norms, and a series of pretests of the survey instruments. After the survey (September-December 2017), another set of qualitative interviews was conducted to help explain and provide insights to some of the key results and patterns emerging from the pro-WEAI scores. The second round of qualitative work drew from the pro-WEAI qualitative protocols[7] in combination with gender and agricultural VC approaches (Rubin, Manfre, and Nichols Barret 2009) to address specific concerns related to participation and benefits at different nodes of the coconut and seaweed VCs.[8] The qualitative study sample included 16 respondents who had participated in the quantitative surveys and reflected a diversity of occupations, locations, genders, and ages. Additional respondents were identified when it was not possible to find a sufficient number of people who had participated in the quantitative survey in the chosen locations. The sample also included 24 government officials, traders, larger processors, and other key informants who could provide insights and information about the participation of women and gendered roles and activities in the VCs. The quantitative survey data were used to identify four interviewees who were categorized as "disempowered," including a man and a woman seaweed producer and a man and a woman coconut processor. Interviews were recorded and supplemented by written notes. Verbatim transcripts were created in the local language and coded using English language codes using Dedoose™ software. Excerpts that demonstrated relevance of the key research themes on local concepts of empowerment, participation in the different VCs, barriers to entry, patterns of decision-making, and perspectives on opportunities for the next generation, among others, were translated into English.

[7] For more on pro-WEAI and other adaptations of the WEAI methodology since its launch in 2012, see Malapit et al. (2019) and Meinzen-Dick et al. (2019).)

[8] The qualitative interviews were carried out only among coconut and seaweed VC actors due to resource constraints.

3. Results

In this paper, we present and analyze the results of the adapted pro-WEAI survey from the Philippines, including calculations of 3DE, GPI and pro-WEAI score by VC, VC activity, and household type. Then, using individual-level measures of empowerment, we identify statistically significant sources and drivers of empowerment using regression analysis. We integrate insights from the qualitative work into the discussion of results.

3.1. Descriptive analysis

Characteristics of respondents

Most respondents did not have education beyond primary school (Table 2). Educational attainment was lowest among seaweed VC respondents; about half of men and a third of women did not graduate from primary school. Most respondents in DHHs were currently married. While most respondents in woman-only households (WOH) were unmarried, some women respondents reported being married but did not live with an adult man. Swine and coconut VC participants were generally more educated than seaweed and abaca participants. In the swine VCs, most respondents were self-employed with no paid employees; in the abaca, coconut, and swine VCs, most respondents were either self-employed or employers in a family business or farm. The average age of respondents was 47 to 59; swine and seaweed VC participants were younger on average than abaca and coconut VC participants.

Although the respondents in the coconut and seaweed VCs were not highly educated, they viewed education for their children, both boys and girls, as important. Coconut VC actors strongly supported education for their daughters and expected they could obtain government jobs. A woman coconut farmer noted, "*I want my [girl] to really take up education... because she'll just stay there in the community and also it's a stable job once you get in. That's what I saw when it comes to teaching."* While respondents generally believed that boys should also continue through high school to get "better jobs," a man seaweed farmer stated a common belief that boys can still earn money by farming or working on boats, jobs that do not require a high school diploma. "*Yes, [education is] important for the future. If one can finish school, they can look for a good job unlike here those who don't have education end up as bystanders or fishermen. It's better to attain higher education."*

Seaweed VC households were the wealthiest on average, while abaca and coconut VC households were the poorest (Table 3). Nearly all households had received monetary assistance from government and NGO projects in the last 12 months, but not training or capacity development; most abaca, coconut, and swine households also received in-kind assistance such as school scholarships and agricultural inputs. Most households owned land, and over half of abaca and seaweed households had experienced a serious shock in the last 12 months.

Table 2. Individual characteristics of respondents by gender, VC, and household type

	Abaca			Coconut			Seaweed			Swine		
	DHH		WOH	DHH		WOH	DHH		WOH	DHH		WOH
	Men	Women		Men	Women		Men	Women		Men	Women	
Number of respondents	323	338	78	307	318	88	282	303	95	279	315	85
VC activity (%)												
Production	57	53	47	51	47	50	48	45	55	58	58	66
Processing	34	35	42	36	33	34	30	31	34	16	15	8
Trading/marketing	9	9	10	13	15	16	22	23	12	26	27	25
Not engaged in VC activities	0	3	0	0	5	0	0	0	0	0	1	1
Mean age of respondent (years)	49	47	56	54	51	59	48	47	48	48	47	49
Education (%)												
No school or some primary	44	28	41	26	17	27	49	31	38	27	18	20
Primary school graduate	40	49	42	43	50	36	30	39	30	32	38	28
Secondary school graduate	13	18	13	23	26	27	17	25	26	29	35	38
Technical/vocational graduate	1	0	1	1	1	0	0	1	2	4	1	4
Tertiary school graduate	1	4	1	5	5	7	4	4	4	7	7	11
Missing	0	1	1	1	1	2	0	0	0	1	2	0
Marital status (%)												
Married	86	87	15	81	81	24	91	91	21	87	88	39
Cohabitating	13	12	4	14	14	2	8	8	11	9	9	11
Widow	0	0	64	1	2	65	0	1	47	0	1	33
Annulled/separated	0	0	3	0	0	3	0	0	6	0	0	8
Single/never married	1	1	13	3	2	3	1	0	15	3	1	9
Missing	0	0	1	1	1	2	0	0	0	1	2	0
Main job or activity (%)												
Wage and salary work	7	11	5	13	11	5	3	3	5	28	14	12
Self-employment (no paid employees)	52	45	56	38	44	48	67	48	66	63	77	80
Employer in family operated farm/business	38	24	37	47	37	46	28	28	28	7	4	8
Unpaid family worker	1	16	0	0	3	1	2	22	0	2	3	0
Missing	1	5	1	2	4	1	0	0	0	1	2	0

Source: IFPRI survey (2017). Note: DHH: Dual-adult household (household with an adult man and woman); WOH: household with adult woman only

Table 3. Characteristics of respondents' households by VC and household type

	Abaca		Coconut		Seaweed		Swine	
	DHH	WOH	DHH	WOH	DHH	WOH	DHH	WOH
Number of households	338	78	320	88	304	95	316	85
Mean household size	5	4	5	3	5	4	5	4
Province (%)								
Albay	36	51	0	0	0	0	0	0
Sorsogon	16	5	54	38	0	0	0	0
Bohol	0	0	0	0	50	48	48	58
Cebu	0	0	0	0	50	52	53	42
Leyte	49	44	46	61	0	0	0	0
Missing	0	0	0	1	0	0	0	0
Asset index (%)								
Quintile 1 (poorest)	29	31	29	24	7	11	14	12
Quintile 2	31	17	23	16	12	11	19	9
Quintile 3	14	15	15	21	22	33	26	20
Quintile 4	14	21	17	13	22	23	24	31
Quintile 5 (richest)	12	17	13	24	36	23	16	27
Missing	0	0	3	3	1	0	1	1
Experienced a serious shock in last 12 months (%)	51	55	46	38	59	57	25	20
Received monetary assistance in last 12 months (%)	100	100	99	100	100	100	100	100
Received in-kind assistance in last 12 months (%)	58	54	74	71	20	27	84	86
Received training or capacity development in last 12 months (%)	30	19	22	8	42	33	23	18
Owns land (%)	72	76	78	75	72	71	65	69

Source: IFPRI survey (2017). Note: DHH: Dual-adult household (household with an adult man and woman); WOH: woman-only household. 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.

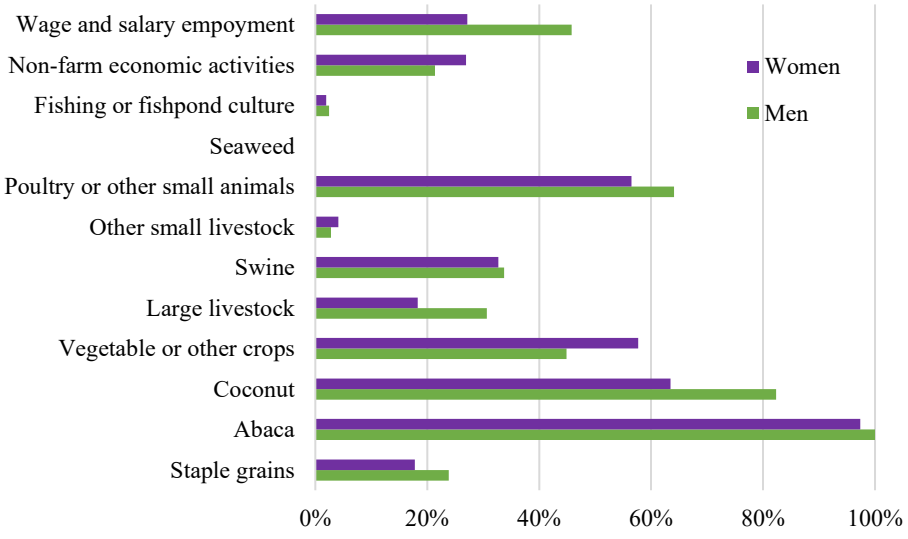
Diversified livelihoods

Nearly all respondents (96%) participated in more than one livelihood activity. On average, respondents participated in four of twelve livelihood activity groups (10 agricultural and 2 non-agricultural). Engagement in non-agricultural economic activities was common (24% of abaca, 34% of coconut, 36% of seaweed and swine respondents). Across all VCs, most respondents produced vegetables and other crops and poultry and other small animals. Many respondents were involved in production of staple grains, swine, and large livestock; non-farm economic activities; and wage and salary employment, especially traders. Most abaca producers and processors also participated in coconut VCs (Figure 3, panel a). However, few coconut VC participants were involved in abaca production (panel b). Most men seaweed

