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

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ABSTRACT

Women's participation and empowerment in value chains are goals of many development organizations, but there has been limited systematic, rigorous research to track these goals between and within value chains (VCs). We adapt 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 and to investigate the correlates of empowerment. 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 relatively small gender gaps in the Philippines, persistent gender stereotypes influence men's and women's empowerment and VC participation.

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 (Barrientos et al., 2003; Maertens et al., 2011; Minten et al., 2009). Although tools and methods to analyze efficiency and profitability of VCs have long been a focus of VC analysis, only recently have equity and distributional impacts been analyzed. Many studies now explicitly address gender inequalities in value chain analysis (Getahun and Villanger, 2018; Rubin et al., 2019; Said-Allsopp and Tallontire, 2015; Van den Broeck et al., 2018) and the methodological 'toolbox' for gendered value chain

analysis is expanding (Mayoux and Mackie, 2009; Riisgaard et al., 2010, 2008; Rubin et al., 2009; Senders et al., 2012). Attention to gender issues 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. Studies illustrate that VCs may reach and benefit women, but also highlight how VCs may exacerbate gender inequalities (Bain, 2010; Dolan and Humphrey, 2000; Raworth and Kidder, 2009). In global agricultural VCs, standards and codes of conduct can help protect poor and marginalized VC employees and actors (Said-Allsopp and Tallontire, 2015). Nevertheless, VCs can be a lever for gender equality and women's empowerment, stemming from greater

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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.

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entrepreneurship and employment opportunities. For example, [Maertens and Verhofstadt \(2013\)](#) show that women's wage employment in the horticultural export sector improved 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 ([Arndt et al., 2011](#); [Atteraya et al., 2016](#); [Elmhirst et al., 2017](#); [Lyon et al., 2017](#); [Shackleton et al., 2011](#)). 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 workloads compared to men, constraining their capacity to engage and expand into higher value agri-enterprises that often require a minimum amount of resources and training ([Forsythe et al., 2016](#); [Handschuch and Wollni, 2016](#); [Meinzen-Dick et al., 2011](#); [Quisumbing et al., 2015](#)). Further, as commercialization intensifies, women may lose control to men over production and marketing ([Ashby et al., 2009](#); [Forsythe et al., 2016](#)). Synthesizing impact evaluations across eight agricultural development projects, [Johnson et al. \(2016\)](#) find that projects that target only women without involving men risk increasing women's work burdens and potential short-term backlash through increased intimate partner violence. These studies show that to inform VC development programs, we need to assess how men and women participate in and benefit from each node of VCs, and how their involvement impacts workload and empowerment.

Empirical studies, both quantitative and qualitative, show inconclusive results and trade-offs in women's participation, empowerment, wellbeing, and development outcomes. Many studies focus exclusively on women and on producers and laborers, with rare mention or analysis of men or of intermediary actors in the VC (e.g., processors, traders) ([Schumacher, 2014](#)). The ambiguity in assessing empowerment impacts also stems partly from the different definitions of empowerment and the lack of consistency in empowerment metrics. In this paper, we define empowerment 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](#)). An increasing number of VC studies attempt to operationalize empowerment using narrative and qualitative approaches ([Akter et al., 2017](#); [Forsythe et al., 2016](#); [Said-Allsopp and Tallontire, 2015](#); [Shackleton et al., 2011](#)). This paper contributes to this literature by using a sequential explanatory mixed methods study design to analyze and compare women's and men's empowerment along multiple stages of the VC—production, processing, and trading—in the abaca, coconut, seaweed, and swine value chains in the Philippines. These are focus commodities of development programs: abaca, coconut, and seaweed are export-oriented, while swine is a fast-growing VC supplying the local market. Initial qualitative interviews informed the survey design; we then adapted the survey-based project-level Women's Empowerment in Agricultural Index (pro-WEAI) ([Malapit et al., 2019a](#)) to quantify and compare women's and men's empowerment in these VCs. We also tested other survey modules not included in pro-WEAI to capture other possible constraints and sources of disempowerment in VCs. Finally, we conducted additional key informant interviews in the coconut and seaweed VCs to explain and add nuance to the quantitative results. To our knowledge, this paper is the first to measure, quantify, and compare women's and men's empowerment within and across different agricultural VCs using mixed methods.

Our quantitative and qualitative data allow us to explore and test several hypotheses about gender gaps in empowerment within these VCs. Our overarching hypothesis is that gender gaps in empowerment exist, but the nature and underlying correlates of these gaps differ across VCs and across VC nodes. We test the following specific hypotheses:

- (i) women are less empowered than men in this sample of VC participants in the Philippines;
- (ii) among VC participants, participation in different value chains is

- differentially associated with men's and women's empowerment;
- (iii) VC participants in higher nodes of the value chain (processing and trading) are more empowered than participants in the production node;
- (iv) socioeconomic factors, including wealth, livelihood sources, and education level, are associated with women's and men's empowerment; and,
- (v) access to external support, such as extension services and community programs, is positively associated with women's and men's empowerment.

Our data on both the primary woman and man within each household allow us to test the following hypotheses about intrahousehold inequality:

- (i) women's (men's) participation in non-farm activities and wage employment is negatively (positively) correlated to intrahousehold inequality;
- (ii) women's (men's) participation in the higher nodes of the VC (processing and trading) is negatively (positively) associated with intrahousehold inequality;
- (iii) socioeconomic factors are associated with intrahousehold inequality; poorer households and lower levels of education for women and men are associated with greater intrahousehold inequality; and,
- (iv) women's and men's relative access to external support, such as extension services and community programs, is negatively (positively) associated with greater intrahousehold inequality.

