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RESEARCH PROGRAM ON Agriculture for Nutrition and Health
CGIAR
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IFPRI Discussion Paper 01957

August 2020

Designing for Empowerment Impact in Agricultural Development projects

Experimental Evidence from the Agriculture, Nutrition, and Gender Linkages (ANGeL) Project in Bangladesh

Agnes Quisumbing

Akhter Ahmed

John Hoddinott

Audrey Pereira

Shalini Roy

Poverty, Health, and Nutrition Division

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

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AUTHORS

Agnes Quisumbing (a.quisumbing@cgiar.org) is a Senior Research Fellow in the Poverty, Health, and Nutrition Division of the International Food Policy Research Institute (IFPRI), Washington, DC.

Akhter Ahmed (a.ahmed@cgiar.org) is a Senior Research Fellow in IFPRI's Poverty, Health, and Nutrition Division, and IFPRI's Country Representative, Dhaka, Bangladesh.

John Hoddinott (jfh246@cornell.edu) is the H.E. Babcock Professor of Food and Nutrition Economics and Policy at Cornell University, Ithaca, NY.

Audrey Pereira (audreylpereira@gmail.com) was a Senior Research Analyst in IFPRI's Poverty, Health, and Nutrition Division when she wrote this work. She is currently a Ph.D. candidate in Public Policy at the University of North Carolina, Chapel Hill, NC.

Shalini Roy (s.roy@cgiar.org) is a Research Fellow in IFPRI's Poverty, Health, and Nutrition Division, Washington, DC.

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ABSTRACT

The importance of women's roles for nutrition-sensitive agricultural projects is increasingly recognized, yet little is known about whether such projects improve women's empowerment and gender equality. We study the Agriculture, Nutrition, and Gender Linkages (ANGeL) pilot project, which was implemented as a cluster-randomized controlled trial by the Government of Bangladesh. The project's treatment arms included agricultural training, nutrition behavior change communication (BCC), and gender sensitization trainings to husbands and wives together – with these components combined additively, such that the impact of gender sensitization could be distinguished from that of agriculture and nutrition trainings. Empowerment was measured using the internationally-validated project-level Women's Empowerment in Agriculture Index (pro-WEAI), and attitudes regarding gender roles were elicited from both men and women, to explore potentially gender-transformative impacts. Our study finds that ANGeL increased both women's and men's empowerment, raised the prevalence of households achieving gender parity, and led to small improvements in the gender attitudes of both women and men. We find significant increases in women's empowerment scores and empowerment status from all treatment arms but with no significant differences across these. We find no evidence of unintended impacts on workloads and we note inconclusive evidence of possible increases in intimate partner violence (IPV). Our results also suggest some potential benefits of bundling nutrition and gender components with an agricultural development intervention; however, many of these benefits seem to be driven by bundling nutrition with agriculture. While we cannot assess the extent to which including men and women within the same treatment arms contributed to our results, it is plausible that the positive impacts of all treatment arms on women's empowerment outcomes may have arisen from implementation modalities that provided information to both husbands and wives when they were together. The role of engaging men and women jointly in interventions is a promising area for future research.

Keywords: women's empowerment; gender norms; nutrition-sensitive agriculture; randomized controlled trial; Asia; Bangladesh

ACKNOWLEDGMENTS

We acknowledge funding from the United States Agency for International Development (USAID) through the Policy Research and Strategy Support Program (PRSSP) in Bangladesh under USAID Grant Number EEM-G-00-04-00013-00; the Gender, Agriculture, and Assets Project – Phase 2 (GAAP2), supported by the Bill & Melinda Gates Foundation through INV-008977; and the CGIAR Research Program on Agriculture for Nutrition and Health (A4NH). We thank Md. Zahidul Hassan and his colleagues at Data Analysis and Technical Assistance for excellent data collection and continued engagement in developing the pro-WEAI instrument. The usual disclaimers apply.

1. INTRODUCTION

The literature on agricultural and nutrition linkages has long recognized the important role of women in attaining good health and nutritional status of their household members (Ruel and Alderman 2013, Kadiyala et al. 2014). In the framework proposed by Ruel and Alderman (2013), three of the six agriculture-nutrition pathways focus on women's roles, and one pathway specifically identifies women's status and empowerment as a key determinant of nutrition. The lessons emerging from this literature have influenced the design and implementation of nutrition-sensitive agricultural projects (Ruel, Quisumbing, and Balagamwala 2018). Increasingly, such projects have gone beyond focusing only on women, taking gender relations into account and deliberately including programming that recognizes women's and men's different roles in providing for their households' food security and nutrition (Malapit et al. (2019). However, the extent to which these projects empower women and improve gender equality remains unclear.

There are several reasons why this evidence base is weak. Although many project designs claim that they seek to empower women, most do not distinguish whether their projects do so, or simply reach (i.e. encourage participation) and benefit them (Johnson et al. 2018). While reach and benefit are frequently evaluated, whether these projects have empowered women often remains unaddressed. Moreover, proponents of gender-transformative approaches (e.g. Wong et al. 2019) argue that focusing only on factors affecting an individual woman's empowerment, without aspiring to transform gender norms, fails to address the foundations of gender inequity and unequal power relations. These gender-transformative aspects are often not assessed in research on agricultural development projects.

Second, measurement issues make it difficult to assess whether defined objectives relating to empowerment are achieved. Even if projects aim to empower women or transform gender norms, the absence of a common quantitative metric for women's empowerment makes it difficult to evaluate the impact of these projects in a comparable manner (Brody et al. 2017). Although qualitative studies have yielded valuable insights into what aspects of these projects empower women, generalizing these findings

beyond their specific context to inform decisions about adapting and scaling up programs is challenging. In addition, many studies use measures that rely only on data collected from women, making it impossible to ascertain the impact on men. For many objectives related to empowerment – such as changing gender norms – assessing effects on men is critical. Moreover, little is known about whether increases in women's empowerment occur at the expense of men's empowerment, which cannot be assessed if men's empowerment is not measured.

Third, additional challenges relate to understanding the role of program design. Agricultural projects that account for gender relations often engage only with women. It is likely that engaging with men may also be important to affect empowerment outcomes; however, the evidence base is thin. Moreover, many nutrition-sensitive agricultural projects that also have gender-related objectives implement bundled strategies. This makes it difficult to tease out the differential or additive effect of strategies that aim to empower women or change gender norms (Ruel, Quisumbing, and Balagamwala 2018). A specific knowledge gap exists on the extent to which women's involvement in agricultural projects alone can improve their empowerment relative to additional programming, and to what extent additional programming needs to be aimed specifically at improving gender relations.

This paper seeks to redress these gaps by providing evidence from a randomized controlled trial (RCT) of a gender- and nutrition-sensitive agricultural project in Bangladesh, the Agriculture, Nutrition, and Gender Linkages (ANGeL) project. ANGeL's treatment arms provided agricultural training, nutrition behavior change communication (BCC), and gender sensitization trainings to husbands and wives together, thus engaging men alongside women. The randomly assigned treatments were designed to be additive, allowing the impact of additional nutrition and gender sensitization trainings to be distinguished from the impact of agricultural training. We assess impact using the project-level Women's Empowerment in Agriculture Index (Pro-WEAI) (Malapit et al. 2019). Pro-WEAI is based on information collected from both women and men within a household, allowing both men's and women's empowerment to be assessed. We assess the impact of ANGeL's treatment arms on (1) women's and men's empowerment, as well as

household gender parity; (2) women's and men's attitudes towards gender norms (that is, were impacts gender transformative); and (3) unintended consequences, namely changes in women's and men's workloads or changes in intimate partner violence (IPV).

2. STUDY DESIGN[1]

2.1 Study design

ANGeL aimed to assess interventions that can leverage agricultural growth to increase farm household incomes, improve nutrition, and enhance women's empowerment in Bangladesh. There were three types of interventions:

1) *Nutrition Knowledge:* Conducting high-quality behavior change communication (BCC) to improve nutrition knowledge of women and men.
2) *Agriculture Production:* Facilitating the production of the high-value food commodities that are rich in essential nutrients.
3) *Gender Sensitization:* Undertaking gender sensitization activities that lead to the improvement in the status/empowerment of women and gender parity between women and men.

Accordingly, we implemented a clustered randomized controlled trial with the following arms:[2]

T-N: Nutrition Behavior Change Communication (BCC)

T-A: Agricultural Production training

T-AN: Agricultural Production training and Nutrition BCC

T-ANG: Agricultural Production training, Nutrition BCC, and Gender Sensitization

C: Control

[1] This section draws on the draft impact report by Ahmed et al. (2018).

[2] There was an additional nutrition BCC treatment arm that used community women rather than agricultural extension agents (AEAs) to deliver the nutrition intervention. It is not used in this analysis, both because of less practical relevance (the Ministry of Agriculture plans to use its nationwide agricultural extension workforce to expand ANGeL across the country) and because it was not part of the bundled interventions that we compare to understand additive effects. We present impacts of nutrition BCC delivered by community women in Appendix Table 6, in the column labeled T2-N.

Helen Keller International (HKI) developed the curriculum and materials for the agricultural production training in collaboration with the Bangladesh Agricultural Research Institute (BARI) and the Bangladesh Rice Research Institute (BRRI). HKI developed the curriculum and training materials for the nutrition BCC with the Bangladesh Institute of Research and Training on Applied Nutrition (BIRTAN) and IFPRI. HKI also trained sub-assistant agricultural officers (SAAOs), henceforth agricultural extension agents (AEAs), belonging to the Department of Agricultural Extension, Ministry of Agriculture, Government of Bangladesh. The AEAs implemented the nutrition and agricultural production treatment arms. A unique aspect of ANGeL was that male and female beneficiaries (usually husbands and wives) were trained together across all intervention arms over the full duration of the study.

The stand-alone nutrition treatment arm (T-N) consisted of 19 sessions held over a 17-month period. Each session lasted approximately 1.5 hours. Topics covered included an introduction to the functional roles played by different types of foods, the importance of a balanced diet, micronutrients (vitamin A, iron, iodine, and zinc) and sources of food containing these, age-appropriate complementary foods, optimal breastfeeding practices, maternal nutrition and care, safe food preparation and preservation, hygiene, and handwashing. Sessions included lectures, interactive discussions, games, and cooking demonstrations.

Stand-alone agricultural production training (T-A) consisted of 17 sessions held over a 17-month period. Each session lasted approximately 1.5 hours. Topics covered an introduction to the cultivation of high-value crops (fruit and vegetables), using crop calendars to design a year-round system of cultivation, preparation of small plots and homestead gardens, water, pest and fertilizer management, harvest techniques, post-harvest storage, and marketing. Raising poultry and small stock (sheep and goats) was also discussed, with attention to breed selection, feeding, vaccination and diseases. Training consisted of introductory lectures, practical demonstrations, and interactive question and answer sessions. Particular care was taken to ensure that both men and women were active participants in these sessions.

The agricultural production and nutrition training (T-AN) covered all material found in the T-N and T-A treatments. There were 36 sessions held over a 17-month period. Each session lasted approximately 1.5 hours.

Agricultural production, nutrition, and gender sensitization (T-ANG) included all material covered in the T-AN treatment arm. For the agriculture and nutrition components, husbands and wives took part in 36 sessions held over a 17-month period with each session lasting approximately 1.5 hours. In addition, there were eight sessions on gender sensitization. These sessions, which were based on HKI's *Nurturing Connections* curriculum (Helen Keller International Bangladesh 2017) and facilitated by staff hired by HKI, consisted of a set of structured activities that aimed to improve intra-family respect, appreciation, and communication, and improve negotiation skills, to influence women's empowerment. Recognizing that women's empowerment is influenced by other household members, this intervention arm included key household decisionmakers and influencers such as husbands and mothers-in-law as participants in the gender sensitization training sessions.

