SOCIAL EQUITY OUTCOMES IN A COMMUNITY-BASED CONSERVATION PROGRAM IN ETHIOPIA

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Abstract

Community-based conservation (CBC), albeit lauded as a more just alternative than command-and-control conservation approaches, is riddled by equity concerns. This study measures perceptions of equity and examines how household, institutional, and program design characteristics affect multiple dimensions of equity in a CBC program in the Bale Mountains, Ethiopia. Informed by a prior in-depth qualitative study, we develop locally relevant indicators about perceptions of distributive, procedural, and recognition equity. We conduct 200 household surveys in four kebeles (smallest administrative unit), two from a 'new CBC model' that involves community-based power sharing and two kebeles from the 'original CBC model' that does not involve community-based power sharing. We find slightly negative perceptions of all three dimensions of equity across the four kebeles. Gender and wealth are strong determinants of perceptions of distributive equity, with women and poorer households having more negative perceptions. Social capital, both internal community cohesion (bonding social capital) and strong relationships with external organizations (linking social capital), positively affect all three dimensions of equity but have the largest impact on procedural and recognition equity. Finally, we find that communities in the 'new CBC model' have higher perceived equity than communities involved in the 'original CBC model'. These findings highlight the need to strengthen weak ties with external organizations, facilitate intra-community cohesion, and design programs that emphasize power-sharing to facilitate more equitable conservation outcomes. Our results also suggest that more attention is still needed in incorporating marginalized groups into CBC programs.

Key Words: Bonding capital, capital assets, community-based natural resource management, environmental justice, linking capital, social justice.

1. Introduction

Natural resource governance approaches in Africa have increasingly shifted from the 'exclusionary' state-centric approaches of the 1970's towards various forms of rights based and participatory approaches since the 1980's. These people-oriented conservation approaches are commonly labelled as community-based conservation (CBC) or community-based natural resource management (CBNRM) (Berchin et al., 2002; Hulme & Murphree, 1999; Gibson & Marks, 1995; Songorwa et al., 2000). In principle, CBC programs are characterized by efforts to promote sharing of benefits and devolving decision-making rights to communities living in and around conservation areas thereby enhancing legitimacy and long-term success in conservation outcomes (Barrow & Murphree, 2001; Nelson & Agrawal, 2008). Despite such appealing premises, however, CBC programs in Africa have met complex implementation challenges over the past few decades resulting in mixed social and ecological outcomes (Balint & Mashinya, 2006; Galvin et al., 2018; Hulme & Murphree, 2001).

Failure to adequately engage with the complex and heterogenous socio-ecological context in which CBC programs operate has resulted in inequitable benefit distribution (distributive equity), exclusionary decision-making processes (procedural equity), and a lack of recognition of multiple knowledge systems, identities, and rights (recognition equity) (Nelson & Agrawal, 2008; Nelson, 2012; Nkhata & Breen, 2010). Although CBC programs might improve conditions in general, one of the most persistent criticisms is that benefits often do not reach the most marginalized groups and programs could exacerbate existing inequalities (Agarwal, 2009; McDermott & Schreckenberg, 2009; Sunam, & McCarthy, 2010). These implementation challenges suggest that oversimplified assumptions are present in CBC programs regarding distribution of benefits, participation, and the notion of 'community', and require critical

engagement with the social diversity and consequent power dynamics within and across communities along the lines of gender, class, wealth, and power (Adams & Hulme, 2001; Berkes, 2004; Blaikie, 2006). To this end, there have been increasing calls for grounded approaches that put local people at the center of conservation outcome assessments and the adoption of more holistic approaches to studying social impacts of conservation programs, especially through a focus on social equity (Gross-Camp, 2017; Haines-Young & Potschin, 2010).

Social equity has been increasingly used as a framework to explicitly understand and critically engage with the power dynamics within and across different groups affected by conservation and/or development interventions (Friedman et al., 2018; Pascual et al., 2014; Schreckenberg et al., 2016). Equity is a multi-dimensional and multi-scalar concept that includes a: (1) distributive dimension focused on the distribution of costs, responsibilities, rights, and benefits among different groups and individuals; (2) procedural dimension concerned with the decision-making processes which determines who has access to benefits and who suffers from restrictions on access to benefits; and (3) recognition dimension that looks at the respect and recognition accorded to distinct values, identities, histories as well as knowledge diversity in the conservation context (Dawson et al., 2018; McDermott et al,. 2012; Schreckenberg et al. 2016; Sommerville et al., 2010). According to a systematic review on social equity by Friedman et al. (2018), the majority of existing equity assessments employ qualitative methods only or mixed methods (Dawson et al., 2017), while quantitative methods that measure equity are less prevalent (Bennett et al., 2020). Within the three dimensions of equity, the distributive aspect of equity is the most commonly studied dimension (Chu et al., 2019; Halpern et al., 2013; Hayes & Murtinho, 2018). While procedural and recognition dimensions have garnered increasing attention in equity

research, there are fewer studies measuring these constructs (Friedman et al., 2018; Martin et al., 2016).

Despite the increased attention to justice concerns in conservation programs (Martin et al., 2013; McDermott et al., 2013; Klein et al., 2015; Schreckenberg et al., 2016), there remains a gap in empirical studies that examine the determinants of equity outcomes in CBC programs (Friedman et al., 2018, Sikor et al., 2014). The existing literature highlights intra-community differences such as age, gender, ethnicity, education, occupation, financial status, or resource-access rights could influence who is likely to receive benefits or incur costs from conservation programs, thereby resulting in differences in perceived equity (Bennett et al., 2020; Hayes & Murtinho, 2018; Kelin et al., 2015). Furthermore, studies highlight the impact of different levels of community organization or institutional characteristics, such as the presence of rules and enforcement mechanisms, transparency, and trust in decision-making processes, among factors that can explain differences in equity outcomes in CBC programs (Hayes & Murtinho, 2018). Thus, there are a multitude of household and institutional characteristics that might shape equity outcomes in conservation programs, and a better understanding of which factors are most important in explaining perceptions of equity in different contexts can help CBC programs adaptively manage their approaches to improve social justice outcomes.