This paper is structured as follows. Section 2 presents the Philippine context, the focus VCs, data sources, and methods. Section 3 presents the results, including the levels of empowerment, sources of disempowerment, and individual and household-level correlates of empowerment and intrahousehold inequality. 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

In 2017, the Philippines was one of the fastest growing economies in Asia, with growth fueled mostly by exports. The movement of employment out of agriculture, sustained remittance receipts, and the government's conditional cash-transfer program contributed to poverty reduction ([World Bank, 2018](#)). However, the agriculture sector continues to underperform, with production contracting by 1.3 percent and shedding 0.5 million jobs in 2016 ([World Bank, 2016](#)). Typhoons, poor infrastructure, land-tenure issues, and other structural constraints limit agricultural productivity. Nevertheless, the agriculture sector, which employed 11.3 million people (30 percent of total employment) in 2015, remains central to achieving inclusive and sustainable growth in the country ([PSA, 2016](#)).

In 2012, women accounted for 16 percent of farm holders and operators and 28 percent of household members engaged in agriculture ([PSA, 2012](#)). In 2018, 14 percent of employed women worked in agriculture; while 30 percent of employed men worked in agriculture, and both have a declining trend ([PSA, 2019a](#)). 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. Women workers in rice, corn, sugarcane and coconut farms received 7–10 percent lower wages than men ([PSA, 2019b](#)). [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. Similarly, Briones (2019) shows a wage bias against women (i.e., wage difference for the same activity) at 21 percent. Overall, while Filipino culture is relatively egalitarian and exhibits greater gender equality in national statistics compared to its neighboring countries (WEF, 2019),² gendered stereotypes persist in households and workplaces that continue to affect women's and men's participation and roles in agricultural VCs.

This study focuses on abaca, coconut, seaweed, and swine VCs—all commodities with high potential for growth and interventions from government and partners, and therefore designated as “target VCs.”³ The study was undertaken to provide rigorous diagnostics to inform the design of a planned large government program to develop and promote greater inclusion in these 4 target VCs. The survey 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.⁴ 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, 2013). Coconut, swine, and seaweed are produced across the country and are major industries 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 (Fig. 1).

The target sample size for each province-commodity group was 200 households, totaling 400 households per commodity and 1600 households for the entire survey (Fig. 2); 1264 households and 2811 individuals were interviewed (see Appendix Tables B1 and B2). These households were distributed among 10 barangays in each of the two provinces for each commodity.⁵ 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 (PSA, 2016) and are also likely to have households engaged in other VC activities.

In each barangay, a minimum of 20 households were surveyed. Producers were selected based on a listing of producers provided by 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.⁶ A screening questionnaire (see Appendix D) was used to identify households that

² Out of 153 countries, the Philippines ranks 16th in the Global Gender Gap score globally, and ranks 2nd out of 20 countries in the East Asia and the Pacific region (WEF, 2019).

³ Consultations with the Philippine government informed the selection of commodities, provinces, and regions for data collection. See Malapit et al. (2019b) for background on the target commodities.

⁴ 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.

⁵ The barangay is the smallest unit of local government in the Philippines.

⁶ 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** – 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.

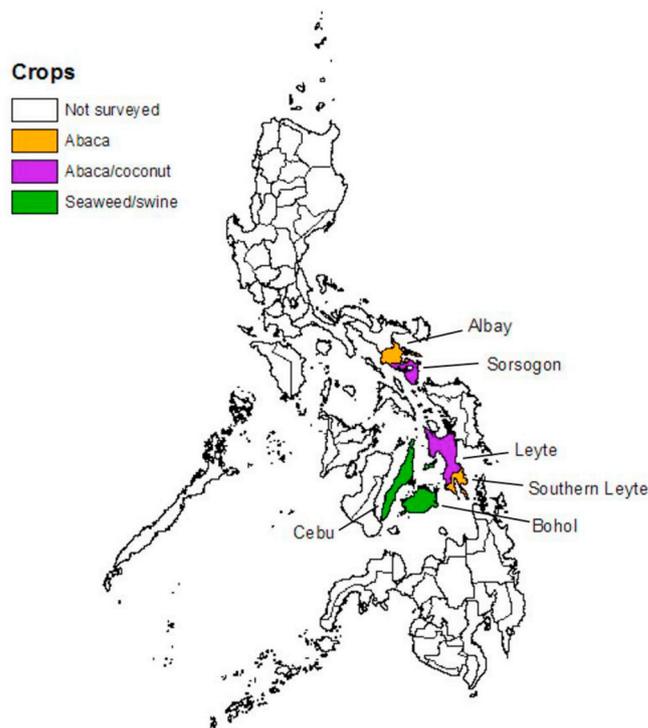


Fig. 1. Map of provinces and value chains surveyed. Source: Authors' illustration.

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]). Only households that selected one of the target VCs as their primary livelihood were included in the survey. All households sampled included at least one adult involved in one of the target VCs. The purposive sampling implies that we are unable to correct for selection into VCs.