Approximately 90% of all participants reported that training sites were situated within one kilometer from their homes. Lecture-style training was typically held either in meeting rooms or in open courtyards. Each participant received a small stipend (125 Taka) to cover incidental costs associated with attending each training session, or 250 Taka per household per session, if both husband and wife participate.

We received permission from the Ministry of Agriculture, Government of Bangladesh who issued Letters of Authorization to conduct the surveys described below. The surveys received ethical approval from the Institutional Review Board of the International Food Policy Research Institute, Washington DC (IRB approval number 00007490). The study was registered on the Registry for International Development Evaluations (RIDIE-STUDY-ID-5afbe43292b4c).

2.2 Sampling, sample size and survey administration

We aimed to construct a sample size that gave an 80% chance of rejecting the null hypothesis of zero change in outcome indicators at the 0.05 level of significance. Our parameters for our empowerment indicator were taken from the Bangladesh Integrated Household Survey (BIHS), which is statistically representative of national rural Bangladesh, conducted in 2011/2012. These showed that, relative to the control group, 25 clusters and 500 households were needed in each treatment arm to detect a 10% increase in empowerment.

Based on these calculations, we next identified rural upazilas (sub-districts) that were agro-ecologically suitable for crop diversification and had good market connectivity. From a list of 484 such upazilas, we purposely selected 16 located in all regions of Bangladesh. Each upazila is divided into a number of "blocks"; each block has a sub-assistant agricultural officer (SAAO) (i.e. AEA). There were 525 blocks in these 16 upazilas. We randomly selected 10 blocks from each upazila, yielding 160 blocks. These were randomly assigned as follows: 25 blocks to each treatment arm described above; 35 blocks to the control group; and 25 blocks to the second BCC intervention described in footnote 3. We randomly selected one village from each block, then conducted a 100% census of households in each of the 160 selected villages. Thereafter, we listed all farm households with at least one child under 24 months from the village census lists. We randomly selected 25 farm households for each of the 160 blocks from village census lists of farm households with at least one child under 24 months, because child nutrition was also an outcome of interest. This yielded 625 households in each treatment arm (2,500 households in total) and 875 households in the control group, for a total sample of 3,375 households.

Baseline data were collected between November 2015 and January 2016. Endline data were collected between January and March 2018. In each household, both the primary female beneficiary and primary male beneficiary were interviewed. Topics covered included household demographic composition, assets and wealth, agricultural production, consumption and expenditures, food security indicators, diet data, anthropometry, women's status and decision-making autonomy, IPV, and data needed to construct

the Women's Empowerment in Agriculture Index (WEAI). Several modules related to empowerment, gender attitudes, and IPV were administered only at endline. In the case of empowerment, the pro-WEAI (see below) was administered at endline but was not available at baseline as it was still under development; instead, at baseline, the abbreviated WEAI (A-WEAI, see Malapit et al. 2017) was fielded. In the case of gender attitudes and IPV questions, these were motivated in part by the *Nurturing Connections* curriculum, which was made available after baseline, thus were included only at endline.

3. DATA, DESCRIPTIVES, ATTRITION AND BALANCE

3.1 Outcome variables

Our measure of women's empowerment at endline is the pro-WEAI, an additive and decomposable index based on the Alkire-Foster methodology (Malapit et al. 2019). Pro-WEAI is based on a weighted adequacy count across 12 indicators. The 12 indicators attempt to measure three types of agency corresponding to the domains of intrinsic agency, instrumental agency, and collective agency. The indicators of intrinsic agency comprise autonomy in income, self-efficacy, attitudes about IPV against women, and respect among household members. Instrumental agency indicators include input in productive decisions, ownership of land and other assets, access to and decisions on financial services, control over use of income, work balance, and visiting important locations. Finally, the collective agency domain includes two indicators: group membership and membership in influential groups. For each of these indicators, individuals are classified as adequate or inadequate based on pre-determined thresholds used in the pro-WEAI. The pro-WEAI is composed of the 3DE sub-index (three domains of empowerment, the pro-WEAI analogue of the five domains of empowerment (5DE) in the WEAI), which measures the extent and depth of empowerment, and the Gender Parity sub-index, which measures gender parity between women and men in the same household. We note that A-WEAI can be computed from pro-WEAI data, albeit with a different weighting scheme and different adequacy thresholds. Appendix Table 1 provides additional information on the pro-WEAI domains, how they are measured, and how they compare with the

A-WEAI domains.

To assess overall empowerment, we use: (1) the individual empowerment score, defined as the weighted sum of the 12 pro-WEAI indicators; this score ranges from 0-1; and (2) the individual's empowerment status, which classifies an individual as empowered if his or her empowerment score is greater than or equal to 75% of the weighted sum of the 12 binary pro-WEAI indicators. Because the empowerment score may not be monotonic in all the 12 indicators, in an appendix, we also analyze impacts on the component indicators; for example, it is possible that ANGeL may increase women's input into productive decisions but also increase workload. In addition to individual empowerment, we are also interested in gender parity. After calculating an empowerment score for the woman's partner, we can classify a household as *achieving gender parity* if the woman is empowered, based on the above definition, or if she achieves at least the same empowerment score as her partner; thus, gender parity is a binary indicator at the household level.

Because one of the treatment arms (T-ANG) explicitly aimed to change attitudes towards gender and relationships through its gender sensitization programming, and because men's and women's attitudes could also have changed simply through participating in agricultural or nutrition training with their spouses, as described above, a module was added to the endline survey that aimed to capture men's and women's degree of agreement with statements related to attitudes. These statements were based on the content of the *Nurturing Connections* curriculum (HKI Bangladesh 2017). Respondents were asked about their extent of agreement with the statements using a five-point scale, where 1 is "strongly disagree" and 5 is "strongly agree." Statements were phrased so that they did not always reveal "positive" or more transformative gender attitudes; specifically, these were written so that agreement would be "better" for some statements while disagreement would be "better" for others. Using responses collected separately from women and men, we construct a gender attitudes composite score, which ranges from 1 to 45 and is the sum of the nine statements recoded so that a higher score is associated with more gender-equitable attitudes. In an appendix, we also assess responses to the individual statements.

Lastly, it is possible that these new agricultural activities or discussions surrounding gender could lead to unintended consequences. One possibility could be changes in men's or women's workloads. There is concern that increasing women's involvement in agricultural development projects could increase women's workload in both productive and reproductive work. Nutrition-sensitive agricultural interventions may fail to improve nutritional outcomes if they do not consider time constraints, particularly of rural women who spend a substantial portion of their time in agriculture (Johnston et al. 2018). On the other hand, messaging in the gender sensitization component of ANGeL could have encouraged men to help with household chores that were typically performed by women, leading to a reallocation of workloads. To assess this issue, at endline, we measure women's and men's workloads using the 24-hour recall module in pro-WEAI.

Another unintended consequence of ANGeL could be changes in relationship conflict. A possible area of concern is that agricultural development projects that attempt to empower women and change gender norms may lead to male backlash, including increases in IPV. On the other hand, it is possible that ANGeL's components could have improved spousal relationships or reduced economic insecurity and thus improved emotional well-being of household members, leading to reduced IPV. To measure these effects, at endline, we include questions drawn from the internationally validated standardized IPV modules in the WHO Violence Against Women instrument (Ellsberg and Heise 2005). The modules ask behaviorally specific questions on a range of abusive acts, a technique shown to maximize disclosure (Ellsberg et al. 2001). Modules were administered following the WHO protocol on ethical guidelines for conducting research on women's experiences of IPV (World Health Organization 2001). Interviewers were adequately trained; women's informed consent, privacy during interviews, and confidentiality were ensured; only one woman per household was interviewed about experiences with IPV so that other members were not aware this topic was part of the survey; and referrals to a national domestic violence hotline were provided to women disclosing IPV. Female enumerators administered modules on two types of IPV: emotional (4 questions) and physical (6 questions). For each act of violence, women were first asked if their current husband had

ever done this. If they reported "yes," they were asked if it had occurred in the past 6 months and with what frequency (once = 1, a few times = 2, many times = 3). We construct four measures: (1) any emotional violence experienced in the past 6 months; (2) any physical violence experienced in the past 6 months; (3) frequency of emotional violence (0-12, the sum of frequency across all acts) in the past 6 months; and (4) frequency of physical violence (0-18, the sum of frequency across all acts) in the past 6 months. In an appendix, we also assess the occurrence of the individual acts.

3.2 Survey characteristics and selection of baseline covariates

To contextualize the study findings, we provide a brief summary of the characteristics of all households at baseline, as reported in Ahmed et al (2017). Among households that were part of the ANGeL study, the average household size at baseline was 5.5. The dependency ratio – the ratio (expressed as a percentage) of the number of people in the household ages 0-14 and above 60 to the number of working age household members (15-60 years) – was 98.1, slightly higher than the average across all rural Bangladesh, possibly because the ANGeL sample selection criteria required sample households to have at least one child under 24 months. About 65% of households owned cultivable land less than half an acre, and just under 80% of all households operated less than 1.5 acres of land. However, farming was by far the most common occupation of the household head across all households (62%), followed by business and trade (10%). Approximately one-third of the sample only farmed their own land; another third both operated their own land and rented in land; and one third were pure tenants. Sharecropping was widespread.

For inclusion of baseline covariates in our regressions, we select several characteristics of the woman, man, and household that are correlated with our outcomes of interest and have few missing values at baseline. The baseline covariates include woman's age (in years); man's age (in years); woman's education (in years); man's education (in years); household's size of operated land (in acres); household's access to electricity (binary); and dummies for the upazila in which the household lived (binary).

3.3 Attrition and balance

Table 1 describes our estimation sample and shows the attrition of households from it. We begin with the 3,375 households that comprised the ANGeL sample at baseline. As the calculation of several of our indices requires information from both men and women in the same household, we drop 444 non-dual adult households. Three households are missing information on our baseline control variables, leaving a target baseline sample of 2,928 households. Of this baseline sample, we include 2,739 households in our endline sample. This represents 6.5% of the baseline sample lost to follow up, because: we were not able to collect a full set of outcome data at endline (87 households); the household migrated (76 households); and 26 households dropped out of the study, declined to be re-interviewed, or could not be traced.

Table 1: Attrition

Attrition	Number of households
Number of households interviewed excluding T2, baseline	3,375
Number of dual-adult households (DHHs) only	2,931
Number of DHHs without missing baseline controls	2,928
Number of attrited DHHs	189
▪ Migrated	76
▪ Dropped out of study, refused to be interviewed, could not be found	26
▪ Data issues/incomplete data	87
Final sample for analysis	2,739
Percent attrition	6.5%

Table 2 reports the correlates of attrition. Coefficients on the treatment arms are small in magnitude. There is no statistically significant impact on attrition of the T-N, T-A or T-AN treatment arm. Households in the T-ANG arm were 2.9 percentage points less likely to attrit, and this was weakly significant. However, an F test shows that we cannot reject the null hypothesis that, jointly, attrition does not differ across treatment arms; the p-value for this test is 0.43.

Attrition differs by the respondent characteristics we selected as baseline covariates; it increases very slightly with women's age and education and it decreases slightly with male age and land operated. Attrition does not differ across upazilas (not shown).

Table 2: Correlates of attrition

	Attrition	SE	p-value
T-N	-0.010	0.018	0.568
T-A	-0.012	0.018	0.524
T-AN	-0.014	0.016	0.373
T-ANG	-0.029	0.017	0.086
Woman respondent's age at baseline (years)	0.007	0.001	0.000
Man respondent's age at baseline (years)	-0.002	0.001	0.000
Woman respondent's education at baseline (years)	0.007	0.002	0.001
Man respondent's education at baseline (years)	-0.001	0.001	0.246
HH electricity access at baseline	-0.011	0.012	0.341
Size of operated land at baseline (acres)	-0.010	0.004	0.015
Upazila fixed effects	YES		
N	2,928		
Test of joint significance			
F-statistic: Treatment arms	0.948		
p-value	0.435		

Notes: Dependent variable is coded as 0 if HH is included in sample (Control/T-N/T-A/T-AN/T-ANG only) and 1 if excluded from sample; Standard errors adjusted for clustering at block level.