As with most African countries, Ethiopia is shifting from state-centric conservation approaches and trying to devise collaborative, co-managed and/or CBC programs. This need for people-centric conservation programs is heightened by the alarming increase in human settlement, land scarcity and associated livelihood impacts on natural resources that threaten both long-term conservation outcomes and sustainable well-being of communities (Mamo & Bekele, 2011; Stephens et al., 2011). Additionally, the contested issues of boundaries and land tenure, the mobile

nature of wildlife spanning beyond the confines of protected areas, and the limited capacity of the state to enforce strict protection regimes, all suggest a need for alternative governance approaches in addition to the dominant 'fences and fines' approach (Young et al., 2020). In the last few decades, Ethiopia has started to design and implement CBC programs around forests and wildlife (Amare, 2015; Tesfaye, 2017); however, little is known about their outcomes or impacts on social equity.

A CBC program within Controlled Hunting Areas (CHA) near Bale Mountains National Park in Ethiopia is one of these alternative governance models. The program is administered by the Oromia Forest and Wildlife Enterprise (OFWE) and is based on sharing benefits from controlled hunting revenues and devolving decision-making power to local communities within kebeles (smallest administrative unit) living within the designated hunting areas. The CBC program strives to restrict the expansion of human settlement and activities that negatively impact wildlife and critical habitats, such as illegal settlement expansion, timber extraction, overgrazing, and poaching (Abebe et al., 2020). There are two slightly different models of the program: a newer model that involves community-based joint resource management and a power sharing mechanism hereafter known as "new CBC", and an older model that only involves sharing of financial incentives without a power sharing mechanism in place, hereafter called "original CBC". The new CBC program has legally organized groups of users called Community Based Organizations (CBO)s in each kebele that are responsible for monitoring and reporting on the protection of resources (e.g., wildlife, forests, rangelands) under their respective jurisdictions to the overseeing CBO management committee. A joint committee made up of CBO management representatives from several kebeles is responsible for overseeing the distribution of benefits to each CBO and providing regular reports to the OFWE on resource protection performance. The original CBC, on

the other hand, does not have a legally binding framework that joins multiple kebeles in benefit sharing and resource monitoring. Although a portion of revenues generated from controlled hunting are deposited to individual community accounts, there is no accountability or reporting mechanisms on the expected conservation outcomes to OFWE in the original CBC model. While the goal is to shift all communities toward the new CBC model, limited resources and political instability in the region have affected this transition.

In the Bale Mountains, previous qualitative research on this CBC program suggests that locals' perception of social equity is marred by the complex histories of interaction with conservation organizations, population growth and political instability in the region (Abebe et al., 2020). Using a locally grounded and multi-dimensional conceptualization of equity, Abebe et al. (2020) also found that while the new CBC model is making positive strides in sharing benefits and decision-making rights, women and youth are the least likely to perceive the program as equitable. Furthermore, access to information, transparency of decision making, and the presence of monitoring and accountability influenced equity outcomes across the two CBC program models. Building on these qualitative results, the goal of this study is to quantitatively measure perceived equity and assess the characteristics that explain perceptions of equity outcomes. The specific objectives are to: (1) examine how perceptions of distributive, procedural and recognition equity dimensions vary across households; (2) assess the effects of household characteristics and institutional factors on explaining equity outcomes; and (3) assess the effects of CBC models (new vs original) on perceptions of equity. This research adds to the scant literature measuring social equity and examining the factors explaining equity outcomes in CBC programs. Given surging social, economic, and political unrest and increasing conservation threats in Ethiopia and other

regions in Africa and the globe, this research is vital to developing more equitable conservation programs that address prevalent misconceptions about intra-community differences.

2. Methods

2.1 Study area

The Bale Mountains is located in the Oromia region of Southeast Ethiopia. The mountain ecosystems display distinct altitudinal zonation that include the Afro-alpine (> 3,700 m.a.s.l.), sub-alpine and ericaceous (3,200 m to 3,700 m.a.s.l), upper Afro-montane forests (2,300-3,250 m.a.s.l.), and lower Afro-montane woodlands (1,500 -2,300 m.a.s.l.) (Evangelista et al., 2012). The Bale Mountains have global conservation significance as important reservoirs of genetic diversity (Hillman,1988; Uhlig, 1988). The mountains serve as vital centers for ecological processes and provide water for an estimated 12–20 million people in south-eastern Ethiopia, central Somalia, and parts of northern Kenya (EWCA, 2017).

Livelihoods in the Bale Mountains are mixed consisting mainly of crop farming and animal rearing. While some areas are more 'livestock zones', maintaining largely semi-transhumant pastoral lifestyles, others are 'cultivation zones', which increasingly integrate livestock holdings into the expanding agricultural economy (Flintan et al., 2008). Important markers of household status include size of agricultural land and number of livestock owned (Amente, 2006; Tesfaye et al., 2011). For poorer households, forest-based resources such as fuel wood, honey, timber, and thatch, provides an important livelihood diversifying option (Tesfaye et al., 2011). The communities in the Bale Mountains are predominantly Muslim and from the Oromo ethnic group. It is largely a patriarchal society with clearly defined age and gender-based divisions of labor in livelihood activities (Amente, 2006).

Six CHAs operate in the Bale Mountains: Hanto, Abbasheba Demero, Besmena-Udubulu, Shedam Berbere, Gasera Wabe, and Adaba-Dodola (OFWE, N.D.). For this study we selected two CHAs operating under the same hunting concession holder that have implemented the original and new CBC model of the CHA program, respectively: Abasheba Demero and Besemena Udubulu. We then selected two highland and two lowland kebeles from each CHA. Highland kebeles are located at higher elevations, and primarily rely on sedentary agriculture where wheat and barley are the main crops grown. Lowland kebeles are located at lower elevations, and livelihoods are based on pastoralism mixed with some subsistence agriculture and wild coffee harvesting.