2.2. Quantitative methodology

2.2.1. Measuring and comparing empowerment

We adapt the pro-WEAI, a survey-based tool to measure women's and men's empowerment and inclusion in agricultural development projects (Malapit et al., 2019a) to focus on aspects of empowerment relevant to VCs. Unlike other empowerment measures (e.g., based on Demographic and Health Surveys), which do not typically cover both men and women, WEAI-type tools allow for direct comparison between women and men in the same household. Pro-WEAI offers additional advantages: it has explicit links to empowerment theory, uses both quantitative and qualitative data to develop and validate the index, and was designed collaboratively with 13 agricultural development projects in Africa and South Asia to ensure that the components of the index are relevant for different project settings (Malapit et al., 2019a). To capture empowerment across VCs, we modified the activity categories in the pro-WEAI questionnaire to include separate questions for each target value chain. Additionally, we included questions about the empowerment and inclusion of women and men in multiple stages of the VC (see Appendix E). New indicators relevant to VCs that are not in pro-WEAI are included in this study. Given the importance of employment and labor issues in VCs, these include autonomy in type of wage 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

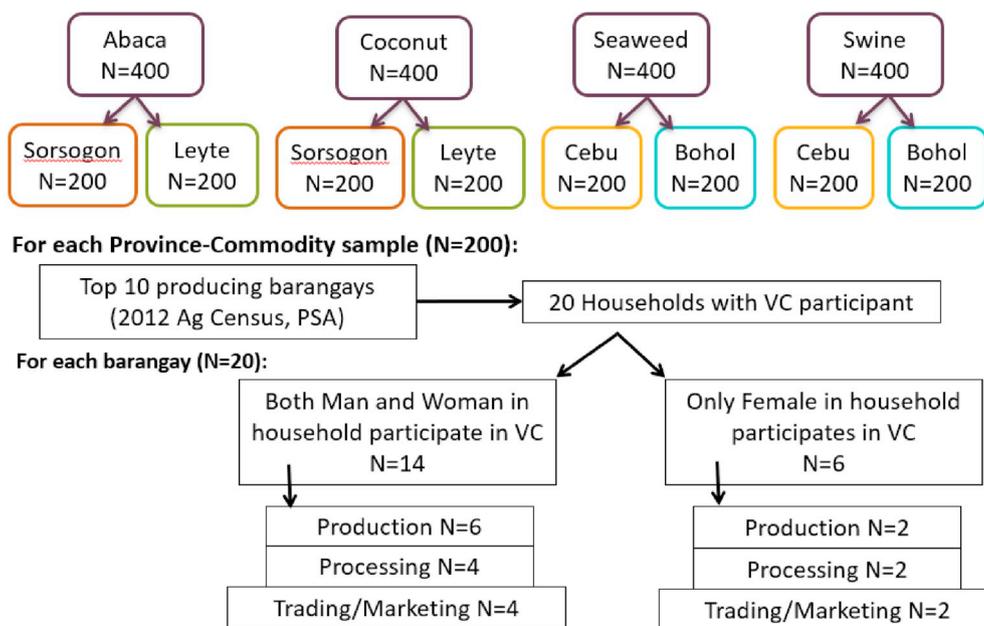


Fig. 2. Survey design.

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

the main VC.⁷

The index is comprised of two sub-indices: (1) the Three Domains of Empowerment index (3DE) and (2) 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 (Table 1). The GPI compares the achievements of women and men in the same household, aggregated for DHHs.

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 shorten the questionnaire and minimize survey costs. Visiting important locations was excluded because constraints on mobility were not deemed important by our local partners given Filipino women's greater freedom of movement compared to the South Asian countries where pro-WEAI has been collected. Table 1 provides the definitions and adequacy cut-offs for each indicator.

2.3. Identifying factors correlated with empowerment scores and gaps

We use regression analysis to examine the factors correlated with different empowerment outcomes at the individual and household level. At the individual level, we are concerned with empowerment of individuals i (*Empowerment*); at the household level, we analyze the difference between empowerment outcomes of the primary man and woman, which we broadly define as intrahousehold inequality of household j (*Intrahousehold Inequality*) (for DHHs, only).

⁷ One limitation of WEAI-based measures is its focus on agricultural livelihoods, so respondents who do not have agriculture-based livelihoods would be classified as disempowered. We address this limitation in this study by also including wage and salary employment but acknowledge that this measure is still rooted in an agricultural value chain.

2.3.1. Individual regressions

We analyze correlates of individual empowerment:

$$Empowerment_i = \beta'_{ind} X_i + \varepsilon_i \quad (1)$$

where X_i are individual- and household-level factors explaining *Empowerment* (details in Appendix Table B1)⁸; β'_{ind} is a vector of coefficients to be estimated; and ε_i are error terms to be estimated. Individual-level regressions are estimated separately for women and men. For these regressions, we are particularly interested in the coefficients of the main VC of the respondent (reference category = seaweed), the main activity (stage or node) in the VC (reference = production), socioeconomic factors, and access to extension and community programs.

We use seven individual empowerment outcome variables (*Empowerment*). The first two indicators measure overall empowerment:

- (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).

The remaining five indicators focus on empowerment regarding the main VC, extending beyond production:

⁸ The individual-level outcomes are regressed on the following variables (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.

Table 1

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

Source: Malapit et al., 2019a. The Philippines survey excluded self-efficacy and mobility with respect to visiting important locations; see explanations in the text. The remaining 10 indicators were weighted 1/10 each.