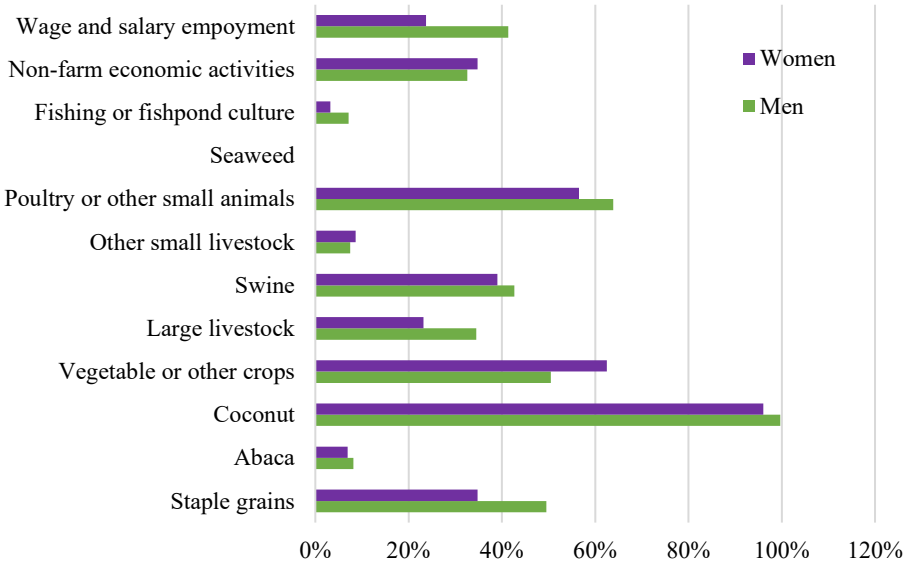
VC respondents were also involved in fishing; women were also involved in fish processing (panel c). Almost all women swine processors also report non-farm and/or wage employment (panel d). More participants in coconut and swine VCs were engaged in staple grain production than in other VCs (panel b and d).

Figure 3. Men's and women's participation in livelihood activities by VC

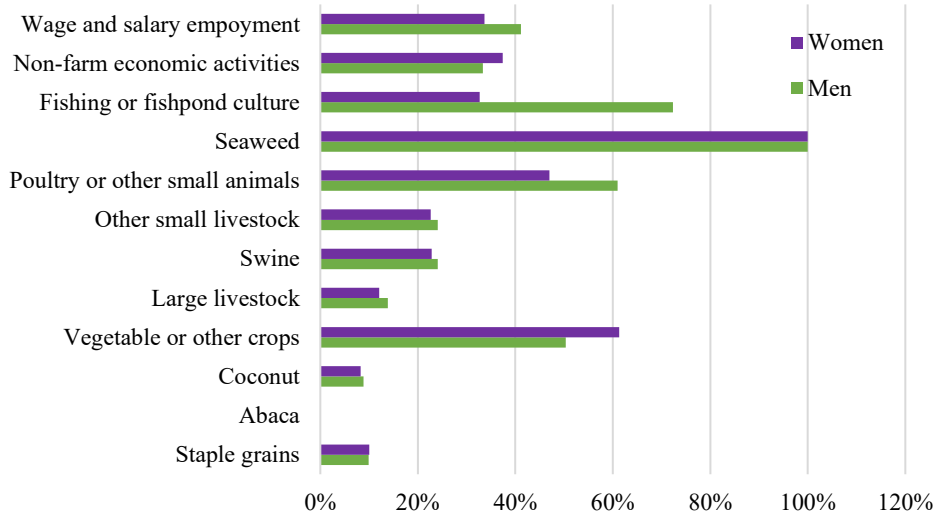
a. Abaca



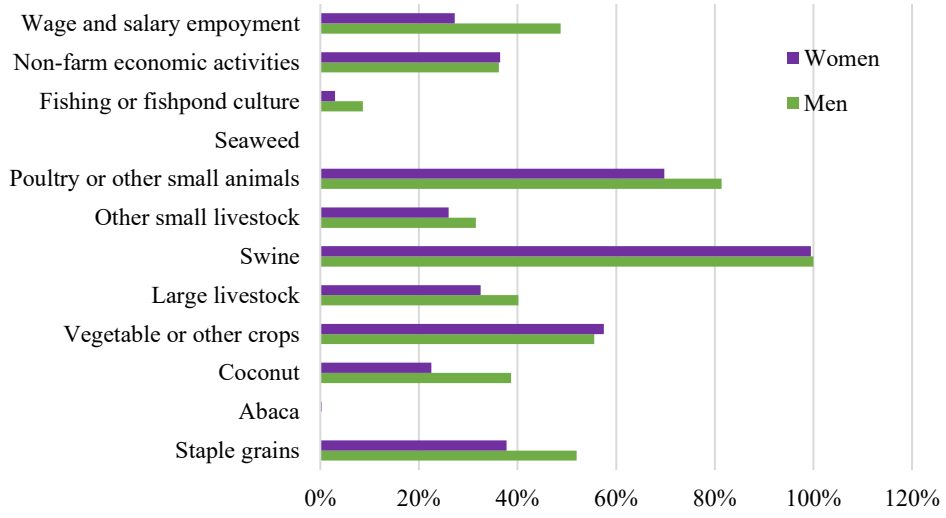
b. Coconut



c. Seaweed



d. Swine



Source: IFPRI survey (2017)

3.2. Levels of (dis)empowerment

Based on our adapted pro-WEAI, most women and men in all four VCs are not empowered (i.e., inadequate in at least 75 percent of the indicators). Empowerment is lowest in the coconut VC (23% of men, 29% of women) and highest in seaweed VC (47% of women and men). Empowerment was lower for women in WOHs compared to those in DHHs, except in the swine VC. Gender parity was high among households in all four VCs (Table 4).

There are indications that empowerment also varied within VCs, although the sample size is small for some of the VC nodes (i.e., processing and trading). In coconut, more women traders and marketers were empowered (38%) compared to women producers and processors (25% and 22%, respectively). More men producers were empowered (28%) compared to men processors and traders/marketers (16% and 19%, respectively). In seaweed, empowerment scores were similar between VC activities, yet more producers and processors were empowered compared to traders, which seems contradictory to the qualitative interviews in which producers and processors aspire to be traders for better income and higher status in the community. This finding is probably attributable to the small number of large traders who were interviewed. Similarly, in abaca, empowerment was lowest among men traders and marketers. On the other hand, in swine, women and men traders/marketers were more empowered than producers and processors (Annex Figure 1).

In addition to pro-WEAI, we collected several indicators to provide further insight into empowerment in agricultural VCs. Given the importance of employment and labor issues in VCs, these indicators include autonomy in type of work, autonomy in working conditions, and attitudes about GBV perpetrated by an employer or landlord. We also included indicators specific to the VC that provides the household's main source of income—input in productive decisions and control over use of income and outputs from the main VC.

In all four VCs, more respondents had adequate autonomy in the type of work they do and their working conditions than in how they spend their income. Also, a higher proportion of respondents indicated that it was never acceptable for an employer or landlord to hit a woman than those who indicated that it was never acceptable for a husband to hit his wife. Nearly all respondents had input in decisions about their household's agricultural activities, except in the swine VC. Most respondents had control over how to use income and outputs from the VC that was their household's main source of income, though fewer had control over how to use income and outputs from all of their household's agricultural activities. In the coconut VC, fewer women than men had control over output and income from coconut. In other VCs, more women had control over use of income and outputs from their main VC than men.

Table 4. Percent of respondents adequate in each indicator of empowerment by VC, gender, and household type

	Abaca			Coconut			Seaweed			Swine		
	DHH		WOH	DHH		WOH	DHH		WOH	DHH		WOH
Indicator	**M**	**W**		**M**	**W**		**M**	**W**		**M**	**W**	
Empowered	34	32	29	23	29	13	47	47	36	29	27	36
Empowerment score (average)	***0.67***	***0.68***	***0.67***	***0.64***	***0.64***	***0.63***	***0.72***	***0.73***	***0.70***	***0.67***	***0.66***	***0.70***
				Pro-WEAI indicators								
Intrinsic agency												
Autonomy in income*	45	58	55	53	56	52	23	32	50	49	61	73
Attitudes about IPV*	48	37	33	49	43	43	59	56	56	50	37	45
Respect among household members*	40	42	34	38	41	10	62	62	14	37	39	35
Instrumental agency												
Input in productive decisions*	95	89	94	96	84	91	91	90	97	88	73	86
Ownership of land and other assets*	94	94	92	96	96	95	99	99	97	97	99	100
Access to and decisions on credit*	94	97	99	92	97	96	92	97	99	97	99	95
Control over use of income and outputs*	65	60	67	60	43	53	71	81	84	43	43	44
Work balance*	68	43	44	70	49	47	58	38	29	67	55	66
Collective agency												
Group membership*	61	81	74	42	65	64	82	92	86	72	80	79
Membership in influential groups*	57	79	69	37	63	60	77	88	83	65	76	76
				VC-related indicators								
Autonomy in wage work	72	87	88	83	89	90	78	86	82	73	86	91
Autonomy in working conditions	72	88	90	78	88	92	80	85	79	78	89	95
Attitudes about use of GBV by employer/landlord	83	77	67	83	78	69	88	82	84	79	74	74
Input in decisions about main VC	99	98	99	98	96	98	99	99	100	98	94	99
Control over use income and outputs from main VC	89	90	95	90	75	85	95	98	100	82	92	87

