Feminist Economics

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/rfec20

Effect of Group and Leader Attributes on Men and Women Farmers' Participation in Group Activities in Zambia

Kelvin Mulungu & Netsayi Noris Mudege

To cite this article: Kelvin Mulungu & Netsayi Noris Mudege (2020) Effect of Group and Leader Attributes on Men and Women Farmers' Participation in Group Activities in Zambia, Feminist Economics, 26:4, 178-204, DOI: 10.1080/13545701.2020.1791926

To link to this article: https://doi.org/10.1080/13545701.2020.1791926

Published online: 14 Aug 2020.

Feminist Economics, 2020
Vol. 26, No. 4, 178–204, https://doi.org/10.1080/13545701.2020.1791926

Effect of Group and Leader Attributes on Men and Women Farmers' Participation in Group Activities in Zambia

Kelvin Mulungu and Netsayi Noris Mudege

ABSTRACT

Since development agencies often implement interventions through collective-action groups such as farmer cooperatives and self-help groups, there is a need to understand how participation is affected by group-level and leader attributes. This study collected gender-disaggregated, quantitative and qualitative data on sixty-eight self-help groups in Zambia to understand the participation of men and women farmers in different crop-production activities. Results show that participation rates of men and women are the same across all maize production activities except harvesting. The gender composition of members influenced men's and women's participation in group activities: when men were fewer in a group, they (men) participated more, while when more women were in a group (above 53 percent), the women participated less. Leader's education level, knowledge of group agenda, and frequency of meetings also affected participation rates. To design collective action groups that promote gender equity outcomes, gender composition of groups should be considered.

KEYWORDS

Gender, group participation, gender composition, group identity, Zambia

JEL CODES: B23, J16

HIGHLIGHTS

- Agricultural collective-action groups assembled by development organizations attempt to bolster women's participation and leadership within the group and the community.
- These empowerment groups may inadvertently reproduce traditional gender labor roles, particularly when membership increases women's workload.
- Attention to group dynamics demonstrates that minority group members – who are usually men – work harder and overperform due to their increased visibility within the group. Thus, increasing

women's numbers in groups has not aided the goal of increasing their participation.

- Policymakers should consider the gender composition of the group, labor roles, time commitment of participation, and leader attributes when forming collective-action groups in order to achieve gender-equity outcomes.

INTRODUCTION

When development actors form collective-action groups, they often include a higher number of women than would usually join. The goal is to both directly benefit more women and indirectly give them greater control in the group in the hope that they influence norms and values in the group and at the community level (Ostrom 2000; Smith, Thomas, and McGarty 2015). The collective action groups approach is a participatory approach that involves communities in finding solutions to their problems, such as natural resource over-exploitation and low adoption of technologies. This approach has become common in development work (Agarwal 2010; Misiko 2013). Development agencies and program managers involve women in collective action groups because they regard women as disproportionately more economically vulnerable than their male counterparts and because efforts to improve their economic conditions without involving them have not worked (Kabeer 2004; Fischer and Qaim 2012). However, there is a need to balance labor demand in groups and household activities, as the groups may burden women more, especially if the group activities involve roles that are traditionally considered to be for women. We investigate whether involving more women in groups influences the participation rates of both women and men in various group activities with gendered expectations.

Indeed, the argument that a higher proportion of women in a group will lead to more participation – at whatever level or definition of participation is used – has been debated in the literature. Focusing only on the executive committees of community forest initiatives in Asia, Bina Agarwal (2010) shows that a higher proportion of women leads to more participation, both in terms of attending meetings and speaking up at those meetings – passive and active participation, respectively. There is also evidence that women participate more if they identify with the objective of the group (Iyer and Ryan 2009). However, focusing only on meetings and not activity-based participation fails to reveal if there is any gender-transformative power in having more women in groups that would challenge the existing gendered division of labor. It is essential to understand what determines the participation rates of men and women and whether increasing members of one gender in a group can lead to the free-rider problem for one group. Free riding may differ by gender because men and women have

different motivations for joining collective action groups (Pandolfelli, Meinzen-Dick, and Dohrn 2007). So, for organizations that are targeting the involvement of different demographics in groups, it is crucial to understand how participation is affected by gender proportions so as not to increase the work burden on one group as the other free rides. In this instance, we consider members who are not contributing labor to group activities but who are benefiting from group resources, such as access to information about vitamin A maize from the group after harvest. Using data collected by the Integrated Research in Development Programme (IRDP) in Northern Zambia, this paper answers these questions based on an analysis of sixty-eight self-help groups.

Africa has a long history with the use of groups in development work. Agriculture program managers and extensionists have used farmer groups as platforms for capacity building, exchange of information, and innovation in rural settings (Fischer and Qaim 2012; Rao and Qaim 2013). Groups have also been used in the management of natural resources, such as forests and water, for marketing in agriculture to reduce the cost of organizing farmers, and for social causes (Fischer and Qaim 2014; Nair et al. 2017). Zambia is no exception to this, as government and development actors have formed different types of groups to implement development activities (Mwanza 2016). Most of these groups target the poor or vulnerable members of the community, such as women and poor farmers (Araki 2001).

Given that development programs use groups as avenues for change, it is vital to understand group dynamics. A common way of farmer group organization in Zambia is the agricultural cooperatives. Over 1.6 million households in Zambia belong to agriculture cooperatives (Mtonga 2012). In Zambia, researchers suggest that men dominate agricultural cooperatives because of biases based on communal gender norms (Blekking 2017).

Elsewhere, in Ethiopia, it has been shown that women tend to organize themselves around and are more active in groups that help them to fulfill roles within their domains, such as joining self-help groups, vegetable gardening groups, and small livestock groups, while men tend to be more involved in formal groups and cooperatives that deal with more lucrative crops and animals (Woldu, Tadesse, and Waller 2013). Not participating equally or fully in farmer organizations may disadvantage women because farmer organizations or cooperatives improve members' access to services, markets, and other resources (Quisumbing et al. 2015). To overcome these challenges, development organizations go into communities and form collective action groups that deliberately include more women. However, one unexplored issue is how different categories, such as women's and men's participation in group activities (substantive activities with traditional gender norms about whose domain it is, rather than the attendance of

meetings) are affected as the proportion of one gender (generally gender composition when referring to both genders) increases.

The present study adds to the literature by studying groups formed on a multidimensional measure of poverty and vulnerability with the community selecting the members. In most cases, people volunteer to be part of groups; however, in our case, group members were selected by the community. Community-led selection processes for group members allows us to understand how members who were "voted" into the group by the community respond to the group's activities. Using this group as a case study, we understand how men and women participate in different activities as the proportion of women in the group increases. We focus on active participation in group maize production activities (henceforth participation) instead of passive participation, such as attending meetings. Development organizations use groups to organize the disadvantaged in society. Our study focuses on one of the most underprivileged regions in Zambia – Northern Province. Even with limited data, we provide insights that are meaningful and can guide future research that aims to deepen our understanding of collective action groups.

Results indicate that gender composition, education level of the leader, and frequency of meetings are key determinants of group participation. We find no differences in participation across different activities. Both men and women displayed the same pattern: with low representation in the group, participation was highest. As one gender's representation increased in the group, participation reduced, and free riding increased. These results contrast the finding from the qualitative household study where study participants still perceive gender division of labor even within the groups.