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: <i>Relative Autonomy Index</i> (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: <i>New General Self-Efficacy Scale</i> 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 h per day: Workload = time spent in primary activity + (1/2) time spent in childcare as a secondary activity
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 Visits least ONE location at least ONCE PER MONTH of [health facility, public meeting]
Collective Agency Domain	
Group membership	2) 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

- (3) autonomy in wage work, measured in terms of Relative Autonomy Index for the type of wage work the individual does (count variable, range = [1,7]);
- (4) autonomy in work conditions, measured in terms of Relative Autonomy Index for working conditions (count variable, range = [1,7]);
- (5) 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]);
- (6) input in decisions about the main VC (binary variable, 0/1); and,
- (7) control over the use of output and income from the main VC (binary variable, 0/1).

2.3.2. Household level regressions

We also analyze the correlates of intrahousehold inequality, measured at the household level:

$$\text{Intrahousehold Inequality}_j = \beta'_{hh} Z_j + \varepsilon_j \quad (2)$$

where Z_j are household-level factors explaining *Intrahousehold Inequality* (details in Appendix Table B2)⁹; β'_{hh} are coefficients to be

⁹ The household-level outcomes are regressed on the following variables (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

estimated; and ε_j are error terms. Household-level regressions are estimated for the subsample of households with both men and women respondents (i.e., DHHs). In the household regressions, we are particularly interested in the coefficients of the main VC of the man and woman respondents, the main activity (stage or node) in the VC of the man and woman respondents (reference category = production), socioeconomic factors, and access to extension and community programs.

We measured intrahousehold inequality as the difference between men's and women's empowerment scores (a continuous variable, from -1 to 1). A positive inequality score means that men are more empowered than women in the household, while a negative inequality score means that women are more empowered than men in the household. If gender equality is a desired outcome, the interpretation of regression coefficients using a continuous intrahousehold inequality variable would be ambiguous. Instead, we construct a categorical variable defined as: (i) whether the man is more empowered than the woman, (ii) whether the woman is more empowered than the man, or (iii) whether the man and woman achieve similar levels of empowerment). Using multinomial logit regressions, we estimate the likelihood that a man (or woman) is more empowered, relative to the excluded category where the man and woman are equally empowered.

(footnote continued)

in wage and salary employment, the main activity in the VC, and the main VC of the man and woman respondents within the household.

2.4. 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 was completed, another set of qualitative interviews was conducted (September–December 2017) to provide insights into 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 protocols¹⁰ in combination with gender and agricultural VC approaches (Rubin et al., 2009) to address specific concerns related to participation and benefits at different nodes of the coconut and seaweed VCs.¹¹ The qualitative study sample included a total of 40 respondents. Sixteen respondents, both men and women, had participated in the quantitative surveys and reflected a diversity of occupations, locations, and ages. Additional respondents were identified when a sufficient number of people who were quantitative survey respondents could not be found in the chosen locations. The sample also included an additional 24 interviewees including government officials, traders, larger processors, and other key informants. 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.

3. Results

3.1. Levels of empowerment

The adapted pro-WEAI shows that most women and men in all four VCs are disempowered (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 DHs, except in the swine VC (Table 2). Gender parity (GPI) was high in all four VCs.

Empowerment also varied within VCs, although the sample size for processing and trading nodes is small. In coconut, more women traders 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 (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. On the other hand, in swine, women and men traders were more empowered than producers and processors (Appendix Figure B2).

In all four VCs, more women and men respondents had adequate autonomy in their type of work and their working conditions than in

¹⁰ For more on pro-WEAI and other adaptations of the WEAI methodology since its launch in 2012, see Malapit et al. (2019a) and Meinzen-Dick et al. (2019).

¹¹ The qualitative interviews were carried out only among coconut and seaweed VC actors due to resource constraints. See Appendix F for qualitative themes and illustrative questions.

how they spend their income. However, most women and men respondents had control over how to use income and outputs from the focus 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.

Although it is common in the Philippines for married women to manage the household income, 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. One woman explained that her “husband gives his full trust in me. All his income is given to me. He trusts me fully because I'm good in handling money.” Furthermore, she stated “I can easily make a decision because I have money.” Nearly all respondents had input in decisions about their household's agricultural activities, except in the swine VC.

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. More men respondents than women respondents indicated it was never acceptable for an employer or landlord to hit a woman; and woman-only households have the lowest proportion indicating that it was never acceptable for an employer or landlord to hit a woman.

3.2. Contributors to disempowerment

We disaggregate pro-WEAI to examine the proportional contributions of each indicator to disempowerment for those respondents identified as disempowered (Fig. 4). Across all four VCs, lack of respect among household members and attitudes about GBV are large contributors to disempowerment for both women and men (Fig. 4). Lack of 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 (Fig. 4). For more details, Table 2 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, lack of work balance was a large contributor for women but less so for men. In the swine VC, lack of control over use of income was a large contributor to disempowerment for both women and men. In the coconut VC, inadequate control over use of income was a large contributor to disempowerment for women; lack of group membership and membership in influential groups were the largest contributors for men. In the coconut and abaca VCs, lack of group membership and membership in influential groups were much larger contributors to disempowerment for men than women.

3.3. Individual regressions: Correlates of empowerment

Regressions on individuals' empowerment status are estimated using logistic regression (Models 1–2 in Table 3) and on empowerment scores (Models 3–4) using fractional regression. Table 4 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 estimated using Poisson regression. Regressions on input in decisions and control over the use of outputs and income, both binary variables estimated using logistic regression, are found in Table 5.¹²

Women's and men's empowerment is positively associated with education, age, being married, access to extension services, and access

¹² Regression results in Tables 3–6 have slightly fewer number of observations due to missing values in some variables. In Table 4, the sample was restricted to those individuals who reported and participated in wage work, resulting in a smaller number of observations under autonomy in wage work and in work conditions. Pooled regression results are reported in Malapit et al. (2019b).