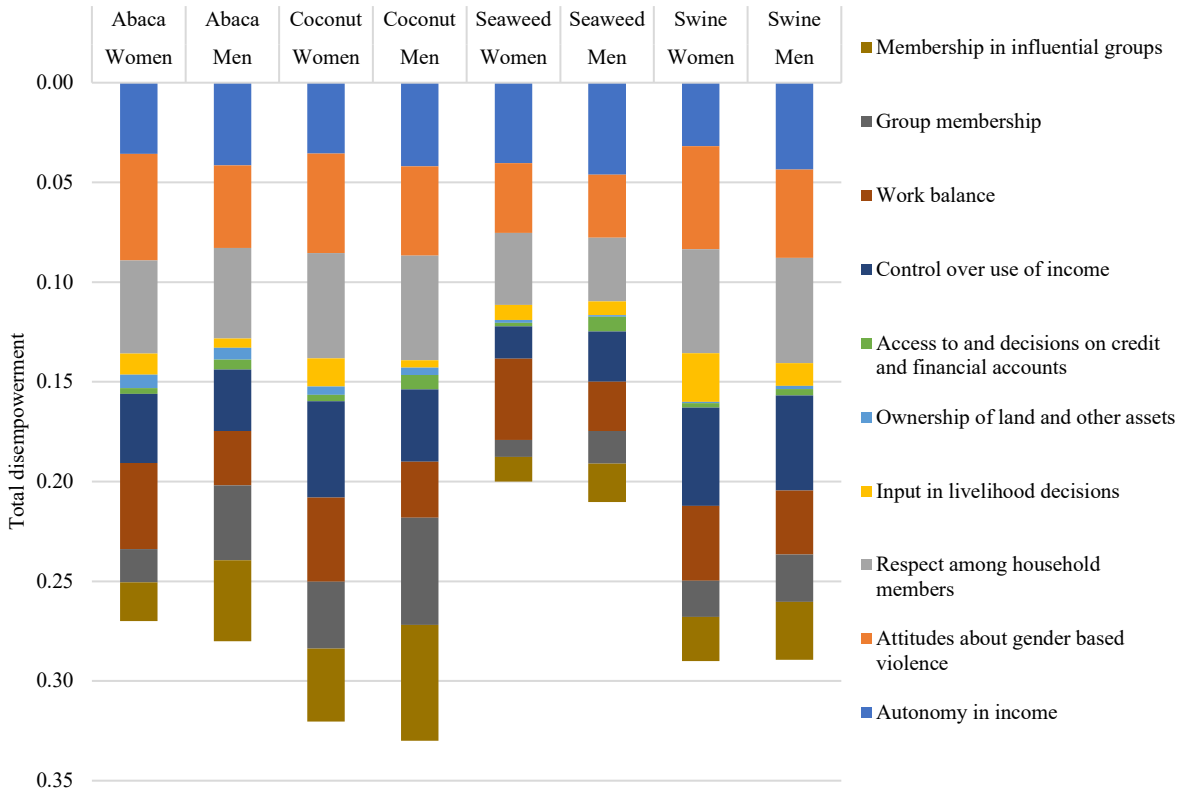
Source: IFPRI survey (2017). Note: DHH: Dual-adult household; WOH: woman-only household. Empowerment (based on pro-WEAI) is defined as adequacy in at least 75 percent of pro-WEAI indicators (see details and robustness check of different cut-offs in Malapit et al. 2019). Empowerment score is the proportion of pro-WEAI indicators in which an individual is adequate. Pro-WEAI indicators as designated with an asterisk (*),defined in Table 1.

3.3. Contributors to disempowerment

The aggregate pro-WEAI value can be disaggregated to examine the proportional contributions of each indicator to disempowerment for respondents identified as disempowered. This analysis helps us to understand which constraints are most important for the least empowered respondents. Across all four VCs, respect among household members and attitudes about GBV are large contributors to disempowerment for both women and men (Figure 4). Ownership of land and other assets, access to and decisions on credit, and input in livelihood decisions were the smallest contributors to disempowerment for women and men across all four VCs (Figure 4). For more details, Table 4 shows the percentage of respondents achieving adequacy in each of these indicators.

Other large contributors to disempowerment varied by VC and gender. In the abaca and seaweed VCs, work balance was a large contributor for women but less so for men. In the swine VC, control over use of income was a large contributor to disempowerment for both women and men. In the coconut VC, control over use of income was a large contributor to disempowerment for women; group membership and membership in influential groups were the largest contributors for men. In the coconut and abaca VCs, group membership and membership in influential groups were much larger contributors for men than women.

Figure 4. Contributors to disempowerment of women and men by VC



Source: IFPRI survey (2017)

3.4. Correlates of empowerment

Women's and men's empowerment are positively associated with socioeconomic factors including education, age, being married, access to extension services and access to community programs and projects (Table 5). Both women and men are less 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 dual-adult households (DHH) and in woman-only households (WOH). There are some differences in the correlates of women's and men's empowerment. Women's empowerment is positively associated with education, being married, and access to community programs/projects. Women who are married, better educated, and have access to extension services are more empowered than those who are not married, those with less education, and no access to extension services. Women who are older have higher empowerment scores, while those engaged mainly in processing have lower empowerment scores compared to those engaged mainly in production or trading. The low scores of women involved in processing may be explained by 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 higher likelihood of being empowered than those in other asset groups.

Men's empowerment is positively associated with education and access to extension services and negatively associated with wage employment. Men who are more educated and have access to extension services are more empowered than those with less education and no access to extension services. Men who are laborers or wage earners are less empowered than those who are not, likely due to preferences for having one's own business, which may come with greater autonomy than wage work. Men's empowerment score is positively associated with being married, age, and access to community programs. Married and older men and those with access to community programs have higher empowerment scores than unmarried or younger men and those without access to community programs.

Community programs and projects are common in the study sites, and at least three-quarters of women and men reported accessing and participating in community programs or projects. Access is weakest among swine VC participants (50% of men and 61% of women participating), and highest in seaweed VCs (more than 90% of women and men participating). The main program is the conditional cash transfer program (Pantawid Pamilyang Pilipino Program, 4P), to which the majority of VC participants, except those in swine VC, have access. In addition, a much greater proportion of seaweed VC participants report access to other programs, including on agricultural inputs and agricultural livelihoods training programs compared to other VCs. Greater access to community programs 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. This is due to the current weak access to extension services, with only about 26 to 44 percent of women and men reporting access to extension services, which 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. In interviews with seaweed VC participants, both men and women explicitly reported limited training in seaweed production or processing, which could have been an opportunity to reduce disempowerment. Because farming is inherently risky owing to its dependence on weather, early warning systems and weather forecasts are particularly useful according to interviewees. 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.

Although both women's and men's empowerment are strongly and positively associated with education and extension services, these factors are more strongly associated with men's empowerment. One level

higher in education is associated with a 2 percent higher likelihood of men being empowered and a 13 percent increase their empowerment score; and associated with a 1 percent higher likelihood of women being empowered and a 9 percent increase in their empowerment score. 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, we note that education appears to have lower returns to women's empowerment compared to men's. This is likely attributable to the higher proportion of women who have completed secondary schooling or higher compared to men (Table 2), which is not unusual in the Philippines. Similarly, access to extension services seems to have higher returns in terms of men's compared to women's empowerment. Access to extension services is associated with increased likelihood of men being empowered by 12 percent and a 7 percent increase in their empowerment score; and of women being empowered by 5 percent and a 4 percent increase in their empowerment score. Although the literature suggests that education increases women's bargaining power within their households, endowing them with knowledge, skills, and resources to make life choices that improve their welfare, it may be insufficient to change deeply-rooted societal attitudes. Education may not improve outcomes that require transformation of gender relations such as agency, asset ownership and community participation. In Indonesia, for example, despite high national levels of girls' education and literacy, many areas are still governed by discriminatory local gender norms that give husbands the right to limit women's ability to work outside the home and restrict inheritance rights; GBV also persists (Samarakoon and Parinduri 2015).

Across VCs and nodes along VCs, we see some variations in the factors explaining variations on the empowerment dimension indicators. Men have generally lower autonomy in wage work and work conditions (Table 6); but are more empowered in terms of greater inputs in decisions about the main VC and stronger control over outputs than women (Table 7). There is no difference between women and men in terms of disempowerment due to attitudes about GBV perpetuated by an employer and control over income (Table 6). Higher education for women is correlated with higher autonomy in work conditions and lower disempowerment due to attitudes about GBV perpetuated by an employer (Table 7).

Additional indicators for instrumental agency are generally high, consistent with the pro-WEAI indicators, however, we see a greater proportion of women who are disempowered in control over output and income in the coconut VC. Men and women in woman-only households are more empowered in terms of input in decisions about the main VC than women in dual-adult households (Tables 4 and 5). Women participants in the swine VC have fewer inputs in decisions about swine VC than women in other VCs. There are also some indications that asset/wealth level is associated with greater inputs into decisions about the main VC and control over output and incomes by women (Table 7).

Women participants have less control over use of both output and income in the coconut VC compared to men (Table 7). In other VCs, women seem to have greater control over use of outputs than men, while men have greater control over use of income from these VCs (Table 7). Men have least control over use of output and income from the swine VC while men have the most control over use of input and income from the seaweed VC. Women have least control over use of output and income from the coconut VC and most control over use of output and income from the seaweed VC. Education, age, access to community programs and engagement in processing are associated with greater control over use of income by men, but not by women. Engagement in trading is associated with greater control over use of income by women, but not by men (Table 7).