2.2 Data collection

2.2.1 Household survey sampling design

In each of the four kebeles, we sampled 50 households for a total of 200 survey responses. For the purpose of this research, we defined households as a unit whose members (who may or may not be related by blood) live, cook, and eat together and primarily depend on the household head to provide means for livelihoods. For a sampling frame, we used a list of total households which we obtained from the kebele administration office. We numbered the households on the lists and used a random number generator to select households for inclusion in the survey. We used local guides to locate the households. This method gave all households equal chances of being included in the survey. Since the majority of registered household heads in our study area are older males, we made intentional efforts to include the participation of women and younger men in our sample when appropriate. We thus surveyed any household member above the age of 18 and aimed to have 15% of our total sample to include women and younger males (18-35 years).

2.2.2 Data collection process

We conducted field trips to the study area in 2017 and 2018 which enabled us to meet with different stakeholders and community leaders, develop trust, build rapport, and collect qualitative data on the socio-demographic and bio-physical context and equity constructs. Data collection for this study occurred between December 2019 and January 2020 and involved: (1) an initial consultation period where we held informal discussions with community leaders; (2) translation of survey instrument, training of enumerators and pre-testing of survey; and (3) revising the surveys and conducting face-to-face household surveys.

The survey was translated and conducted in the local language Afaan Oromo. The translation of the survey was an iterative process involving a number of feedbacks and revisions to the original survey. To ensure relevance and accuracy, we used multiple skilled Afaan Oromo translators working on conservation who also had familiarity with terms and expressions specific to the study area as well as the conservation field. We hired six local enumerators who had training and experience in social science field research. One author on this study led a week-long training with the enumerators where they went through the research objectives and each survey question, making sure enumerators became sufficiently versed with the concepts and terms used in the questionnaire. The workshop also covered standard IRB guidelines, such as informed prior consent and confidentiality of personal identifiers, as well as appropriate ethical research norms in the study area.

We pre-tested the translated questionnaire on 15 randomly selected respondents in one of our four sample kebeles. Based on the comments and feedbacks from the pre-testing, we adjusted the language for a small subset of questions in the final survey to ensure clarity. In the survey process, enumerators used neutral probing techniques such as repeating the question or presenting

scripted definitions for selected concepts in questions when respondents requested clarification (Schober & Conard, 1997; West et al., 2018). Known as 'Conversational Interviewing', this involves incorporating flexible interviewing techniques with varying degrees of departure from standardization to provide clarity for concepts (Schober & Conard, 1997). To minimize possible interviewer bias, we ensured that enumerators did not have direct previous working exposure in the kebeles where they collected data from. Enumerators presented themselves as independent researchers collecting data for a study on community perceptions of the CHA program. The questionnaire took on average 90 minutes (Appendix I). One author from this study participated in data collection by monitoring the enumerators and was available to answer questions that arose in the field.

2.2.3 Survey instrument

The survey was informed by prior, in-depth qualitative research conducted in the area which was instrumental in eliciting locally relevant indicators of capital assets and social equity (Abebe et al., 2000). The survey only included close-ended questions (Appendix I). Each of the three dimensions of equity was measured using 5-scale Likert statements, where "1 = strongly disagree" and "5 = strongly agree" (Chyung et al., 2017). To measure distributive equity, we used eight Likert questions focused on the perceived gains and/or losses of benefits among different groups such as monetary incentives, community development projects, access rights to land and natural resource use, and compensation for restrictions or losses in access to resources. We measured procedural equity using 10 Likert questions focused on the kinds and levels of participation in management and monitoring of forest and wildlife resources, transparency of decision-making processes, presence of mechanisms for accountability, and conflict resolution in

the CHA programs. Finally, we measured recognition equity using five Likert questions focused on the values, rights, and identities of different groups in relation to resource use and access.

There are challenges with using standardized Likert-scale statements in data collection that can be more pronounced in non-Western cultural contexts (Browne-Nuñez & Jonker, 2008). Some of these limitations include multiple interpretations of concepts measured, central tendency bias where participants avoid extreme response categories, social desirability bias where respondents report what they perceive to be socially desirable answers versus giving honest responses, and interviewer bias where responses may be influenced by the appearance, behavior, and/or organization the interviewer is perceived to represent (Bertram, 2007; Browne-Nuñez & Jonker, 2008). There are a number of suggested approaches to overcome these limitations such as the use of multiple methods including participatory focus groups to develop culturally relevant indicators and intensive pre-testing (Browne- Nuñez & Jonker, 2008), both of which we used in this study to reduce potential bias. The Conversational Interviewing technique described above was also used to provide clarity of Likert scales while in the field in the form of neutral probing techniques and using scripted definitions of concepts that were pre-defined based on the inputs during the pre-testing (Schober & Conard, 1997).

We use the Sustainable Livelihoods Framework (SLF) (Carney, 2003; Chambers & Conway, 1992; DfID, 1999; Scoones, 1998) to examine how household and institutional characteristics affect perceptions of equity outcomes. The SLF posits that individuals and households have varying levels of access to capital and exposure to mediating institutions and policies which influences their livelihood choices and resulting outcomes (Carney, 2003; DfID, 1999; Mensah, 2011). The SLF defines capital assets as human, financial, physical, natural, and social capital (DfID, 1999). Different levels of access to these assets are likely to influence whether

a household or community participates in conservation programs (Jones et al., 2020) and the types of impacts a conservation program has on the household (Hayes & Murtinho, 2018). We measured human capital with questions related to gender, age, education, household size and composition, and length of residence in the kebele. To measure physical capital, we asked questions related to household material assets and house construction material. Financial capital was measured using questions on the amount of crops and livestock sold in local markets. We measured natural capital using questions on use and frequency of extraction of timber and non-timber products, size of personal land and future access to lands. We measured two forms of social capital. Bonding social capital was measured using five 5-scale Likert questions focused on communities' internal connections such as presence of active cooperation and functional support system in the community, presence of clear rules and sanction mechanisms, and fair access for decision-making rights within the community. To measure linking social capital, we used five 5-scale Likert questions focused on perceptions of relationships with external conservation organizations, including the presence and quality of communication, presence of active relationships with the conservation organizations in the form of addressing community concerns, giving technical and financial support, trainings, and capacity building or other opportunities.

