

His, Hers, or Ours: Impacts of a Training and Asset Transfer Program on Intra-household Decision-making in Zambia¹

Kashi Kafle^{†a}, Hope Michelson^b, and Alex Winter-Nelson^b

Abstract

This paper studies effects of a multifaceted asset transfer program on the decision-making dynamics of small-farmer households. Constructing separate indexes of participation in household decision-making for adult females and males, and using difference-in-differences to assess the impact of livestock transfer and training, we find evidence that these interventions increased the share of decisions in which individuals participated, regardless of gender. Increases in decision-making participation by both men and women are driven by an increase in joint decision-making within the household on the extensive margin. Decisions made jointly by men and women increased by 17% across all household activities, with statistically significant declines in independent decision making by men. Findings are encouraging given the evidence of welfare gains associated both with increases in participation in decision-making by women as well as increased cooperation within households.

JEL codes: O12, J16, D04

Key words: decision-making, livestock transfer, training, women's empowerment, Zambia

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† Corresponding author (k.kafle@ifad.org)

^a Research and Impact Assessment Division (RIA), International Fund for Agricultural Development (IFAD), Rome, Italy

^b Department of Agricultural and Consumer Economics, University of Illinois, Urbana, IL, USA

1. Introduction

Numerous policies and interventions work to empower women through education, training, improved access to credit, leadership development, and transfer of economic resources. The design of such projects is commonly informed by evidence that improving women's economic resources can alter the dynamics of intra-household decision-making, and that increasing women's decision-making participation can lead to desirable household welfare gains, including improvements in children's health and nutritional outcomes (Bobonis, 2009; Deere, Oduro, Swaminathan, and Doss, 2013; Duflo, 2012; Malapit, Kadiyala, Quisumbing, Cunningham, and Tyagi, 2013; Sharaunga, Mudhara, and Bogale, 2015; Wilcox et al., 2015).

Research and interventions have often focused on women's empowerment, but evidence remains scarce regarding how such interventions impact men's decision-making participation, and alter intra-household decision-making (Garikipati, 2013). One common assumption is that empowerment is a zero-sum-game, and that improving women's position within the household necessarily weakens men (Hanstad, 2014; Miller, 2011). Meanwhile, McCarthy and Kilic, (2017) present theoretical and empirical support for the idea that increased cooperation among men and women within the household can yield welfare improvements. Whether women can experience increased involvement in decision-making (empowerment) without diminishing men's roles could be a critical question for programs focused on asset transfers, especially when effective management of the asset is facilitated by participation from both men and women. In any case, to evaluate how women's empowerment programs impact intra-household cooperation, empirical evidence is still in short supply.

As a step towards understanding the relationship between gender empowerment and intra-household cooperation, we measure women's and men's roles in intra-household decision-making in rural Zambia to assess changes by gender. We also examine joint decision-making to assess changes

in cooperation between male and female members of the household. Decisions in a household may be made solely by women, solely by men, or jointly by men and women. Some measures of women's empowerment, such as the Women's Empowerment in Agriculture Index (WEAI), focus on women's participation in decision-making, considering as a measure of empowerment the prevalence of decisions that are made jointly or by women independently. Since participation in jointly-made decisions may not imply influence comparable to decisions taken independently, some studies consider only decisions made exclusively by women as a measure of empowerment. Though rarely used, one could construct analogous measures of men's roles in intra-household decision-making from decisions taken alone or jointly. Examination of men's and women's individual and joint decision-making reveals whether changes in women's participation emerge in a context of increasing or diminishing cooperation within the household.

In this analysis, we assess the effects of a program that combines livestock transfers with training in multiple areas, including gender awareness. This transfer program could affect women's empowerment through its focus on women as recipients of the transfers, or through the training process, or both. At the same time, because the transferred livestock inevitably entails a household commitment of labor and management, cooperation among household members to achieve optimal benefits from these new assets is an imperative. How a multifaceted asset transfer program affects household decision-making has consequences for several dimensions of overall wellbeing. When household enterprises require the support or active involvement of men, negative impacts on the continued engagement of men in household decision-making can prove detrimental for women-led enterprises (Chant and Gutmann, 2000). For example, to assure successful implementation of a livestock transfer, men's labor may be needed for some essential tasks. Also, some evidence suggests that disempowerment of men has strong correlations with increases in sexually aggressive behavior (Silberschmidt, 2001) and domestic violence (Schuler, Bates, and Islam, 2008; Vyas and Watts, 2009).

We use panel data to analyze the program's impacts on (1) patterns of decision-making in beneficiary households, (2) joint decision-making, and (3) the scope of women's and men's participation in or control over decisions. We treat independent and joint decisions separately, because the program could impact gender-related empowerment, altering the prevalence of decisions made solely by either women or men, or changing the share of one gender's participation in joint decision-making in the household. In the context of this livestock intervention, changes in decision-making dynamics could emerge at the extensive margin, affecting only those new management decisions that arise as a result of the livestock transfer (eg. where to sell the milk produced by the transferred dairy cow) or might permeate pre-existing decision spheres. Understanding whether a program affects decision dynamics beyond areas directly related to the scope of the asset transfer allows us to assess the extent of broader impacts within the household.

A shift from individual to joint decision-making in the household may expand the scope of decision-making for the household member who was previously excluded, thereby enhancing productivity by increasing the flexibility in allocation of resources controlled by each member and also by expanding the knowledge-base for decision processes. However, a shift from sole control over a decision to shared control could represent diminished empowerment for the individual losing independence as a decision maker. Implications for women's empowerment may differ substantively, depending on whether a shift from independent to joint decision-making implies a disproportionate reduction in decision-making solely by women or solely by men. A focus on women's participation in decision-making that combines joint with female-controlled decisions (as in the WEAI), can miss important changes in decision-making dynamics. A more nuanced result emerges by analyzing joint and independent decision-making separately before combining them into a single index.

With these issues in mind, our paper makes four primary contributions to the literature. First, our analysis is among the first to evaluate the impact of a multifaceted intervention – physical asset transfers and training – on gendered decision-making in rural households. We find an increase in women’s decision-making participation, limited to areas directly related to the transfer and emerging primarily through growth in joint decision-making. Second, we extend the literature by assessing men’s decision-making and demonstrate that an increase in women’s participation need not imply reduction in men’s decision-making in the household. This result emerges because of an increase in the prevalence of joint decision-making in the household. Third, we examine changes in joint decision-making as a means of assessing impacts on cooperation in the household. Finally, because we are able to identify households that received training related to gender and household decision-making but had not yet received asset transfers, we can assess the impact of such training with and without the asset transfer. We find that households that received training without an asset transfer showed no change in decision-making dynamics. Our results suggest that decision-making is more malleable on the extensive margin than in areas where decision dynamics are well-established.