Table 5. Correlates of empowerment of women and men

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	Whether empowered (=1 if empowered)						Empowerment score					
	Pooled		Women only		Men only		Pooled		Women only		Men only	
Man respondent (=1)	0.008						-0.012					
	(0.020)						(0.011)					
Respondent is in a			-0.022						0.003			
woman-only household (WOH)			(0.039)						(0.011)			
Asset/wealth quintile† (reference=poorest)												
Asset quintile 2	-0.034		-0.013		-0.070		-0.006		-0.013		0.003	
	(0.030)		(0.041)		(0.045)		(0.008)		(0.011)		(0.013)	
Asset quintile 3	0.020		0.040		-0.014		0.003		-0.001		0.007	
	(0.032)		(0.043)		(0.049)		(0.008)		(0.011)		(0.013)	
Asset quintile 4	0.007		0.043		-0.050		0.005		0.006		0.001	
	(0.032)		(0.043)		(0.048)		(0.008)		(0.011)		(0.013)	
Asset quintile 5	0.064	*	0.094	**	0.013		0.002		0.003		-0.003	
	(0.034)		(0.046)		(0.053)		(0.009)		(0.012)		(0.013)	
Highest educational	0.017	***	0.013	*	0.024	***	0.113	***	0.090	**	0.135	***
level	(0.005)		(0.007)		(0.008)		(0.028)		(0.038)		(0.041)	
Married (=1)	0.077	***	0.067	*	0.065		0.092	***	0.081	**	0.122	**
	(0.024)		(0.036)		(0.045)		(0.026)		(0.036)		(0.052)	
Age (years)	0.001		0.001		0.001		0.150	***	0.118	*	0.157	*
	(0.001)		(0.001)		(0.001)		(0.054)		(0.070)		(0.091)	
Access to extension	0.077	***	0.050	*	0.123	***	0.053	***	0.039	***	0.074	***
(=1)	(0.021)		(0.027)		(0.032)		(0.010)		(0.013)		(0.017)	
Access to community	0.054	**	0.060	*	0.045		0.132	***	0.133	***	0.128	***
programs (=1)	(0.023)		(0.031)		(0.035)		(0.023)		(0.031)		(0.033)	
Participates non-farm	0.002		-0.001		0.004		-0.003		0.004		-0.014	
activities (=1)	(0.021)		(0.027)		(0.034)		(0.009)		(0.012)		(0.014)	
Participates in wage	-0.029		0.008		-0.077	**	-0.012		0.001		-0.036	*
employment (=1)	(0.021)		(0.029)		(0.031)		(0.010)		(0.011)		(0.019)	
VC main activity (reference=production)												
Processing	-0.021		-0.043		0.010		-0.019	**	-0.023	**	-0.013	
	(0.022)		(0.029)		(0.035)		(0.009)		(0.011)		(0.014)	
Trading	-0.035		-0.006		-0.082	**	-0.005		-0.002		-0.009	
	(0.027)		(0.035)		(0.041)		(0.007)		(0.009)		(0.010)	
Main VC (reference=seaweed)												
Abaca	-0.083	***	-0.076	**	-0.099	**	-0.043	***	-0.037	***	-0.053	***
	(0.026)		(0.035)		(0.040)		(0.010)		(0.013)		(0.016)	
Coconut	-0.168	***	-0.138	***	-0.212	***	-0.083	***	-0.081	***	-0.085	***
	(0.025)		(0.034)		(0.037)		(0.010)		(0.012)		(0.016)	
Swine	-0.136	***	-0.134	***	-0.140	***	-0.052	***	-0.057	***	-0.046	***
	(0.026)		(0.034)		(0.041)		(0.010)		(0.013)		(0.015)	

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	Whether empowered (=1 if empowered)			Empowerment score		
	Pooled	Women only	Men only	Pooled	Women only	Men only
Observations	**2451**	**1410**	**1041**	**2451**	**1410**	**1041**
Pseudo R-squared	**0.044**	**0.037**	**0.064**	**0.150**	**0.130**	**0.110**

Source: IFPRI survey (2017). Models 1-3 were estimated using logit regression, and Models 4-6 were estimated using fractional regression.

Additional notes: 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<0.05, ** p<0.01, *** p<0.001. † 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. Estimates using municipality and province fixed effects were largely consistent.

Table 6. Correlates of individual's intrinsic agency indicators in main VCs

	Autonomy in wage work			Autonomy in work conditions			Attitude towards GBV by employer		
	Pooled	**Women only**	**Men only**	**Pooled**	**Women only**	**Men only**	**Pooled**	**Women only**	**Men only**
Man respondent (=1)	-0.064**			-0.049*			0.032		
	(0.030)			(0.030)			(0.021)		
Respondent is in a woman-only household (=1)		0.036			0.041			-0.013	
		(0.060)			(0.060)			(0.041)	
Asset/wealth quintile (reference=poorest) †									
Asset quintile 2	0.035	0.093	-0.01	0.055	0.063	0.048	0.018	0.042	-0.008
	(0.045)	(0.069)	(0.059)	(0.044)	(0.068)	(0.058)	(0.032)	(0.043)	(0.047)
Asset quintile 3	0.039	0.100	-0.020	0.044	0.023	0.058	0.011	0.025	-0.003
	(0.048)	(0.076)	(0.064)	(0.047)	(0.074)	(0.062)	(0.033)	(0.044)	(0.050)
Asset quintile 4	0.026	0.025	0.028	0.031	0.008	0.041	0.009	0.019	0.001
	(0.049)	(0.078)	(0.065)	(0.049)	(0.075)	(0.065)	(0.033)	(0.044)	(0.050)
Asset quintile 5	0.011	0.084	-0.071	0.059	0.030	0.078	0.029	0.047	0.008
	(0.054)	(0.079)	(0.076)	(0.052)	(0.078)	(0.073)	(0.034)	(0.046)	(0.053)
Highest educational Level	0.025*	0.018	0.026	0.019	0.037*	0.005	0.021**	0.026*	0.015
	(0.015)	(0.022)	(0.021)	(0.015)	(0.022)	(0.021)	(0.011)	(0.015)	(0.016)
Married (=1)	-0.042	-0.047	0.007	-0.035	-0.014	-0.024	0.009	-0.003	0.009
	(0.038)	(0.060)	(0.059)	(0.037)	(0.059)	(0.057)	(0.026)	(0.038)	(0.046)
Age (years)	0.000	0.000	-0.001	0.000	0.002	-0.002	-0.001	-0.001	0.000
	(0.001)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Access to extension (=1)	-0.015	-0.033	-0.002	-0.022	-0.033	-0.013	-0.002	0.005	-0.011
	(0.031)	(0.045)	(0.044)	(0.030)	(0.045)	(0.042)	(0.021)	(0.029)	(0.033)
Access to community programs (=1)	0.035	0.000	0.053	0.025	-0.052	0.071	0.024	0.022	0.026
	(0.038)	(0.061)	(0.050)	(0.037)	(0.059)	(0.049)	(0.024)	(0.033)	(0.036)
Participates in non-farm (=1)	0.002	0.005	-0.001	0.008	0.008	0.003	-0.001	0.001	0.000
	(0.033)	(0.047)	(0.047)	(0.032)	(0.046)	(0.045)	(0.022)	(0.029)	(0.034)
Participates in wage employment (=1)							0.001	-0.002	0.006
							(0.022)	(0.030)	(0.032)
Main activity (reference=Production)									
Processing	-0.043	0.015	-0.102**	0.017	0.009	0.024	-0.009	-0.008	-0.012
	(0.034)	(0.049)	(0.047)	(0.033)	(0.048)	(0.046)	(0.023)	(0.031)	(0.035)
Trading	0.039	0.144**	-0.047	0.040	0.075	0.006	-0.006	-0.014	0.004

	Autonomy in wage work			Autonomy in work conditions			Attitude towards GBV by employer		
	Pooled	**Women only**	**Men only**	**Pooled**	**Women only**	**Men only**	**Pooled**	**Women only**	**Men only**
	(0.044)	(0.064)	(0.062)	(0.043)	(0.064)	(0.060)	(0.029)	(0.038)	(0.044)
Main VC (reference=seaweed)									
Abaca	0.054	0.061	0.055	0.026	0.033	0.003	-0.031	-0.035	-0.025
	(0.045)	(0.065)	(0.063)	(0.044)	(0.064)	(0.061)	(0.030)	(0.040)	(0.045)
Coconut	0.107**	0.054	0.149**	0.030	-0.002	0.043	-0.023	-0.026	-0.020
	(0.046)	(0.070)	(0.065)	(0.046)	(0.069)	(0.063)	(0.031)	(0.041)	(0.047)
Swine	0.029	0.006	0.047	0.083*	0.069	0.093	-0.045	-0.046	-0.044
	(0.045)	(0.064)	(0.066)	(0.044)	(0.062)	(0.063)	(0.031)	(0.040)	(0.048)
Observations	**947**	**433**	**514**	**944**	**429**	**515**	**2728**	**1559**	**1169**
Pseudo R-squared	**0.006**	**0.008**	**0.008**	**0.004**	**0.007**	**0.004**	**0.002**	**0.002**	**0.001**

Source: IFPRI survey (2017); models are estimated using Poisson regressions for count data; see additional notes to Table 5.

Table 7. Correlates of individual's instrumental agency indicators in main VCs

	Input in decisions about main VC			Control over use of output from main VC			Control over use of income from main VC		
	Pooled	Women only	Men only	Pooled	Women only	Men only	Pooled	Women only	Men only
Man respondent (=1)	0.015***			0.021***			-0.002		
	(0.005)			(0.008)			(0.011)		
Respondent is in a woman-only household (=1)		0.023***			0.025*			0.019	
		(0.006)			(0.014)			(0.018)	
Asset/wealth quintile (reference=poorest) †									
Asset quintile 2	0.003	0.002	0.002	0.007	0.008	0.002	0.014	0.009	0.019
	(0.006)	(0.009)	(0.007)	(0.010)	(0.014)	(0.015)	(0.015)	(0.017)	(0.024)
Asset quintile 3	0.004	-0.003	0.007	0.015	0.025*	-0.002	0.019	0.025	0.005
	(0.006)	(0.010)	(0.007)	(0.010)	(0.013)	(0.016)	(0.016)	(0.017)	(0.026)
Asset quintile 4	0.015***	0.015*	0.013**	0.029***	0.033***	0.02	0.034**	0.041***	0.019
	(0.005)	(0.008)	(0.006)	(0.009)	(0.013)	(0.013)	(0.015)	(0.016)	(0.026)
Asset quintile 5	0.009*	0.001		0.009	0.011	0.001	0.015	0.013	0.014
	(0.006)	(0.011)		(0.012)	(0.016)	(0.017)	(0.017)	(0.020)	(0.028)
Highest educational Level	0.003	0.002	0.003	0.008*	0.006	0.008	0.009	-0.001	0.019**
	(0.003)	(0.004)	(0.004)	(0.005)	(0.006)	(0.006)	(0.006)	(0.007)	(0.010)
Married (=1)	-0.003	0.011	-0.004	-0.015*	-0.002	-0.020*	-0.026**	-0.012	-0.043**
	(0.005)	(0.011)	(0.007)	(0.008)	(0.015)	(0.011)	(0.012)	(0.017)	(0.020)
Age (years)	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.002**
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	(0.001)	(0.001)
Access to extension (=1)	0.005	0.008	0.000	0.015*	0.010	0.018	0.008	0.011	0.010
	(0.005)	(0.007)	(0.007)	(0.008)	(0.011)	(0.011)	(0.012)	(0.014)	(0.018)
Access to community programs (=1)	0.004	0.002	0.008	0.007	-0.003	0.018	0.045***	0.007	0.080***
	(0.006)	(0.008)	(0.008)	(0.009)	(0.012)	(0.013)	(0.014)	(0.016)	(0.023)
Participates in non-farm (=1)	-0.004	-0.007	-0.001	-0.002	0.001	-0.005	0.006	0.006	0.000
	(0.005)	(0.008)	(0.007)	(0.009)	(0.012)	(0.012)	(0.012)	(0.014)	(0.019)
Participates in wage employment (=1)	-0.007	-0.004	-0.011	-0.011	-0.005	-0.013	-0.004	-0.004	-0.001
	(0.005)	(0.008)	(0.008)	(0.009)	(0.013)	(0.011)	(0.012)	(0.015)	(0.018)
Main activity (reference=Production)									
Processing	-0.001	-0.006	0.005	0.001	-0.008	0.011	0.021*	0.001	0.048***
	(0.005)	(0.008)	(0.007)	(0.009)	(0.013)	(0.011)	(0.012)	(0.015)	(0.018)
Trading	0.003	0.010	-0.004	-0.008	0.010	-0.029	0.019	0.047***	-0.014