A final set of seven independent variables was selected based on theory and exploratory analysis described in Section 3.1. These seven variables span the five capital asset categories. From human capital, we use gender and age, where gender is measured as a binary variable with "1" coded as women and "2" coded as men. We expected that women would score lower on their perceptions of equity. Age was measured as a continuous variable and we expected as age increases, perception of equity scores would increase. We measured physical capital with household roofing material measured as a binary variable and coded as "1" for lower quality

roofing and "2" coded for higher quality roofing. As a proxy for wealth, the expected relationship with social equity was that households with higher quality roofing would score higher on their perceptions of equity. For financial capital, we use sale of crops measured as a binary variable that was coded as "1" for low crop sales (less than half of their total crops) and "2" for high crop sales (more than half of their total crops). As a measure of wealth, we expected high crop sales to be positively correlated with perceived equity. For natural capital we use perception of future access to land, measured as a binary variable with "1" for negative perception on security in accessing land in the future and "2" for positive perception to have access rights to the land they currently use in the foreseeable future. As a gauge for tenure security, we expected that households that had positive perceptions on land access would score higher on their perceptions of equity. Additionally, to capture the different CBC models we created a binary variable where "1" was equal to the new CBC model and "2" was equal to the original CBC model. We expected the new CBC model to be correlated with higher perceptions of equity.

2.3.4 Data analysis

To analyze the survey data, we used Statistical Package for the Social Sciences (IBM SPSS statistics 26). We created composite scores for each social equity category using the individual 5-scale Likert scale questions. Since composite scores could not be computed for a given questionnaire when one of the composing items was a missing value using the listwise deletion, we used the delete items solution where we specified the number of questions a respondent must answer to be included in the summated index (Vaske, 2008). Individual responses to each equity dimension were graded and summed, resulting in an overall score for each respondent. The internal consistency of the items on the scales was measured by the reliability coefficient, Cronbach's alpha, which ranges from 0 to 1; the larger the value, the greater the reliability of the scale (Vaske,

2008). All of the equity items had a Chronbach's alpha coefficient >0.7, which was considered sufficient (Taber, 2018). We followed a similar process to create composite indices for the measures of bonding and linking social capital, with each social capital dimension having a Chronbach's alpha coefficient >0.75.

Following variable creation, we ran basic descriptive statistics on all independent and dependent variables for each kebele. Then we tested for univariate associations between each independent variable and the dependent variable using the following statistical tests: (1) independent samples t-test using the F test (Levene's) when independent and dependent variables were binary; (2) analysis of variance (ANOVA) using Tueky HSD for Post Hoc comparison tests for binary/categorical independent variables and continuous dependent variables; and (3) correlations measured using the Pearson Correlation (r) for continuous independent variables and continuous dependent variables (Garson, 2012; Vaske, 2008).

We used multiple ordinary-least squares linear regression analysis to develop descriptive models on the effects of capital assets on each of the three dimensions of social equity. In developing the regression models, we checked that the assumptions for linear regression had been met. We used multicollinearity diagnostics tests of Variance Inflation Factor (VIF) >4 and Tolerance < 0.2 as cut off points for deciding if there was too much intercorrelation between independent variables (Garson, 2012; Vaske, 2008). We used tests of homoscedasticity to ensure the relationship investigated is the same for the entire range of the dependent variable (Garson, 2012). We used scatter plots for the standardized predicted value against the standardized residual value to check that the variance of error terms was similar across the values of the independent variables (Garson, 2012; Osborne & Waters 2002). Additionally, we ensured there were no significant outliers using the Cook's Distance with a cutoff of 1 (Garson, 2012).

For the full regression model, we included all seven capital asset predictors that we expected would capture salient variables relevant to the study area as predictors of social equity (Table 2). We also present a parsimonious model, which was determined independently for each social equity construct by using backward stepwise regression, which is a stepwise regression approach that starts with the full model using all seven variables and gradually eliminates variables from the regression to find a reduced model that best explains the data (Oshima & Dell-Ross, 2016). To test the role of the CBC model on equity outcomes, we introduce the CBC dummy-coded variable in the full model and parsimonious model for each equity outcome. To help control for potential omitted variables at the kebele level, and provide additional confidence in our results, we ran all four models above with kebele dummies. Finally, to control for potential interviewer bias, we created dummy-coded variables using each enumerator and entered these variables in the full and parsimonious models.

3. Results

3.1. Household and institutional characteristics

Of the 200 households surveyed, 73% of respondents were male and 27% female, and the average age was 37 years with 56% of the sample less than the age of 36 years (Table 1). The average household size was seven persons and ranged between three and 22 family members. The average number of dependents (under 15 years of age) per household was four. About 65% of our sample respondents reported they could read and write. Of the total respondents, about 33% reported having some type of leadership role in the kebele. The majority of the respondents had lived in the area most of their lives and average length of residence was 33 years. Households were located on average 16 minutes walking distance from the kebele center and an hour from the CHA boundary.

In terms of livelihood activity, 97% of our sample population practiced traditional agriculture mixed with livestock keeping as their primary livelihood activity. Each household had an average of five cattle with a maximum of 21 cattle per household. In the highlands, the most commonly produced crops reported were wheat (74%), barley (52%) and beans (42%). Of the top produced crop (wheat), 55% of those surveyed in the highlands reported selling more than half of their harvest. In the lowlands, maize (87%), teff (68%) and coffee (49%) were the most common crops grown. Only 28% of the sample households in the lowlands reported selling more than half of their top produced crop (maize).

About 96% of the respondents reported extracting fuelwood from the forest, of which 66% reported extracting at least two times a week. Other forest uses included timber extraction (52%) and honey production (27%). Households on average owned between 1.6 hectares of land in the lowlands to 2.3 hectares of land in the highlands. About 78% of those surveyed consisted of households that had lower quality roofing construction material, which included thatch, wood or mud roofing, the majority of which are found in the lowlands. About 90% of households reported that they felt secure in their access to land in the foreseeable future and this was generally consistent across kebeles, except in one kebele where close to 20% reported they did not think they would have access to land in the near future. The average community decision-making index (bonding social capital) was generally high, at around 4 out of 5. External relations with conservation organizations (linking social capital) was evaluated lower across all kebeles, with a mean value around 3.