Table 2

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

Source: Authors' calculations. 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., 2019a). Empowerment score is the proportion of pro-WEAI indicators in which an individual is adequate. Pro-WEAI indicators are designated with an asterisk (*), defined in Table 1.

Indicator	Abaca		Coconut		Seaweed		Swine					
	DHH		WOH		DHH		WOH					
	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												
<i>Intrinsic agency</i>												
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
<i>Instrumental agency</i>												
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
<i>Collective agency</i>												
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

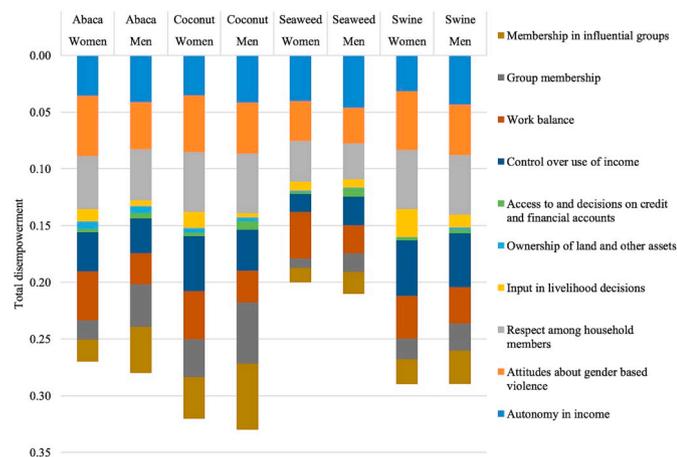


Fig. 4. Contributors to disempowerment of women and men by VC. Source: Authors' calculations.

to community programs and projects (Table 3), but some correlates of men's and women's empowerment differ. 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). Older women 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 processors may arise from their engagement in low-value and time-demanding processing activities in coconut and abaca and the poor work conditions in abatoirs. Women who are in the richest quintile have higher likelihood of being empowered than those in other asset groups. 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 involve greater autonomy than wage work.

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), probably due to the role of community projects in allocating seaweed plots and other resources. A much greater proportion of seaweed VC participants report access to other programs, including on agricultural inputs and agricultural livelihoods training programs compared to other VCs. The main program is the conditional cash transfer program (Pantawid Pamilyang Pilipino Program, 4 P), to which the majority of VC participants, except those in swine VC, have access. 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, owing to the current weak access to extension services, with only about 26–44 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. However, interviews with men and women seaweed VC participants reveal limited training in seaweed production or processing. Because farming is inherently risky, 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.

Education and extension services are more strongly associated with men's empowerment compared to women's. 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, in our study setting, the weaker

Table 3

Correlates of women's and men's empowerment.

Source: Authors' calculations. Models 1–2 were estimated using logit regression, and Models 3–4 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 < 0.10, ** p < 0.05, *** p < 0.01. † 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.

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

correlation of education to women's empowerment is likely attributable to the higher proportion of women who have completed secondary schooling or higher compared to men (Appendix Table B1), which is not

Table 4

Correlates of individuals' intrinsic agency indicators in main VCs.

Source: Authors' calculations; models are estimated using Poisson regressions for count data; see additional notes to Table 3.

	Autonomy in wages and work conditions		Autonomy in work conditions		Attitudes towards GBV by employer	
	Women	Men	Women	Men	Women	Men
Respondent is in awoman-only household (= 1)	0.036 (0.060)		0.041 (0.060)		-0.013 (0.041)	
<i>Asset/wealth quintile (reference = poorest) †</i>						
Quintile 2	0.093 (0.069)	-0.01 (0.059)	0.063 (0.068)	0.048 (0.058)	0.042 (0.043)	-0.008 (0.047)
Quintile 3	0.100 (0.076)	-0.020 (0.064)	0.023 (0.074)	0.058 (0.062)	0.025 (0.044)	-0.003 (0.050)
Quintile 4	0.025 (0.078)	0.028 (0.065)	0.008 (0.075)	0.041 (0.065)	0.019 (0.044)	0.001 (0.050)
Quintile 5	0.084 (0.079)	-0.071 (0.076)	0.030 (0.078)	0.078 (0.073)	0.047 (0.046)	0.008 (0.053)
Highest educational Level	0.018 (0.022)	0.026 (0.021)	0.037* (0.022)	0.005 (0.021)	0.026* (0.015)	0.015 (0.016)
Married (= 1)	-0.047 (0.060)	0.007 (0.059)	-0.014 (0.059)	-0.024 (0.057)	-0.003 (0.038)	0.009 (0.046)
Age (years)	0.000 (0.002)	-0.001 (0.002)	0.002 (0.002)	-0.002 (0.002)	-0.001 (0.001)	0.000 (0.001)
Access to extension (= 1)	-0.033 (0.045)	-0.002 (0.044)	-0.033 (0.045)	-0.013 (0.042)	0.005 (0.029)	-0.011 (0.033)
Access to community programs (= 1)	0.000 (0.061)	0.053 (0.050)	-0.052 (0.059)	0.071 (0.049)	0.022 (0.033)	0.026 (0.036)
Participates in non-farm (= 1)	0.005 (0.047)	-0.001 (0.047)	0.008 (0.046)	0.003 (0.045)	0.001 (0.029)	0.000 (0.034)
Participates in wage employment (= 1)					-0.002 (0.030)	0.006 (0.032)
<i>Main activity (reference = Production)</i>						
Processing	0.015 (0.049)	-0.102** (0.047)	0.009 (0.048)	0.024 (0.046)	-0.008 (0.031)	-0.012 (0.035)
Trading	0.144** (0.064)	-0.047 (0.062)	0.075 (0.064)	0.006 (0.060)	-0.014 (0.038)	0.004 (0.044)
<i>Main VC (reference = seaweed)</i>						
Abaca	0.061 (0.065)	0.055 (0.063)	0.033 (0.064)	0.003 (0.061)	-0.035 (0.040)	-0.025 (0.045)
Coconut	0.054 (0.070)	0.149** (0.065)	-0.002 (0.069)	0.043 (0.063)	-0.026 (0.041)	-0.020 (0.047)
Swine	0.006 (0.064)	0.047 (0.066)	0.069 (0.062)	0.093 (0.063)	-0.046 (0.040)	-0.044 (0.048)
Observations	433	514	429	515	1559	1169
Pseudo R-squared	0.008	0.008	0.007	0.004	0.002	0.001