	Input in decisions about main VC			Control over use of output from main VC			Control over use of income from main VC		
	Pooled	**Women only**	**Men only**	**Pooled**	**Women only**	**Men only**	**Pooled**	**Women only**	**Men only**
	(0.006)	(0.008)	(0.011)	(0.012)	(0.015)	(0.019)	(0.014)	(0.014)	(0.025)
Main VC (reference=seaweed)									
Abaca	-0.005	-0.012	0.004	-0.058***	-0.085***	-0.026	-0.101***	-0.133***	-0.078**
	(0.009)	(0.015)	(0.009)	(0.020)	(0.032)	(0.023)	(0.026)	(0.040)	(0.036)
Coconut	-0.014	-0.023	-0.002	-0.098***	-0.117***	-0.078**	-0.196***	-0.297***	-0.084**
	(0.011)	(0.018)	(0.012)	(0.024)	(0.036)	(0.032)	(0.031)	(0.050)	(0.039)
Swine	-0.030**	-0.046**	-0.007	-0.061***	-0.095***	-0.024	-0.133***	-0.153***	-0.125***
	(0.014)	(0.022)	(0.013)	(0.022)	(0.034)	(0.024)	(0.029)	(0.043)	(0.041)
Observations	**2731**	**1561**	**944**	**2731**	**1561**	**1170**	**2731**	**1561**	**1170**
Pseudo R-squared	**0.067**	**0.077**	**0.084**	**0.054**	**0.062**	**0.077**	**0.060**	**0.113**	**0.069**

Source: IFPRI survey (2017); models are estimated using logit regression for binary variables; see additional notes to Table 5.

3.5 Correlates of gender parity

WEAI metrics define gender parity as the woman being equally or more empowered than the main man in the household (Alkire et al. 2013). At the household level, 75 percent of the dual-adult households have achieved gender parity according to this definition. The average intrahousehold inequality score is close to zero, defined as the difference between the man's empowerment score and the woman's empowerment score among households without gender parity (see Annex Table 2).

Unpacking gender parity further, Table 8 shows that out of 1134 dual adult households, for which the gender parity measure is relevant, 664 households (58.6%) are those in which men and women have equal empowerment scores, 240 households (21.2%) are those where women are more empowered, and 230 households (20.2%) are those where men are more empowered. We examine the factors associated with the likelihood of a household's achieving parity (Model 1) and the likelihood of a household's having more empowered women or empowered men, relative to the likelihood of belonging to a household where men and women have similar levels of empowerment (Model 2). Marginal effects allow us to compare the relative magnitudes of these associations. Interestingly, the associations of woman's age and education with gender parity, defined as the woman being at least as empowered as the man, although positive, are small (Table 8). Men's access to extension services and women's access to community services have small, though negative, associations with gender parity. Women's access to extension services and the man's participation in nonfarm activities and wage employment are positively associated with gender parity, but the magnitudes of these associations are also small. The two factors that have large and significant marginal effects relate to the node of the value chain: a man's participation in trading (compared to the base category, production) is associated with the household's not achieving gender parity, while a woman's participation in trading is associated with gender parity.

Recall that households that achieve gender parity include those where the woman is equally empowered, as well as those where she is more empowered than the man. To investigate this further, we present the results of the multinomial logit regression (Model 2), where we examine the likelihoods of the man (woman) being more empowered relative to the excluded category, where they are similarly empowered. Similar to the logit regression on gender parity, age and education have marginal effects that are small in magnitude. What is noteworthy are the frequently offsetting marginal effects of participation and access to public services and different types of employment on the likelihood that men or women are more empowered relative to a condition of gender equality. Men's access to extension services tends to contribute to the likelihood that the man is more empowered (and the woman more disempowered), while women's access to extension services contributes to the likelihood that the man is more disempowered. Men's access to community programs is associated with a lower likelihood that the woman is more empowered, whereas women's own access to community programs is associated with a higher likelihood that she is more empowered. If extension services and community programs are targeted to specific individuals but run the risk of disempowering their partners, this may limit households' participation in these programs compared to programs that could potentially empower both men and women.

The male respondent's participation in nonfarm activities as well as in wage employment is associated with a lower likelihood that he is more empowered relative to when he is engaged in agricultural production. It is possible that nonfarm work and wage employment are 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. Participation in trading may involve more direct access to sales proceeds, as well as more engagement with other market actors,

and could be viewed as empowering. 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.

Table 8. Correlates of intrahousehold inequality (dual-adult households only)

	Model 1 (logit)	Model 2 (multinomial logit, base=households where woman and man are equally empowered)	
	Whether gender parity is achieved (=1) /a	**Whether man is more empowered (=1)**	**Whether woman is more empowered (=1)**
Asset/wealth quintile † (reference=poorest quintile)			
Asset quintile 2	-0.025	0.174	0.097
	(0.039)	(0.249)	(0.237)
Asset quintile 3	-0.064	0.466*	0.306
	(0.043)	(0.258)	(0.249)
Asset quintile 4	-0.043	0.287	0.109
	(0.042)	(0.264)	(0.257)
Asset quintile 5 (richest)	-0.027	0.131	-0.133
	(0.045)	(0.283)	(0.278)
Household size	0.003	-0.027	-0.034
	(0.006)	(0.040)	(0.039)
Highest educational level of man respondent	-0.008	0.034	-0.092*
	(0.008)	(0.050)	(0.051)
Highest educational level of woman respondent	0.015*	-0.088*	0.012
	(0.008)	(0.053)	(0.050)
Age of man respondent (years)	-0.002	0.012	-0.014
	(0.002)	(0.012)	(0.011)
Age of woman respondent (years)	0.003*	-0.020*	-0.004
	(0.002)	(0.012)	(0.011)
Man respondent has access to extension services (=1)	-0.066**	0.281*	-0.521***
	(0.027)	(0.167)	(0.176)
Woman respondent has access to extension services (=1)	0.052**	-0.320*	0.095
	(0.025)	(0.177)	(0.171)
Man respondent has access to community programs (=1)	0.030	-0.268	-0.322*
	(0.030)	(0.188)	(0.180)
Woman respondent has access to community programs (=1)	-0.063**	0.400*	-0.143
	(0.028)	(0.213)	(0.199)

	Model 1 (logit)	Model 2 (multinomial logit, base=households where woman and man are equally empowered)	
	Whether gender parity is achieved (=1) /a	**Whether man is more empowered (=1)**	**Whether woman is more empowered (=1)**
Man respondent participated in non-farm activities (=1)	0.058*	-0.430*	-0.097
	(0.034)	(0.243)	(0.230)
Woman respondent participated in non-farm activities (=1)	-0.013	0.183	0.291
	(0.035)	(0.230)	(0.221)
Man respondent participated in wage employment (=1)	0.046*	-0.372**	-0.259
	(0.025)	(0.170)	(0.166)
Woman respondent participated in wage employment (=1)	0.038	-0.217	0.071
	(0.027)	(0.190)	(0.176)
Man's participation in different nodes of the VC (reference=production)			
Processing	0.032	-0.358	-0.564
	(0.070)	(0.599)	(0.550)
Trading	-0.269**	1.416**	0.049
	(0.126)	(0.629)	(0.584)
Woman's participation in different nodes of the VC (reference=production)			
Processing	-0.039	0.352	0.399
	(0.077)	(0.599)	(0.551)
Trading	0.181***	-1.517**	-0.164
	(0.053)	(0.634)	(0.574)
Main VC (reference=seaweed)			
Abaca	-0.051	0.374*	0.283
	(0.036)	(0.222)	(0.220)
Coconut	0.021	-0.143	-0.008
	(0.035)	(0.243)	(0.236)
Swine	-0.045	0.278	0.019
	(0.038)	(0.237)	(0.233)
Constant		-0.491	0.688
		(0.613)	(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)
Adjusted R-squared			
Pseudo R-squared	**0.036**	**0.036**	

Source: IFPRI survey (2017); Model 1 is estimated using logistic regression; Model 2 is estimated using multinomial logit. /a Gender parity is defined as the woman being equally or more empowered than the main man in the household. See additional notes to Table 5.

4. Discussion

4.1. How do stereotypes about gender roles influence value chain participation and benefits?

Although Filipino culture is generally gender-egalitarian, as confirmed by our quantitative results showing relatively high gender parity and small empowerment gaps, our qualitative results suggest that gender stereotypes do influence the division of labor and time use. For example, women and men play different roles in seaweed production and processing. Women are considered more skilled in tying, and typically tie seaweed strips, divide plants into seedlings, plant seedlings, and dry seaweed. Adult men do not perform this work, until they are too old to work in a boat. Women mention that they like the work because they can work in groups, talk to co-workers, sit down, and interrupt the work if needed. In contrast, men are described as stronger and "more capable of the harder physical work" of diving to attach seaweed lines to stakes. They work offshore for the whole workday. However, both boys and girls learn to swim and tie knots, so these statements seemed inadequate explanations. Women and men are also compensated differently for seaweed work. In general, women are paid "piece work" for tying, while men are paid a flat fee for each day. Women earn five to six pesos per line; most tie 40 to 50 lines per day, earning 200 to 250 pesos. Men are paid a flat rate of 250 to 300 pesos per day, and typically work shorter days. The gender stereotypes about appropriate work are buttressed by economic factors that favor paying men more.