CONTEXT

The Northern Province of Zambia consistently appears as one of the country's four poorest provinces, and per capita poverty levels approach 80 percent, according to the Living Conditions Monitoring Survey (CSO 2015). Child malnutrition is widespread, and the province has one of the highest rates of child stunting at 54.3 percent, as well as the highest child wasting rate at 8.7 percent among children under five years of age in Zambia (CSO 2015). The problem is especially extreme in Luwingu district, where figures are above the national average and wasting affects an alarmingly high proportion of children (27.8 percent). In Mbala district of Northern Province, stunting among children under five is a particular challenge, while wasting is less severe. Thus, the government and its partners have introduced vitamin A maize (VAM) in the districts to address micronutrient deficiency, particularly vitamin A deficiency in young children and infants. The promotion of new technologies

among the poor by different stakeholders has led to the formation of different community groups ranging from those tackling health challenges, agriculture, and education. The availability of community groups makes the province a perfect case study for how such groups function to guide any further efforts in the future by other partners.

The main staples in Northern Zambia include maize and cassava (Chapoto et al. 2010). Within the province, the government offered incentives for maize production in permanent fields leading to agricultural intensification (German, Schoneveld, and Gumbo 2011). The long history of maize interventions in the area makes it a natural entry point to improve nutritional outcomes through vitamin A bio-fortified maize. Understanding the labor contributions to maize has implications for overall household labor, as the majority of the agricultural production is dedicated to maize. Table 1 shows that 40 percent of the total area allocated to crops in the districts is under maize.

In both districts, deep-rooted norms dictate gendered divisions of agricultural labor as well as access to education. Heavy agriculture-based workloads such as planting, weeding, and harvesting coupled with home-based duties often overburden women (Nakhone and Kabutha 1998; Cole et al. 2016). This gender-based burden has implications for programs that

Table 1 Common crops grown in the two districts

Crop	*No. of HHs growing*	*Average number of plots per HH*	*Average plot size (Hectares)*	*Percent of total cultivated area (%)*
Maize	56	4.45	0.93	40.09
Cassava	33	5.67	0.49	15.77
Mixed beans	37	3.76	0.96	14.54
Groundnuts	25	5.16	0.65	14.54
Millet	20	4.20	0.49	2.11
Garden	2	8.50	0.42	1.23
Soya beans	3	4.33	0.50	1.12
Sunflower	2	5.50	1.11	1.11
Sorghum	4	2.00	0.81	0.53
Sweet potatoes	1	6.00	0.52	0.22
Irish potato	1	2.00	0.63	0.18
Sweet potatoes – orange fleshed	1	2.00	0.33	0.11

Note: HH = household.

Source: Authors' own calculation using the Rural Agricultural Livelihoods Survey (RALS) collected in 2015. RALS is a district-level representative survey that is collected from about 8,000 rural households nationally by Central Statistical Office and Indaba Agricultural Policy Research Institute.

aim to empower women through groups yet inadvertently increase the women's workload as they are expected to attend meetings and perform group activities. In Zambia, research suggests that there is generally more access to primary level education and limited access to tertiary education for young men and women (Masaiti and Chita 2014). With low education, the role that traditional norms and values play in labor decisions becomes amplified (Iyer and Ryan 2009).

The intervention

To address the problems related to malnourishment among children under five years, the Integrated Research in Development Programme (IRDP) rolled out vitamin A maize through self-help groups called Livelihoods Enhancement Groups (LEGs), which are platforms for facilitating research for development initiatives focusing on nutrition, agriculture, veterinary services, and savings. IRDP regarded LEGs as key levers of change in empowering poor, rural men and women and improving their livelihood through an innovation platform that includes different stakeholders and entry points. HarvestPlus, through its partner, Self Help Africa (SHA), formed livelihoods enhancement groups (LEGs) in the various communities where they were implementing the IRDP project. The project implementers targeted LEGs with training and information in three key domains that included aquaculture, forestry, and nutrition. These domains are regarded as vital because they are the primary sources of livelihood for the people in these communities.

The LEGs were comprised of forty-five members each with at least 60 percent female membership recommended. Members were supposed to be vulnerable households. The project defined a vulnerable person as someone unable to compete economically, such as: (i) female head of household, (ii) people with health conditions and impairments, (iii) elder-headed households, and (iv) vulnerable children or their caregivers. LEG membership was strict in ensuring that vulnerability was not merely superficial. For example, any household that had an iron-roofed house was not eligible; village headmen were also not allowed. This strict selection requirement resulted in quite homogenous groups in terms of poverty. The emphasis of 60 percent women members per LEG was because of the project's deliberate desire to empower more women. In each LEG, group members selected three farmers – called lead farmers – to manage the agricultural-related domains. Of the three managing agriculture-related domains in each LEG, HarvestPlus randomly selected one farmer to be in charge of the demonstration vitamin A maize plot. Even though the farmer had the right to refuse this selection, none of the selected farmers did, and most were happy to be chosen. The random selection process ensured that those selected were not systematically different from those not selected.

Members of the LEGs also managed the demonstration plots under the supervision of a lead farmer. LEG members regarded themselves as different from non-members, primarily because of the knowledge that had been transferred to them by the project. Additional entry points for the vitamin A maize in both Mbala and Luwingu were mother-to-mother training, Infant and Young Child Feeding training, the promotion of exclusive breastfeeding in the first six months, sanitation training, recipe and cookery demonstrations (including men), and the promotion of nutrient-rich foods, for instance, vitamin A rich orange maize, sweet potato, cassava, and iron-rich beans.

Researchers entered all LEGs into Excel and used a random number generator to select sixty and 120 LEGs, respectively, in Luwingu and Mbala to host the maize demonstration plots. Luwingu received a fewer number of LEGs hosting demonstration plots because it is a dual cassava-maize belt while Mbala is predominantly a maize belt. Each group received VAM seed and fertilizer for use in the plots for the 2014–15 agricultural season.

While the LEGs served many different purposes, this paper will focus mainly on the VAM demonstration plots. The demonstration plots had a dual purpose: to teach and demonstrate the efficacy of vitamin A maize to members of the LEGs and other community members and potential beneficiaries. Lead farmers were trained in agronomic practices for maize and the nutritional benefits of VAM. Activities at the plot required all group members to participate and learn about the cultivation of VAM and its nutritional benefits. Lead farmers were trained to keep gender-disaggregated data of attendees on dates when plot activities happened. Maintaining attendance records allowed us to collect data by gender for each activity that was carried out from land preparation to harvesting. From all 180 LEGs that had plots, eighty-seven LEGs were randomly selected for interviews using a random number generator in Excel. Structured questionnaires were then privately (outside the group) administered to the selected LEGs' lead farmers to get leader attribute variables and other group data. The researcher hired locally resident enumerators to administer these interviews in the two districts. However, because some LEGs had poor records, that is, they did not record the members who attended different activities, the data could not be used, and this left sixty-eight LEGs for analysis of gendered participation in various activities. Tests (in Appendix A) reveal that there is no statistically significant difference at both the group and lead-farmer level between the dropped and kept LEGs/observations, meaning the dropped observations do not introduce a systematic bias in the results. At the individual level, we observe the participation of 1,171 men and 1,659 women in group activities. To fully understand the quantitative results, we use the qualitative LEG characterization survey (the results of the characterization are published in Mulungu et al. [2017]) that used Focus Group Discussions and key

informant interviews to explain the results. The qualitative data was collected after harvest with four randomly selected LEGs in Luwingu and eight randomly selected LEGs in Mbala.[1]

METHODS

Testing for equality of participation rates

Our data has some limitations in that we did not collect household data on labor allocation to have a full picture of the determinants of the ability of individuals to participate in group activities. For example, in an insightful paper, Felix Meier zu Selhausen found that in Uganda "duration of membership, access to extension services, more equal intrahousehold power relations, and joint land ownership positively influence women's ability to commit to collective action" (2016: 130). While we did not collect data at the household level and other indicators that Meier zu Selhausen (2016) regards as important, we try our best to understand if there would be differences in how much free time there is between men and women by analyzing the labor allocation to other main crops in the region.