Our finding that most changes in decision-making are on the extensive margin may reflect two features of our sample. The first feature is characteristic of many small-scale farming regions in Sub Saharan Africa: because economic diversification is limited, the number and variety of decisions being made is commensurately small. Of the 42 decisions that we can measure using our survey instrument, households on average report activity in 5 decisions in baseline and 10 decisions in endline.² Second, the majority of decisions that we observe in our sample are made jointly at

² Examining the growth in the mean number of decisions over time shows that, on average, both ‘treated’ and ‘control’ households reported more decision-making activities in endline and the increase was greater among ‘treated’ households. The expansion in decision-making came from ‘treatment’ related decision spheres such as animal slaughter and animal sale as well as activities related to access to credit and crop produce sales which are not directly related to animal transfer but may have been influenced by the training.

baseline. Together, these factors may drive the majority of project impacts to the extensive margin of newly introduced decisions in the household.

The rest of this paper proceeds as follows. In Section 2, we discuss the livestock transfer intervention. Section 3 explains approaches to measure women's empowerment and presents a brief survey of the empirical evidence regarding the impacts of a range of interventions on intra-household decision-making or women's empowerment. Section 4 presents the research methods and explain both the structure of the survey and our empirical method. Section 5 presents results and contextualizes these results in existing theories of intra-household bargaining models. We discuss implications of the findings in the conclusion.

2. The Intervention

This study analyzes the household decision-making effects of a multifaceted asset transfer program implemented by the NGO Heifer International. Heifer initiated the program in the Copperbelt Province of Zambia in 2011 in 12 communities and the intervention consists of provision of donated livestock, training and social capital development to households who belong to organized groups who applied to Heifer Zambia for the opportunity to participate.³ The groups that applied to Heifer Zambia were typically women's groups at the time of application, but the Heifer screening process favored groups that included participation of male and female household members when both sexes are present in the household. Thus, most groups were organized and led by women but included male participants. Selected groups received support and training over the course of a year. After a year, Heifer transferred livestock to a subset of group members. Based on local ecological and market conditions, group members received either one pregnant dairy cow, two

³ In this paper, we focus on the impact of the intervention on intra-household decision-making. Earlier analyses by Jodlowski et al. (2016) and Kafle et al. (2016) find positive effects of the same intervention on poverty and food security outcomes.

pregnant draft cattle, or seven female and one male meat goat. Cattle recipients also received one bull to share as a group to service the cows. The total value of the asset transfer was similar regardless of the species transferred. The program requires that individuals receiving a donated animal pass on the first female offspring of that animal to group members who did not receive a gift in the initial distribution. Eventually, all group members are expected to receive animal asset transfers. The training component of the project includes training on gender balance, accountability, shared responsibilities, sustainability and self-reliance, business management, social justice, environmental sustainability, improved animal management, and nutrition. Both men and women from recipient households receive the same training.

The Heifer program could impact women's role in decision-making through at least three pathways. First, capacity building in groups that have significant female leadership might translate into greater voice for women within households. Second, the training component of the program could change household preferences of men and women by stressing the benefits of collective decision-making, cooperation, mutual respect, and the importance of women's contributions in the household. Finally, by introducing a new asset that must be managed, providing access to an insurance fund to be used in case of animal death, and facilitating participation in formal financial markets, the program may introduce a new set of decisions that are addressed in a way that is consistent with the cooperative models presented in trainings.

2.1 Sample Selection

The number of groups that applied to Heifer Zambia for support exceeded the number that could be supported by the resources available in 2011 and the research leveraged the phase-in design of the intervention to define a control group for the analysis. Once eligible groups were identified, livestock transfers were scheduled by order of application within the geographic scope of the

project. Twelve groups were identified for transfers and training in the initial round. Groups from three communities were selected for study representing each of the three livestock types transferred. Additionally, eligible groups in two communities that were next in queue for future participation were selected to form a control group for the treated households. Households in these control communities received nothing from Heifer during the next three years in which the project was implemented in “treated” communities, but were considered eligible.

Eligible groups that were ahead in a queue and received services in an initial round of distributions are classified as “Early recipients”. A second set of eligible groups – “Prospectives” – were deferred from receiving services until additional resources became available. All group members across early and prospective recipients self-selected to participate and are similar in group and household observables that the NGO considers when selecting groups for participation including: appropriate membership in terms of household capacity and needs, cohesiveness of the group, and commitment to contribute to a livestock insurance fund managed by the group and to make complementary investments in sheds and fencing for livestock. Because households and groups self-selected into the program and are balanced in observables we assume that they are similar in their relevant non-observable factors. As long as there are no systematic differences between groups based on timing of application, households in the “Prospectives” groups can form a control group for the “Early Recipients”. Similar experimental design was applied by (Jodlowski, Winter-Nelson, Baylis, and Goldsmith, 2016) and (Kafle, Winter-Nelson, and Goldsmith, 2016) in their analyses of the effects of the same intervention on food security and poverty outcomes. (Rawlins, Pimkina, Barrett, Pedersen, and Wydick, 2014) also uses a similar approach in an analysis of nutritional impacts of a livestock transfer program in Rwanda.

All “Early Recipient” households received training and any benefits of enhanced social capital that come through group membership, but only a subset initially received animals. We

designate those who received assets in the initial distribution as “Original” recipients, while households who received the offspring from the original livestock are “Pass on the Gift” (POG) recipients. Figure 1 details the selection procedure. Key informant interviews with group members indicated that selection of original recipients within the group was random, but the purity of that randomness is not known. The POGs receive second-generation animals from Original recipients and the majority of POGs had already received animals by the endline survey for this study (January 2015). The spatial proximity of the POGs to the Originals implies that they may be subject to spillover effects as well as the benefits of training; neither spillovers nor training are relevant for the Prospectives who serve as a control because they are geographically separated from the communities where Originals and POGs live and because they had not received the training by the project endline survey. For convenience, we refer to the Originals and POGs jointly as the “treated” groups and Prospectives as the “control” group⁴.

3. Background

Economic development and women's empowerment are critical complements (Duflo, 2012; Malhotra and Schuler, 2005; Mehra, 1997). Empirical evidence suggests that more empowered women improve household wellbeing and food security (Sharaunga et al., 2015; Wilcox et al., 2015; Bobonis, 2009), have healthier children (Doss, 2013; Lundberg, Pollak, and Wales, 1997), have fewer children and lower rates of child mortality (Dyson and Moore, 1983; Rosenzweig and Schultz, 1982), and contribute to improved household nutrition and dietary quality (Malapit et al., 2013). In addition, children from empowered mothers are likely to have better educational outcomes (Bruce,

⁴ A group of 30 households who were not members of any group and therefore ineligible for participation were also surveyed. These “Independent” households are not included in this analysis due to concerns over sample selection bias.

Lloyd, Leonard, Engle, and Duffy, 1995; Garikipati, 2013; Luz and Agadjanian, 2015). Where empowerment is understood to relate to women's bargaining power in a collective household, increased women's empowerment can have greater welfare impacts if it is combined with movement towards cooperation (McCarthy and Kilic, 2017). Despite research establishing the importance of women's empowerment and cooperation for overall economic development, empirical evidence of the impact of policy interventions on these conditions is not definitive. Das et al. (2013) assesses the impact of a multifaceted intervention in Bangladesh that transfers physical assets – primarily livestock – and provides training to rural women and finds ambiguous effects on women's empowerment. In particular, despite the fact that female beneficiaries had ownership of the transferred assets, men retained control over other household assets, investments, and even income generated from the transferred assets.