The coconut VC also exhibits divisions of labor by gender. Men tend the trees and harvest nuts and *tuba* (palm wine), while women perform postharvest activities, including drying copra, although they do not typically transport it. Although informants say women can perform most tasks, the preference for sex-segregated work was clear and commonly centers on perceptions of physical strength. A woman farmer stated, *"I think that all men's work requires exertion of physical strength. Women do the taking out of dried coconut meat or slice the meat since that is the easiest job they can do. Women can also open the coconut since it is also easy. Men usually do most of climbing up the coconut trees. It is very high, women might fall to the ground. So, women can collect the nuts after they drop, but the delivery of the nuts is left for men since carrying nuts is a heavy work."*

Gender differences in participation, pay, and conditions at different parts of the VC are often explained in terms of women's supposedly innate characteristics like docility, patience, or physical weakness. Given that these stereotypes are often associated with women's being relegated to lower-return activities within the VC, VC analysis should question biological explanations of gender differences and investigate why work is not arranged to facilitate women's participation (e.g., by using technology or altering working hours).

4.2. Are agricultural VCs empowering?

Both the quantitative and qualitative results show that some agricultural VCs can be empowering, yet inequities persist. Overall empowerment scores of both women and men, for example, are lower in other VCs compared to the seaweed VC (the base category). Our qualitative work found that the seaweed VC provided increased employment and livelihood opportunities. These findings are consistent with Arnold (2008) and recent papers on the impact of horticulture on employment, women's empowerment, and development outcomes. Seaweed requires less capital investment and provides higher returns than other export commodities and other aquaculture species, so it is potentially a pro-poor, empowering, export-oriented VC (Arnold 2008).

However, there is variation between sites within the seaweed VC. In northern Cebu, labor patterns are relatively equitable and both men and women farm seaweed (Arnold 2008). In other areas of the Visayas,

such as Hingotanan (in Bohol), the gendered division of labor in seaweed is rigid. Although the local government allocates seaweed plots and some women own seaweed farms, most did not engage in the actual work of farming. The higher empowerment scores among the women in the seaweed VC may reflect greater control over where and when they work, as tasks such as preparing string and tying fresh seaweed can occur near their homes and in groups of family or neighbors. Women working in seaweed commented that *"tying seaweeds allows you to be flexible with your working time."*

Some question the seaweed VC's ability to restructure power inequities where other cash crops have failed (Macabuac 2005; Jain 2006). Vandergeest et al. (1999) showed that seaweed plot size is linked to preexisting income and social hierarchies that influence access to plots, land, water, and capital. Nonetheless, entrenched social inequities are slowly shifting and previously marginalized people can take advantage of opportunities to improve their standard of living, mobility, and influence due to increased income from seaweed farming (Arnold 2008). Income also allows more travel to nearby cities and markets, bringing back new ideas and values that influence local power structures (Arnold 2008).

Structural constraints can also limit how empowering different aspects of agricultural VCs are. For instance, our results show that participation in groups and associations is high, except in the coconut VC (Table 3). Group participation can provide benefits such as access to inputs, loans, insurance, and funeral services. Several explanations for the limited participation in associations in the coconut VC emerged from the interviews. First, association membership may be controlled by the political elite within the community. For example, an individual associated with the opposing political party may not be granted membership in a coconut farmers' association, limiting his or her access to association's programs or inputs. Also, coconut farms are often part of an integrated livelihood strategy involving other types of agriculture, petty trade, and fishing. An individual cannot join both the farmer and fisher associations, so a producer must choose to identify as one or the other. Members must also pay monthly dues and attend meetings, requirements that could challenge those with limited income or time. Thus, people's hesitation to join formal organizations, especially in the coconut VC, may be rational given the monetary and transaction costs of participation. Distrust in cooperatives stems from issues of clientelism, elite capture, and organizational failures in the past, so informal groups and social networks may be a better way to improve collective power.

Lack of autonomy in income was a large contributor to disempowerment in all four VCs, and this was more important for men than women. Lack of autonomy in income can reflect dissatisfaction towards the VC or aspirations for other livelihoods. In the qualitative interviews, several respondents in the seaweed and coconut VCs reported aspirations of working at a higher node in the VC such as trading, but these jobs require capital and resources. Many coconut producers aspired to having their own business, tailoring, planting ginger or other high-value crops, or raising pigs. Some women in the seaweed and coconut VCs aspired to put up their own neighborhood (*sari-sari*) store. This may reflect the limits of purely agricultural VCs in improving welfare. Similarly, most households augment income and cope with risk by diversifying their livelihoods beyond these VCs, suggesting that nonagricultural jobs may be more lucrative or stable.

4.3. Are higher VC nodes more empowering?

Qualitative results suggest that individuals engaged in higher VC nodes, such as trading and marketing, express a stronger sense of empowerment. This is supported by the quantitative results as well. Women who market their own products report making their own decisions about how much to sell and where to sell it. Women traders were said to hire or manage others, rather than perform the work themselves. A woman coconut trader noted, *"The women being admired in the community can stand on her own decision. I manage my business, not just to earn profit but also [to] help my customers if they have*

problems." However, the quantitative results suggest that this is true for only some VCs. Women coconut traders, men abaca processors, and men and women swine traders were more empowered than producers in those VCs, while coconut and swine processors and seaweed and abaca traders were less empowered than producers in those VCs (Annex Figure 1). Ahmed et al. 2018 found similar results in VCs in Bangladesh, where producers are generally more empowered than entrepreneurs and wage earners (Ahmed et al. 2018). However, this may be related to the resources that producers command, compared to entrepreneurs and wage earners—in Bangladesh, producers may have more secure access to land and other productive resources, whereas wage work is a more uncertain undertaking, and a wage worker is at the mercy of producers who hire agricultural laborers.

Many development researchers and practitioners argue that entrepreneurship is key to empowering poor rural women. However, one must consider the nature and scale of the enterprise. Inadequate autonomy indicates that women may have few options on product type, location, and enterprise size. Most traders in our sample are engaged in small-scale retail, which typically involves small margins and is not very lucrative. As we sampled processors, traders, and marketers in the same geographic areas as producers, we likely captured the lower bound of empowerment for these VC roles. Entrepreneurship often only pays off as micro-entrepreneurs become small or medium enterprises and can hire employees and retain more profit; larger enterprises may be located closer to urban areas. In our sample, most women are engaged in the VC primarily to augment family income while also maintaining domestic responsibilities; some Filipino authors have called this a double burden (Liwag, dela Cruz, and Macapagal 1998). Work balance (or lack thereof) is most disempowering among women processors and traders in abaca, coconut and seaweed VCs (Annex Figure 1), suggesting that moving up along the nodes of the VC may increase women's workload disproportionately relative to the additional market and income access they derive. Most women did not aspire to move up the VC; for the few who did, lack of capital restricted this goal, implying much needed support for both capital, facilitiation and skills development support for women agri-entrepreneurship, beyond micro-credit.

Our results suggest that efforts to increase women's involvement in higher nodes of the agricultural VC with potential for high returns may not automatically be empowering. Most households augment income and mitigate risk by diversifying their livelihoods, suggesting that non-agricultural jobs may be more lucrative. Interventions should aim to reduce time burden, especially for women, and explore opportunities for livelihood diversification, especially in work that allows for a more stable income.

5. Conclusions

Women's participation and empowerment in VCs are goals that concern many development organizations but limited systematic and rigorous empirical data exists to measure and track empowerment across VCs and contexts. We use quantitative and qualitative methods to measure women's and men's empowerment and intrahousehold parity in four VCs in the Philippines. Despite a relatively egalitarian culture in the Philippines, gender norms disempower both women and men and underlie inequities within households and across all four VCs. Respect among household members, attitudes about GBV, and autonomy in income—all measures of intrinsic agency—are the top sources of disempowerment for both women and men across VCs. Stratifying by VC, we found that both overall empowerment and some of the most important areas of disempowerment vary between households engaged in different VCs, even in the same geographical area. Work balance, control over use of income, and group membership—all measures of instrumental agency—were the second most important contributors to disempowerment but varied by VC, suggesting that interventions intended to empower women should be tailored by VC. Control over use of income by women and men is weakest in coconut and swine VCs; work balance is most disempowering among women processors and traders in abaca, coconut and seaweed VCs; and group membership is lowest among men in coconut VC.

Some of the same gender issues exist across VCs, highlighting the need to address deeply-rooted, structural gender and social norms, which will require transformative approaches that cut across VCs and locations. One strategy is to increase gender awareness in communities, targeting both women and men. Incorporating gender awareness in schools, starting in primary school, may prove useful. Recent studies of behavior change communication combined with transfers show that these strategies can change behavior and reduce physical violence (Roy et al. 2019). Social networks also play a role in promoting collective power and changing behavior against GBV and stereotyped gender roles across different VCs.

At the same time, program designers and policymakers must be mindful of unintended consequences of interventions. Our findings that access to extension services and community programs may have offsetting effects on men's and women's empowerment suggests that such programs that attempt to reach or benefit only one household member, without possibly taking into account intrahousehold dynamics, may end up disempowering other household members. This may create resistance to these types of programs. VC approaches that consider the entire household, and the different roles and responsibilities of men and women within that household, may be more effective both in increasing participation in the target value chain as well as changing gender norms that limit the ability to benefit from participation.

This study shows how researchers and practitioners can measure, compare and identify sources of disempowerment of women and men in specific VCs and find ways to address them that are targeted specifically to each VC. For future work, we recommend complementing the measures of agency used in this study with indicators of achievements and benefits from VCs by women and men, disaggregated by their role in different types of VCs, the distribution of incomes and profits derived from their participation and by wealth/asset groups. This can provide a rich gendered VC analysis that can link resources, agency and achievements together and how they contribute to empowerment and development, to inform the design and implementation of gender-transformative VC policies and interventions.