unusual in the Philippines. Similarly, access to extension services seems to have weaker correlation with men's rather than 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. Even if education increases women's bargaining power within their households, it may be insufficient to change deeply-rooted societal attitudes. Many women respondents in the coconut and seaweed VCs wanted their daughters to get an education to obtain salaried employment in women-dominated sectors such as teaching, nursing, and clerical work. Thus, education may not improve outcomes that require transformation of gender relations such as agency, asset ownership and community participation. In Indonesia, for example, despite high national levels of

Table 5

Correlates of individuals' instrumental agency indicators in main VCs.

Source: Authors' calculations; models are estimated using logit regression for binary variables; see additional notes to Table 3.

	Input in decisions about main VC		Control over use of output from main VC		Control over use of income from main VC	
	Women	Men	Women	Men	Women	Men
Respondent is in a woman-only household (= 1)	0.023*** (0.006)		0.025* (0.014)		0.019 (0.018)	
Asset/wealth quintile (reference = poorest) [†]						
Quintile 2	0.002 (0.009)	0.002 (0.007)	0.008 (0.014)	0.002 (0.015)	0.009 (0.017)	0.019 (0.024)
Quintile 3	-0.003 (0.010)	0.007 (0.007)	0.025* (0.013)	-0.002 (0.016)	0.025 (0.017)	0.005 (0.026)
Quintile 4	0.015* (0.008)	0.013** (0.006)	0.033*** (0.013)	0.02 (0.013)	0.041*** (0.016)	0.019 (0.026)
Quintile 5	0.001 (0.011)		0.011 (0.016)	0.001 (0.017)	0.013 (0.020)	0.014 (0.028)
Highest educational Level	0.002 (0.004)	0.003 (0.004)	0.006 (0.006)	0.008 (0.006)	-0.001 (0.007)	0.019** (0.010)
Married (= 1)	0.011 (0.011)	-0.004 (0.007)	-0.002 (0.015)	-0.020* (0.011)	-0.012 (0.017)	-0.043** (0.020)
Age (years)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.001 (0.000)	0.000 (0.001)	0.002** (0.001)
Access to extension (= 1)	0.008 (0.007)	0.000 (0.007)	0.010 (0.011)	0.018 (0.011)	0.011 (0.014)	0.010 (0.018)
Access to community programs (= 1)	0.002 (0.008)	0.008 (0.008)	-0.003 (0.012)	0.018 (0.013)	0.007 (0.016)	0.080*** (0.023)
Participates in non-farm (= 1)	-0.007 (0.008)	-0.001 (0.007)	0.001 (0.012)	-0.005 (0.012)	0.006 (0.014)	0.000 (0.019)
Participates in wage employment (= 1)	-0.004 (0.008)	-0.011 (0.008)	-0.005 (0.013)	-0.013 (0.011)	-0.004 (0.015)	-0.001 (0.018)
Main activity (reference = Production)						
Processing	-0.006 (0.008)	0.005 (0.007)	-0.008 (0.013)	0.011 (0.011)	0.001 (0.015)	0.048*** (0.018)
Trading	0.010 (0.008)	-0.004 (0.011)	0.010 (0.015)	-0.029 (0.019)	0.047*** (0.014)	-0.014 (0.025)
Main VC (reference = seaweed)						
Abaca	-0.012 (0.015)	0.004 (0.009)	-0.085*** (0.032)	-0.026 (0.023)	-0.133*** (0.040)	-0.078** (0.036)
Coconut	-0.023 (0.018)	-0.002 (0.012)	-0.117*** (0.036)	-0.078** (0.032)	-0.297*** (0.050)	-0.084** (0.039)
Swine	-0.046** (0.022)	-0.007 (0.013)	-0.095*** (0.034)	-0.024 (0.024)	-0.153*** (0.043)	-0.125*** (0.041)
Observations	1561	944	1561	1170	1561	1170
Pseudo R-squared	0.077	0.084	0.062	0.077	0.113	0.069

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).

Factors associated with variations in the empowerment indicators differ across VCs and nodes along VCs. Men have generally lower autonomy in wage work and work conditions (Table 4); but are more empowered in terms of greater inputs in decisions about the main VC and stronger control over outputs than women (Table 5). There is no difference between women and men in terms of adequacy related to attitudes about GBV perpetuated by an employer and control over income (Table 4). 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 5).

VC-specific indicators for instrumental agency generally show high levels of adequate achievements, however, a greater proportion of women 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. Asset/wealth levels are also associated with greater inputs into decisions about the main VC and control over output and incomes by women (Table 5).