Treatment definitions: All treatments targeted to men and women. T-N=Nutrition Behavior Change Communication (BCC)-1 training delivered to women and men by agricultural extension agents (AEAs) from the Ministry of Agriculture. T-A=Agricultural Production training delivered to women and men by AEAs. T-AN=Agricultural Production + Nutrition BCC training delivered to women and men by AEAs. T-ANG=Agricultural Production + Nutrition BCC training delivered to women and men by AEAs + gender sensitization activities for women and men conducted by Helen Keller International (HKI).

Table 3 reports the mean values for the baseline covariates selected for inclusion in our regressions. Women in the control group, with a mean age around 26 years, are on average 10 years younger than their husbands; however, they have 6.3 grades of schooling compared to 5.1 for their husbands. Mean land operated at baseline was 1.1 acres for the control group, and 75% of control households had access to electricity. Using ANOVA, we tested for the equality of the mean values of these baseline covariates across all treatment and control arms. For these baseline covariates, we reject the null that the mean values are equal across intervention arms.

Table 3: Mean values of baseline covariates, by intervention arm

	Women						Men					
	Control	T-N	T-A	T-AN	T-ANG	F test for equality of means	Control	T-N	T-A	T-AN	T-ANG	F test for equality of means
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)		Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	
	Baseline											
Age (years) at baseline	26.56 (0.32)	25.28 (0.25)	26.19 (0.36)	26.58 (0.36)	26.29 (0.29)	3.67***	36.76 (0.68)	34.75 (0.77)	35.35 (0.67)	36.31 (0.93)	35.72 (0.65)	2.82**
Years of education at baseline	6.34 (0.19)	6.55 (0.25)	6.49 (0.22)	5.72 (0.23)	6.38 (0.21)	5.11***	5.15 (0.22)	5.33 (0.27)	4.97 (0.27)	4.41 (0.27)	5.23 (0.23)	3.94***
Household-level												
Size of operated land at baseline (acres)	1.10 (0.09)	1.24 (0.14)	1.20 (0.11)	1.08 (0.13)	0.96 (0.06)	4.66***						
HH electricity access at baseline	0.75 (0.04)	0.71 (0.06)	0.74 (0.05)	0.73 (0.05)	0.80 (0.05)	2.91**						
N	717	520	497	492	513		717	520	497	492	513	

Note: *p<.10; ** p<.05; *** p<.001

4. EMPIRICAL SPECIFICATION

Our approach to evaluating ANGeL's impacts on empowerment, gender attitudes, workload, and IPV takes advantage of the RCT design of the intervention. The randomized assignment of a large sample of eligible households to treatment and control arms helps to reduce the observable and unobservable differences across these arms at baseline.

Because our outcomes of interest were collected only at endline, our estimation relies on single-difference estimates. For each outcome of interest, the specification used to assess the single-difference impact of each of the four treatment arms – T-N, T-A, T-AN, T-ANG – relative to the control is described in equation (1):

$$Y_{ib} = \alpha + \beta_N TN_b + \beta_A TA_b + \beta_{AN} TAN_b + \beta_{ANG} TANG_b + \beta_X X + \varepsilon_i \quad (1)$$

where Y_{ib} is the outcome of interest for individual i residing in block b; TN_b, TA_b, TAN_b, and $TANG_b$ are dummy variables that take the value of 1 if block b was assigned to T-N, T-A, T-AN, and T-ANG, respectively, and takes the value of 0 otherwise; and ε_i is an error term. β_N, β_A, β_{AN}, and β_{ANG} represent the single-difference impact estimator for T-N, T-A, T-AN, and T-ANG, respectively. We include a vector of control variables, X, for baseline values of: the individual's age in years, the individual's years of education, whether the household had a connection to electricity, the size of operated land in acres, and dummy variables for the upazila in which the household lived; β_X represents their associated coefficients. We run separate regressions for outcomes constructed separately for men and women. For household-level outcomes, the woman's baseline covariates are used. Standard errors are clustered at the block level, which is the level at which the randomization was conducted.

We estimate ordinary-least-squares for the empowerment score, gender attitudes measures, workload, and frequency of IPV. We estimate probit regressions then calculate marginal effects for binary outcomes: the individual pro-WEAI components, experience of any emotional IPV, and experience of any physical IPV. For each outcome, we conduct Wald tests to assess whether the difference in impacts

estimated from various treatment arms are statistically significant. Specifically, we assess whether T-N = T-AN; T-A = T-AN; T-AN = T-ANG; T-N = T-ANG; and T-A = T-ANG. These comparisons allow us to infer how combined interventions compare with single interventions and how adding the nutrition and gender sensitization trainings changes impacts.

A common concern when many outcomes are being examined simultaneously is that standard statistical techniques will tend to over-reject the null hypothesis. Although our main outcome variables – such as the empowerment score, whether the woman or man is empowered, and the likelihood of the household achieving gender parity – are well-defined composite measures, concerns about over-rejecting the null hypotheses may be higher when we consider individual component indicators. These include the twelve individual indicators in pro-WEAI, the components of the gender attitudes score, and the types of emotional and physical violence that a woman may report. When we present impacts on these component indicators, we adjust for multiple testing by controlling the false detection rate (FDR) and constructing sharpened q-values following Benjamini, Krieger, and Yekutieli (2006) and Anderson (2008). Unadjusted p-values and adjusted q-values are presented in appendix tables for the component indicators.

5. IMPACT ESTIMATES

5.1 Core results

5.1.1 Pro-WEAI aggregates

Table 4 presents single difference impacts of the ANGeL project on pro-WEAI outcomes: women's and men's empowerment scores, whether women and men are empowered, and whether the household achieves gender parity. In the control group at endline, the mean empowerment score for women is 0.59; only 25% of women are empowered, compared to 39% of men, and 47% of control households achieve gender parity. In terms of treatment effects, for women's empowerment outcomes, there are significant positive impacts from all treatment arms (T-A, T-N, T-AN, T-ANG) relative to the control group. The women's empowerment score increases by 0.04 to 0.07, and the prevalence of empowered women increases

by 8 to 14 percentage points. For both the women's empowerment score and whether women are empowered, the point estimate for impact is highest in the T-ANG arm; however, Wald tests show that the differences in impacts from the added gender sensitization component are not statistically significant. On the other hand, for men's empowerment outcomes, there are no significant impacts except from the T-N arm which increases men's empowerment scores by 0.03 and increases the prevalence of empowered men by 10 percentage points. We reject the null hypothesis that T-N=T-AN and that T-N=T-ANG; the increases in men's empowerment from the nutrition intervention alone are significantly larger than from a combination of the nutrition with the agriculture and/or gender interventions. Thus, the significant increases in women's empowerment from all intervention arms occur without any significant negative impacts on men's empowerment.

In terms of the likelihood that the household achieves gender parity, the T-A, T-AN, and T-ANG treatments have positive impacts, with a highly significant 14 percentage point increase from the T-ANG arm and a weakly significant 8 percentage point increase from the T-AN arm. Tests of differences across arms show that the impact estimates from T-ANG and T-AN do not significantly differ, while the larger impact from T-ANG than T-N is weakly significant. Given that a household is classified as achieving gender parity if the woman is either empowered or achieves at least the same empowerment score as the primary man in the household, these results are consistent with the above results for women and men individually.

Table 4: Single-difference impacts on pro-WEAI outcomes

Indicator	Impacts					Test of difference between arms					N
	Control	T-N	T-A	T-AN	T-ANG	T-N = T-AN	T-A = T-AN	T-AN = T-ANG	T-N = T-ANG	T-A = T-ANG	
	Mean (SE)					p-value					
Women											
Empowerment score	0.59	0.05***	0.04**	0.04**	0.07***	0.67	0.85	0.16	0.25	0.22	2,739
	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)						
Whether empowered	0.25	0.09***	0.08**	0.08*	0.14***	0.83	0.97	0.24	0.24	0.22	2,739
	(0.02)	(0.03)	(0.04)	(0.04)	(0.04)						
Men											
Empowerment score	0.67	0.03**	0.01	-0.00	0.00	0.01***	0.44	0.65	0.04**	0.76	2,739
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)						
Whether empowered	0.39	0.10**	0.02	-0.01	0.01	0.01**	0.55	0.70	0.03**	0.81	2,739
	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)						
Household											
HH achieves gender parity	0.47	0.05	0.06	0.08*	0.14***	0.62	0.73	0.24	0.08*	0.10	2,739
	(0.03)	(0.04)	(0.04)	(0.05)	(0.05)						

Note: Estimates are average treatment effects for the empowerment score indicator and marginal effects for whether empowered and gender parity indicators. See notes to Table 1 for the definition of the dependent variables. Standard errors adjusted for clustering at block level are in parentheses. *p<.10; ** p<.05; *** p<.001. All specifications include as independent variables the treatment indicators, age and education level of respondent, household access to electricity, size of household operated land and upazila at baseline. Household gender parity estimation includes women's age and education at baseline and baseline household covariates.

Treatment definitions: See notes to Table 3.

Because the empowerment score is a weighted average of individual pro-WEAI indicators, not all indicators will necessarily respond in the same way to intervention, and it is useful to understand which indicators are impacted by ANGeL's intervention components. Appendix Table 3, Panel A, presents ANGeL's impacts on the 12 component indicators of the pro-WEAI for women. Adjustments are shown for multiple testing following Anderson (2008), with q-values controlling the FDR. For women, looking at q-values, we see significant positive impacts from all treatment arms on the indicator for access to/decisions on financial services, in the range of 19 to 24 percentage point increases. Tests of differences between arms indicate that impacts on access to/decisions on financial services do not differ significantly across the treatments. No significant impacts are found on other pro-WEAI indicators for women.

Appendix Table 3, Panel B shows impacts on pro-WEAI indicators for men. Based on q-values, we find that the T-N and T-A arms also lead to significant impacts on the access to/decisions on financial services for men, representing 11 and 10 percentage point increases, respectively. Tests of differences between these two arms do not show a significant difference; however, the impact of both arms is significantly larger than the impact of T-AN. No other pro-WEAI indicators show treatment impacts for men. We discuss possible interpretations of these findings for both women and men in the conclusion.

5.1.2 Gender attitudes composites, women, and men

Table 5 shows ANGeL's impacts on men's and women's attitudes regarding gender roles. In the control group at endline, the mean gender attitudes score for both women and men in the control group is 34. In terms of impact, for women's gender attitudes, only the combined treatments T-AN and T-ANG have significant effects, leading to "improvements" of about 3% and 2%, respectively. For men's gender attitudes, all treatments that include the nutrition component (T-N, T-AN, T-ANG; but not T-A) significantly improved men's gender attitudes by 2% to 3%. For both men and women, there do not appear to be statistically significant differences between impacts from the treatment arms.

To ascertain whether these changes in the gender attitudes score can be attributed to specific questions, we examine the individual items in Appendix Table 4 Panels A and B; estimates for the individual items have been adjusted for multiple hypothesis testing following Anderson (2008). The overall changes in women's attitudes do not appear to have been driven by any particular item. However, among men, we detect a significant change based on q-values in the item "husbands should help wives with household chores like cooking and taking care of children" only in the T-ANG arm.

Table 5: Single-difference impacts on gender attitudes score

Indicator	Impacts					Test of difference between arms					N
	Control	T-N	T-A	T-AN	T-ANG	T-N = T-AN	T-A = T-AN	T-AN = T-ANG	T-N = T-ANG	T-A = T-ANG	
	Mean (SE)					p-value					
Women											
Total gender attitudes score (1-45)	34.44	0.34	0.29	0.95**	0.78*	0.20	0.21	0.69	0.34	0.34	2,739
	(0.28)	(0.44)	(0.49)	(0.43)	(0.40)						
Men											
Total gender attitudes score (1-45)	34.47	0.57*	0.47	0.90***	0.83**	0.34	0.21	0.85	0.47	0.32	2,739
	(0.20)	(0.33)	(0.33)	(0.30)	(0.32)						

Note: Estimates are average treatment effects. Standard errors adjusted for clustering at block level are in parentheses. *p<.10; ** p<.05; *** p<.001. See notes to Table 4 for details on the independent variables and notes to Table 3 for the treatment arms.