Because the numbers of men and women in the LEGs are not the same, we compare proportions of men and women participating in various activities using a *t*-test. The *t*-test helps to establish if a higher proportion of women or men take part in certain activities at the VAM plot. We further investigate if the participation rates depend on gender proportions. A simple proportion cannot be used here because increasing the number of women or men increases the mathematical probability of having someone from that group attending an activity.

Following a similar approach as Agarwal (2010), we construct the proportion (p) of gender (j) attending (A) activity i as (or, as we call it, participation rate): $p_i^j = \frac{A_i^j}{m^j}$ with m being the number of that gender in the group, $j = 1,2$ for men and women, while $i = 1, \ldots ,6$ for land preparation, planting, weeding, basal (compound D) fertilizer application, top (urea) fertilizer application, and harvesting. To calculate the overall participation rate, a simple mean of the above activity-level participation rates is taken.

While research in urban Zambia shows greater flexibility in terms of the gendered division of labor (Evans 2014), in agriculture, participation differs by crop and activity (World Bank 2004; Shipekesa and Jayne 2012). Using a nationally representative sample from the crops forecast survey, Arthur M. Shipekesa and Thomas S. Jayne (2012) suggest that, in terms of maize production, women provide more labor hours in planting, weeding, harvesting, and shelling maize, while men provide more labor hours in transporting maize from the field to the homestead. All other activities, such as land preparation and fertilizer application, are

shared equally between men and women. Gemechu Ogato, Emmanuel Boon, and Janaki Subramani (2009) show that participation is similar in land preparation, planting, and fertilizer application in rural Ethiopia. However, more women (75 percent) take part in harvesting. B. T. Mohammed and A. F. Abdulquadr's (2012) study, which uses nationally representative data in Nigeria, shows that more men take part in land preparation while more women take part in planting and weeding. These studies use data at the household level. Lenah Nakhone and Charity Kabutha (1998), who analyzed data from Tanzania, Ethiopia, and Uganda, argue that women tend to engage more in nonmechanized activities. Using these studies from Africa, we draw the following hypotheses:

(1) A higher proportion of men take part in land preparation.
(2) A higher proportion of women take part in planting, weeding, fertilizer application, and harvesting.

Determinants of participation

The study examines not only the differences in participation rates but also the gender-related determinants of participation in group activities. To achieve this, three models are estimated, one for women;s participation, another for men's participation, and the overall model. The dependent variable is the participation rate, as defined earlier. With a dependent variable that is a proportion, we employ a fractional probit to estimate the determinants of participation. Fractional probit has advantages over other models (for example, ordinary least squares, probit, and logit) when the response variable can include one and zero (100 percent and zero; see, for example, Papke and Wooldridge [2008]; Mulungu and Tembo [2015]). Following Leslie Papke and Jeffrey M. Wooldridge (1996), we specify the heteroschedastic fractional probit model as:

$$E(y_i|X_i) = G(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_k x_k) exp\left(-\frac{\alpha Z}{2}\right) \quad (1)$$

X_i are independent variables and y_i is the dependent variable which is a proportion, that is $0 \leq y_i \leq 1$ and G is a known function satisfying $0 < G(v) < 1$ for all values where v is a real number and does not depend on the sample size. Z are parameters in the variance equation with α as the corresponding parameters. Equation 1 above is well defined even for cases of full participation, that is, where y takes on values of 1 (full participation for a specific LEG and/or gender) or 0 (no participation for a specific LEG and/or gender). The nonlinear estimation of the parameters for this

model is done through quasi-maximum likelihood methods (for details on the model see Papke and Wooldridge [1996]). Because the dependent variable is not binary, robust standard errors are used in estimation, as variance tends to vary (heteroscedasticity) with the dependent variable (participation rate).

The quasi-maximum likelihood estimator, β, is consistent and asymptotically normal, regardless of the distribution of the dependent variable, conditional on the predictors (Gallani, Krishnan, and Wooldridge 2015). This allows the dependent variable to be continuous, discrete, or have both continuous and discrete characteristics, making this model applicable in most research settings.

Qualitative data were analyzed using text analysis in Stata to look for information that was shared during activities. We also looked for motivations for joining groups, how group members viewed themselves, and any themes that could explain the quantitative results.

Independent variables

In the model, seven variables are included as possible factors that influence the participation rates of women and men. Gender of the lead farmer is included to test if it affects women's or men's participation. Literature shows that demographics are key determinants of women's participation in informal groups (Kiptot and Franzel 2011). Knowledge of vitamin A deficiency (VAD) is included as an explanatory variable because the VAM plots were also learning sites about vitamin A and understanding of the group goal/agenda is shown to increase participation (Iyer and Ryan 2009). Knowledge of vitamin A was coded as a 1/0 variable. A question asked the lead farmers what vitamin A deficiency is and what the benefits of vitamin A are, and all those who gave the right answers were taken as knowledgeable while those that gave wrong answers were taken as not knowledgeable. We also include a variable that measures the frequency with which the group meets. This variable captures the integration in the group as more meetings translate to better understanding and enhanced group identification (Doosje, Ellemers, and Spears 1995). The ratio of women to men is included to determine if the participation of one gender is lower in groups dominated by the opposite gender. This is the variable of interest, and we investigate further by using a second model that has an interaction of education and gender of lead farmer and a squared proportion. We also include a graphical analysis to understand if free riding is correlated with gender proportions in the groups. Our interpretations are, however, based on the first model, as interaction effects require a bigger sample size (Leon and Heo 2009; Shieh 2019).

The LEG and lead farmer characteristics are summarized in Table 2. Descriptive statistics indicate that, on average, men lead farmers are older

Table 2 Descriptive statistics by gender of lead farmer for the LEGs

Variable		*Men*	*Women*
Age of lead farmer (in years)		44.68	39.96
Marital Status of lead farmer (percentage)	Never Married	0	3.57 (1)
	Married	100 (37)	78.57 (22)
	Divorced	0	7.14 (2)
	Widowed	0	3.57 (1)
	Separated	0	7.24 (2)
Education level of lead farmer (percentage)	None	2.70 (1)	7.14 (2)
	Lower primary	37.84 (14)	7.14 (2)
	Upper primary	27.032 (10)	39.29 (11)
	Junior secondary	29.73 (11)	32.14 (9)
	Senior secondary	2.7 (1)	14.29 (4)
	Tertiary	0	0
Lead farmer knowledge of VAD (percentage)	Yes	89.19 (33)	84.62 (22)
	No	10.81 (4)	15.38 (4)
LEG members participation rate (percentage)		35.86	40.47
Average active LEG members (frequency)		18	25

Notes: Numbers in parenthesis are frequencies. Percentages are column-wise.

than their female counterparts. The average age for male lead farmers is around 46 years, while for female lead farmers, the average is around 40 years. This could be representative of the membership in the LEGs where men are generally older than the women. Given the criteria for vulnerability to qualify to be a member of the LEG, most men are more likely to be older (Sender and Smith 2011).

All men lead farmers were married while about twenty-two of the women lead farmers were. Of the remaining women lead farmers, one was never married, two were divorced, and another separated. No woman or man lead farmers had any tertiary education. However, a higher proportion of men only reached lower primary school while a higher proportion of women reached upper primary school. Only four women lead farmers attained senior secondary education (grades ten through twelve). This indicates that few members in the LEGs have reached high school education if the sample of lead farmers is representative of an average member. Participation rates in the activities of the group at the plot are higher in LEGs with women lead farmers (40 percent) than in groups with men lead farmers (36 percent). Both genders are aware of vitamin A deficiency with only a few lead farmers lacking the knowledge.

RESULTS

Are participation rates between men and women for different activities equal?

To examine the hypotheses earlier outlined, we test if the participation rates for men and women are equal for different activities. The results are displayed in Table 3.