Table 1: Summary statistics of independent variables across the four kebeles in the study area. Binary variables are reported in percentages and continuous variables are presented as mean with standard deviation in italics.

Independent Variable	Description	New CBC		Original CBC		Full Sample
		Kebele 1- Highlands	Kebele 2 - Lowlands	Keble 3- Highlands	Kebele 4- Lowlands	
Gender	Women	38%	28%	22%	18%	26.6%
	Men	62%	72%	78%	82%	73.4%
Roof type	Lower quality	30%	8%	8%	44%	22.5%
	Higher quality	70%	92%	92%	56%	77.5%
Crops sold	Low sale	42%	60%	84%	48%	58.5%
	High sale	58%	40%	16%	52%	41.5%
Future land access	No	6%	4%	10%	18%	9.5%
	Yes	94%	96%	90%	52%	90.5%
Age	Number of years	37 *16.7*	40 *14.3*	35 *14.2*	36 *14.1*	37 *14.9*
Bonding social capital	1 through 5, where 1 is lowest and 5 highest	3.7 *0.76*	4.03 *0.91*	3.5 *0.9*	3.3 *0.96*	3.8 *0.8*
Linking social capital	1 through 5, where1 is lowest and 5 highest	2.5 *0.86*	3.63 *0.9*	2.32 *0.89*	2.65 *0.95*	2.8 *1.1*

3.2 Social equity perceptions

Households gave a lower average score for distributive equity than for procedural or recognition equity (Table 2). For distributive equity, the mean value was 1.9, with kebele 3 (original CBC) having the most negative perception of distributive equity. For procedural equity, the mean value was 3.4, with kebele 3 having the most negative perception of procedural equity. The mean value for recognition equity was 2.2, with kebele 3 again having the most negative perception of recognition equity.

Table 2: Summary statistics on equity dimensions across the four kebeles. Mean presented with standard deviation in italics.

Dependent Variable	New CBC		Original CBC		Full Sample
	Kebele 1- Highlands	Kebele 2 - Lowlands	Keble 3- Highlands	Kebele 4- Lowlands	
Distributive equity	2.0 *0.7*	2.2 *0.66*	1.46 *0.55*	2.01 *0.66*	1.95 *0.7*
N					1.85
Procedural equity	3.4 *0.77*	4.1 *0.8*	2.7 *0.95*	3.4 *0.8*	3.4 *0.96*
N					1.84
Recognition equity Count	2.9 *0.96*	3.7 *0.98*	2.2 *0.97*	2.8 *1.06*	2.9 *1.1*
N					181

3.4. Regression models

3.4.1 Full model with household and institutional predictors of social equity

For distributive equity, the results from the full model containing the seven predictors indicated that the model explained 29.5% of the variance and was a significant predictor of distributive equity, $F(7, 173) = 10.27$, $p < 0.01$. Out of the seven predictors entered in this model (Table 3), gender, roof type, crops sold, perception of future land access and linking social capital were statistically significant predictors. Specifically, the model shows that, on average women reported 0.2 points lower in perceived distributive equity than men. For physical capital, on average households with higher quality roofing had 0.14 points higher perception of distributive equity than households with lower quality roofing. For financial capital, on average households with higher crop sales scored 1.27 points higher on perceptions of distributive equity than households with lower crop sales. For natural capital, on average, households that had negative

perceptions on future land access scored 0.1 points less on their perception of distributive equity than households with more positive perception on land accessibility. For linking social capital, as perception of relationships with other organizations increased by one standard deviation, perception of distributive equity increased by 0.42 standard deviation.

For procedural equity, the results from the full model indicated that the model explained 38.7% of the variance and was a significant predictor of procedural equity, $F(7, 173) = 15.18$, $p < 0.01$. Out of the seven variables entered in this model, perceptions of land access, bonding social capital, and linking social capital were statistically significant predictors. Specifically, the model predicts that on average households that had negative perceptions of future land access scored 0.14 points less in procedural equity than households with more positive perception of land access. For bonding social capital, a one standard deviation increase in community decision-making led to a 0.24 standard deviation increase in perception of procedural equity. For linking social capital, a one standard deviation increase in perception of relationships with other organizations led to a 0.44 standard deviation increase in procedural equity.

For recognition equity, the results indicated that the model explained 29.9% of the variance and was a significant predictor of recognition equity, $F(7, 170) = 10.25$, $p < 0.01$. Out of the seven variables entered in this model, bonding and linking social capital were statistically significant predictors of recognition equity. More specifically, for a one standard deviation increase in bonding social capital, recognition equity increased by 0.16 standard deviation. For every one standard deviation increase in linking social capital, recognition equity increased by 0.41 standard deviation.

When kebele dummy variables were added to the full model, there were some minor changes in which independent variables were statistically significant (Table 3). For distribution

equity, gender, roof type and linking social capital remained statistically significant while crops sold and perception of land access were no longer statistically significant predictors of distributive equity. For procedural equity, the same three predictors remained statistically significant. For recognition equity, both bonding and linking social capital remained statistically significant predictors when the kebele dummy variables were added. Adding enumerator dummy variables to account for interviewer bias did not change the results of any of the three models (Appendix II).