Numerous studies have examined the impact of micro-credit, conditional cash transfers, or 'training and education' on women's empowerment. Garikipati (2013) reviews existing literature on the relationship between microcredit interventions and women's empowerment and finds mixed evidence. For example, while some studies (Bandiera et al., 2014; de Brauw, Gilligan, Hoddinott, and Roy, 2014; Hashemi, Schuler, and Riley, 1996) find that microcredit interventions have positive impacts on women's empowerment, Yoong, Rabinovich, and Diepeveen (2012) and Pitt, Khandker, and Cartwright (2006) argue that recipient's gender affects the outcome. In a systematic review of related literature, Yoong et al. (2012) notes that transferring resources to women does not guarantee improvement in women's empowerment if men control the majority of household assets and income.

While the evidence of the effects of asset transfers and micro-finance on women's empowerment is mixed, studies of women's education (Bandiera et al., 2014; Kandpal, Baylis, and Arends-Kuenning, 2012), and conditional cash transfers (de Brauw et al., 2014) find more

consistently positive effects. Research suggests that male control over resources can affect the extent to which an asset transfer influences women's empowerment (Yoong et al. 2012; Das et al. 2013). The literature, however, is mostly silent about the impact of these interventions on men's decision-making participation and on the impact of transfers on joint decision-making, a measure of cooperation.

Measuring women's empowerment remains an active area of research and debate; the term empowerment is used in different ways in a range of contexts and the concept has proved somewhat difficult to measure though the literature is rapidly evolving. One challenge is that empowerment encompasses multiple dimensions of a woman's lived experience. Measures that try and capture this richness by collecting, for example, data across multiple spheres of decision-making and social influence then face problems related to dimensionality reduction and interpretation. Measurement strategies in the existing body of related literature generally rely on the construction of indices to aggregate women's independent and joint decision-making participation across multiple spheres (Bandiera et al., 2014; Bandiera and Natraj, 2013; Lépine and Strobl, 2013; Hashemi et al., 1996). The Women's Empowerment in Agriculture Index (WEAI) takes a similar approach; it aggregates joint and independent decision-making across five dimensions into one index (Alkire et al., 2013; Malapit et al., 2013; Sharaunga et al., 2015). Our strategy is to focus on household members' decision-making but to study both decisions made individually and jointly within the household. Measures based on individual and joint decision-making can provide a lens for consistently gauging the voice of individual household members and the prevalence of cooperation in the household. Despite differences in measurement strategies, our primary focus on decision-making participation to gauge empowerment and cooperation is consistent with the WEAI and other existing measures of women's empowerment (de Brauw et al., 2014; Doss, 2013; Wiig, 2013).

We extract and adapt components of the WEAI to define decision-making indexes that can be applied to assess the role of male decision-making, female decision-making and joint decision-making in the household. The WEAI is data intensive with a somewhat complex methodology.⁵ Our measure is distinct from the WEAI in three primary ways: we only include decisions related to production and control over economic resources in the household; we analyze joint and independent decisions separately rather than aggregating them into a single index; and we exclude indicators beyond decision-making such as time allocation. We use this approach for both practical and theoretical reasons. First, we lack the detailed data across multiple decision spheres to construct the full WEAI. Second, we expect that production activities and control over economic resources are the two spheres most likely to be affected by the program's physical asset transfers and associated training. Third, we seek measures that can be extended to joint participation as a measure of cooperation.

4. Data and methods

4.1 Data

Data collection included an initial survey in January 2012, at approximately the time when livestock transfers were being made to Original recipients (Initial livestock distribution extended from November 2011 through March 2012). Five additional survey rounds were conducted in July 2012, January 2013, July 2013, January 2015, and July 2015.⁶ This study uses a two-period panel because questions related to decision-making were administered in two survey rounds only. Figure 2 presents the survey timeline and corresponding sample sizes. The baseline for this study is the first

⁵ The WEAI is comprised of two sub-indexes, five dimensions of empowerment (5DE) and a gender parity index; the gender parity index is calculated using both women's and men's responses to the exact same survey instrument. Each dimension of 5DE consists sub-dimensions and the methodology uses proportional weighting to aggregate the five dimensions into the 5DE sub-index (*see* Alkire et al., 2013).

⁶ The process of data collection is described in more details in Jodlowski et al. (2016) and Kafle et al. (2016).

follow up survey (July 2012), conducted four to six months after the initial animal distribution, and the endline for this study is the fourth follow up survey conducted in January 2015. If the program affected decision-making during the first six months, using the first follow up survey as baseline will underestimate the treatment effect.

Table 1 presents survey characteristics and attrition rates. The baseline includes 276 households of which 260 were successfully re-interviewed in the endline giving us a two-period panel of 260 households. The full sample attrition rate is about 6% but POGs have a slightly higher attrition rate of 8% while attrition among the Prospective households was 3%. We find no obvious pattern in attrition related to observable characteristics of the households.

Given the design and implementation of the livestock transfer and training intervention and availability of longitudinal data on men's and women's control over intra-household decisions, we propose four testable hypotheses:

Hypothesis 1. *The asset transfer and training intervention increases women's (men's) decision-making participation.*

Hypothesis 2. *The intervention increases women's (men's) decision-making participation in household activities related to the transferred assets only, with no spillover into other household decision spheres.*

Hypothesis 3. *The scope of both men's and women's decision-making within the household expands as they shift from independent to collective decision-making.*

Hypothesis 4. *In the absence of an asset transfer, training has no impact on household decision-making.*

4.2 Measuring decision-making participation

We estimate changes in decision-making using two measures: decision scores and an empowerment index. We use decision scores to measure five different types of decision-making: (1) combined women's independent and joint decision-making; (2) combined men's independent and

joint decision-making; (3) joint decision-making by men and women; (4) women's independent decision-making; and (5) men's independent decision-making.

As in the WEAI and in Wiig (2013), we focus on a count of decisions that men and women in the household make either independently or together. We define a decision sphere as a set of decisions related to a single theme, such as crop production. We construct our measures using information about control and authority over eight decision spheres of household activities including decisions about sending children to school, slaughtering animals, sales of animal products and live animals, sales of crops, control over farm income, access to loan and credit opportunities, and crop storage. Within these spheres we measure 42 household decisions. We consider all decisions directly related to the intervention (eg. cattle and goat sale and slaughter; milk, meat, and draft power sale; and access to loan/credit⁷) to be 'treatment-related' decisions. We use remaining decisions to test for the existence of project spillovers into spheres of household activities unrelated to the project.