5.1.3 Unintended consequences: Workload and IPV

Table 6 assesses the impacts of the ANGeL treatment arms on workloads. In the control group at endline, mean workload is 9.4 hours for both women and men. None of the treatment arms has a statistically significantly impact on the workload of women or of men.[3]

[3] An exception is the increase in women's workload in the T2-N arm (Appendix Table 6), which is the BCC delivered by community women.

Table 6: Single-difference impacts on time spent on work

Indicator	Impacts					Test of difference between arms					N
	Control	T-N	T-A	T-AN	T-ANG	T-N = T-AN	T-A = T-AN	T-AN = T-ANG	T-N = T-ANG	T-A = T-ANG	
	Mean (SE)					p-value					
Women											
Hours spent on work	9.49	0.26	0.01	0.08	-0.03	0.54	0.80	0.65	0.27	0.85	2,739
	(0.14)	(0.25)	(0.24)	(0.23)	(0.22)						
Men											
Hours spent on work	9.44	0.24	0.35	0.09	0.14	0.61	0.42	0.88	0.75	0.54	2,739
	(0.18)	(0.27)	(0.29)	(0.25)	(0.28)						

Note: Estimates are average treatment effects. Standard errors adjusted for clustering at block level are in parentheses. *p<.10; ** p<.05; *** p<.001. See notes to Table 4 for details on the independent variables and notes to Table 3 for the treatment arms.

Table 7 presents ANGeL's impacts on IPV. In the control group at endline, over the preceding six months, 21% of women report experiencing any emotional violence, and 7% report experiencing any physical violence. Impact estimates show that, relative to the control group, none of the treatment arms significantly changes the prevalence of women reporting any emotional violence in the preceding six months nor the prevalence reporting any physical violence in the preceding six months. However, Wald tests suggest that T-ANG leads to a weakly significant increase in prevalence of emotional IPV relative to T-AN (point estimate of 0.07 relative to -0.02). Other differences between treatment arms in impacts on IPV prevalence are not statistically significant. In terms of reported frequency of IPV, the gender sensitization arm (T-ANG) leads to a weakly significant increase in the reported frequency both of emotional violence (a small point estimate of 0.32 on a scale from 0-12, but about a 50% increase relative to control) and of physical violence (a small point estimate of .15 on a scale from 0-18, but a 100% increase relative to control). Wald tests suggest that T-ANG leads to weakly significant increases in frequency of emotional IPV relative to T-AN and T-N. No other differences between treatment arms in impacts on IPV frequency are statistically significant.

Table 7: Single-difference impacts on IPV indicators (Women)

Indicator	Impacts					Test of difference between arms					N
	Control	T-N	T-A	T-AN	T-ANG	T-N = T-AN	T-A = T-AN	T-AN = T-ANG	T-N = T-ANG	T-A = T-ANG	
	Mean (SE)					p-value					
Emotional violence in last 6 months	0.21	-0.01	0.03	-0.02	0.07	0.90	0.44	0.10*	0.10	0.39	2,739
	(0.03)	(0.04)	(0.05)	(0.05)	(0.04)						
Physical violence in last 6 months	0.07	-0.01	0.02	-0.01	0.02	0.78	0.16	0.16	0.19	0.97	2,739
	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)						
Frequency of emotional violence (0-12), in last 6 months	0.64	-0.02	0.03	-0.03	0.32*	0.96	0.73	0.09*	0.07*	0.17	2,739
	(0.11)	(0.15)	(0.17)	(0.17)	(0.18)						
Frequency of physical violence (0-18), in last 6 months	0.15	0.04	0.05	0.01	0.15*	0.67	0.52	0.15	0.23	0.29	2,739
	(0.04)	(0.06)	(0.05)	(0.07)	(0.09)						

Note: Estimates are marginal effects for ever experience of violence indicators and average treatment effects for frequency of violence indicators. Standard errors adjusted for clustering at block level are in parentheses. *p<.10; ** p<.05; *** p<.001. See notes to Table 4 for details on the independent variables and notes to Table 3 for the treatment arms.

We take a closer look at the prevalence and frequency of reporting the individual acts of emotional and physical IPV in Appendix Table 5. After adjusting for multiple hypothesis testing, we find no statistically significant impacts of any of the treatment arms relative to the control arm in either the reported prevalence or reported frequency of individual acts of IPV. The point estimates for prevalence or frequency of each individual act in the T-ANG arm are consistently marginally larger or the same relative to the other treatment arms; for some individual acts, Wald tests suggest a weakly significant difference in the estimated impacts between T-ANG and other arms (for example, for "insulted you or made you feel bad about yourself," the difference in T-ANG's point estimate of 0.06 and T-AN's point estimate of -0.02 is weakly significant).

Taken together, results show few significant impacts on IPV, but isolated weakly significant increases in prevalence or frequency from T-ANG with small point estimates, relative to the control or to other treatment arms. It is hard to know how to view these impacts, both because they are isolated and weakly significant, and because their interpretation is ambiguous. In particular, it is unclear whether they might imply that adding a gender sensitization component leads women to experience more frequent acts of IPV or leads women to be more sensitized to IPV and thus more likely to recall and report instances to the enumerator. Because noting potential risks of interventions is important, we further discuss these issues in the conclusion.

5.2 Extensions

5.2.1 Sensitivity to choice of empowerment indicator

ANGeL has significant impacts on the empowerment score as measured by pro-WEAI, the probability that a woman is empowered, and the likelihood that the household attains gender parity. As pro-WEAI is a relatively new index in the WEAI-based family of indicators, it is useful to compare it with another WEAI variant that is widely used in population-based surveys, the Abbreviated-WEAI (A-WEAI) (Malapit et al. 2017).

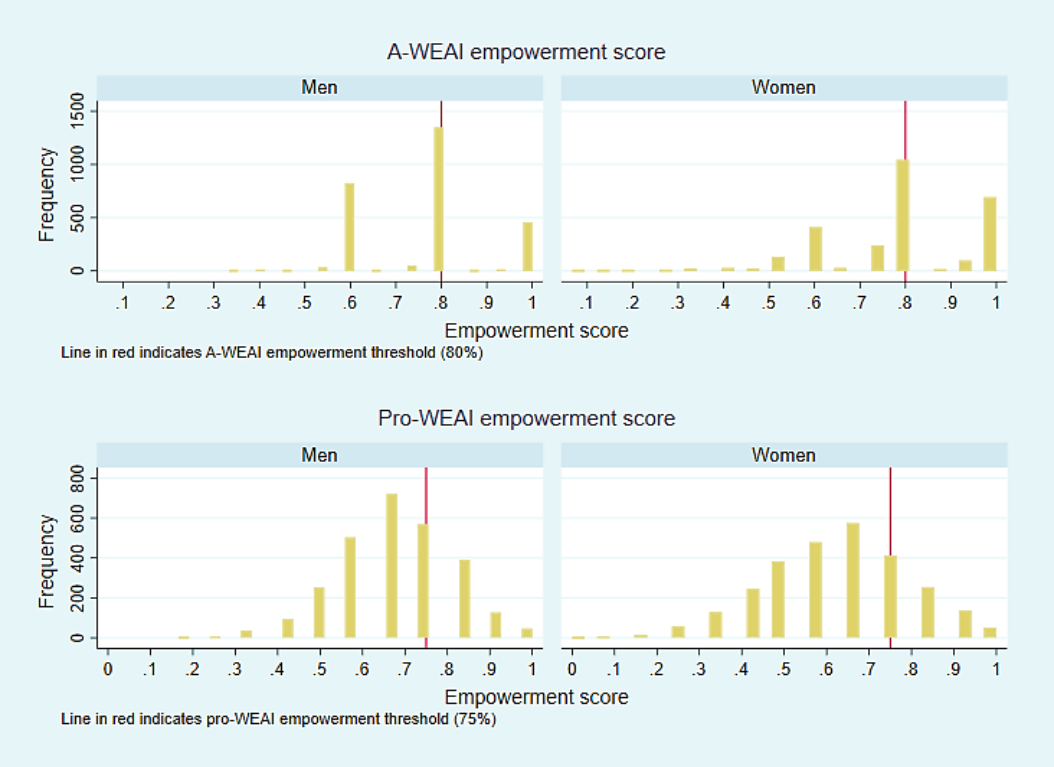
Table 8 presents single difference impacts on A-WEAI outcomes for both women and men. Unlike pro-WEAI, we are only able to detect a weakly significant impact of the T-ANG treatment on the women's empowerment score measured using A-WEAI, and no other significant impacts. To understand why these results differ, it is useful to note that pro-WEAI has 12 indicators, compared to A-WEAI's six, and that it was designed to capture more aspects of empowerment that are relevant to agricultural development projects. Moreover, the cut-offs for the individual indicators in pro-WEAI are stricter, because pro-WEAI was designed for projects that have explicit empowerment objectives. Having more indicators introduces more variability in the aggregate index, making it more sensitive. This is particularly relevant if many individuals are clustering or bunching around the threshold for adequacy. Figure 1, which shows the distributions of A-WEAI and pro-WEAI for men and women, is revealing. Although one would need to be adequate in 80% of the indicators to be classified as empowered in A-WEAI compared to 75% in pro-WEAI, the distribution of the pro-WEAI and A-WEAI scores is quite different. The extent of bunching around the threshold value is much higher with A-WEAI, making it difficult to measure improvements in empowerment.

Table 8: Single-difference impacts on A-WEAI outcomes

Indicator	Impacts					Test of difference between arms					N
	Control	T-N	T-A	T-AN	T-ANG	T-N = T-AN	T-A = T-AN	T-AN = T-ANG	T-N = T-ANG	T-A = T-ANG	
	Mean (SE)					p-value					
Women											
A-WEAI: Empowerment score	0.79	0.01	-0.00	-0.00	0.03*	0.37	0.82	0.05**	0.41	0.13	2,739
	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)						
A-WEAI: Whether empowered	0.67	-0.00	-0.00	0.01	0.05	0.87	0.81	0.29	0.22	0.19	2,739
	(0.02)	(0.04)	(0.04)	(0.04)	(0.04)						
Men											
A-WEAI: Empowerment score	0.76	0.01	-0.00	0.01	0.02	0.98	0.42	0.57	0.52	0.14	2,739
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)						
A-WEAI: Whether empowered	0.65	0.02	-0.00	0.03	0.05	0.86	0.51	0.76	0.61	0.29	2,739
	(0.03)	(0.04)	(0.04)	(0.05)	(0.04)						
Household											
A-WEAI: HH achieves gender parity	0.75	-0.00	0.02	0.00	0.03	0.96	0.67	0.42	0.42	0.72	2,739
	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)						

Note: Estimates are average treatment effects for the empowerment score indicator and marginal effects for whether empowered and gender parity indicators. The empowerment score is the weighted average of the six A-WEAI indicators. An individual is defined as empowered if s/he reaches the threshold of 80% or more of the weighted indicators. A household achieves gender parity if the woman respondent is empowered or her empowerment score is equal to or greater than that of the man respondent in the household. Standard errors adjusted for clustering at block level are in parentheses. *p<.10; ** p<.05; *** p<.001. See notes to Table 4 for details on the independent variables and notes to Table 3 for the treatment arms.

Figure 1: Empowerment score distributions for pro-WEAI and A-WEAI, by sex



Notes: Empowerment score is the weighted sum of the pro-WEAI/A-WEAI indicators. See Appendix Table 1 for definitions of pro-WEAI and A-WEAI indicators.