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Annex Table 1. Descriptive statistics of individual's empowerment outcomes and correlates

Variable	Mean	Std. Dev.	Min	Max
Outcome variables				
Whether empowered (=1)	0.33	0.47	0	1
Empowerment score (3DE)	0.67	0.15	0.2	1
Has autonomy in wage work (=1)	0.83	0.38	0	1
Has autonomy in work conditions (=1)	0.83	0.37	0	1
Attitudes about gender-based violence perpetrated by an employer or landlord (believes that employer or landlord is NOT justified in any GBV) (=1)	0.80	0.40	0	1
Has some input in productive decisions in main VC (=1)	0.97	0.18	0	1
Has some control over use of output and income from main VC (=1)	0.88	0.32	0	1
Explanatory variables				
Man respondent (=1)	0.42	0.49	0	1
Woman respondent in a woman-only household (=1)	0.12	0.33	0	1
Asset/wealth quintile [/a]				
Asset quintile 1 (poorest)	0.20	0.40	0	1
Asset quintile 2	0.21	0.41	0	1
Asset quintile 3	0.20	0.40	0	1
Asset quintile 4	0.20	0.40	0	1
Asset quintile 5 (richest)	0.20	0.40	0	1
Highest education level	3.85	1.98	1	9
Levels (% of respondents)				
1=No education	*0.47*			
2=Some primary school	*29.88*			
3=Primary school graduate	*24.04*			
4=Some high school	*15.87*			
5=High school graduate	*17.34*			
6=Some vocational education	*0.43*			
7=Vocational education graduate	*1.25*			
8=Some college education	*5.77*			
9=College graduate or higher	*4.94*			
Married (=1)	0.79	0.40	0	1
Age (years)	49.34	12.73	18	88
Has access to extension agent in the last 12 months (=1)	0.37	0.48	0	1
Has access to and awareness of community projects/programs (=1)	0.74	0.44	0	1
Participated in any nonfarm activities (=1)	0.32	0.47	0	1
Participated in any wage- or salary-based employment (=1)	0.35	0.48	0	1
Main activity				
Production	0.53	0.50	0	1
Processing	0.29	0.46	0	1
Trading	0.18	0.38	0	1
Main VC				
Abaca	0.26	0.44	0	1
Coconut	0.25	0.44	0	1
Seaweed	0.24	0.43	0	1
Swine	0.24	0.43	0	1

Source: IFPRI survey (2017). Note: [/a] Asset index includes 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. Asset index was calculated using principal components analysis.

Annex Table 2. Descriptive statistics of household-level gender parity outcomes and correlates.

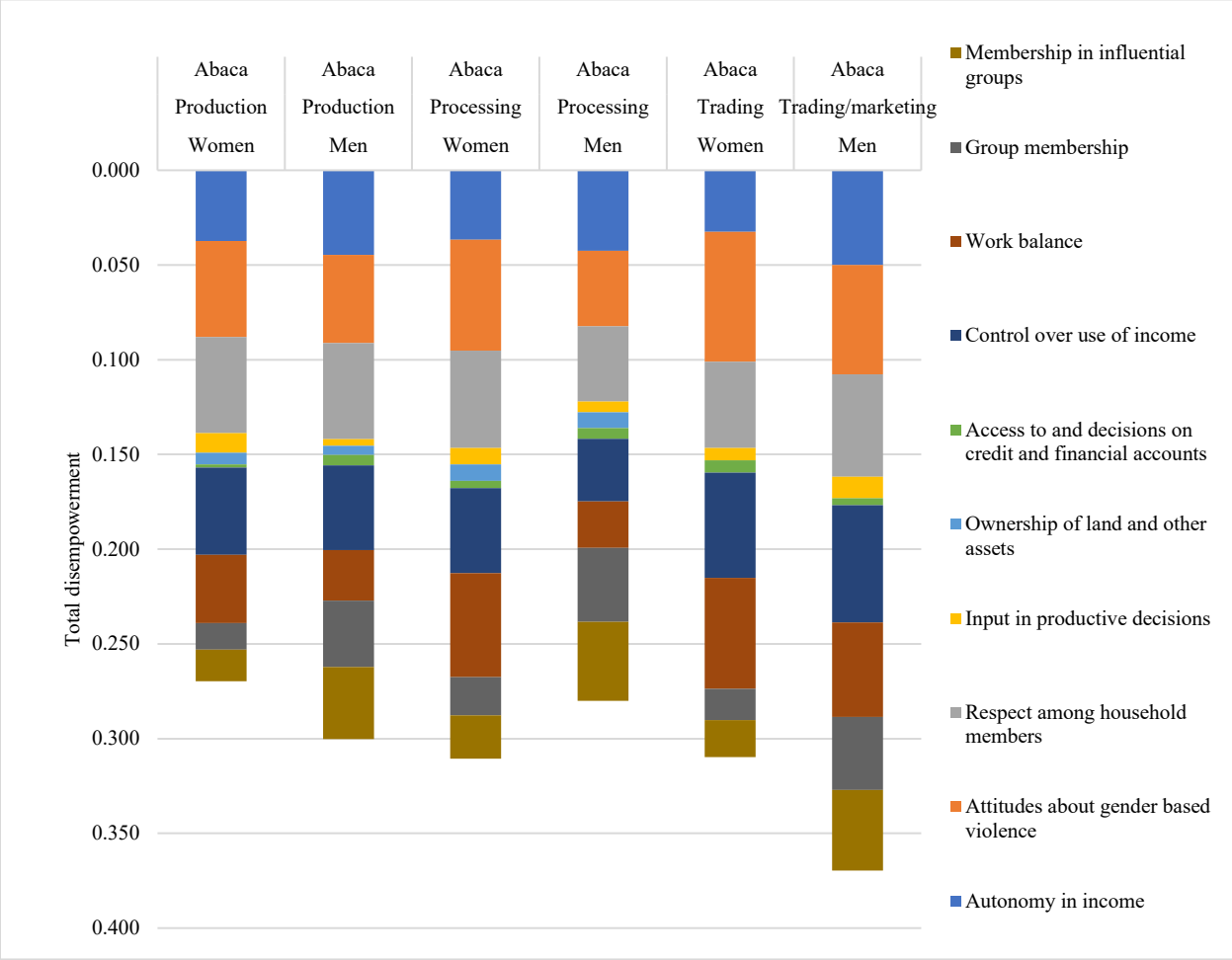
Variable	Mean	Std. Dev.	Min	Max
Outcome variables				
Intrahousehold inequality score (men's empowerment score - women's empowerment score, =0 if gender parity=1)	0.01	0.19	-0.60	0.70
Whether the household has gender parity (=1 if women's empowerment score ≥ men's empowerment score, or if women is empowered)	0.75	0.43	0	1
Explanatory variables				
Asset/wealth quintile [/a]				
Asset quintile 1 (poorest)	0.20	0.40	0	1
Asset quintile 2	0.20	0.40	0	1
Asset quintile 3	0.20	0.40	0	1
Asset quintile 4	0.20	0.40	0	1
Asset quintile 5 (richest)	0.20	0.40	0	1
Household size	4.58	2.05	1	17
Age of man respondent	49.76	12.25	18	88
Age of woman respondent	49.02	13.07	18	87
Highest education level by man respondent	3.64	1.94	1	9
Level (% of respondents)				
1=No education	0.68			
2=Some primary school	36.35			
3=Primary school graduate	22.65			
4=Some high school	14.12			
5=High school graduate	14.88			
6=Some vocational education	0.68			
7=Vocational education graduate	1.52			
8=Some college	4.82			
9=College graduate or higher	4.31			
Highest education level by woman respondent	3.99	1.99	1	9
Level (% of respondents)				
1=No education	0.31			
2=Some primary school	25.14			
3=Primary school graduate	25.08			
4=Some high school	17.17			
5=High school graduate	19.17			
6=Some vocational education	0.25			
7=Vocational education graduate	1.06			
8=Some college education	6.47			
9=College graduate or higher	5.35			
Man respondent has access to extension agent in the last 12 months (=1)	0.39	0.49	0	1
Woman respondent has access to extension agent in the last 12 months (=1)	0.36	0.48	0	1
Man respondent has access to and awareness of community programs (=1)	0.71	0.46	0	1
Woman respondent has access to and awareness of community programs (=1)	0.76	0.43	0	1
Man respondent participated in any nonfarm activities (=1)	0.31	0.46	0	1
Woman respondent participated in any nonfarm activities (=1)	0.34	0.47	0	1

Man respondent participated in any wage/salary-based employment (=1)	0.44	0.50	0	1
Woman respondent participated in any wage/salary-based employment (=1)	0.28	0.45	0	1
Main activity of man respondent				
Production	0.54	0.50	0	1
Processing	0.29	0.46	0	1
Trading	0.17	0.38	0	1
Main activity of woman respondent				
Production	0.53	0.50	0	1
Processing	0.29	0.46	0	1
Trading	0.18	0.39	0	1
Main VC of household				
Abaca	0.26	0.44	0	1
Coconut	0.25	0.44	0	1
Seaweed	0.24	0.43	0	1
Swine	0.24	0.43	0	1