Table 3: Full regression model with all seven independent variables for the three equity dimensions. *p<0.1: **p<0.05: ***p<0.01

Variables	Distributive equity	Procedural equity	Recognition equity	Distributive equity	Procedural equity	Recognition equity
	Coefficient *Std Error*	Coefficient *Std Error*	Coefficient *Std Error*	Coefficient *Std Error*	Coefficient *Std Error*	Coefficient *Std Error*
Gender	-0.205** *0.109*	-0.095 *0.136*	-0.100 *0.175*	-0.187** *0.108*	-0.075 *0.132*	-0.084 *0.172*
Age	0.006 *0.003*	0.015 *0.004*	0.051 *0.005*	-0.010 *0.003*	-0.005 *0.004*	0.037 *0.005*
Roof type	-0.145** *0.110*	-0.037 *0.141*	0.002 *0.176*	-0.127* *0.116*	-0.017 *0.145*	-0.009 *0.185*
Crops sold	1.27* 0.094	0.039 0.119	0.102 0.149	0.074 0.097	-0.024 0.120	0.064 0.153
Future land access	0.107* *0.277*	0.142** *0.354*	0.066 *0.438*	0.107* *0.277*	0.121** *0.340*	0.051 *0.429*
Bonding social capital	-0.001 *0.064*	0.246*** *0.080*	0.168** *0.102*	0.001 *0.065*	0.256*** *0.079*	0.165** *0.102*
Linking social capital	0.421*** *0.048*	0.447*** *0.061*	0.415*** *0.077*	0.338*** *0.053*	0.335*** *0.066*	0.303*** *0.085*
Kebele dummy variables included (Y/N)	N	N	N	Y	Y	Y
R^2	29.5%	38.7%	29.9%	33.4%	45.1%	34.4%
N	*185*	*184*	*181*	*185*	*184*	*181*

3.4.2 Parsimonious model with household and institutional predictors of social equity

For distributive equity, the parsimonious model predicted 29.5% of the variation in the outcome variable and was statistically significant with $F(5,175) = 14.6$ $p<0.01$ (Table 4). The same five variables as in the full model—gender, roof type, crops sold, future land access and linking social capital—remained statistically significant predictors in the parsimonious model. For procedural equity, the parsimonious model predicted 36.4% of the variation in the outcome variable and was statistically significant at $F(3,177) = 35.3$, $p<0.01$. This model found perception of future land access, bonding and linking social capital were statistically significant predictors of procedural equity. Similarly, for recognition equity, bonding and linking social capital were statistically significant predictors in the parsimonious model. This model predicted 26.5% of the variation in the outcome variable and was statistically significant with $F(2, 175) = 32.9$, $p<0.01$.

Similar to the addition of kebele dummy variables in the full model, including kebele dummy variables only changed the independent variables in the model for distributive equity in the parsimonious model. Specifically, crops sold and land access were no longer statistically significant with the kebele dummy variables included (Table 4). Adding enumerator dummy variables to account for interviewer bias did not change the results of any of the three models (Appendix II).

Table 4: Parsimonious regression model with least explanatory predictors of equity dimensions sequentially removed from the equation. *p<0.1: **p<0.05: ***p<0.01

Variables	Distributive equity	Procedural equity	Recognition equity	Distributive equity	Procedural equity	Recognition equity
	Coefficient *Std Error*	Coefficient *Std Error*	Coefficient *Std Error*	Coefficient *Std Error*	Coefficient *Std Error*	Coefficient *Std Error*
Gender	-0.204** *0.108*			-0.172* *0.105*		
Roof type	-0.145** *0.108*			-0.133* *0.116*		
Crops sold	0.126* *0.092*					

Future land access	0.107* *0.275*	0.149** *0.351*			0.127** *0.335*	
Bonding social capital		0.248*** *0.079*	0.189* *0.101*		0.254*** *0.078*	0.165** *0.102*
Linking social capital	0.421*** *0.048*	0.458*** *0.061*	0.423*** *0.076*	0.382* *0.051*	0.340*** *0.065*	0.303*** *0.085*
Kebele dummy variables included (Y/N)	N	N	N	Y	Y	Y
R^2	29.5%	36.4%	26.5%	28.7%	42%	31.1%
N	*185*	*184*	*181*	*185*	*184*	*181*

3.4.3 Regression models testing impact of CBC program models

The CBC model type had a statistically significant influence on each dimension of social equity (Table 5). For distributive equity, CBC model types were significantly different from each other with the original CBC scoring on average 0.14 less in perception of distributive equity than the new CBC model. Gender, roof type, and linking social capital remained significant predictors in the model. For procedural equity, the original CBC model scored on average 0.2 points less than the new CBC in perception of procedural equity. When the CBC dummy variable was included, gender also became a statistically significant predictor in this regression model. For recognition equity, the CBC models were again significantly different from each other where the original CBC scored on average 0.15 points less than the new CBC in perception of recognition equity. There was no change in other independent predictors.

In the parsimonious model for distributive equity, the CBC dummy variable remained statistically significant (Table 5). On average, the original CBC model scored 0.14 less in perception of distributive equity than the new CBC model. For procedural equity, original CBC scored 0.2 less in perception of procedural equity than the new CBC model in the parsimonious

model. In this model, gender was no longer a significant predictor. For recognition equity, on average, the original CBC scored 0.16 less in perception of recognition equity than the new CBC model. Because we only have four kebeles and two kebeles are in each CBC model, it was not possible to implement a regression model with both kebele dummy variables and the CBC dummy variable due to collinearity. Adding enumerator dummy variables to account for interviewer bias did not change the results of any of the three models (Appendix III).

Table 5: Full and parsimonious regression models with the CBC dummy coded variable. *p<0.1: **p<0.05: ***p<0.01

Variables	Full Model			Parsimonious Model		
Variables	Distributive equity	Procedural equity	Recognition equity	Distributive equity	Procedural equity	Recognition equity
	Coefficient *Std Error*	Coefficient *Std Error*	Coefficient *Std Error*	Coefficient *Std Error*	Coefficient *Std Error*	Coefficient *Std Error*
Gender	-0.208** *0.108*	-0.102* *0.133*	-0.104 *0.173*	-0.190* *0.105*		
Age	0.002 *0.003*	0.006 *0.004*	0.046 *0.005*			
Roof type	-0.141** *0.109*	-0.027 *0.137*	0.010 *0.174*	-0.147* *0.108*		
Crops sold	0.116* *0.093*	0.026 *0.116*	0.091 *0.147*			
Future land access	0.099 *0.275*	0.130** *0.346*	0.056 *0.433*		0.139** *0.342*	
Bonding social capital	0.009 *0.064*	.267*** *0.078*	0.189** *0.101*		0.269*** *0.078*	0.211** *0.100*
Linking social capital	0.366*** *0.051*	0.372*** *0.064*	0.356*** *0.081*	0.364*** *0.047*	0.382*** *0.063*	0.359*** *0.080*
CBC dummy variable	-0.141** *0.097*	-0.203** *0.121*	-0.154** *0.153*	-0.146** *0.096*	-0.23*** *0.120*	-0.163* *0.153*
R^2	29.5%	38.7%	29.9%	26.87%	39.7%	28.5%
N	*185*	*184*	*181*	*185*	*184*	*181*