5.2.2 Bundled vs. single interventions

Conceptually, bundling interventions could change impacts if, for example, the two components reinforce each other or if there is simply a different effect from husbands and wives attending a larger number of trainings together. Accordingly, throughout the paper, we have included assessments of whether bundled interventions (e.g. T-AN) are more effective than single interventions (e.g. T-N and T-A). Here, we consider this topic in a complementary way, assessing how any bundled intervention combining both nutrition and agriculture compares with any single intervention on either nutrition or agriculture. To assess this, we pool T-AN and T-ANG as the bundled interventions and pool T-N and T-A as the single interventions. Pooling in this way gives us greater statistical power than comparing each individual arm as in Table 4.

Table 9 presents the impacts of pooled T-AN and T-ANG (the bundled interventions) and pooled T-N and T-A (the single interventions). First, as would be expected, point estimates of the pooled arms are consistent with the averages over point estimates from relevant individual arms in Table 4. Second, the pooled results highlight that single *or* bundled interventions appear to empower women, while *only* single – and not bundled – interventions appear to empower men (from Table 4, we know further that it is the T-N arm that drives impacts from single interventions). Third, although in Table 4, T-N and T-A did not each have statistically significant impacts on the household achieving gender parity, in Table 9 the pooled single interventions lead to a weakly significant increase in households achieving gender parity (owing likely to increased statistical power).Wald tests indicate that the single and the bundled treatments do not have significantly different effects on the likelihood of achieving gender parity.

Table 9: Single-difference impacts on pro-WEAI outcomes

Indicator	Impacts			Test of difference between arms	N
	Control	T-N & T-A	T-AN & T-ANG	T-N & T-A = T-AN & T-ANG	
	Mean (SE)			p-value	
Women					
Empowerment score	0.59	0.04***	0.05***	0.48	2,739
	(0.01)	(0.01)	(0.02)		
Whether empowered	0.25	0.08***	0.11***	0.42	2,739
	(0.02)	(0.03)	(0.03)		
Men					
Empowerment score	0.67	0.02*	0.00	0.05**	2,739
	(0.01)	(0.01)	(0.01)		
Whether empowered	0.39	0.06*	0.00	0.06*	2,739
	(0.03)	(0.04)	(0.03)		
Household					
HH achieves gender parity	0.47	0.06*	0.11***	0.13	2,739
	(0.03)	(0.03)	(0.04)		

Note: Estimates are average treatment effects for the empowerment score indicator and marginal effects for whether empowered and gender parity indicators. See notes to Table 1 for the definition of the dependent variables. Standard errors adjusted for clustering at block level are in parentheses. *p<.10; ** p<.05; *** p<.001. See notes to Table 4 for details on the independent variables and notes to Table 3 for the treatment arms.

6. DISCUSSION AND CONCLUSION

ANGeL increased both women's and men's empowerment, raised the prevalence of households achieving gender parity, and led to small improvements in the gender attitudes of both women and men. Specifically, we find significant increases in women's empowerment scores and empowerment status from all treatment arms – T-N, T-A, T-AN, T-ANG – but with no significant differences across these. Relative to the 25% of women in the control group that are empowered, the magnitudes of the impacts on women's empowerment status – increases between 8 and 14 percentage points – are meaningful. Further, the positive impacts of these treatment arms on women did not coincide with reductions in men's empowerment. No treatment led to significant negative effects on men's empowerment, and one, T-N, increased both men's empowerment scores and empowerment status. Both T-AN and T-ANG led to increases in households achieving gender parity. T-AN and T-ANG had small, positive impacts (significant or weakly significant) on women's gender attitudes with no significant differences between these. For men, we find significant or weakly significant improvements in gender attitudes from T-N, T-AN and T-ANG, with no significant differences across any of these. We find no evidence of unintended impacts on workloads and we note inconclusive evidence of possible increases in IPV.

Several points are worth noting in our findings. First, patterns of empowerment impacts differ between women and men. For women, *all* bundled and single interventions improve empowerment. The bundled intervention with a gender sensitization component (T-ANG) leads to slightly larger point estimates on women's empowerment score and status, but these are not significantly different from impacts of the interventions without the gender sensitization component (T-A, T-N, T-AN). For men by contrast, *only* the intervention with a nutrition component alone increases empowerment score and status. We cannot answer conclusively why patterns of impact differ between women and men. We do note, however, that empowerment impacts for both women and men appear to be driven by increases in access to/decisions regarding credit. Recall that this indicator requires meeting at least one of the following conditions: (1) belonging to a household that used a source of credit in the past year *and* participating in at least one sole

or joint decision about it, (2) belonging to a household that did not use credit in the past year but could have if it wanted to from at least one source, or (3) having access, solely or jointly, to a financial account. Given that the ANGeL interventions did not directly involve credit, one possible interpretation of our findings is that trainings in a particular domain increased decision-making on use of credit for that domain. For example, if women previously had relatively little input into decision-making around the use of credit in agriculture, their participation in the agricultural treatment arm may have led to their greater involvement in decisions about using credit for agricultural activities. Men may have had high levels of participation in decision-making around use of credit for agriculture, but relatively lower levels of participation in decision-making around use of credit for food and nutrition. In essence, women and men both may have become more involved in areas of decisionmaking around credit that they previously were not, if trained together in that area.

Second, for women, impacts on the composite measure of gender attitudes do not appear to be driven by agreement with any particular statement. For men, however, positive impacts on the composite appear to be driven by greater agreement with the statement, "Husbands should help wives with household chores like cooking and taking care of children." Among men, treatments that include a nutrition component also lead to significantly higher proportions agreeing with this statement; for example, Wald tests indicate that the impact of T-A is significantly smaller than impacts of T-AN and T-ANG. This suggests that men's participation with their wives in the nutrition component – even without explicit gender sensitization – may lead them to see greater importance in women's typical roles around child nutrition. Nutrition trainings that emphasize the importance of child nutrition may valorize for men some of women's responsibilities that were previously not recognized. Given that changes in attitudes are important for longer-term gender-transformative effects, these results may be meaningful. That said, we see no reductions in women's actual reported workloads based on 24-hour recall, thus these effects remain to be demonstrated. In any case we may not expect changes in attitudes to translate to immediate action. The possibility of gender-

transformative effects, as well as the persistence of changes in attitudes beyond the intervention, are promising areas for future research.

Third, we do not see clear evidence of unintended harm to women in terms of workloads. However, in terms of IPV, the evidence is less conclusive. Results show few significant impacts overall on IPV, but isolated weakly significant increases in prevalence or frequency from T-ANG with small point estimates, relative to the control or to other treatment arms. Although it is hard to know how meaningful these isolated weakly significant impacts are, we highlight them given the importance of potential risks. On one hand, results could suggest that addition of the gender sensitization component slightly increased the frequency of women experiencing emotional and physical IPV, which is concerning and could reflect male backlash. On the other hand, results could reflect that the addition of the gender sensitization component increased women's awareness of what constitutes violence (particularly emotional IPV, which may have been previously perceived as acceptable) and made women more likely to recall and *report* certain instances to the enumerator. While we cannot definitively distinguish between these explanations, we note that results on women's and men's attitudes toward IPV in Appendix Table 3 are suggestive. In Panel A, q-values suggest no significant impacts on women's attitudes from any treatment; point estimates are positive and larger from T-ANG than the other arms (p-value=0.08, without multiple testing adjustments), suggesting at least the possibility of T-ANG making women less accepting of violence, though this is not conclusive. In Panel B, q-values also show no significant impacts on men's attitudes from any treatment; although again not conclusive, all point estimates are positive, thus there is at least no evidence that T-ANG increased men's perceptions of acceptability of violence. Our findings on IPV are not straightforward to interpret; that said, they highlight the importance of monitoring unintended harm to women when implementing gender-transformative interventions and suggest the need for further research.

Finally, our results suggest some potential benefits of bundling nutrition and gender components with an agricultural development intervention; however, many of these benefits seem to be driven by bundling nutrition with agriculture. For example, point estimates for impacts on women's empowerment

are larger for T-ANG than for the other treatment arms (T-A, T-N, T-AN), however differences are not statistically significant. The point estimate for the impact on households achieving gender parity is higher for T-ANG than T-AN; however, again the difference is not statistically significant. The design of ANGeL does not allow us to assess the extent to which including men and women within the same treatment arms contributed to our results. That said, it is plausible that the positive impacts of all treatment arms on women's empowerment outcomes—and the absence of a detectable difference across arms—may have arisen from the fact that all implementation modalities provided information to both husbands and wives when they were together. Qualitative work conducted as part of the impact evaluation supports this possibility; both men and women beneficiaries in the T-ANG arm indicate that joint training has facilitated joint decisionmaking.

> "After training, taking a joint decision is easier. It's better than before. Earlier, I used to buy things for cooking. I used to cook as I wish. Now, we take decision together and we can avoid any confusion or complexities." –T-ANG woman beneficiary

> "As we both attended ANGeL training, we both know that taking decisions together is good. After participating in ANGeL, my wife could take the right decision, and sometimes the husband's decision is wrong." –T-ANG man beneficiary

The careful implementation of the agricultural treatment arm – ensuring active inclusion of both men and women – may have led to women having more of a voice in decisionmaking. Engaging men with interventions on nutrition may have been impactful because it exposed them to messages that they may not receive in traditional nutrition BCC, which often targets only women, or because it engaged men in an area where women typically hold responsibilities. The role of engaging men and women jointly in interventions, and how best to do so, is another promising area for future research.

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Appendix Table 1: Comparing Pro-WEAI and A-WEAI domains and indicators

Pro-WEAI domain	Pro-WEAI indicator name	Pro-WEAI definition	A-WEAI domain	A-WEAI indicator name	A-WEAI definition
Intrinsic agency	Autonomy in income	More motivated by own values than by coercion or fear of others' disapproval *Weight = 1/12*			
Intrinsic agency	Self-efficacy	"Agree" or greater on average with self-efficacy questions: *New General Self-Efficacy Scale* [C] score>=32 *Weight = 1/12*			
Intrinsic agency	Attitudes about intimate partner violence against women	Believes husband is NOT justified in hitting or beating his wife in all 5 scenarios: [D] 1) She goes out without telling him 2) She neglects the children 3) She argues with him 4) She refuses to have sex with him 5) She burns the food *Weight = 1/12*			
Intrinsic agency	Respect among household members	Meets <u>ALL of the following</u> conditions related to their spouse, the other respondent, or another household member: 1) Respondent respects relation (MOST of the time) AND 2) Relation respects respondent (MOST of the time) AND 3) Respondent trusts relation (MOST of the time) AND 4) Respondent is comfortable disagreeing with relation (MOST of the time) *Weight = 1/12*			
Instrumental Agency	Input in productive decisions	Meets <u>at least ONE of the following</u> conditions for <u>ALL of the agricultural activities</u> 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) *Weight = 1/12*	Production	Input in productive decisions	Adequate if individual participates in and makes decisions, has input in decisions, or feels she could make decisions (if desired) about at one agricultural activity *Weight = 1/5*
Instrumental Agency	Ownership of land and other assets	Owns, either solely or jointly, <u>at least ONE of the following</u>: (updated March 2020) 1) Any three assets 2) Land *Weight = 1/12*	Resources	Ownership of assets	Adequate if individual owns at least one major asset or at least two minor assets *Weight = 2/15*