A higher proportion of men took part in land preparation and planting compared to women, though the difference is not statistically significant. This is the same for weeding, basal fertilizer application, and top-dressing fertilizer application. So, from planting to weeding to fertilizer application, the participation of men and women in LEGs is statistically equal. However, at harvesting, results show that significantly more men participate than women. Around 44 percent of the men in the LEGs attended harvesting compared to only 34 percent of the women who took part. In the discussion, we provide alternative explanations for this finding.

Table 3 Testing for equality of participation rates in different activities by gender

Activity	*Gender*	*Observations (LEGs)*	*Mean*	*Standard error*	*t-statistic*
Land preparation	Men	68	0.47	0.031	0.84
	Women	68	0.44	0.034	
Planting	Men	68	0.36	0.026	− 0.38
	Women	68	0.38	0.030	
Weeding	Men	68	0.40	0.032	0.33
	Women	68	0.39	0.031	
Basal dressing application	Men	68	0.37	0.029	1.28
	Women	68	0.32	0.030	
Top dressing application	Men	68	0.40	0.035	1.60
	Women	68	0.35	0.031	
Harvesting	Men	68	0.44	0.038	2.24**
	Women	68	0.34	0.030	

Notes: **significant at $\alpha = 0.05$.

Determinants of participation

Participation rates for men and women are modeled as a dependent variable to understand factors that influence participation in group activities. Independent variables include lead-farmer attributes and other group identifiers, including the proportion of women in the group. Table 4 shows the results from a heteroskedastic fractional probit model that was estimated for each activity. For brevity, marginal effects instead of

Table 4 Determinants of participation rates by gender and activity

	Land preparation		*Planting*		*Weeding*		*Basal fertilizer application*		*Top fertilizer application*		*Harvesting*	
	Men	*Women*	*Men*	*Women*	*Men*	*Women*	*Men*	*Women*	*Men*	*Women*	*Men*	*Women*
Gender of lead farmer	– 0.020	0.024	– 0.039	– 0.040	– 0.081	0.087*	– 0.069	– 0.043	– 0.039	– 0.000	– 0.053	– 0.022
	(0.071)	(0.052)	(0.034)	(0.064)	(0.045)	(0.042)	(0.038)	(0.053)	(0.054)	(0.043)	(0.054)	(0.066)
Number of meetings	0.000	0.000	0.001	0.001	0.001	0.001	– 0.000	– 0.000	0.000	0.001	0.001	0.002*
	(0.001)	(0.001)	(0.000)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
District	0.060	143.026	– 0.090	0.044	0.087	459.97**	– 0.020	– 0.037	0.013	116.76**	227.470	– 0.041
	(0.068)	(81.730)	(0.055)	(0.375)	(0.071)	(120.37)	(0.178)	(0.052)	(0.101)	(33.444)	(144.41)	(0.048)
Education of lead farmer	0.021	0.034	– 0.039*	0.011	– 0.037	0.042	– 0.004	– 0.014	– 0.039	0.050	0.009	– 0.011
	(0.028)	(0.022)	(0.017)	(0.053)	(0.031)	(0.025)	(0.020)	(0.022)	(0.031)	(0.030)	(0.021)	(0.021)
Vitamin A knowledge	0.13	– 0.032	0.070*	– 0.003	0.009	– 0.003	– 0.002	– 0.034	0.014	– 0.022	0.017	– 0.045
	(0.072)	(0.043)	(0.035)	(0.116)	(0.055)	(0.051)	(0.034)	(0.045)	(0.042)	(0.052)	(0.051)	(0.057)
Proportion of Women	0.74**	– 0.099	0.39**	– 0.69*	0.249	– 0.38*	0.354*	– 0.55**	0.59*	– 0.085	0.26	– 0.56**
	(0.17)	(0.15)	(0.12)	(0.27)	(0.19)	(0.17)	(0.16)	(0.19)	(0.28)	(0.11)	(0.17)	(0.13)
Obs	62	62	62	62	62	62	62	62	62	62	62	62

Notes: Standard errors in parentheses. **, * denote statistical significance at the 5 and 10 percent levels, respectively. The dependent variable in all regressions is the participation rate. Marginal effects for gender, district, and knowledge of vitamin A are calculated as a discrete change in participation rate as the independent variable changes from 0 to 1. Analysis is at group level. Proportion of women is calculated as the number of women divided by the group size (total membership).

coefficients are reported. Marginal effects give an effect on the probability of a positive outcome (higher participation rate). The effect on the probability is usually the statistic of interest. The marginal effects are evaluated at the mean (evaluating the effect for a typical group).

For all activity-level regressions, the impact of increasing the proportion of women in the group is consistently positive for men and negative for women. This means that as the proportion of women in the group increases, holding other factors constant, participation rates for men increase while the participation rates for women decrease. This relationship is statistically significant for most of the activities. For land preparation, increasing the proportion of women by 10 percent increases men's participation rate by about 7.4 percent. For women, the relationship is negative even though it is not significant. For planting, increasing the proportion of women in the group by 10 percent significantly increases the participation rate for men by about 4 percent and reduces women's participation rate by about 7 percent. For weeding, a 10 percent increase in the proportion of women reduces women's participation by about 3.8 percent. A 10 percent increase in the proportion of women increases men's participation rate by about 3.5 and 6 percent for basal and top fertilizer application, while it reduces participation rates for women by about 5.5 percent for basal fertilizer and 5.6 percent for harvesting. Apart from proportions, the only other variable that is significant is the district dummy, showing that participation rates in Mbala are, on average, higher for women in weeding and top fertilizer application.

Determinants of overall participation

We also model what determines overall participation of group members by gender. We use a slightly different measure of proportion here – the proportion of men to women in the group to reflect the overall influence of the two genders in the groups. The results are presented in Table 5. Our interpretation focuses on model 1, while model 2 is used to understand the interaction of gender and education and nonlinearity of the effect of gender-ratios in the group. Interaction among members as indicated by the frequency of meetings, the composition of the group in terms of the ratio of men to women, and knowledge of vitamin A deficiency are key determinants of men's participation rates (Table 5). For every extra meeting held, there is an increase in participation rates of about 0.14 percent or 0.16 percent using model 2 for women, while for men it is about 0.12 percent, economically small benefits even though statistically significant.

Men's participation in groups where the lead farmer is knowledgeable about vitamin A (understands the goal/agenda of the group) is significantly higher than participation rates where the lead farmer is not knowledgeable.

Table 5 Gendered regression results from heteroskedastic fractional probit – determinants of overall participation rates

	Women		*Men*		*Whole sample*	
Variables	*Model 1*	*Model 2*	*Model 1*	*Model 2*	*Model 1*	*Model 2*
Gender	– 0.044*	– 0.35*	– 0.023	0.097	– 0.030	– 0.077
	(0.025)	(0.21)	(0.043)	(0.19)	(0.023)	(0.15)
Number of meetings	0.001***	0.002***	0.001**	0.001	0.001***	0.001***
	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)
District	– 137.86***	– 269.64***	– 0.11	0.017	– 216.84***	– 130.51***
	(13.26)	(11.36)	(0.39)	(0.055)	(9.57)	(10.74)
Education	– 0.044**	– 0.063*	– 0.048***	0.021	– 0.042***	– 0.036
	(0.020)	(0.033)	(0.018)	(0.034)	(0.014)	(0.029)
[Gender]*[Education]		0.074		– 0.034		0.011
		(0.048)		(0.050)		(0.038)
Knowledge of VAD	0.034	– 0.004	0.10**	0.13**	0.059*	0.047
	(0.035)	(0.031)	(0.042)	(0.059)	(0.031)	(0.031)
Proportion of men to women	0.065***	– 0.16	– 0.043[bb]	– 0.29***	0.009	– 0.049
	(0.017)	(0.11)	(0.030)	(0.11)	(0.009)	(0.059)
[Proportion of men to women]^square		0.099*		0.055**		0.014
		(0.052)		(0.023)		(0.012)
Observations	62	62	62	62	62	62
Wald chi2 (6)	228.6		13.64		1242	
Prob > chi2	0	0	0.034	0.022	0	0
Log-likelihood	– 38.68	– 38.33	– 39.96	– 39.88	– 39.89	– 39.84
Wald chi2 (8)		9100		17.94		231.8

Notes: Robust standard errors in parentheses. ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively. [bb] indicates that coefficient is significant at 5 percent level even though the marginal effect is not. Only marginal effects are reported for brevity.