We first calculate individual decision scores specific to each of the eight decision spheres by averaging the number of women's and men's joint and/or independent decisions over total decisions made in the household specific to the decision sphere, giving equal weight to joint and independent decisions. Our approach of aggregating women's joint and independent decisions into a single measure is consistent with the approach to measuring women's empowerment in the WEAI, which equally weights decisions in which women have independent control and those in which they have a share of control. We then calculate aggregate decision scores by averaging the scores for each decision sphere, giving equal weight to each of the spheres in which a household is active. Since

⁷ Access to loan and credit is part of the treatment because the intervention establishes an insurance fund that beneficiaries can access under specific conditions. In addition, the training emphasizes financial literacy, financial planning, and business management. The NGO also supports the self-help groups as they graduate to co-operatives with credit and microfinance roles and introduces members to existing financial institutions.

there are only a few households with activities in all eight decision spheres, decision scores for most households are averaged over fewer than eight decision spheres. This process implies that each sphere is in some sense equally important, but of course the consequence is that individual decisions are weighted less when there are more decisions in a specific sphere.

Suppose T denotes the total number of decisions made in the household, T_i denotes the number of decisions under each decision sphere i , W_i denotes the number of decisions under sphere i made by female members, M_i denotes the number of decisions under sphere i made by male members, and J_i denotes the number of joint decisions under sphere i . Let N_k be the number of decision spheres in which household k has reported some activity. Then decision scores for household k are computed as follows:

1. Female and joint score $(WJ_k) = \frac{1}{N_k} \sum_i \frac{W_i + J_i}{T_i}$
2. Male and joint score $(MJ_k) = \frac{1}{N_k} \sum_i \frac{M_i + J_i}{T_i}$
3. Joint score $(J_k) = \frac{1}{N_k} \sum_i \frac{J_i}{T_i}$
4. Female only score $(W_k) = \frac{1}{N_k} \sum_i \frac{W_i}{T_i}$
5. Male only score $(M_k) = \frac{1}{N_k} \sum_i \frac{M_i}{T_i}$

By construction, all five scores lie in the continuum from 0 to 1. The ‘Female (Male) and Joint’ score for a household can be interpreted as the mean of the share of female (male) members’ joint and independent decisions over the decision spheres in which the household has reported activity. For example, a ‘Female and Joint’ score value of 1 for a household means that female member(s) of the household have participated in the decision-making of all activities considered. The ‘Female (Male) Only’ score for a household is the mean of the share of female (male) members’ independent decisions over the decision spheres in which the household has reported activity. A

‘Female Only’ score value of 1 for a household means that female member(s) of the household have full control in the decision-making in all areas in which the household made decisions.

The challenge of interpreting change in a decision score that aggregates independent and jointly-made decisions is that it is not possible to know whether the measure has changed through a growth in joint decisions, growth in women’s independent decisions, or both. In contrast, tracking changes in decision scores that separately measure the prevalence of uniquely male, uniquely female, and joint decisions in the household obviously allows us to distinguish changes in the decision dynamics between independent and joint decisions. Changes in the ‘Female and Joint’ score and the ‘Male and Joint’ score will indicate changes in the scope of participation in decision-making and can be used to inform hypotheses 1 and 2, but they will not reveal shifts from individual to joint decision-making. We use the Joint score and the ‘Male Only’ and ‘Female Only’ scores to test the effect of the asset transfer and training on the shares of independent and joint decisions, separately, to address hypothesis 3.

Finally, as a robustness check we aggregate the scores by decision sphere into an index by using weights from a principal components analysis, rather than using equal weights. We calculate five decision indexes analogous to the five decision scores. First we calculate the proportions of joint or independent decisions to total decisions by decision spheres and run principal component analysis (PCA) over the eight proportions to derive weights. In all cases, we retain only the first principal component because it captures the maximum variation present in the data (Filmer and Scott, 2008; McKenzie, 2005; Vyas and Kumaranayake, 2006). In this case the first component explains 26% variation in baseline data and 30% variation in endline data.

4.3. Econometric method

We use difference-in-differences (DID) to estimate the impact of the livestock intervention on decision-making. Combined with household level fixed effect estimation, the DID approach corrects for endogeneity that may arise from unobserved individual effects (Bertrand, Duflo, and Mullainathan, 2004). Given two ‘treatment’ groups (Original recipients and POG recipients) across two periods, the estimating equation includes multiple interactions of time and treatment:

$$y_{it} = \alpha_0 + \alpha_1 Time + \beta_1 Original \times Time + \beta_2 POG \times Time + \Pi X + c_i + \varepsilon_{it} \quad (1)$$

where y_{it} is the outcome of interest for household i at time t . $Time$ is a time dummy that equals one for endline and zero for baseline, $Original$ is a treatment indicator that equals one for the Original group and zero for others, POG equals one for POG group and zero for others, X is a vector of control variables that includes household size, number of children ages five years or below, number of children ages six to sixteen, age of the household head, level of education for the head, a dummy variable for female head, and dummy variable for marital status of the household head, c_i is the household level fixed effect, and ε_{it} is idiosyncratic error term. The coefficients of interest are β_1 and β_2 ; β_1 represents the program effect on the households experiencing full treatment and β_2 represents the effect of training and spillover effects as well as the effect of delayed receipt of an animal.

5. Results

5.1. Descriptive results

Table 2 presents descriptive statistics and balancing tests for control variables and outcome variables at baseline. Overall, summary statistics and balancing test results indicate that our sample is

reasonably balanced and the baseline characteristics are smoothly distributed across both the recipients and non-recipients. We use the normalized differences for balancing test (Imbens and Wooldridge, 2008). Based on the normalized differences, household size and age of the household head for the treated groups are significantly different from that of the control group. All other observed characteristics of the treated and control groups are equivalent. Even though household size and age of the household head are different for the treated and control groups, they are unlikely to contribute to selection bias as these variables do not change much over time so play little role in the fixed effects regression. Balancing tests on the outcome variables indicate that the various decision scores are similar across the treated and control groups in baseline. Moreover, the baseline results indicate a high prevalence of joint decision-making in all groups and similar scores for male only and female only decision-making. Given that both control and treated households applied to the program, their unobserved characteristics are also likely to be similar. We correct for any time invariant unobserved characteristics through the use of household fixed effects.

Table 3 presents changes in the share of household decisions made by male and female members jointly or individually at baseline and endline. These descriptive statistics suggest a shift from individual decision-making by men and women to joint decision-making in the households that were among the original recipients. The decline in individual decision-making and increase in joint decision-making results in an 8% increase in the share of independent and joint decisions in which women have participation and an 11% increase in the share of decisions in which men participate. A similar pattern appears for the POGs, but the differences are not statistically significant.

Table 4 presents changes in both women's and men's joint and independent decision scores over the eight decision spheres. Post-intervention, both women's and men's participation in decision-making has increased in most decision spheres. For example, the 'Female and Joint' decision scores increased by 23% and 14% for live animal sale and for animal slaughter, respectively,

suggesting expansion in women's decision-making participation in spheres related to the transferred assets. The 'Male and Joint' decision scores for animal slaughter increased by 23% but there is no significant increase on live animal sales suggesting an increase in men's participation in important decisions about the transferred assets. Regarding decisions not directly related to the transferred asset, women had more say on sending kids to school and men gained involvement in crop produce sales and loan/credit services. Results on POG households show a similar pattern but there is no significant change in men's and women's decision-making participation in the control groups. Figure 3 depicts the change in Joint decisions among Originals and Prospectives and suggests that the expansion in 'Female and Joint' and 'Male and Joint' decisions largely comes from a growth in joint decision-making. These patterns of change in decision making are explored further in the econometric analysis.