4. Discussion

The CHA program in the Bale Mountains seeks to offer an alternative governance approach from top-down strategies by devolving decision-making rights (in new CBC model) and benefit opportunities (in both new and original CBC model) to the local communities. While the program is making commendable strides as an inclusive and bottom-up approach to conservation in the area, there remain equity concerns about the benefit sharing, decision-making processes and recognition of different identities and priorities (Abebe et al., 2020). In this study, we quantitatively assess the effects of household and institutional characteristics on perceptions of equity and consider how two different models of the CHA program influence social equity outcomes. While we found that equity perceptions for all kebeles were relatively low, our results point to the important role that bonding and linking social capital can play in improving perceptions of equity and suggest that marginalized populations continue to be left out of CBC benefits (distributive equity) and decision-making processes (procedural equity). We discuss these results in more detail below.

4.1 Effects of household characteristics on perceptions of equity

In our analysis of household capital assets, we found that gender was an important characteristic in explaining perceptions of distributive equity. This supports qualitative findings in the region (Abebe et al., 2020) that women are less likely to receive benefits or deem these benefits as sufficient compensations to losses incurred. In the CHAs, while restrictions on access to forest products such as fuelwood strongly affect women's daily livelihood activities, the benefits from the CHA in terms of annual cash incentives are made to the household heads which are mostly men. This likely explains the more negative perception of distribution equity by women. This finding corroborates the literature on gender equity in developing countries in Africa, Asia, and

Latin America where women usually represent a marginalized and disadvantaged group, gaining a meagre benefit from conservation efforts while bearing disproportional costs from restrictions or loss of access to resources (Mwangi et al., 2011). For most women from poor households in sub-Saharan Africa, various forest products such as fuel wood, medicinal plants, and animal fodder serve as major sources of subsistence income (Brown, 2011; Timko et al., 2010). Thus, measures that restrict or prevent access to these products will disproportionately affect women. For example, a study of the Communal Areas Management Programme for Indigenous Resources (CAMPFIRE) in Zimbabwe showed how women were disproportionately disadvantaged by restrictions on access to forest resources such as rope and thatch as a result of the conservation program (Nabane & Matzke,1997). Other studies similarly assert that gender is one of the most important dimensions that defines and mediates access to and benefits from decisions related to natural resources in most developing countries (Leisher et al., 2015; Mwangi et al., 2011). The equitability of conservation programs for women is marred by complex socio-cultural, economic, and institutional structural barriers such as resource access and control rights, discrimination, and male bias in the provision of services including credits, lack of networks and exclusion of women from the decision-making space at household, community, and national levels (Mwangi et al., 2011; Torri, 2010). While we expected age to be an important human capital factor in predicting equity outcomes based on previous work (Abebe et al. 2020), the results from this study did not find a statistically significant effect of age in explaining equity outcomes.

Our results also show that roofing material, as an indicator of wealth, was statistically related to distributive equity perceptions. We also found that perceptions of land access, another proxy for status and vulnerability, was also statistically related to distributive equity. Land is a critical resource in rural communities, especially those with increasingly high population density

and land shortages (Calfucura, 2018). Land poor households without access to land or having small plots of land depend heavily on natural resources for sustenance, and thus find it more taxing to restrict land use practices as a result of conservation programs. Hence, these two variables capture the perceptions of distributive equity by poorer households in our sample, and their more negative perceptions are likely related to greater costs/losses from restrictions on resource use from the CHA land, such as the ability to access grazing pasture, agricultural land, or forest products. This supports the assertion in the literature that poorer households are more reliant on 'open access' natural resources on average (Cavendish, 2000; Thondhlana et al., 2012). This finding reaffirms previous studies where wealthier households tend to benefit more from CBC programs given their secure land tenure and capacity to sustain and support their lives employing an array of natural resources which poorer households do not have the access to (Larson & Ribot, 2007; Shrestha & Alavalapati, 2006).

Lastly, we found perceptions of land access is statistically related to procedural equity. The link between negative perceptions of land access and procedural equity could be tied to power and decision-making rights around natural resources. Households that had negative perceptions on their land access were likely to report that the decision-making processes of the CHA program are not inclusive and considerate of the needs of the most vulnerable in the community. This ties to discussions on procedural justice that questions whose voices are represented when decisions are made on natural resources and how reflective those decisions are of the needs of marginalized groups. Our results corroborate findings in Gustavsson et al. (2014) where a marine protected area program that failed to consider inequalities between villages (e.g., varying resource use access rights) and incorporate meaningful participation of all actors affected failed to attain both procedural and distributive justice. Similarly, CBNRM programs in Andhra Pradesh in India

showed how preexisting inequitable social structures (e.g., land access relations based on caste) combined with the lack of safeguards by the program to ensure adequate representation of the marginalized groups resulted in decision making that favored the elite group (Saito-Jensen et al., 2010). We did not find any household characteristics related to human, financial, physical, or natural capital to be correlated with perceptions of recognition equity.