Men's participation in groups led by a knowledgeable lead farmer is around 10 percent higher than in groups led by lead farmers who are not knowledgeable about VAD. These lead farmers can galvanize the group around the management of the plot, appreciating that its existence is to help combat an ailment that they know well (vitamin A deficiency). The proportion of men and women in the group also influenced men's participation. As men move from being very few (minority) to being many (majority), their participation goes down. With an increase in the ratio of men to women of 10 percent, there is a reduction in men's participation of around 0.4 percent or 28 percent if the nonlinear model is considered (model 2). Model 2 indicates that for both men and women, there is no difference in the effect of education between men and women lead farmers. However, it indicates that there is significant nonlinearity in the effect of the proportion of men to women on the participation of men (some kind of a U-shaped relationship).

The regression results for women's participation are the same as for men for most variables. For women, the study shows that as they move from being the majority to a minority in the group, their participation increases just like men and just like what we had found for activity-level regressions (Table 4). The higher the frequency of meeting as a group, the higher the participation rate of women in the field activities. District control also indicates that the participation rates are significantly different between the two districts, with lower participation in Mbala compared to Luwingu. For women (both models) and men (model 1 only), the education level of the lead farmer is another factor that influences participation rates. Groups with lead farmers who are more educated have lower participation rates.

Model 2 shows that the negative impact of education on participation rates for women is higher if the lead farmer is a man rather than a woman. Education was treated as a continuous variable from lower primary to tertiary. Education of the lead farmer could be related to gender as fellow women were more educated compared to males. Overall, the district control, knowledge of vitamin A, and the education level of the lead farmer are significant determinants of participation rates.

Participation rates and proportion of women in the group – evidence of free riding?

While the results on participation rates in activities reveal that the participation rates are not the same across activities, they mask the differences that arise within the same activity as the proportion of women in the group increases. The econometric results showed a U-shaped relationship for the participation of men in activities overall, while for women, the nonlinearity was not significant. However, as model 1 indicates an inverse relationship between women's participation rate and proportion

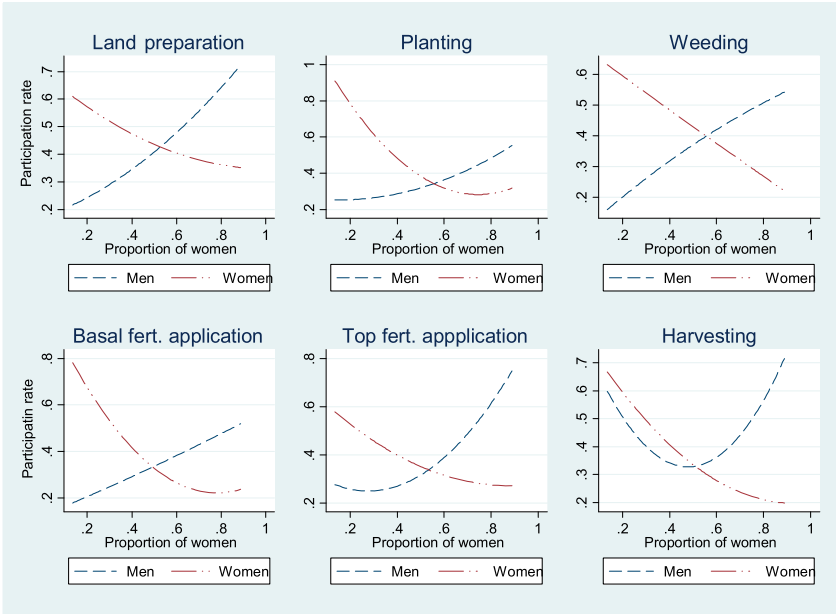

Figure 1 Participation rates for men and women against proportion of women

of women in the group, we delve further to investigate this. To understand how the participation of women and men in various group activities changes with gender proportions, a quadratic fit graphical representation is made in Figure 1 (by activity) and in Figure 2 (overall). The graphs support all the statistical results presented above that show that as the proportion of women in the group increases, the participation rate for women decreases while that for men increases. However, it offers a more natural way to see this relationship and approximate the *threshold* at which the participation for women becomes lower than that of men.

All graphs reveal that the participation rate for women is higher when their proportion in the group is low but reduces asymptotically as the proportion approaches unit. In groups that are about 20 percent women, the participation rates for women are, on average, about 60 percent of all women in the group, while that of men is about 20 percent, except for harvesting. The participation rate for men increases as the proportion of women increases or as men become fewer in the groups. For all activities, the *threshold* proportion of women is about 53 percent; below this threshold, fewer men participate, and above this threshold, more men than women participate in the activities. Harvesting for men shows a surprising result where their participation rate has a U-shaped curve, demonstrating that as the proportion of women increases from 0 to about 50 percent, the

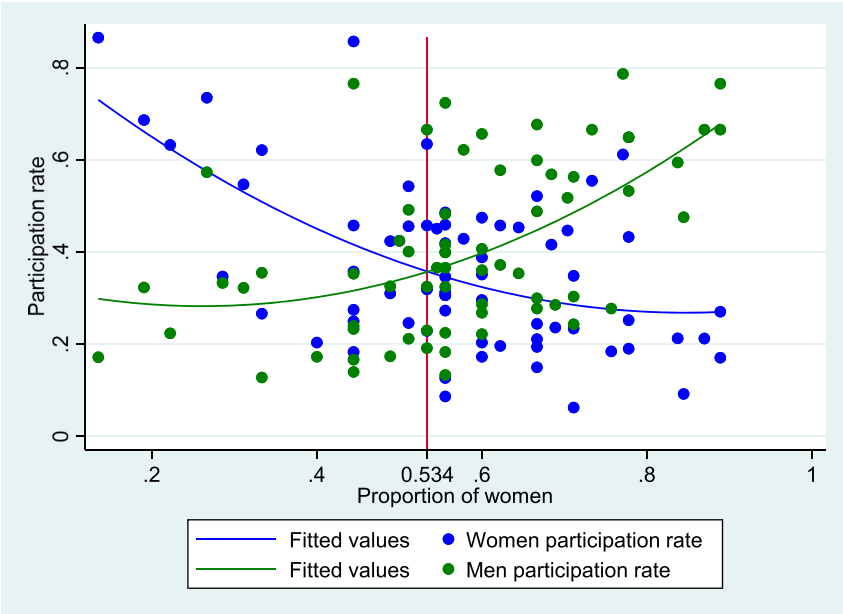

Figure 2 Overall participation rate for men and women

participation rate decreases but rises as the proportion of women goes towards 100 percent. However, all graphs confirm that below about 50 percent, the participation of men is lower than that of women. This observed relationship for men is supported by the econometric model, while for women, the econometric results are not significant. We discuss the implications of these observations on free riding and burden of group work for women and men.

Qualitative results

In the qualitative survey, we tried to understand the motivations for joining these self-help groups and how the members view the groups. Both women and men consider group membership as vital because it provides easy access to the crop market; for example, they were linked to the World Food Programme to sell beans. Group members also consider group membership valuable for vegetable, legume, and cereal seeds as well as livestock benefits. Access to information within groups motivated men and women to participate in the groups and also to manage the VAM plots.