5.2. Empirical results and discussion

We begin by using our data to explore the relationship between decision-making participation and household wellbeing. We seek to test previous findings of the existence of positive correlations between women's participation and indicators of economic development. Next, we use decision scores as outcome variables and assess the impact of the livestock intervention on women's and men's decision-making participation and on the role of joint decision-making within the household. If more decisions are being made jointly by men and women, it is possible that both men and women's scope of decision-making can increase. Such an outcome might imply that improvements in women's voice have been achieved while maintaining male involvement.

Table 5 presents the relationship between women's and men's decision-making participation and poverty and food security outcomes, using different combinations of decision indices as

independent variables.⁸ Though these results do not imply causality, they suggest that expansion in both joint and women's decision-making positively corresponds to household consumption expenditures and dietary diversity, consistent with previous findings (Duflo, 2012; Sharaunga et al., 2015; Wilcox et al., 2015). Both women's and men's decision-making are positively related to consumption expenditures. Unlike men's, an increase in women's involvement in decision-making is associated with higher dietary diversity. While the positive effects of men's combined joint and independent decisions are derived from joint decisions, women's independent decision-making has positive effects on its own.

Table 6 presents estimates of the impact of the intervention on decision scores. The first column presents the impact of the livestock intervention on the 'Female and Joint' decision score, which is interpreted as the share of decisions in which the woman participated in any capacity. The second column reports impact on the 'Male and Joint' decision score capturing male participation and columns (3), (4), and (5) present the impact on Joint decisions, women's independent decisions ('Female Only' decisions) and men's independent decisions ('Male Only' decisions) separately. Results indicate that being an original recipient of the transfer and training resulted in an increase of 9.3 percentage points in the 'Female and Joint' decision score and a 7.6 percentage point increase in the 'Male and Joint' decision score. Thus the program resulted in increased participation in household decision-making by both men and women. Considering joint decisions and independent decisions separately reveals that the intervention led to an expansion of joint decision-making by 17 percentage points accompanied by a 9 percentage point reduction in men's independent decision-making with no statistically significant impact on women's independent decision-making. Because the number of decision spheres does not change over time, expansion in joint decisions almost

⁸ Results based on decision scores (not presented here) were of similar sign and magnitude but were barely statistically significant.

always comes from reduction in independent decisions or addition of new joint decisions within existing decision spheres. In this case, the results point to increased cooperation in the household with both men and women participating in more decisions, but with a reduction in men's independent decision making.

In contrast to the original recipients, the POG households exhibit no statistically significant impacts from the treatment on the decision scores. The POG households received training but delayed and (initially) lower value asset transfers compared to the originals. Thus, the lack of evidence of change in men's and women's decision-making among the POG households suggests a possible difference in the impact of training with and without asset transfers. Absent the asset transfer, impacts on decision-making are not observed.

Results of the analysis using PCA to generate empowerment indexes rather than the scores are presented in Table 7. These results confirm the finding that receiving the initial asset transfer and training resulted in an increase in joint decisions and a decrease in decisions made independently by men. Results indicate the intervention increased women's decision-making and that that increase was driven by an increase in joint decision-making, coupled with a decrease in men's independent decision-making. Men's participation in joint and independent decisions in aggregate is unchanged. Results confirm that the intervention expanded joint decision-making. This finding is robust in that the results are consistent across the two different measures of decision-making.

To assess whether the impact on decision-making is restricted to decision spheres related to the asset transfer, we combine the eight decision spheres into a "treatment related" sphere and a sphere for all other decisions. The "treatment related" sphere includes decisions about cattle and goat sale, milk, meat, and draft power sale, cattle and goat slaughter, and women's and men's access to credit. The "all other" sphere includes all remaining decisions across the eight decision spheres. In this formulation the decision score based on an average across multiple spheres is no longer

relevant. Instead, the number of decisions made in each of the five processes (Joint, Male Only, Female Only, Male and Joint, Female and Joint) is taken as the outcome of interest.

The program led to a large and statistically significant increase in joint decision-making for treatment-related activities (Table 8); both men and women experience an increase in the number of decisions in which they participate. However, we find no evidence of a statistically significant change in the number of decisions that are made independently by men or women, implying that the increase in joint decisions is concentrated in new decision-making opportunities emerging from the asset transfer. The result is consistent for POG households. Regarding impacts on decision-making for activities not directly related to the intervention, results suggest that the intervention had no impact at all on joint or women's independent decision-making (Table 9). Interestingly, the intervention appears to have decreased men's independent decision-making on non-treatment related decisions. Results hold for men and women in POG households.

In summary, our findings suggest that transferring physical assets and providing associated training to rural women and men can expand the scope of cooperative decision-making and increases women's participation in decisions while reducing the decisions in which men operate independently, but increasing the prevalence of their participation in joint decisions. The finding that providing training along with transferring physical resources to women leads to expansion in women's voice in decision-making is consistent with Lundberg and Pollak's (1993) separate spheres bargaining model in which household members have full control over the payoff of household resources under their control. In their assessment of a cash transfer program, Lundberg and Pollak found that the program's impact differs according to the recipient's gender. In our case, women's control over decision-making regarding transferred assets has probably increased due to the intervention because women were the primary recipients of the transferred assets and therefore likely have more control over the payoff of the transferred assets. However, our finding that

expansion in women's decision-making participation comes through increased joint decision-making on the extensive margin of new decisions suggests that a decrease in men's decision-making participation is not inevitable. In this light, contrary to separate bargaining spheres, our findings may be better explained by a model of collective rationality. That is, even though women may have more individual control over transferred assets and related decisions, they may still cooperate with men in the household because non-cooperation leads to Pareto inefficiency in household resource allocation.

We are unable to test for Pareto-efficiency in resource allocation due to data limitations, but a large number of existing studies find evidence of Pareto-efficiency in intra-household resource allocation in agrarian settings (Bobonis, 2009; Browning and Chiappori, 1998; Chiappori, 1992). Evidence suggesting the absence of Pareto-efficiency in household resource allocation is not uncommon (Basu, 2006; Lundberg and Pollak, 1993), but Chiappori (1992) argues that intra-household decision-making leads to a Pareto-efficient outcome irrespective of bargaining mechanisms. Meanwhile, McCarthy and Kilic (2017) provides a theoretical and empirical base to argue that increased intra-household cooperation may increase productivity. Because our finding is consistent with the outcome of the collective rationality model, this analysis suggests that the livestock transfer and training intervention may have contributed to efficient intra-household resource allocation through increased cooperation in decision-making.

6. Conclusion

This study assesses the impact of livestock transfers and training on the dynamics of intra-household decision-making. Using data from a livestock allocation and training intervention in the Copperbelt Province in Zambia, we investigate whether household decision-making patterns are affected by the program and if expansion in women's decision-making within households can be

reconciled with continued male engagement. Maintaining male participation may be critical to the success of activities that benefit from men's labor and management. Our study is among the first to test for effects of a program targeting women on men's, women's, and joint decision-making participation. In addition to testing for the effects of the intervention on decision-making spheres directly impacted by the project such as livestock related activities, we also test for spillovers into other household activities including child education and crop sales. Results show that transferring physical assets along with providing training to both male and female members of recipient households helps expand cooperation in intra-household decision-making. Our results also reveal that women's decision-making participation can be improved without compromising men's engagement as joint decision making can be effectively expanded.