Pro-WEAI domain	Pro-WEAI indicator name	Pro-WEAI definition	A-WEAI domain	A-WEAI indicator name	A-WEAI definition
Instrumental Agency	Access to and decisions on financial services	Meets at least ONE of the following conditions: 1) Belongs to a household that used a source of credit in the past year AND participated in at least ONE sole or joint decision about it 2) Belongs to a household that did not use credit in the past year but could have if wanted to from at least ONE source 3) Has access, solely or jointly, to a financial account *Weight = 1/12*	Resources	Access to and decisions about credit	Adequate if individual makes decisions about at least one source of credit accessed by her/his household *Weight = 1/15*
Instrumental Agency	Control over use of income	Has input in decisions related to how to use BOTH income and output from ALL of the agricultural activities they participate in AND has input in decisions related to income from ALL non-agricultural activities they participate in, unless no decision was made *Weight = 1/12*	Income	Control over use of income	Adequate if individual participates in and has input in decisions about income generated from an activity or she/he makes decisions, has input in decisions, or feels she/he could make decisions (if desired) about employment or major household expenditures *Weight = 1/5*
Instrumental Agency	Work balance	Works less than 10.5 hours per day: Workload = time spent in primary activity + (1/2) time spent in childcare as a secondary activity *Weight = 1/12*	Time	Workload	Adequate if individual worked fewer than 10.5 hours during the previous day *Weight = 1/5*
Instrumental Agency	Visiting important locations	Meets at least ONE of the following conditions: 1) Visits at least TWO locations at least ONCE PER WEEK of [city, market, family/relative], or 2) Visits least ONE location at least ONCE PER MONTH of [health facility, public meeting] *Weight = 1/12*			
Collective Agency	Group membership	Active member of at least ONE group *Weight = 1/12*	Leadership	Group member	Adequate if individual is an active member of at least one group *Weight = 1/5*
Collective Agency	Membership in influential groups	Active member of at least ONE group that can influence the community to at least a MEDIUM extent *Weight = 1/12*			

Source: Malapit et al. (2019, 2017)

Appendix Table 2: Extended empowerment diagnostics of men and women by treatment arm, endline

	Women					Men				
	Control Mean (SD)	T-N Mean (SD)	T-A Mean (SD)	T-AN Mean (SD)	T-ANG Mean (SD)	Control Mean (SD)	T-N Mean (SD)	T-A Mean (SD)	T-AN Mean (SD)	T-ANG Mean (SD)
Pro-WEAI indicators										
Autonomy in income	0.76	0.83	0.77	0.75	0.83	0.95	0.96	0.96	0.91	0.93
	(0.03)	(0.02)	(0.04)	(0.04)	(0.03)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)
Self-efficacy	0.50	0.54	0.57	0.54	0.54	0.60	0.66	0.64	0.61	0.54
	(0.04)	(0.04)	(0.04)	(0.05)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Attitudes about intimate partner violence against women	0.62	0.64	0.67	0.64	0.71	0.70	0.78	0.71	0.72	0.73
	(0.04)	(0.03)	(0.04)	(0.04)	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Respect among household members	0.71	0.70	0.72	0.75	0.72	0.82	0.81	0.81	0.78	0.76
	(0.04)	(0.03)	(0.04)	(0.04)	(0.03)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)
Input in productive decisions	0.86	0.91	0.89	0.89	0.89	0.90	0.90	0.89	0.87	0.91
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.02)	(0.02)
Ownership of land and other assets	0.81	0.84	0.80	0.83	0.88	0.99	1.00	0.99	0.99	0.99
	(0.03)	(0.03)	(0.04)	(0.03)	(0.02)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)
Access to and decisions on financial services	0.62	0.86	0.89	0.88	0.86	0.78	0.89	0.88	0.81	0.86
	(0.02)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Control over use of income	0.80	0.86	0.83	0.83	0.87	0.86	0.85	0.84	0.83	0.87
	(0.03)	(0.02)	(0.02)	(0.02)	(0.03)	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)
Work balance	0.48	0.46	0.48	0.46	0.50	0.53	0.47	0.48	0.54	0.53
	(0.03)	(0.04)	(0.04)	(0.05)	(0.05)	(0.02)	(0.03)	(0.03)	(0.04)	(0.04)
Visiting important locations	0.24	0.25	0.32	0.28	0.32	0.49	0.58	0.53	0.52	0.51
	(0.03)	(0.04)	(0.04)	(0.04)	(0.05)	(0.03)	(0.04)	(0.04)	(0.04)	(0.05)
Group membership	0.45	0.47	0.45	0.47	0.54	0.29	0.35	0.28	0.30	0.35
	(0.03)	(0.04)	(0.05)	(0.03)	(0.04)	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)
Membership in influential groups	0.21	0.23	0.19	0.24	0.25	0.17	0.20	0.16	0.14	0.15
	(0.02)	(0.03)	(0.04)	(0.03)	(0.04)	(0.02)	(0.02)	(0.03)	(0.02)	(0.02)
Gender attitudes statements										
I make important contributions to my family	4.68	4.68	4.68	4.70	4.63	4.60	4.68	4.72	4.66	4.66
	(0.03)	(0.05)	(0.05)	(0.04)	(0.05)	(0.04)	(0.03)	(0.04)	(0.05)	(0.05)
Some adults in my family do not make important contributions to the family	2.40	2.39	2.40	2.29	2.37	2.46	2.40	2.32	2.24	2.37
	(0.09)	(0.15)	(0.14)	(0.13)	(0.10)	(0.09)	(0.11)	(0.08)	(0.10)	(0.11)
I make important contributions to my community	3.23	3.19	3.39	3.42	3.42	3.77	3.88	3.79	3.87	3.68
	(0.07)	(0.10)	(0.09)	(0.10)	(0.10)	(0.06)	(0.07)	(0.07)	(0.07)	(0.08)
I sometimes refrain from voicing my opinion because I fear being ignored/ridiculed	3.46	3.43	3.38	3.29	3.27	3.19	3.12	3.01	3.05	2.91
	(0.08)	(0.08)	(0.11)	(0.11)	(0.11)	(0.08)	(0.11)	(0.07)	(0.11)	(0.10)
I have a hard time saying positive things about myself	3.51	3.50	3.49	3.45	3.47	3.36	3.33	3.26	3.35	3.21
	(0.07)	(0.08)	(0.11)	(0.11)	(0.07)	(0.08)	(0.11)	(0.08)	(0.10)	(0.10)
Women should stand up for themselves to get what they want	4.67	4.75	4.70	4.74	4.72	4.45	4.42	4.35	4.46	4.49
	(0.03)	(0.04)	(0.05)	(0.03)	(0.03)	(0.05)	(0.05)	(0.07)	(0.05)	(0.05)
Women are usually very busy with work that benefits the	4.74	4.73	4.76	4.75	4.77	4.51	4.54	4.46	4.61	4.62

	Women					Men				
	Control Mean (SD)	T-N Mean (SD)	T-A Mean (SD)	T-AN Mean (SD)	T-ANG Mean (SD)	Control Mean (SD)	T-N Mean (SD)	T-A Mean (SD)	T-AN Mean (SD)	T-ANG Mean (SD)
household										
	(0.03)	(0.05)	(0.03)	(0.03)	(0.03)	(0.04)	(0.04)	(0.05)	(0.03)	(0.04)
Husbands should help wives with HH chores like cooking and taking care of children	4.62	4.68	4.64	4.70	4.67	4.42	4.53	4.45	4.53	4.59
	(0.04)	(0.06)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)	(0.04)	(0.04)
We can change culture/tradition regarding what men/ women do and how relate to each other	3.87	4.10	3.86	4.04	4.11	3.74	3.82	3.70	3.78	3.75
	(0.10)	(0.08)	(0.09)	(0.11)	(0.09)	(0.07)	(0.08)	(0.09)	(0.07)	(0.07)
A-WEAI outcomes										
A-WEAI: Empowerment score	0.79	0.79	0.79	0.78	0.82	0.76	0.77	0.76	0.77	0.78
	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
A-WEAI: Whether empowered	0.67	0.64	0.65	0.68	0.73	0.65	0.66	0.64	0.67	0.69
	(0.02)	(0.04)	(0.04)	(0.04)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)	(0.03)
A-WEAI: HH achieves gender parity	0.75	0.73	0.76	0.76	0.79	0.75	0.73	0.76	0.76	0.79
	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)
A-WEAI: Input in productive decisions	0.97	0.98	0.98	0.98	0.97	0.99	1.00	0.99	0.99	0.99
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)
A-WEAI: Ownership of assets	0.96	0.97	0.95	0.97	0.97	1.00	1.00	0.99	1.00	1.00
	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.00)		(0.00)	(0.00)	(0.00)
A-WEAI: Access to and decisions about credit	0.81	0.78	0.82	0.81	0.83	0.96	0.96	0.97	0.96	0.97
	(0.02)	(0.03)	(0.02)	(0.03)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
A-WEAI: Control over use of income	0.94	0.97	0.96	0.96	0.96	1.00	1.00	1.00	1.00	1.00
	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.00)	(0.00)		(0.00)	(0.00)
A-WEAI: Group member	0.45	0.47	0.45	0.47	0.54	0.29	0.35	0.28	0.30	0.35
	(0.03)	(0.04)	(0.05)	(0.03)	(0.04)	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)
A-WEAI: Workload	0.67	0.62	0.64	0.61	0.68	0.56	0.50	0.52	0.58	0.57
	(0.03)	(0.05)	(0.04)	(0.05)	(0.04)	(0.02)	(0.03)	(0.03)	(0.04)	(0.04)
N	717	520	497	492	513	717	520	497	492	513

Note: Treatments are: T -N=Nutrition Behavior Change Communication (BCC)-1 training delivered to women and men by agricultural extension agents (AEAs) from the Ministry of Agriculture. T-A=Agricultural Production training delivered to women and men by AEAs. T-AN=Agricultural Production + Nutrition BCC training delivered to women and men by AEAs. T-ANG=Agricultural Production + Nutrition BCC training delivered to women and men by AEAs + gender sensitization activities for women and men conducted by Helen Keller International (HKI).

Appendix Table 3 (Panel A): Single difference impacts on pro-WEAI indicators (Women)

Indicator	Control	Impacts				Test of difference between arms					N
		T-N	T-A	T-AN	T-ANG	T-N = T-AN	T-A = T-AN	T-AN = T-ANG	T-N = T-ANG	T-A = T-ANG	
	Mean (SE)					p-value					
Autonomy in income	0.76	0.07	0.01	-0.01	0.07	0.08	0.71	0.12	0.91	0.21	2,739
	(0.03)	(0.04)	(0.04)	(0.04)	(0.05)						
		[0.07]	[0.81]	[0.86]	[0.11]						
		<0.42>	<1.00>	<1.00>	<0.48>						
Self-efficacy	0.50	0.03	0.07	0.05	0.04	0.74	0.76	0.88	0.83	0.62	2,739
	(0.04)	(0.05)	(0.05)	(0.06)	(0.05)						
		[0.58]	[0.18]	[0.37]	[0.41]						
		<1.00>	<0.76>	<1.00>	<1.00>						
Attitudes about intimate partner violence against women	0.62	0.01	0.04	0.02	0.09	0.85	0.67	0.18	0.13	0.38	2,739
	(0.04)	(0.05)	(0.05)	(0.05)	(0.05)						
		[0.82]	[0.41]	[0.69]	[0.08]						
		<1.00>	<1.00>	<1.00>	<0.42>						
Respect among household members	0.71	-0.03	0.01	0.05	0.01	0.11	0.36	0.40	0.40	0.93	2,739
	(0.04)	(0.04)	(0.04)	(0.05)	(0.04)						
		[0.56]	[0.91]	[0.33]	[0.84]						
		<1.00>	<1.00>	<1.00>	<1.00>						
Input in productive decisions	0.86	0.05	0.03	0.02	0.03	0.30	0.81	0.64	0.67	0.79	2,739
	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)						
		[0.06]	[0.28]	[0.41]	[0.23]						
		<0.42>	<1.00>	<1.00>	<0.97>						
Ownership of land and other assets	0.81	0.03	-0.01	0.01	0.06	0.64	0.51	0.20	0.40	0.07	2,739
	(0.03)	(0.03)	(0.04)	(0.04)	(0.03)						
		[0.36]	[0.75]	[0.67]	[0.08]						
		<1.00>	<1.00>	<1.00>	<0.42>						
Access to and decisions on financial services	0.62	0.20	0.24	0.22	0.19	0.69	0.58	0.40	0.75	0.20	2,739
	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)						
		[0.00]	[0.00]	[0.00]	[0.00]						
		<0.00>	<0.00>	<0.00>	<0.00>						
Control over use of income	0.80	0.07	0.03	0.02	0.07	0.22	0.82	0.24	0.95	0.31	2,739
	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)						
		[0.05]	[0.33]	[0.48]	[0.06]						
		<0.42>	<1.00>	<1.00>	<0.42>						
Work balance	0.48	-0.01	-0.00	-0.02	0.01	0.91	0.77	0.70	0.77	0.91	2,739
	(0.03)	(0.05)	(0.05)	(0.05)	(0.05)						
		[0.81]	[0.99]	[0.73]	[0.91]						
		<1.00>	<1.00>	<1.00>	<1.00>						
Visiting important locations	0.24	0.03	0.08	0.04	0.08	0.78	0.36	0.51	0.38	0.87	2,739
	(0.03)	(0.05)	(0.05)	(0.05)	(0.05)						
		[0.60]	[0.08]	[0.39]	[0.15]						
		<1.00>	<0.42>	<1.00>	<0.64>						
Group membership	0.45	0.04	0.00	0.00	0.09	0.43	1.00	0.06	0.39	0.10	2,739
	(0.03)	(0.05)	(0.05)	(0.04)	(0.04)						
		[0.39]	[0.96]	[0.95]	[0.04]						
		<1.00>	<1.00>	<1.00>	<0.42>						
Membership in influential groups	0.21	0.02	-0.02	0.02	0.04	0.96	0.31	0.81	0.78	0.24	2,739
	(0.02)	(0.04)	(0.04)	(0.04)	(0.04)						
		[0.58]	[0.61]	[0.53]	[0.41]						
		<1.00>	<1.00>	<1.00>	<1.00>						