Because women were the majority in all cases, they found groups to be empowering since they felt free to voice their concerns. For example, women freely complained that the involvement of men in the ASCAs

(Accumulated Savings and Credit Association) – a voluntary sub-group within each LEG – posed a challenge since men often borrowed money on behalf of the household for business but misused it, using it to buy alcohol and not invest in a business. Thus, women preferred LEGs because of the strong disapproval of the consumption of alcohol. Steven Cole et al. (2016) linked alcohol abuse in Mbala and Luwingu district to substance abuse as well as fights over the use of cash within the household. They reported increasing levels of economic desertion of wives by husbands as a result of alcohol abuse. Thus, for women, these groups provided an arena where they could discuss issues affecting them with other women and community members and try to find solutions.

Generally, the self-help group members view themselves as different from other community members as well as from their status and condition in the past. Unlike non-members, they receive training on farming cereals and horticulture, savings, poultry, and animal health monitoring. There is also some mixed evidence of the transformation of gender norms among households. For example, in some groups, the infant and young child feeding training involved both men and women. Men appreciated the training, saying the information was useful for better communication between themselves and their spouses regarding diets and family planning. The participation of men in infant feeding is a much-desired change in gender norms. However, in Luwingu, the men in one ward (Bwalinde ward) said that the training on nutrition solely focused on women. The men justified their exclusion saying that the training was mainly about breastfeeding, even though it was not as the UNICEF guide used clearly states that the breastfeeding programs should be aimed at couples as opposed to women only.

DISCUSSION AND CONCLUSION

These results offer interesting insights into the group dynamics of an informal group deliberately formed to have more women. Most studies in Africa (see, for example, Nakhone and Kabuta [1998]; Doss and Morris [2001]; Doss [2014]) have shown that there is a division of labor in agriculture with men more engaged in mechanized activities and women more involved in labor-intensive and time-consuming activities in the production of maize. Our study shows no such differences in group activities, probably because the research was focusing on learning plots where men and women participate to learn about new technologies and ways of doing things. Further, surveys from the group members offer some explanations as to why there is no difference in participation. First, because groups had different proportions of men and women, they may average out to have equal participation. Second, the qualitative survey carried out by Cole et al. (2016) among the group members showed that gender equity

outcomes, such as girls going to school and the division of household responsibilities between men and women, in the two districts have been improving. This is in line with findings by Shipekesa and Jayne (2012) who found that, in Zambia, at the household level, there is an equal provision of labor in maize in all activities. Matakala Monde Mulunga and Kandiwa Kandiwa (2015) also found no significant gender difference in post-harvest activities for maize in Zambia.

Table A4 (in the Supplemental Online Appendix), which is computed from the district-level representative data, shows almost similar labor patterns for maize as what is observed using our data. All activities in maize production except harvesting are equally done by both men and women. All activities are performed mainly by both men and women; it means there might be no major differences in agricultural labor allocation to crops. This means that the division of labor patterns observed at the household level are reproduced in the informal groups.

This higher participation by both genders in activities may be supported by existing qualitative evidence. Participation in the groups was not only related to the group field activity, but farmers received information and training on numerous topics, including farming techniques, new technologies and nutrition, and men's engagement in family nutrition and well-being, and discouraging the over-consumption of alcohol. The information, even though not new, was appreciated and could have motivated participation:

> Ideas such as training in planting and weeding are not new but important to us because they impart into the trainees: How to plan; when to execute our work and the best periods to care for the crop. (Luwingu LEG 8, Men's Focus Discussion Group)

Thus, it is possible that men participated in group activities so that they could have access to more information and training. The homogeneity of the groups may mean that men did not see themselves differently but as equal with the women given that they all met the selection criteria.

There is also stronger in-group identification compared to identification with those outside the group. From the qualitative data, members of the groups perceived themselves to be different from other members of the community and saw the selection based on vulnerability as an equity measure meant to bring them to the same level as well-to-do members of the community (Mulungu et al. 2017). Groups like these, in which membership is based on some common trait (vulnerability) or because members feel they suffer a common unfair treatment, have members who identify more with the group (Baumeister, Ainsworth, and Vohs 2016). The members in such a group also refrain from displaying strategic behavior serving their self-interest when their group identity is valued (Mlicki and Ellemers 1996).

Given this understanding, it is easier to explain why our results show that participation rates are not significantly different for men and women and higher with a higher frequency of meetings.

However, despite there being generally no significant differences in men and women's participation in almost all group activities, we find that men participated more in harvesting than women. This finding on harvesting corroborates with findings from other studies in Zambia (World Bank 2004; Shipekesa and Jayne 2012). Maize harvesting under smallholder conditions in Zambia is a manual activity. The higher participation of men at this stage may be because the maize is shared among members immediately after or during harvest. It has been shown that men tend to control resources in a group and how those resources are managed (Woldu, Tadesse, and Waller 2013). Thus, the higher participation of men may hinge on their desire to control and have a say in how the maize is shared. This practice reproduces household dynamics, where men in Zambia decide how maize is shared and distributed within households after harvest. We have no reason to believe that these participation rates are dependent on labor constraints, as provision of labor to three of the four most common crops by hectarage and number of households growing them is done by both genders (see Table A4 in the Online Appendix). Linda Mayoux (2012) finds similar patterns in Uganda where men come to harvest the coffee so they can determine how it is marketed and take away the money even though they participated less in production.

The ratio of men to women in the group is also another variable that is significant in the determinants of participation. We find that for men, as they tend toward majority (meaning, fewer proportion of women in the group), their participation in the activities reduces, and this holds for women as well – as they tend toward the minority, their participation increases. This renders clear support to the idea that tokens or minority group members work more, overachieve, and have pressure to perform. The category with fewer members (men) is more visible than the category with more members in the group. The increased visibility makes it difficult for the category with fewer members to abscond from an activity at the field plot as they will be noticed. Members from the surveyed groups reported pressure to work hard and be seen as working hard because "other poor people are willing to join" and take up the place of those not performing (Focus Group Discussion with Chandayemba Village LEG number 17).

On the participation of the whole group, the two genders offset each other, and there is no significant effect of the ratio of men to women on participation. While making groups that include a minority group/gender has been regarded, in many instances, as bad for women and other vulnerable groups because it takes away genuine participation and empowerment (Beckwith, Friedman, and Conroy 2016), it is possible that having a token or a minority of men in women-dominated groups can

bring about transformational gender change. To compensate for being the minority in the group, men overachieve by attending activities that they would not traditionally attend and by informing everyone in the group of how well they are doing. However, further studies may be needed to see if group behavior may translate into a community-wide change in behavior and gender norms.

While we interpret these results using majority and minority groups, the graphical analysis also reveals that the dominant group has tendencies to free ride. Using these results, we find that a threshold of about 53 percent of women is what would be needed if the goal is to ensure that there is equal participation of women and men in group activities. A proportion of women less than this would lead to women participating more and shouldering the burden of work from the group activities. This is similar to what Agarwal (2010) finds in forest groups in India and Nepal. Maximum participation (in terms of attending meetings, speaking up at meetings, and holding office) is achieved when the proportion of women in the group is between 25 and 33 percent and after that "the gain is limited and tapers off" (Agarwal 2010: 104). This arises as one gender, women or men, in this case, feels overrepresented and can miss activities without feeling the pressure to be visible.