Further examination shows expansion men's and women's decision-making participation largely comes from increased roles in activities directly related to the transferred assets. In particular, the intervention increased the proportion of joint decisions by 17% in all household activities, led to an overall decrease in men's independent decisions of 9%, and did not impact women's independent decision making. We find, however, that effects on decision-making are largely limited to decisions that relate directly to the transferred assets. The intervention also contributed to increases in joint decisions among the group of households that received training but delayed and immature second generation animals; the impact, however, was limited to the decision spheres related to the transferred assets only. Our results emphasize the importance of treating independent and joint decisions separately when analyzing decision-making dynamics; when independent and joint decisions are combined, the estimated impacts differ because the expansion in joint decisions is offset somewhat by a reduction in individual decisions.

These findings highlight the importance of considering joint and solitary decisions separately because combining them obscures intra-household decision-making dynamics. In particular,

recognition of the expansion in joint decisions influences interpretation of the reduction in solitary decisions by men. Likewise, interpretation of whether an increase in women's participation in decision-making reflects growth in female empowerment requires an understanding of changes in independent and joint decisions. Failure to attend to both joint and independent decision-making can lead to misrepresentation of impacts of interventions on decision-making and empowerment.

In general, the larger impact on the Original recipient households and minimal or negligible impacts on the POG households who received lower value assets after a delay, implies that programs that provide awareness or educational training on gender balance, social justice, and other themes may be more effective when combined with physical asset transfers. The observed large increase in joint decisions suggests that the intervention helped move households toward gender equity and shared responsibilities in activities on the extensive margin. Impacts on decision-making in established areas of household activity were less pronounced even in the presence of asset transfer. This result suggests that changes in decision-making power are more likely to emerge in the presence of economic transformations that introduce new decisions to the household.

Our analysis reveals that empowerment based on participation in decision-making is not necessarily a zero-sum game in agrarian settings where household decisions are often made independently by men or women and involve a relatively narrow range of activities. The introduction of new management opportunities with new decisions can create space for more joint decision-making, expanding women's overall engagement without diminishing men's involvement. Interventions that aim to improve women's empowerment may enhance effectiveness by integrating men in program design and demonstrating practical benefits from cooperative decision-making.