Note: Estimates are marginal effects for the 12 pro-WEAI indicators. Standard errors adjusted for clustering at block level are in parentheses. p-values in square brackets; Anderson (2008) sharpened q-values in triangular brackets. All specifications include as independent variables the treatment indicators, age and education level of respondent, household access to electricity, size of household operated land and upazila at baseline. See notes to Appendix Table 2 for the definition of the treatment arms.

Appendix Table 3 (Panel B): Single-difference impacts on pro-WEAI indicators (Men)

Indicator	Impacts					Test of difference between arms					N
	Control	T-N	T-A	T-AN	T-ANG	T-N = T-AN	T-A = T-AN	T-AN = T-ANG	T-N = T-ANG	T-A = T-ANG	
	Mean (SE)					p-value					
Autonomy in income	0.95	0.01	0.01	-0.04	-0.02	0.02	0.03	0.52	0.08	0.12	2,739
	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)						
		[0.58]	[0.71]	[0.07]	[0.23]						
		<1.00>	<1.00>	<0.96>	<1.00>						
Self-efficacy	0.60	0.06	0.04	0.01	-0.06	0.41	0.65	0.23	0.03	0.08	2,739
	(0.04)	(0.05)	(0.05)	(0.05)	(0.05)						
		[0.27]	[0.48]	[0.84]	[0.26]						
		<1.00>	<1.00>	<1.00>	<1.00>						
Attitudes about intimate partner violence against women	0.70	0.09	0.02	0.03	0.04	0.15	0.86	0.81	0.25	0.69	2,739
	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)						
		[0.02]	[0.59]	[0.47]	[0.35]						
		<0.39>	<1.00>	<1.00>	<1.00>						
Respect among household members	0.82	-0.01	-0.01	-0.04	-0.06	0.60	0.64	0.62	0.30	0.34	2,739
	(0.03)	(0.05)	(0.05)	(0.05)	(0.05)						
		[0.79]	[0.76]	[0.43]	[0.21]						
		<1.00>	<1.00>	<1.00>	<1.00>						
Input in productive decisions	0.90	-0.00	-0.01	-0.03	0.01	0.26	0.56	0.13	0.63	0.45	2,739
	(0.02)	(0.02)	(0.03)	(0.02)	(0.03)						
		[0.89]	[0.64]	[0.22]	[0.74]						
		<1.00>	<1.00>	<1.00>	<1.00>						
Ownership of land and other assets	0.99	0.00	-0.01	-0.01	-0.00	0.09	0.79	0.68	0.20	0.52	2,739
	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)						
		[0.51]	[0.23]	[0.29]	[0.54]						
		<1.00>	<1.00>	<1.00>	<1.00>						
Access to and decisions on financial services	0.78	0.11	0.10	0.03	0.07	0.03	0.02	0.25	0.29	0.29	2,739
	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)						
		[0.00]	[0.00]	[0.26]	[0.02]						
		<0.02>	<0.02>	<1.00>	<0.39>						
Control over use of income	0.86	-0.00	-0.02	-0.03	0.00	0.43	0.81	0.36	0.89	0.47	2,739
	(0.02)	(0.04)	(0.03)	(0.03)	(0.04)						
		[0.96]	[0.47]	[0.36]	[0.91]						
		<1.00>	<1.00>	<1.00>	<1.00>						
Work balance	0.53	-0.04	-0.04	0.02	0.01	0.18	0.26	0.88	0.27	0.35	2,739
	(0.02)	(0.04)	(0.04)	(0.04)	(0.04)						
		[0.29]	[0.40]	[0.63]	[0.79]						
		<1.00>	<1.00>	<1.00>	<1.00>						
Visiting important locations	0.49	0.09	0.04	0.04	0.02	0.34	0.99	0.72	0.21	0.72	2,739
	(0.03)	(0.05)	(0.05)	(0.05)	(0.06)						
		[0.05]	[0.42]	[0.43]	[0.75]						
		<0.87>	<1.00>	<1.00>	<1.00>						
Group membership	0.29	0.07	0.00	0.03	0.07	0.35	0.63	0.44	0.90	0.22	2,739
	(0.03)	(0.05)	(0.05)	(0.05)	(0.05)						
		[0.11]	[0.99]	[0.58]	[0.17]						
		<1.00>	<1.00>	<1.00>	<1.00>						
Membership in influential groups	0.17	0.03	-0.01	-0.02	-0.01	0.14	0.81	0.90	0.15	0.89	2,739
	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)						
		[0.31]	[0.79]	[0.59]	[0.66]						
		<1.00>	<1.00>	<1.00>	<1.00>						

Note: Estimates are marginal effects for the 12 pro-WEAI indicators. Standard errors adjusted for clustering at block level are in parentheses. p-values in square brackets; Anderson (2008) sharpened q-values in triangular brackets. See notes to Appendix Table 3 for specifications and notes to Appendix Table 2 for the definition of the treatment arms.

Appendix Table 4 (Panel A): Single-difference impacts on gender attitudes outcomes (Women)

Indicator	Control	Impacts				Test of difference between arms					N
		T-N	T-A	T-AN	T-ANG	T-N = T-AN	T-A = T-AN	T-AN = T-ANG	T-N = T-ANG	T-A = T-ANG	
	Mean (SE)					p-value					
I make important contributions to my family	4.68	0.02	0.01	0.03	-0.05	0.93	0.78	0.17	0.25	0.39	2,739
	(0.03)	(0.05) [0.67] <1.00>	(0.06) [0.86] <1.00>	(0.05) [0.56] <1.00>	(0.05) [0.38] <1.00>						
Some adults in my family do not make important contributions to the family	2.40	-0.01	-0.01	-0.10	-0.04	0.64	0.60	0.70	0.88	0.84	2,739
	(0.09)	(0.17) [0.93] <1.00>	(0.16) [0.97] <1.00>	(0.15) [0.50] <1.00>	(0.14) [0.76] <1.00>						
I make important contributions to my community	3.23	-0.03	0.16	0.21	0.18	0.10	0.72	0.86	0.13	0.86	2,739
	(0.07)	(0.13) [0.79] <1.00>	(0.12) [0.18] <1.00>	(0.12) [0.10] <1.00>	(0.12) [0.14] <1.00>						
I sometimes refrain from voicing my opinion because I fear being ignored/ ridiculed	3.46	-0.00	-0.06	-0.19	-0.19	0.13	0.37	0.97	0.14	0.38	2,739
	(0.08)	(0.10) [0.97] <1.00>	(0.13) [0.61] <1.00>	(0.12) [0.12] <1.00>	(0.13) [0.13] <1.00>						
I have a hard time saying positive things about myself	3.51	0.00	-0.01	-0.09	-0.04	0.51	0.62	0.75	0.68	0.80	2,739
	(0.07)	(0.11) [1.00] <1.00>	(0.13) [0.93] <1.00>	(0.13) [0.50] <1.00>	(0.10) [0.66] <1.00>						
Women should stand up for themselves to get what they want	4.67	0.08	0.02	0.07	0.05	0.88	0.41	0.57	0.52	0.70	2,739
	(0.03)	(0.05) [0.12] <1.00>	(0.05) [0.66] <1.00>	(0.04) [0.12] <1.00>	(0.04) [0.30] <1.00>						
Women are usually very busy with work that benefits the household	4.74	-0.01	0.02	0.01	0.02	0.62	0.95	0.75	0.47	0.81	2,739
	(0.03)	(0.05) [0.82] <1.00>	(0.04) [0.72] <1.00>	(0.04) [0.76] <1.00>	(0.04) [0.55] <1.00>						
Husbands should help wives with HH chores like cooking and taking care of children	4.62	0.07	0.02	0.09	0.05	0.73	0.21	0.42	0.75	0.63	2,739
	(0.04)	(0.06) [0.27] <1.00>	(0.05) [0.67] <1.00>	(0.05) [0.07] <1.00>	(0.05) [0.35] <1.00>						
We can change culture/tradition regarding what men/women do and how relate to each other	3.87	0.20*	-0.02	0.17	0.24*	0.81	0.16	0.58	0.70	0.03	2,739
	(0.10)	(0.12) [0.10] <1.00>	(0.13) [0.85] <1.00>	(0.14) [0.24] <1.00>	(0.13) [0.06] <1.00>						

Notes: Estimates are average treatment effects. Standard errors adjusted for clustering at block level are in parentheses. p-values in square brackets; Anderson (2008) sharpened q-values in triangular brackets. See notes to Appendix Table 3 for specifications and notes to Appendix Table 2 for the definition of the treatment arms.