We also find that the participation rate in Mbala is significantly lower than the participation rate in Luwingu despite Mbala having more lead farmers knowledgeable about vitamin A. Mbala is traditionally a maize zone while Luwingu is a cassava zone where maize has only been recently introduced with government input subsidies. Therefore, there is great interest in Luwingu to learn about not only VAM but the cultivation of maize in general. The desire for knowledge is expressed in the qualitative data. As Table A6 in the Supplemental Online Appendix shows (content analysis of the information shared during the activities at the plot), Luwingu lead farmers gave out more information on how to grow maize beginning with applying fertilizer, weeding, and harvesting. This could be the reason why most members attended – to learn more about maize, which is relatively new in the district.

In conclusion, the study results are important for policymakers and development experts interested in using collective action groups to rollout crop agriculture technologies while addressing gender equity issues among vulnerable members of the community. For example, the fact that men's and women's participation in groups was affected by their proportion may mean the need to look at optimal group composition to achieve appropriate levels of men and women engagement. In groups where men were the minority, men attended and participated in group activities that they would normally not attend or do. Thus, a thought-out consideration of proportions may promote the ability of groups to challenge existing gender norms. Participation, overall, is also affected by other factors such

as frequency of meetings, education level of the leader, and knowledge of the group's agenda (vitamin A in our case). Even though more meetings may discourage groups that are overburdened by housework, such as women, from participation, it is important for groups to be set up with rules that allow maximum interactions to encourage more active participation, especially if benefits depend on participation in activities. These interactions are not just social meetings, but meetings where an exchange of knowledge and ideas happen. As indicated in the qualitative data (Table A6 in the Online Appendix), at every meeting (even during the activities) groups shared information on practices and encouraged other members to report for upcoming activities ("To Come for Work"). Reasons, why these groups have been formed, should also be communicated to members to encourage participation.

Our results also suggest that there is free riding as women become the majority in the group. Women's free riding occurs when their proportion exceeds about 55 percent for all activities. There may be a need, therefore, for more research to understand how the culture and social institutions shape men's and women's experiences when they participate in organizations and groups as minorities and as the majority.[2]

Kelvin Mulungu
Colorado State University College of Agricultural Sciences, Agricultural and Resource Economics
501 University Avenue, Fort Collins, Colorado 80523-1101, United States
email: kmulungu@colostate.edu

Noris Mudege
WorldFish
Plot 18944 Lunbansenshi, Lusaka, Zambia
email: n.mudege@cgiar.org

NOTES ON CONTRIBUTORS

Kelvin Mulungu is an agricultural economist by training. He is currently studying for his PhD in Agricultural and Resource Economics at Colorado State University in the US. He obtained a Collaborative MSc in Agricultural and Applied Economics from Egerton University in Kenya and University of Pretoria in South Africa. He worked for CGIAR as Research Manager for an agriculture for nutrition and health project in Zambia. He also worked as a Research Fellow at the University of Zambia Institute of Economic and Social Research. His research interests include nutrition, gender in agriculture, climate change, and natural resource economics.

Netsayi Noris Mudege (PhD, Wageningen University, and MA in Sociology and Social Anthropology, University of Zimbabwe) is Senior Scientist at the

WorldFish based in Lusaka, Zambia. She has experience in researching on gender, health, the transition of adolescents to adulthood, and education. Before joining WorldFish she was Gender Research Coordinator at the International Potato Center where she was responsible for conducting research and coordinating the gender equity and youth employment cluster under the Roots Tubers and Bananas program. Her research interests include rural development, agriculture, education, health, gender analysis, and gender mainstreaming.

ACKNOWLEDGMENTS

We would like to thank our partners at Self-Help Africa and the partners for the Integrated Research in Development Program (CIFOR, WorldFish, and HarvestPlus). We also thank the lead farmers of the self-help groups for their support during data collection. Finally, we acknowledge overall financial support from Irish Aid for the project. We would also like to thank two anonymous reviewers for the insightful comments that improved this manuscript.

NOTES

[1] All personal information that would allow the identification of any person(s) described in the article has been removed.

[2] Limitations of the study can be found in the Supplemental Online Appendix.

SUPPLEMENTAL DATA

Supplemental data for this article can be accessed at https://doi.org/10.1080/13545701.2020.1791926

REFERENCES

Agarwal, Bina. 2010. "Does Women's Proportional Strength Affect their Participation? Governing Local Forests in South Asia." *World Development* 38(1): 98–112.

Araki, Minako. 2001. "Different Meanings and Interests over Women's Clubs in Rural Zambia: An Ethnography of Development in Practice." *African Study Monographs* 22(4): 175–93.

Baumeister, Roy F., Sarah E. Ainsworth, and Kathleen D. Vohs. 2016. "Are Groups More or Less Than the Sum of their Members? The Moderating Role of Individual Identification." *Behavioral and Brain Sciences* 39: 1–56.

Beckwith, Ruthie-Marie, Mark G. Friedman, and James W. Conroy. 2016. "Beyond Tokenism: People with Complex Needs in Leadership Roles: A Review of the Literature." *Inclusion* 4(3): 137–55.

Blekking, Jordan. 2017. "Who Gains from Rural Agricultural Cooperative Membership? Empirical Evidence from Rural Zambia." Paper prepared for the Ostrom Workshop research Series, Indiana University, February 8.

Central Statistical Office. 2015. "2015 Living Conditions Monitoring Survey Report." Republic of Zambia Central Statistical Office, Lusaka, Zambia. https://www.zamstats.gov.zm/phocadownload/Living_Conditions/2015%20Living%20Conditions%20Monitoring%20Survey%20Report.pdf.

Chapoto, Antony, Jones Govereh, Steven Haggblade, and Thomas Jayne. 2010. "Staple Food Prices in Zambia." Paper Prepared for the COMESA Policy Seminar on variation in Staple Food Prices: causes, Consequence, and Policy Options, Maputo, Mozambique, January 25–6.

Cole, Steven M., Mary Sweeney, Abigail Moyo, and Mwauluka Mwauluka. 2016. "A Social and Gender Analysis of Northern Province, Zambia: Qualitative Evidence That Supports the Use of a Gender Transformative Approach." Dublin, Ireland: Self Help Africa and Lusaka, Zambia: WorldFish. http://pubs.iclarm.net/resource_centre/Social-Gender-Analysis-NP-Zambia.pdf.

Doosje, Bertjan, Naomi Ellemers, and Russell Spears. 1995. "Perceived Intragroup Variability as a Function of Group Status and Identification." *Journal of Experimental Social Psychology* 31(5): 410–36.

Doss, Cheryl R. 2014. "If Women Hold Up Half the Sky, How Much of the World's Food do They Produce?" In *Gender in Agriculture: Closing the Knowledge Gap*, edited by Agnes R. Quisumbing, Ruth Meinzen-Dick, Terri Raney, André Croppenstedt, Julia Behrman, and Amber Peterman, 69–88. Netherlands: Springer.

Doss, Cheryl R. and Michael L. Morris. 2001. "How does Gender Affect the Adoption of Agricultural Innovations?: The Case of Improved Maize Technology in Ghana." *Agricultural Economics* 25(1): 27–39.

Evans, Alice. 2014. "'Women Can do What Men Can do': The Causes and Consequences of Growing Flexibility in Gender Divisions of Labour in Kitwe, Zambia." *Journal of Southern African Studies* 40(5): 981–98.

Fischer, Elisabeth and Matin Qaim. 2012. "Gender, Agricultural Commercialization, and Collective Action in Kenya." *Food Security* 4(3): 441–53.

———. 2014. "Smallholder Farmers and Collective Action: What Determines the Intensity of Participation?" *Journal of Agricultural Economics* 65(3): 683–702.

Gallani, Susanna, Ranjani Krishnan, and Jeffrey M. Wooldridge. 2015. "Applications of Fractional Response Model to the Study of Bounded Dependent Variables in Accounting Research." Working Paper No. 16-016, Harvard Business School.