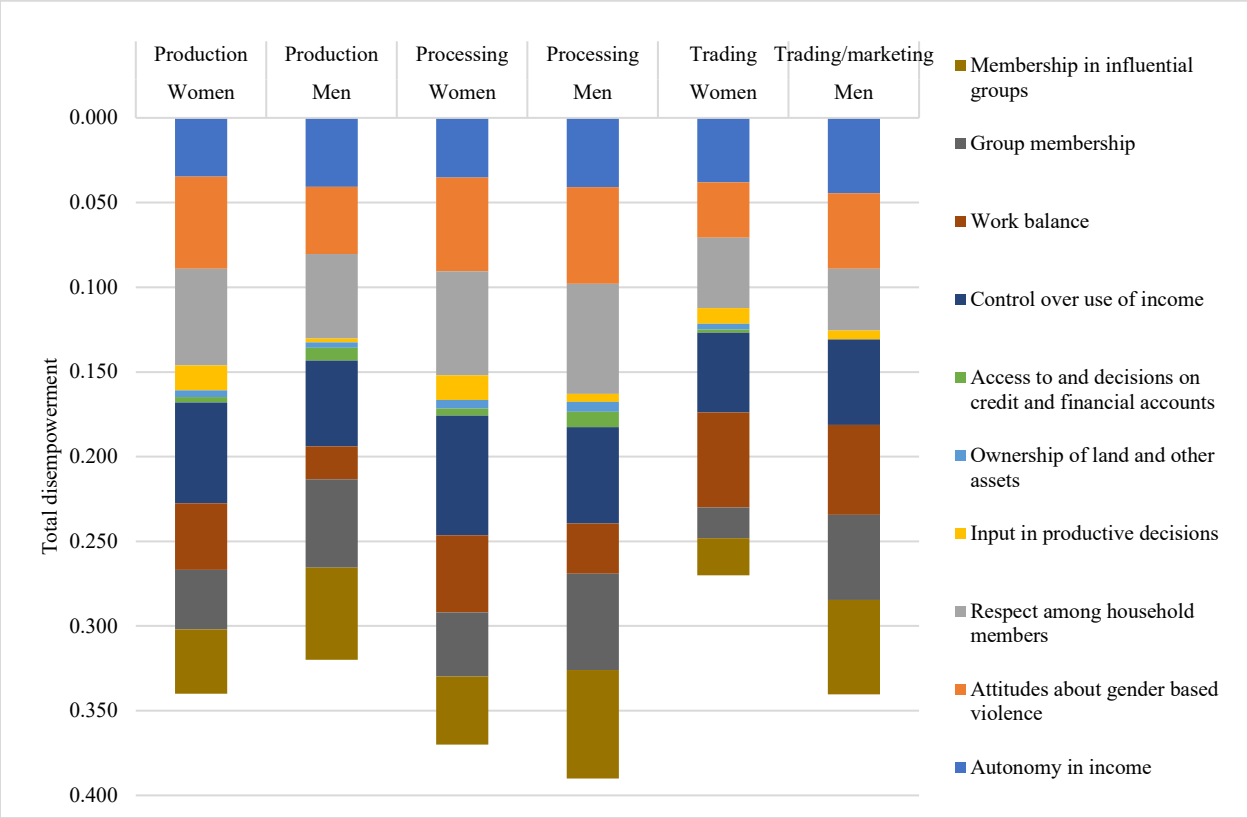
Source: IFPRI survey (2017). Note: [a] Asset index includes roof material, floor material, people per sleeping room, state of dwelling, type of toilet, source of water and drinking water, electricity, source of cooking fuel, and ownership of land, boats, fishponds, farm equipment, business equipment, consumer durables, cell phones, houses, and means of transportation. Asset index was calculated using principal components analysis.

Annex Figure 1. Level and contributors of disempowerment of women and men by nodes of the VC

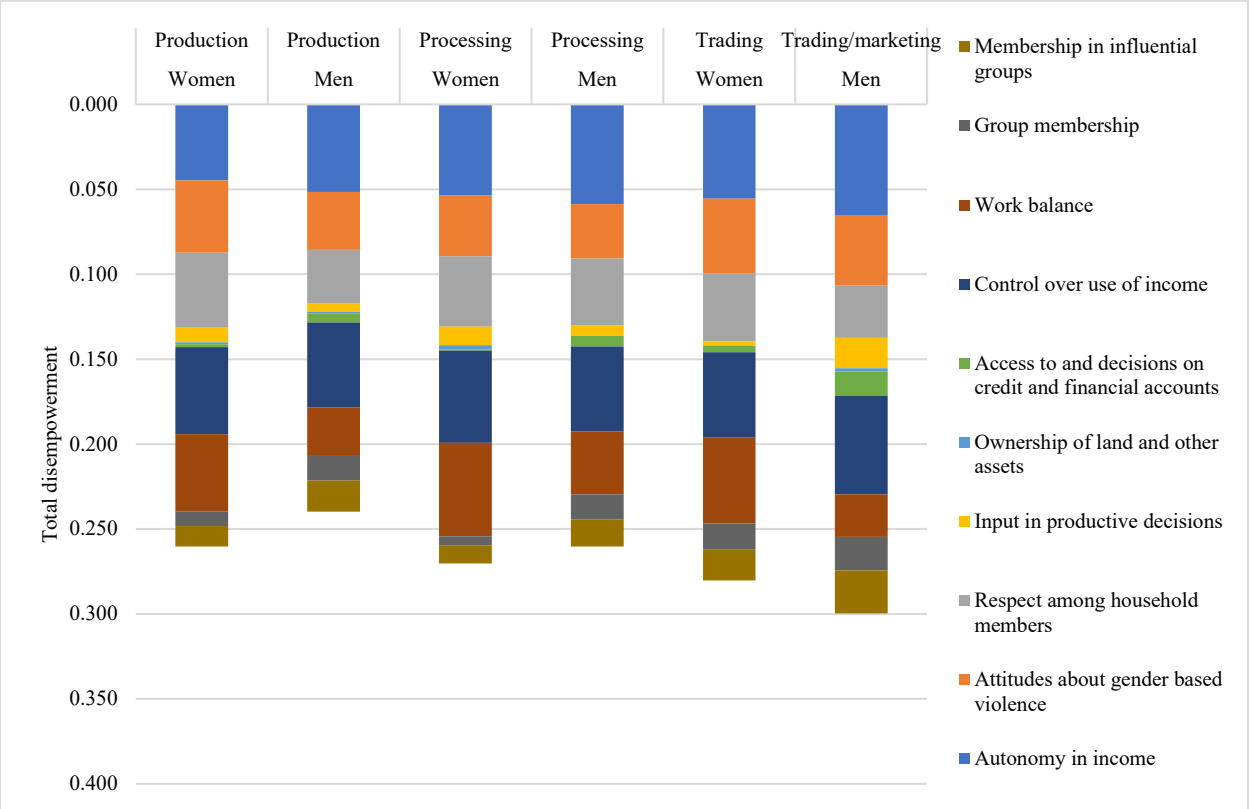
a. Abaca



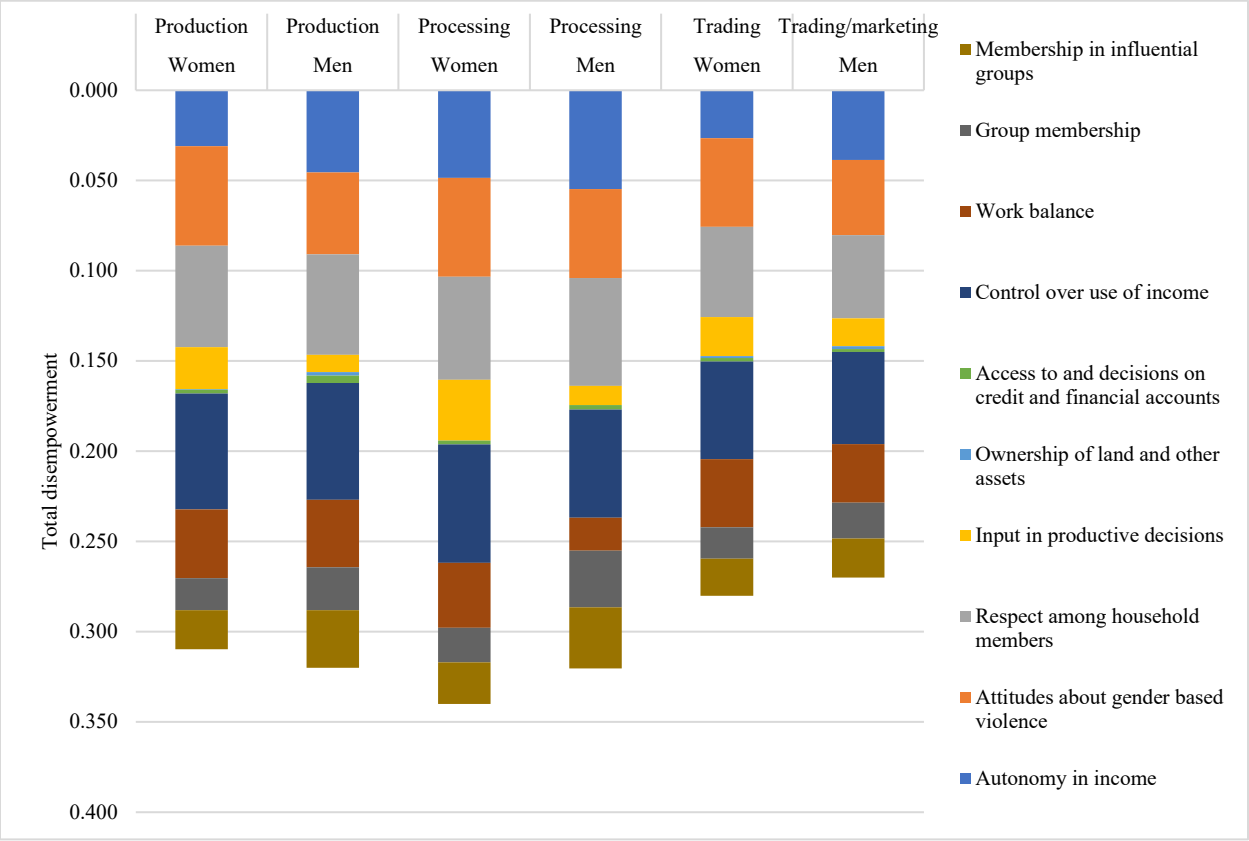
b. Coconut


Production Women
Production Men
Processing Women
Processing Men
Trading Women
Trading/marketing Men
Total disempowerment
0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
Membership in influential groups
Group membership
Work balance
Control over use of income
Access to and decisions on credit and financial accounts
Ownership of land and other assets
Input in productive decisions
Respect among household members
Attitudes about gender based violence
Autonomy in income

c. Seaweed


Production Women
Production Men
Processing Women
Processing Men
Trading Women
Trading/marketing Men
Total disempowerment
0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
Membership in influential groups
Group membership
Work balance
Control over use of income
Access to and decisions on credit and financial accounts
Ownership of land and other assets
Input in productive decisions
Respect among household members
Attitudes about gender based violence
Autonomy in income

d. Swine


Production Women
Production Men
Processing Women
Processing Men
Trading Women
Trading/marketing Men
Total disempowerment
0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
Membership in influential groups
Group membership
Work balance
Control over use of income
Access to and decisions on credit and financial accounts
Ownership of land and other assets
Input in productive decisions
Respect among household members
Attitudes about gender based violence
Autonomy in income

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