Men's control over use of output and income is highest in the swine

VC and lowest in the seaweed VC. For women, however, the highest controls are in the seaweed VC and the lowest in the coconut 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 5).

3.4. Household level regressions: Correlates of intrahousehold inequality

Table 6 shows that out of 1134 dual adult households, men and women are equally empowered in 664 (58.6%), women are more empowered in 240 (21.2%), and men are more empowered in 230 households (20.2%). Multinomial logit regressions allow us to examine the likelihoods of the man (woman) being more empowered relative to the excluded category, where they are similarly empowered. Results show that age and education have marginal effects that are small in magnitude. However, the marginal effects of men's and women's participation and access to public services and different types of employment often show opposite signs, which suggests offsetting associations between men's and women's access to services and achieving greater equality. Men's access to extension services increases the likelihood that the man is more empowered by 6.5 percent (and lowers the likelihood that the woman is more empowered by 9.6 percent), and therefore is correlated with greater likelihood of inequality. Women's access to extension services is associated with a 5.4 percent reduced likelihood

Table 6
Correlates of intrahousehold inequality (dual-adult households only), marginal effects.

Source: Authors' calculations; See additional notes to Table 3.

	Multinomial logit, base = households where woman and man are equally empowered	
	Whether man is more empowered (= 1)	Whether woman is more empowered (= 1)
<i>Asset/wealth quintile</i> [†] (reference = poorest quintile)		
Quintile 2	0.023 (0.038)	0.009 (0.037)
Quintile 3	0.061 (0.039)	0.031 (0.039)
Quintile 4	0.041 (0.040)	0.006 (0.040)
Quintile 5 (richest)	0.026 (0.043)	-0.027 (0.044)
Household size	-0.003 (0.006)	-0.005 (0.006)
Highest educational level of man respondent	0.009 (0.008)	-0.016** (0.008)
Highest educational level of woman respondent	-0.014* (0.008)	0.006 (0.008)
Age of man respondent (years)	0.002 (0.002)	-0.003 (0.002)
Age of woman respondent (years)	-0.003* (0.002)	0.000 (0.002)
Man respondent has access to extension services (= 1)	0.065*** (0.025)	-0.096*** (0.027)
Woman respondent has access to extension services (= 1)	-0.054** (0.027)	0.028 (0.027)
Man respondent has access to community programs (= 1)	-0.029 (0.028)	-0.042 (0.028)
Woman respondent has access to community programs (= 1)	0.069** (0.032)	-0.039 (0.031)
Man respondent participated in non-farm activities (= 1)	-0.064* (0.037)	0.001 (0.036)
Woman respondent participated in non-farm activities (= 1)	0.017 (0.035)	0.040 (0.035)
Man respondent participated in wage employment (= 1)	-0.048* (0.026)	-0.027 (0.026)
Woman respondent participated in wage employment (= 1)	-0.037 (0.029)	0.020 (0.028)
<i>Man's participation in different nodes of the VC (reference = production)</i>		
Processing	-0.034 (0.091)	-0.078 (0.086)
Trading	0.221** (0.095)	-0.049 (0.092)
<i>Woman's participation in different nodes of the VC (reference = production)</i>		
Processing	0.039 (0.091)	0.051 (0.087)
Trading	-0.232** (0.096)	0.034 (0.090)
<i>Main VC (reference = seaweed)</i>		
Abaca	0.047 (0.034)	0.031 (0.034)
Coconut	-0.022 (0.037)	0.004 (0.037)
Swine	0.043 (0.036)	-0.008 (0.037)
Constant	-0.491 (0.613)	0.688 (0.587)
Observations (total number of households)	1134	
<i>Households in which empowerment scores are equal (% of total)</i>	664 (58.6)	

Table 6 (continued)

<i>Households in which man is more empowered (% of total)</i>	230 (20.2)	
<i>Households in which woman is more empowered (% of total)</i>	240 (21.2)	
Adjusted R-squared		
Pseudo R-squared	0.036	0.036

that the man is more empowered, and therefore greater likelihood that men and women are equally empowered. Surprisingly, women's own access to community programs is associated with a 6.9 percent increased likelihood that the man is more empowered, whereas men's access to community programs does not appear to be significant. If extension services and community programs are targeted to specific individuals but run the risk of worsening gender inequality and 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 and wage employment (relative to agricultural production) is associated with a lower likelihood that he is more empowered relative to a condition of gender equality. Nonfarm work and wage employment may be relatively low-return sectors for men in these contexts. The node of the value chain also matters: men's participation in trading is associated with a higher likelihood of his being more empowered, whereas the woman's participation in trading is associated with a lower likelihood that the man is more empowered to a condition of gender equality. Participation in trading may involve more direct access to sales proceeds on higher value products, as well as more engagement with other market actors. Among the four value chains, participation in the abaca value chain is associated with a higher likelihood of the man being more empowered, relative to a condition of gender equality.