Appendix Table 4 (Panel B): Single-difference impacts on gender attitudes outcomes (Men)

Indicator	Control	Impacts				Test of difference between arms					N
		T-N	T-A	T-AN	T-ANG	T-N = T-AN	T-A = T-AN	T-AN = T-ANG	T-N = T-ANG	T-A = T-ANG	
	Mean (SE)					p-value					
I make important contributions to my family	4.60	0.09	0.12	0.07	0.06	0.66	0.33	0.97	0.61	0.30	2,739
	(0.04)	(0.05)	(0.05)	(0.06)	(0.06)						
		[0.06]	[0.02]	[0.29]	[0.30]						
		<0.31>	<0.30>	<0.64>	<0.64>						
Some adults in my family do not make important contributions to the family	2.46	-0.09	-0.16	-0.21	-0.09	0.35	0.58	0.35	0.97	0.57	2,739
	(0.09)	(0.12)	(0.10)	(0.12)	(0.13)						
		[0.45]	[0.11]	[0.07]	[0.50]						
		<0.88>	<0.36>	<0.31>	<0.94>						
I make important contributions to my community	3.77	0.11	0.04	0.14	-0.08	0.80	0.30	0.04	0.06	0.25	2,739
	(0.06)	(0.08)	(0.09)	(0.09)	(0.10)						
		[0.18]	[0.64]	[0.14]	[0.43]						
		<0.55>	<0.96>	<0.43>	<0.88>						
I sometimes refrain from voicing my opinion because I fear being ignored/ ridiculed	3.19	-0.08	-0.19	-0.17	-0.27	0.55	0.83	0.46	0.19	0.51	2,739
	(0.08)	(0.13)	(0.10)	(0.13)	(0.13)						
		[0.52]	[0.06]	[0.19]	[0.03]						
		<0.94>	<0.31>	<0.55>	<0.31>						
I have a hard time saying positive things about myself	3.36	-0.04	-0.12	-0.04	-0.15	0.99	0.52	0.41	0.43	0.80	2,739
	(0.08)	(0.13)	(0.11)	(0.12)	(0.12)						
		[0.74]	[0.28]	[0.75]	[0.23]						
		<0.96>	<0.64>	<0.96>	<0.57>						
Women should stand up for themselves to get what they want	4.45	-0.04	-0.09	0.01	0.05	0.34	0.11	0.58	0.17	0.05	2,739
	(0.05)	(0.06)	(0.07)	(0.06)	(0.07)						
		[0.54]	[0.20]	[0.83]	[0.49]						
		<0.94>	<0.55>	<0.99>	<0.94>						
Women are usually very busy with work that benefits the household	4.51	0.02	-0.06	0.10	0.11	0.09	0.00	0.82	0.07	0.00	2,739
	(0.04)	(0.05)	(0.06)	(0.05)	(0.05)						
		[0.78]	[0.32]	[0.04]	[0.03]						
		<0.96>	<0.68>	<0.31>	<0.31>						
Husbands should help wives with HH chores like cooking and taking care of children	4.42	0.10	0.03	0.12	0.17	0.71	0.10	0.34	0.17	0.01	2,739
	(0.04)	(0.05)	(0.06)	(0.05)	(0.05)						
		[0.05]	[0.65]	[0.02]	[0.00]						
		<0.31>	<0.96>	<0.30>	<0.02>						
We can change culture/tradition regarding what men/ women do and how relate to each other	3.74	0.08	-0.04	0.05	0.02	0.75	0.45	0.77	0.56	0.63	2,739
	(0.07)	(0.10)	(0.11)	(0.09)	(0.10)						
		[0.44]	[0.73]	[0.63]	[0.87]						
		<0.88>	<0.96>	<0.96>	<1.00>						

Notes: Estimates are average treatment effects. Standard errors adjusted for clustering at block level are in parentheses. p-values in square brackets; Anderson (2008) sharpened q-values in triangular brackets. See notes to Appendix Table 3 for specifications and notes to Appendix Table 2 for the definition of the treatment arms.

Appendix Table 5 (Panel A): Single-difference impacts on whether women experienced different types of IPV

Indicator	Control	Impacts T-N	T-A	T-AN	T-ANG	Test of difference between arms T-N = T-AN	T-A = T-AN	T-AN = T-ANG	T-N = T-ANG	T-A = T-ANG	N
	Mean (SE)					p-value					
Insulted you or made you feel bad about yourself	0.20	-0.00	0.02	-0.02	0.06	0.70	0.36	0.07	0.14	0.42	2,739
	(0.03)	(0.04)	(0.05)	(0.04)	(0.04)						
		[0.94]	[0.59]	[0.63]	[0.13]						
		<1.00>	<1.00>	<1.00>	<1.00>						
Belittled or humiliated you in front of other people	0.10	-0.01	0.00	0.02	0.04	0.48	0.74	0.46	0.14	0.29	2,739
	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)						
		[0.79]	[0.88]	[0.59]	[0.15]						
		<1.00>	<1.00>	<1.00>	<1.00>						
Done things to scare or intimidate you on purpose	0.05	-0.00	0.02	0.02	0.05	0.39	0.96	0.21	0.04	0.26	2,739
	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)						
		[0.99]	[0.37]	[0.38]	[0.03]						
		<1.00>	<1.00>	<1.00>	<1.00>						
Threatened to hurt you or someone you care about	0.00	0.00	-0.00	0.00	0.01	0.60	0.31	0.16	0.07	0.04	2,739
	(0.00)	(0.00)	(0.01)	(0.00)	(0.01)						
		[0.88]	[0.67]	[0.48]	[0.09]						
		<1.00>	<1.00>	<1.00>	<1.00>						
Slapped you or thrown something at you that could hurt you	0.06	-0.01	0.02	-0.01	0.02	0.77	0.14	0.09	0.11	0.80	2,732
	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)						
		[0.61]	[0.38]	[0.47]	[0.27]						
		<1.00>	<1.00>	<1.00>	<1.00>						
Pushed you or shoved you or pulled your hair	0.02	0.01	0.01	0.01	0.01	1.00	0.75	0.86	0.85	0.59	2,734
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)						
		[0.34]	[0.17]	[0.35]	[0.43]						
		<1.00>	<1.00>	<1.00>	<1.00>						
Hit you with his fist or with something else that could hurt you	0.01	0.01	0.01	0.00	0.01	0.92	0.91	0.65	0.72	0.70	2,727
	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)						
		[0.54]	[0.52]	[0.64]	[0.33]						
		<1.00>	<1.00>	<1.00>	<1.00>						
Kicked you, dragged you or beat you up	0.01	0.01	-0.01	0.00	0.01	0.82	0.33	0.30	0.47	0.06	2,725
	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)						
		[0.50]	[0.55]	[0.66]	[0.13]						
		<1.00>	<1.00>	<1.00>	<1.00>						
Choked or burnt you on purpose	0.00	-0.00	-0.00	0.00	0.01	0.35	0.33	0.25	0.07	0.05	2,725
	(0.00)	(0.01)	(0.01)	(0.00)	(0.00)						
		[0.50]	[0.47]	[0.72]	[0.14]						
		<1.00>	<1.00>	<1.00>	<1.00>						

Notes: Estimates are marginal effects. Standard errors adjusted for clustering at block level are in parentheses. p-values in square brackets; Anderson (2008) sharpened q-values in triangular brackets. See notes to Appendix Table 3 for specifications and notes to Appendix Table 2 for the definition of the treatment arms.

Appendix Table 5 (Panel B): Single-difference impacts on frequency of women experiencing different types of IPV

Indicator	Control	Impacts T-N	T-A	T-AN	T-ANG	Test of difference between arms T-N = T-AN	T-A = T-AN	T-AN = T-ANG	T-N = T-ANG	T-A = T-ANG	N
	Mean (SE)					p-value					
Insulted you or made you feel bad about yourself	0.35	-0.00	0.02	-0.02	0.06	0.70	0.36	0.07	0.14	0.42	2,739
	(0.05)	(0.04) [0.94] <1.00>	(0.05) [0.59] <1.00>	(0.04) [0.63] <1.00>	(0.04) [0.13] <1.00>						
Belittled or humiliated you in front of other people	0.18	-0.01	0.00	0.02	0.04	0.48	0.74	0.46	0.14	0.29	2,739
	(0.03)	(0.03) [0.79] <1.00>	(0.03) [0.88] <1.00>	(0.03) [0.59] <1.00>	(0.03) [0.15] <1.00>						
Done things to scare or intimidate you on purpose	0.10	-0.00	0.02	0.02	0.05	0.39	0.96	0.21	0.04	0.26	2,739
	(0.02)	(0.02) [0.99] <1.00>	(0.02) [0.37] <1.00>	(0.02) [0.38] <1.00>	(0.02) [0.03] <1.00>						
Threatened to hurt you or someone you care about	0.01	0.00	-0.00	0.00	0.01	0.60	0.31	0.16	0.07	0.04	2,739
	(0.00)	(0.00) [0.88] <1.00>	(0.01) [0.67] <1.00>	(0.00) [0.48] <1.00>	(0.01) [0.09] <1.00>						
Slapped you or thrown something at you that could hurt you	0.09	-0.01	0.02	-0.01	0.02	0.77	0.14	0.09	0.11	0.80	2,732
	(0.02)	(0.02) [0.61] <1.00>	(0.02) [0.38] <1.00>	(0.02) [0.47] <1.00>	(0.02) [0.27] <1.00>						
Pushed you or shoved you or pulled your hair	0.02	0.01	0.01	0.01	0.01	1.00	0.75	0.86	0.85	0.59	2,734
	(0.01)	(0.01) [0.34] <1.00>	(0.01) [0.17] <1.00>	(0.01) [0.35] <1.00>	(0.01) [0.43] <1.00>						
Hit you with his fist or with something else that could hurt you	0.02	0.01	0.01	0.00	0.01	0.92	0.91	0.65	0.72	0.70	2,727
	(0.01)	(0.01) [0.54] <1.00>	(0.01) [0.52] <1.00>	(0.01) [0.64] <1.00>	(0.01) [0.33] <1.00>						
Kicked you, dragged you or beat you up	0.01	0.01	-0.01	0.00	0.01	0.82	0.33	0.30	0.47	0.06	2,725
	(0.01)	(0.01) [0.50] <1.00>	(0.01) [0.55] <1.00>	(0.01) [0.66] <1.00>	(0.01) [0.13] <1.00>						
Choked or burnt you on purpose	0.01	-0.00	-0.00	0.00	0.01	0.35	0.33	0.25	0.07	0.05	2,725
	(0.00)	(0.01) [0.50] <1.00>	(0.01) [0.47] <1.00>	(0.00) [0.72] <1.00>	(0.00) [0.14] <1.00>						

Notes: Estimates are average treatment effects. Standard errors adjusted for clustering at block level are in parentheses. p-values in square brackets; Anderson (2008) sharpened q-values in triangular brackets. See notes to Appendix Table 3 for specifications and notes to Appendix Table 2 for the definition of the treatment arms.

Appendix Table 6: Single-difference impacts on pro-WEAI outcomes

Indicator	Control	Impacts					Test of difference between arms				N
		T1-N	T2-N	T-A	T-AN	T-ANG	T1-N = T2-N	T-A = T2-N	T-AN = T2-N	T-ANG = T2-N	
	Mean (SE)						p-value				
Women											
Empowerment score	0.59	0.05***	0.04**	0.04**	0.04**	0.07***	0.63	0.81	0.99	0.11	3,245
	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)					
Whether empowered	0.25	0.09**	0.07*	0.08**	0.08*	0.14***	0.73	0.85	0.90	0.16	3,245
	(0.02)	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)					
Total gender attitudes score (1-45)	34.44	0.33	1.08**	0.28	0.96**	0.78*	0.11	0.13	0.79	0.50	3,245
	(0.28)	(0.44)	(0.43)	(0.49)	(0.43)	(0.40)					
Time spent working (hours)	9.49	0.26	0.50**	0.02	0.08	-0.04	0.40	0.07*	0.12	0.04**	3,245
	(0.14)	(0.25)	(0.23)	(0.24)	(0.23)	(0.22)					
Men											
Empowerment score	0.67	0.03**	0.04**	0.01	-0.00	0.00	0.87	0.08*	0.01***	0.04**	3,245
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)					
Whether empowered	0.39	0.10**	0.11***	0.02	-0.01	0.01	0.88	0.06*	0.01**	0.03**	3,245
	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)					
Total gender attitudes score (1-45)	34.47	0.59*	0.29	0.47	0.89***	0.83**	0.43	0.65	0.09*	0.15	3,245
	(0.20)	(0.33)	(0.33)	(0.33)	(0.29)	(0.32)					
Time spent working (hours)	9.44	0.24	0.00	0.34	0.09	0.14	0.40	0.25	0.74	0.64	3,245
	(0.18)	(0.27)	(0.23)	(0.29)	(0.25)	(0.28)					
Household											
HH achieves gender parity	0.47	0.05	0.03	0.06	0.07	0.14***	0.51	0.37	0.30	0.02**	3,245
	(0.03)	(0.04)	(0.04)	(0.04)	(0.05)	(0.05)					

Note: Estimates are average treatment effects for the empowerment score indicator and marginal effects for whether empowered and gender parity indicators. Standard errors adjusted for clustering at block level are in parentheses. *p<.10; ** p<.05; *** p<.001. See notes to Appendix Table 3 for specifications and notes to Appendix Table 2 for the definition of the treatment arms.

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IFPRI HEADQUARTERS
1201 Eye Street, NW
Washington, DC 20005 USA
Tel.: +1-202-862-5600
Fax: +1-202-862-5606
Email: ifpri@cgiar.org