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Figures and Tables

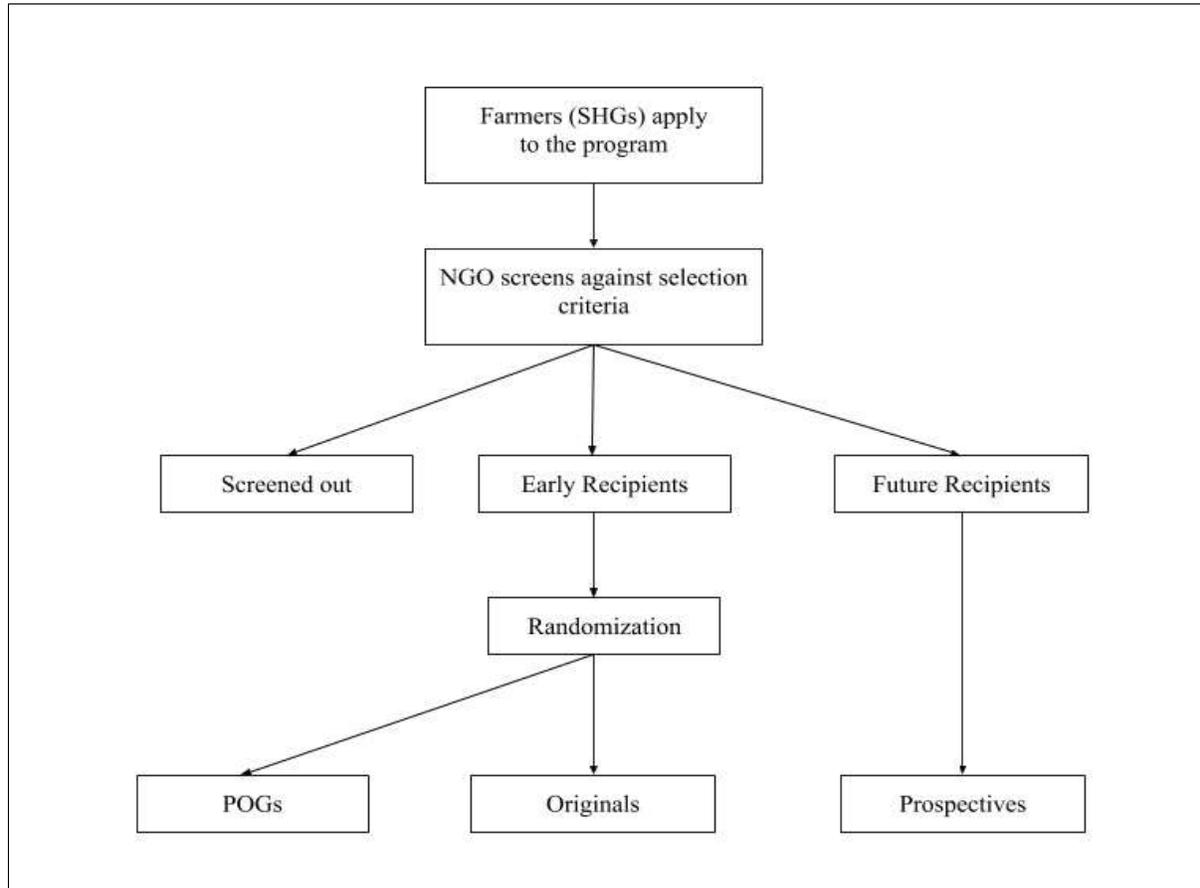


Figure 1. Selection procedure and treatment groups

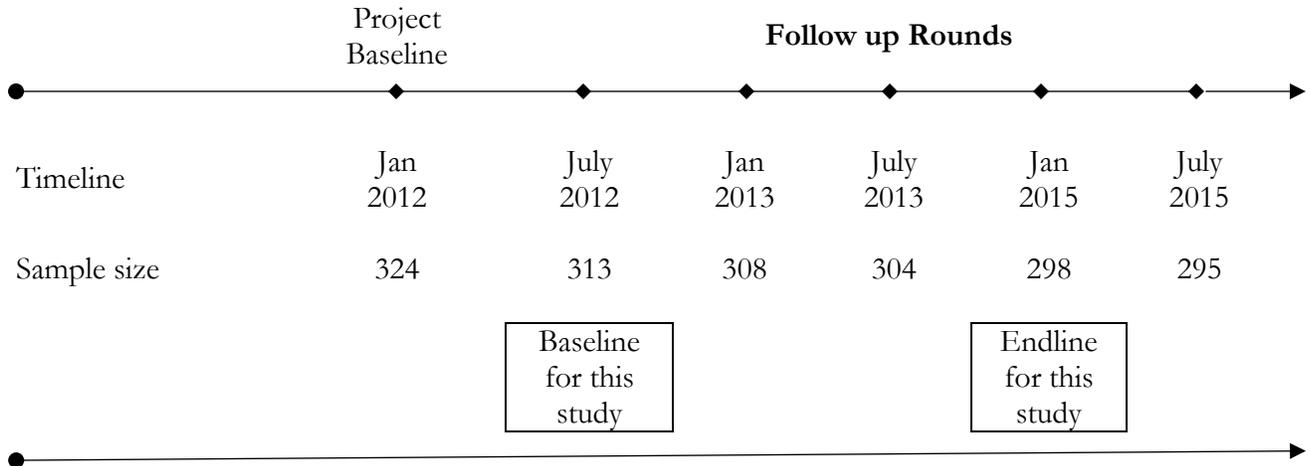


Figure 2. Timeline of survey and corresponding sample size

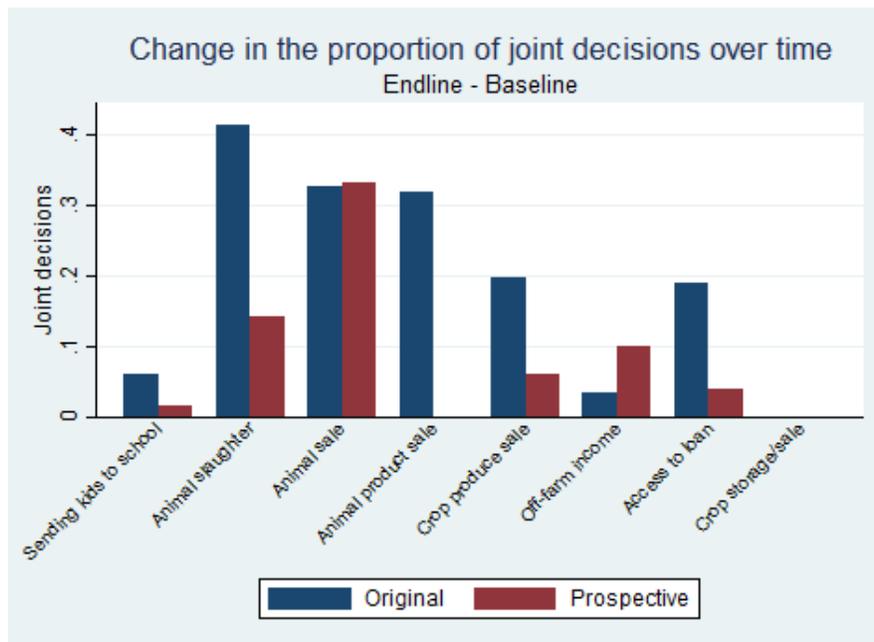


Figure 3. Change in the joint decision scores over time

Table 1: Survey characteristics and attrition

Treatment Status	Baseline	Endline	Attrition (%)	Attrition (n)
Originals	104	100	3.8	-4
POGs	105	96	8.6	-9
Prospectives	67	64	4.5	-3
<i>Total</i>	276	260	5.8	-16

Notes: Baseline is the first follow up survey from a larger field experiment we conducted in the Copperbelt Province. See Kafle et al. (2016) and Jodlowski et al. (2016) for details about the experiment and other survey rounds.

Table 2: Summary statistics and balancing tests on baseline sample

Variables	Treatment Status			Normalized Difference	
	Original	POG	Prospective	ND1	ND2
Household Size	7.24 (0.266)	7.10 (0.296)	5.84 (0.292)	0.36	0.32
No. of children 5 or under	1.19 (0.101)	1.22 (0.099)	1.00 (0.134)	0.13	0.15
No. of children 6 to 16	2.28 (0.168)	2.52 (0.183)	1.84 (0.198)	0.18	0.27
Female head (1=Yes, 0=No)	0.21 (0.041)	0.15 (0.036)	0.19 (0.049)	0.04	-0.08
Married head (1=Yes, 0=No)	0.82 (0.038)	0.89 (0.033)	0.78 (0.052)	0.07	0.19
Education of head	2.90 (0.142)	3.10 (0.158)	2.94 (0.165)	-0.02	0.08
Age of head	51.1 (1.300)	44.6 (1.404)	43.7 (1.800)	0.35	0.04
Female and joint decision score	0.74 (0.030)	0.80 (0.026)	0.79 (0.036)	-0.12	0.02
Male and joint decision score	0.70 (0.034)	0.77 (0.032)	0.78 (0.041)	-0.16	-0.03
Female only decision score	0.30 (0.034)	0.23 (0.032)	0.22 (0.041)	-0.25	-0.01
Male only decision score	0.26 (0.030)	0.20 (0.027)	0.21 (0.036)	0.16	0.02
Joint decision score	0.44 (0.035)	0.56 (0.036)	0.57 (0.045)	0.12	-0.01
<i>Observations</i>	100	96	64		

Notes: Point estimates are mean and standard errors are in parentheses.

ND1 and ND2 indicate the value of normalized difference between Originals and Prospectives, and POGs and Prospectives, respectively.

Table 3: Change in decision scores over time by treatment groups

Treatment status	Decision scores					N
	Female and Joint*	Male and Joint	Joint	Female only	Male only	
Original	0.08** (0.034)	0.11** (0.027)	0.18*** (0.036)	-0.11*** (0.027)	-0.07** (0.034)	99
POG	0.03 (0.032)	0.06* (0.027)	0.09* (0.040)	-0.06 (0.027)	-0.03 (0.032)	96
Prospective	-0.02 (0.037)	0.04 (0.038)	0.02 (0.050)	-0.04 (0.038)	0.02 (0.037)	64
Full sample	0.04* (0.020)	0.08*** (0.017)	0.11*** (0.024)	-0.07*** (0.017)	-0.03 (0.020)	259

Notes: Point estimates are mean. Standard errors are in parentheses, asterisks indicate the level of significance for test of equality of means over time, * $p < .10$, ** $p < .05$, *** $p < .01$.

*'Female (Male) and Joint' score is the combined score of adult women's (men's) joint or independent participation in intra-household decision-making. Joint and independent decisions are equally weighted.