3.5. Robustness checks

We explored the robustness of our results with respect to empowerment cutoffs, weighting, and estimation methods. We first investigated the sensitivity of the empowerment score with respect to the use of different cut-offs. A respondent is considered empowered if s/he is adequate in at least 75 percent of the pro-WEAI indicators. In this sample, the rank of empowerment scores (3DE) by gender and value chain (Kendall's Tau-b = 1.000) and by gender, value chain, and value chain role (Kendall's Tau-b = 1.000) is robust to different empowerment cutoffs, or different numbers of adequate indicators required to be considered empowered (see Appendix Tables C1 and C2). The rank of empowerment scores by gender and value chain (Kendall's Tau-b = 0.857) and by gender, value chain, and value chain role (Kendall's Tau-b = 0.841) is also robust to two different indicator weighting schemes: equal weights by indicator and equal weights by domain, where indicators are weighted equally within each domain (see Appendix Tables C4 and C.5). Moreover, correlations of dimensions are weak, indicating that there is no over-emphasis or over-weighting of some of the dimensions. The lack of correlation also indicates that the dimensions are complementary, rather than being duplicates or substitutes, adding to our confidence that they are capturing different aspects of empowerment.

Finally, we explored robustness to the choice of estimation procedure. For the binary outcome variables, results using the logistic and the probit model are similar. Ordinary least squares regressions, tobit, and fractional regression models yield similar results. Using Poisson and negative binomial models for count data also generate similar results. Estimation results are robust to the inclusion of additional regressors, to the specification of asset (tercile vs. asset index) and

education variables (categorical vs. continuous variables), and the inclusion of municipality or province fixed effects. These alternative specifications yield similar coefficients and did not change the interpretation of key variables of interest.

4. Discussion

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

Filipino culture is gender-egalitarian in comparison to other Asian nations, confirmed by our quantitative results showing relatively high gender parity and small empowerment gaps. Our qualitative results however suggest that gender stereotypes do influence the division of labor and time use. For example, while women and men both participate in seaweed production and processing, their activities are closely associated with gendered domestic responsibilities, as well as stereotypes about appropriate work for both genders based on perceptions about physical capabilities and status. Women are considered more skilled in tying, and typically tie seaweed strips, divide plants into seedlings, plant seedlings, and dry seaweed. This work can be scheduled around domestic work and done near the homestead. Women report 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 under a hot sun for the whole workday. Men only tie knots when they are too old (or too young) to work in a boat. However, both boys and girls learn to swim and tie knots, so these explanations seem inadequate. 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 250–300 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. Some women producers are also micro-entrepreneurs, making and selling handicrafts such as brooms and jewelry, as well as food and cosmetic products. Fewer women than men are positioned at the higher end of the chain in bulking (aggregating) and transporting the copra to larger buyers or directly to the processing mills. Although informants say women can perform most tasks in coconut production and processing, the clear preference for sex-segregated work 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 attributed to 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 some agricultural VCs associated with greater empowerment?

Even in VCs where empowerment is higher, inequities persist. Overall empowerment scores of both women and men, for example, are

highest in the seaweed VC. 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; 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 (Jain, 2006; Macabuac, 2005). Vandergeest et al. (2009) 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 limit the empowerment potential of agricultural VCs. For instance, our results show that participation in groups and associations is high, except in the coconut VC (Table 2). Interviews revealed several explanations for the limited participation in associations in the coconut VC. 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. Also, coconut farms are almost always 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; 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 aspired to work 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 (often intercropping with coconut palms), or raising pigs. Some women in the seaweed and coconut VCs aspired to put up their own neighborhood (*sari-sari*) store. These stated aspirations reflect the limits of purely agricultural VCs in improving welfare. Similarly, most households augment income and cope with risk by diversifying their livelihoods beyond agriculture, suggesting that nonagricultural jobs may be more lucrative or stable.

4.3. Are higher VC nodes associated with greater empowerment?

Both qualitative and quantitative results suggest that individuals engaged in higher VC nodes, such as trading, express a stronger sense of empowerment. 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 (Appendix Figure B2). 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.

Many development researchers and practitioners argue that entrepreneurship is key to empowering poor rural women, but it is not for everyone. One must consider the type and scale of the enterprise, the level of startup and scale-up capital needed, and both men's and women's perceptions around the appropriateness of women for the work in terms of mobility, interaction with strangers, and alignment with domestic responsibilities. Concerns around the perceived or real risk of gender-based violence may also limit women's interest in pursuing entrepreneurship.

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 engaged in the VC primarily to augment family income while also fulfilling domestic responsibilities; some Filipino authors have called this a double burden (Liwag et al., 1998). Work balance (or lack thereof) is most disempowering among women processors and traders in abaca, coconut and seaweed VCs (Appendix Figure B2), 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, facilitation 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. While the Philippines exhibits greater gender equality compared to other neighboring countries and globally (WEF, 2019), 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 in magnitude by VC, suggesting that interventions intended to empower women should be tailored by VC.

Some of the same gender issues exist across VCs, highlighting the need to address deeply-rooted, structural gender and social norms 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., 2018). Social networks can 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.

CRedit authorship contribution statement

Hazel Malapit: Conceptualization, Methodology, Investigation, Writing - original draft, Writing - review & editing, Supervision, Project administration, Funding acquisition. **Catherine Ragasa:** Conceptualization, Methodology, Formal analysis, Writing - original draft, Writing - review & editing. **Elena M. Martinez:** Software, Validation, Formal analysis, Data curation, Writing - original draft, Writing - review & editing, Visualization. **Deborah Rubin:** Conceptualization, Methodology, Investigation, Writing - original draft, Writing - review & editing. **Greg Seymour:** Conceptualization, Methodology, Writing - review & editing. **Agnes Quisumbing:** Conceptualization, Methodology, Investigation, Writing - original draft, Writing - review & editing, Supervision, Funding acquisition.

Declaration of competing interest

The authors declare that they have no conflicts of interest.

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Appendix A. Supplementary data

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