German, Laura, George C. Schoneveld, and Davison Gumbo. 2011. "The Local Social and Environmental Impacts of Smallholder-based Biofuel Investments in Zambia." *Ecology and Society* 16(4): 12.

Iyer, Aarti and Michelle K. Ryan. 2009. "Why do Men and Women Challenge Gender Discrimination in the Workplace? The Role of Group Status and In-group Identification in Predicting Pathways to Collective Action." *Journal of Social Issues* 65(4): 791–814.

Kabeer, Naila. 2004. "Globalization, Labor Standards, and Women's Rights: Dilemmas of Collective (In)Action in an Interdependent World." *Feminist Economics* 10(1): 3–35.

Kiptot, Evelyne and Steven Franzel. 2011. "Gender and Agroforestry in Africa: A Review of Women's Participation." *Agroforestry Systems* 84(1): 35–58.

Leon, Andrew C. and Moonseong Heo. 2009. "Sample Sizes Required to Detect Interactions between Two Binary Fixed-effects in a Mixed-Effects Linear Regression Model." *Computational Statistics and Data Analysis* 53(3): 603–8.

Masaiti, Gift and Joseph Chita. 2014. "Zambia: An Overview of Formal Education." In *Education in East and Central Africa*, edited by C. C. Wolhuter, 423–54. London: Bloomsbury.

Mayoux, Linda. 2012. "Balanced Trees Grow Richer Beans: Promoting Gender Justice through Value Chain Development in Western Uganda. Gender Action Learning

System Case Study 1." Oxfam Novib. https://gamechangenetwork.org/wp-content/uploads/2016/06/BalancedTrees_Case-Study.pdf.

Meier zu Selhausen, Felix. 2016. "What Determines Women's Participation in Collective Action? Evidence from a Western Ugandan Coffee Cooperative." *Feminist Economics* 22(1): 130–57.

Misiko, Michael. 2013. "Dilemma in Participatory Selection of Varieties." *Agricultural Systems* 119: 35–42.

Mlicki, Pawel P. and Naomi Ellemers. 1996. "Being Different or Being Better? National Stereotypes and Identifications of Polish and Dutch Students." *European Journal of Social Psychology* 26(1): 97–114.

Mohammed, B. T., and A. F. Abdulquadr. 2012. "Comparative Analysis of Gender Involvement in Agricultural Production in Nigeria." *Journal of Development and Agricultural Economics* 4(8): 240–44.

Mtonga, Emeldah. 2012. "Cooperatives and Market Access in Zambia." Discussion Paper. http://www.fes-zambia.org/media/publications/Cooperatives%20and%20Market%20access%20in%20Zambia.pdf (accessed February 2017).

Mulunga, Monde Matakala and Vongai Kandiwa. 2015. "Gender Analysis of Maize Post-Harvest Management in Zambia: A Case Study of Chipata and Katete Districts." Swiss Agency for Development and Cooperation SDC. http://doc.rero.ch/record/257816/files/31-Gender_Analysis_PHM_Zambia_March2015.pdf (accessed May 2017).

Mulungu, Kelvin, Elias Madzudzo, Samuel Adjei-Nsiah, and Mulani Akatama. 2017. "Platforms for Institutional Change: Assessing the Potential of Livelihoods Enhancement Groups as Community Entry Points in Zambia." *Development in Practice* 27(6): 837–47.

Mulungu, Kelvin and Gelson Tembo. 2015. "Effects of Weather Variability on Crop Abandonment." *Sustainability* 7(3): 2858–70.

Mwanza, Josephine. 2016. "An Evaluation of Performance of Self Help Groups in Empowerment of Women: Case of Selected Women Groups in Chipata District." MSc Thesis, University of Zambia, Lusaka, Zambia. http://dspace.unza.zm/handle/123456789/4628.

Nair, Nirmala, Prasanta Tripathy, Harsh Pal Singh Sachdev, Hemanta Pradhan, Sanghita Bhattacharyya, Rajkumar Gope, Sumitra Gagrai, Shibanand Rath, Suchitra Rath, Rajesh Sinha, Swati Sarbani Roy, Suhas Shewale, Vijay Singh, Aradhana Srivastava, Anthony Costello, Andrew Copas, Jolene Skordis-Worrall, Hassan Haghparast-Bidgoli, Naomi Saville, and Audrey Prost. 2017. "Effect of Participatory Women's Groups and Counselling Through Home Visits on Children's Linear Growth in Rural Eastern India (CARING Trial): A Cluster-Randomised Controlled Trial." *Lancet Global Health* 5(10): e1004–16.

Nakhone, Lenah and Charity Kabutha. 1998. "A Review of Gender Disaggregated Data on Maize and Wheat Cropping Systems in Ethiopia, Kenya, Tanzania and Uganda." CIMMYT. http://repository.cimmyt.org/xmlui/handle/10883/3639.

Ogato, Gemechu Shale, Emmanuel Boon, and Janaki Subramani. 2009. "Gender Roles in Crop Production and Management Practices: A Case Study of Three Rural Communities in Ambo District, Ethiopia." *Journal of Human Ecology* 27(1): 1–20.

Ostrom, Elinor. 2000. "Collective Action and the Evolution of Social Norms." *Journal of Economic Perspectives* 14(3): 137–58.

Pandolfelli, Lauren, Ruth Suseela Meinzen-Dick, and Stephan Dohrn. 2007. "Gender and Collective Action: A Conceptual Framework for Analysis." CAPRi Working Papers 64, International Food Policy Research Institute, Washington, DC.

Papke, Leslie E. and Jeffrey M. Wooldridge. 1996. "Econometric Methods for Fractional Response Variables with an Application to 401(k) Plan Participation Rates." *Journal of Applied Econometrics* 11(6): 619–32.

———. 2008. "Panel Data Methods for Fractional Response Variables with an Application to Test Pass Rates." *Journal of Econometrics* 145(1–2): 121–33.

Quisumbing, Agnes R., Deborah Rubin, Cristina Manfre, Elizabeth Waithanji, Mara van den Bold, Deanna Olney, Nancy Johnson, and Ruth Meinzen-Dick. 2015. "Gender, Assets, and Market-Oriented Agriculture: Learning from High Value Crop and Livestock Projects in Africa and Asia." *Agriculture and Human Values* 32(4): 705–25.

Rao, Elizaphan J. O. and Matin Qaim. 2013. "Supermarkets and Agricultural Labor Demand in Kenya: A Gendered Perspective." *Food Policy* 38: 165–76.

Sender, John and Sheila Smith. 2011. *Poverty, Class, and Gender in Rural Africa: A Tanzanian Case Study*. London: Routledge.

Shieh, Gwowen. 2019. "Effect Size, Statistical Power, and Sample Size for Assessing Interactions between Categorical and Continuous Variables." *British Journal of Mathematical and Statistical Psychology* 72(1): 136–54.

Shipekesa, Arthur M. and Thomas S. Jayne. 2012. "Gender Control and Labour Input: Who Controls the Proceeds from Staple Crop Production among Zambian Farmers?" Working Paper No. 68, Indaba Agricultural Policy Research Institute (IAPRI), Lusaka, Zambia.

Smith, Laura G. E., Emma F. Thomas, and Craig McGarty. 2015. "'We must be the Change We Want to See in the World': Integrating Norms and Identities Through Social Interaction." *Political Psychology* 36(5): 543–57.

Woldu, Thomas, Fanye Tadesse, and Marie-Katherine Waller. 2013. "Women's Participation in Agricultural Cooperatives in Ethiopia." ESSP Working Papers 57, International Food Policy Research Institute (IFPRI). https://ideas.repec.org/p/fpr/esspwp/57.html.

World Bank. 2004. "Zambia Strategic Country Gender Assessment." http://documents1.worldbank.org/curated/en/569301468178168044/pdf/337760ZA0SCGA.pdf.