Table 4: Change in women's and men's independent and joint decision scores by decision spheres

Decision spheres	Originals		POGs		Prospectives	
	Female and Joint	Male and Joint	Female and Joint	Male and Joint	Female and Joint	Male and Joint
Sending kids to school	0.14*** (0.049)	-0.08 (0.055)	0.03 (0.049)	-0.02 (0.046)	0.01 (0.058)	0.01 (0.058)
Animal slaughter	0.14*** (0.056)	0.23*** (0.072)	0.09* (0.057)	0.16** (0.070)	0.04 (0.075)	0.11 (0.094)
Live animal sale	0.23*** (0.086)	0.09 (0.093)	0.14 (0.112)	0.27** (0.127)	0.003 (0.124)	0.16 (0.148)
Animal product sale	0.04 (0.109)	0.16 (0.104)	0.08 (.)	-0.17 (.)	0.36 (0.520)	0.21 (0.532)
Crop produce sale	-0.04 (0.062)	0.27*** (0.056)	-0.02 (0.055)	0.18*** (0.058)	-0.08 (0.070)	0.12 (0.076)
Off-farm income	-0.06 (0.114)	0.02 (0.110)	-0.01 (0.108)	-0.07 (0.096)	-0.01 (0.127)	-0.01 (0.116)
Access to loan/credit	0.005 (0.063)	0.18*** (0.052)	0.03 (0.056)	0.08* (0.046)	0.005 (0.071)	0.05 (0.061)
Crop storage/sale	-0.18 (0.195)	-0.07 (0.197)	-0.12 (0.201)	-0.01 (0.202)	0.13 (0.216)	-0.05 (0.227)
<i>Observations</i>	99	99	96	96	64	64

Notes: Point estimates are mean decision scores for women's and men's independent and joint decisions. Standard errors are in parentheses, asterisks indicate the level of significance for test of equality of means over time, * $p < .10$, ** $p < .05$, *** $p < .01$.

All decision spheres, except sending kids to school, involve multiple decisions and the women's (men's) empowerment score is the weighted score of women's (men's) independent and joint decisions made in the household.

Table 5: Relationship between decision making measures and household wellbeing: expenditures and dietary diversity (DDS)[†]

	(1)			(2)			(3)		
	Total Exp.	Food Exp.	DDS	Total Exp.	Food Exp.	DDS	Total Exp.	Food Exp.	DDS
<i>Decision indexes</i>									
Female and Joint	0.088** (0.041)	0.086** (0.040)	0.19** (0.095)	-	-	-	-	-	-
Male and Joint	-	-	-	0.10** (0.049)	0.13*** (0.045)	-0.082 (0.14)	-	-	-
Joint	-	-	-	-	-	-	0.083*** (0.031)	0.077** (0.031)	0.098 (0.094)
Female only	-	-	-	0.080* (0.042)	0.087** (0.042)	-0.067 (0.14)	0.064* (0.035)	0.061* (0.034)	-0.0025 (0.12)
Male only	0.037 (0.033)	0.067** (0.033)	0.094 (0.098)	-	-	-	0.020 (0.026)	0.049* (0.027)	-0.12 (0.098)
Household controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Observations</i>	518	518	517	518	518	517	518	518	517

Notes: Standard errors are in parentheses, level of significance * $p < .10$, ** $p < .05$, *** $p < .01$.

All decision indexes are calculated by running the principal component analysis on joint and independent decision scores for 8 decision spheres. Model 1 estimates the effects of Female and Joint and Male only decisions on wellbeing variables, Model 2 estimates the effects of Male and Joint and Female only decisions, and Model 3 estimates the effects of Joint and independent decisions. Expenditure are in Zambian Kwacha per capita per week. Dietary diversity score is based on 13 different food groups classified by USDA, FANTA..

[†]Results are obtained from fixed effects regression. Household controls include household size, number of children ages 5 or under, aged 6 to 16, indicators for female head and married head, and age and education of head

Table 6: Project impact on women and men's decision-making based on decision scores

	Decision scores				
	(1) Female and Joint	(2) Male and Joint	(3) Joint	(4) Female only	(5) Male only
Endline	-0.033 (0.038)	0.037 (0.036)	0.003 (0.049)	-0.036 (0.035)	0.034 (0.038)
Original x Endline	0.093* (0.050)	0.076* (0.046)	0.17*** (0.058)	-0.073 (0.046)	-0.090* (0.050)
POG x Endline	0.058 (0.049)	0.029 (0.045)	0.085 (0.062)	-0.027 (0.044)	-0.056 (0.049)
Household Controls	Yes	Yes	Yes	Yes	Yes
<i>Observations</i>	517	517	517	517	517

Notes: Standard errors in parentheses, significance level, * $p < .10$, ** $p < .05$, *** $p < .01$

Household controls include household size, number of children ages 5 or under, number of children ages 6 to 16, indicators for female head and married head, and level and squared of age and education of head

Table 7: Project impact on women and men's decision-making based on decision index

	Decision index				
	(1) Female and Joint	(2) Male and Joint	(3) Joint	(4) Female only	(5) Male only
Endline	-0.39 (0.24)	-0.066 (0.19)	-0.43* (0.23)	0.18 (0.17)	0.49** (0.20)
Original x Endline	0.54* (0.29)	-0.053 (0.24)	0.56* (0.30)	-0.27 (0.24)	-0.99*** (0.27)
POG x Endline	0.32 (0.28)	-0.006 (0.23)	0.40 (0.29)	-0.16 (0.22)	-0.40 (0.26)
Household Controls	Yes	Yes	Yes	Yes	Yes
<i>Observations</i>	518	518	518	518	518

Notes: Standard errors in parentheses, significance level, * $p < .10$, ** $p < .05$, *** $p < .01$

Household controls include household size, number of children ages 5 or under, number of children ages 6 to 16, indicators for female head and married head, and level and squared of age and education of head

Table 8: Project impact on women and men’s decision-making based on ‘treatment related’ activities

	Treatment related decisions				
	(1) Female and Joint	(2) Male and Joint	(3) Joint	(4) Female only	(5) Male only
Endline	1.04*** (0.22)	0.95*** (0.22)	0.74*** (0.21)	0.30** (0.12)	0.20** (0.092)
Original x Endline	0.93*** (0.25)	0.67*** (0.25)	0.75*** (0.24)	0.18 (0.16)	-0.083 (0.14)
POG x Endline	0.49* (0.28)	0.92*** (0.27)	0.70*** (0.27)	-0.22 (0.15)	0.22 (0.14)
Household Controls	Yes	Yes	Yes	Yes	Yes
<i>Observations</i>	518	518	518	518	518

Notes: Standard errors in parentheses, significance level, * $p < .10$, ** $p < .05$, *** $p < .01$
Household controls include household size, number of children ages 5 or under, number of children ages 6 to 16, indicators for female head and married head, and level and squared of age and education of head

Table 9: Project impact on women and men’s decision-making based on ‘other’ activities

	‘Other’ decisions				
	(1) Female and Joint	(2) Male and Joint	(3) Joint	(4) Female only	(5) Male only
Endline	2.46*** (0.39)	2.11*** (0.37)	1.76*** (0.42)	0.70*** (0.22)	0.35* (0.19)
Original x Endline	0.67 (0.53)	0.28 (0.52)	0.80 (0.57)	-0.13 (0.33)	-0.52** (0.25)
POG x Endline	0.42 (0.50)	0.018 (0.46)	0.52 (0.53)	-0.096 (0.30)	-0.50* (0.27)
Household Controls	Yes	Yes	Yes	Yes	Yes
<i>Observations</i>	518	518	518	518	518

Notes: Standard errors in parentheses, significance level, * $p < .10$, ** $p < .05$, *** $p < .01$
Household controls include household size, number of children ages 5 or under, number of children ages 6 to 16, indicators for female head and married head, and level and squared of age and education of head