4.2 Effects of institutional characteristics on perceptions of equity

Our analysis illuminated the role of social capital in shaping perceptions of equity outcomes. We found that bonding social capital had a strong positive effect on procedural equity. We found that the presence of strong ties, trust, and networks among households within each kebele serves as a catalyst in shaping positive perceptions towards transparency in decision making, access to information, and accountability in the CHA program. This corroborates the social capital literature on how strong relationships across members within a given environmental collaborative facilitates trust, cooperation, and collective action (Chowdhury et al., 2013). For example, Dahal et al. (2008) show that the presence of high levels of cohesion and traditional norms among the local people within a CBC program in the Philippines resulted in a forest management planning and implementation process being perceived as fair and legitimate among the participants. Similarly, a study of communal governance systems in a payment for ecosystem services program in Ecuador finds that households in more organized communities were more likely to engage in inclusive and transparent decision-making processes that would lead to more acceptable outcomes in distribution of benefits (Hayes & Murtinho, 2018). In another study, Diedrich et al. (2017) show how social capital in the form of trust for leaders in a marine protected area program in Siquijor, Philippines had a positive impact on perceptions of equity.

We also find that presence of bonding social capital positively affects perceptions of recognition equity. In the context of the study area this most likely has to do with how the priorities, needs and beliefs of different groups such as women, youth and poorer households are addressed in the CHA program. Recognition equity has an inter-subjective aspect in that freedom is achieved through the perception of meaning acquired in a relational context (Martin et al., 2016). Our results support this assertion where presence of internal cohesion within a community, such as active support groups and networks, led to positive perceptions on the recognition of these groups' priorities in the CHA program. For example, qualitative data from a study of equity in the region (Abebe et al., 2020) shows that in the kebeles with strong bonding capital, women reported relying on "*Afosha*", a rotating saving and credit association that also serves as means to support each other in times of need. Such networks, particularly among marginalized groups, serves as an informal source of information and a means of empowerment and assertion of their particular needs and priorities. Similarly, the presence of "*Gote*" (a nucleus of smaller community units) were reported as vital in creating cohesion among community members and leaders. In qualitative findings, households with stronger sense of belongingness to their respective *Gotes*, where they received information about the programs and had a close relationship with the kebele leaders, were more likely to have positive perceptions of procedural equity. Communities with less active *Gotes* and poor relations with their kebele leaders were more likely to have negative perceptions towards the CHA program leaders and CHA program. Thus, bonding social capital across units such as *Gote*s, kebele administration and the community members, and self-support groups appears key in facilitating or hindering perceptions of inclusion and acknowledgement in the CHA program. Our results did not show bonding social capital to have a statistically significant effect on perceptions of distributive equity.

Our results showed that linking social capital positively shaped perceptions of all three forms of equity. There are different organizations involved with the communities in various conservation and livelihood programs in the area. The private hunting concessionaire that leases land from the government has been working with different communities in providing community services such as roads, water wells and employment opportunities. OFWE is the key government organization that has been mobilizing communities in the creation of the CBOs. Farm Africa, primarily active in the lowlands, has been providing training and material support related to forest conservation efforts. Across all households in the four kebeles, the private hunting concessionaire was rated as the top organization that has the most presence and active relationship with the communities. Households that reported that their communities had an active and positive relationship with the private concessionaire reported positive perceptions of all three dimensions of equity. This is in line with qualitative findings that found that perceptions of previous or current relationships with the private hunting concessionaire shaped the extent to which people perceived the benefits of the program as equitable or felt like the program recognized their rights and priorities (Abebe et al., 2020).

This finding is particularly important considering that in principle, the CHA program is distinct from the private hunting concessionaire in terms of the expected responsibilities towards the community. The OFWE oversees the CHA program, and CBOs and kebeles administer their respective communities in the sharing of benefits and monitoring. While the private hunting concessionaire brings in hunting revenues and pays concession fees, it is not directly involved with or responsible for the distribution of these benefits to the local community. The official responsibility of distributing benefits from trophy hunting fees to the respective CHAs is entrusted to EWCA and OFWE. Some community infrastructure, such as roads and schools, that the

concessionaire has provided in kebeles most adjacent to hunting campgrounds are not part of the CHA program, but the concessionaire's own initiatives of establishing good rapport with the neighboring community. However, the local community does not have a clear understanding of the separate mandates of these external organizations. Underpinning their perceptions of equity of the CHA program are their past and present relationship, support, and direct benefits received from the hunting concessionaire, who they identify as a key stakeholder when they discuss the CHA program. However, the hunting concessionaire does not have the capacity or mandate to extend its support or maintain active relationships with all adjoining kebeles in the CHA program, fueling resentments and suspicion of favoritism for certain kebeles.

4.3 Effects of CBC models on perceptions of equity

We found that the CBC models were a significant determinant of each of the three equity dimensions. A household was found more likely to report having received benefits from the CHA program and to rate these as fair if they lived in kebeles found in the new CBC program. Furthermore, households that lived in the new CBC kebeles were more likely to positively report on the decision-making processes and the recognition of their needs and priorities in the new CBC than households involved in the original CBC program. This result is aligned with some of the ways in which the new CBC program is attempting to facilitate an organized mechanism for distributing benefits across kebeles, putting in place designated CBOs, which include management and monitoring committees and an accountability framework where CBOs report to OFWE, the overseeing external organization.

Contrasting the two models, the new CBC program involves an explicit framework to devolve resource monitoring, management of incentives and decision-making rights to designated CBOs in each community, whereas in the original CBC where kebele leaders are the *de facto*

administrators of the financial benefits from the CBC program. Since kebele officials are political appointees, perceptions toward them are clouded with bureaucratic bottle necks, administrative failures, and misallocation of resources. The perceptions of equity are invariably associated with these negative connotations. The finding of more positive perceptions for distributive equity in the new CBC can thus be linked with the presence of an accountability mechanism that increases trust and transparency for households in this arrangement. Furthermore, the presence of joint CBO committees (the community management units adjoining multiple kebeles with a performance-based benefit sharing mechanism) appears to facilitate an understanding that the share of benefits is reasonably administered among kebeles. While this approach is imperfect in that not all community members in the new CBC program kebeles were aware of the distributive processes, there was a common understanding in these kebeles that the benefits from hunting were not arbitrarily disbursed across kebeles. This can be attributed to the presence of better procedural trust in these communities as a result of the establishment of the CBOs. The contrary was true in the original CBC kebeles where despite the presence of the incentive mechanisms (each kebele received revenues solely based on its respective size), there was no framework that serves to connect the community with OFWE or a committee specifically designated for managing finances. As a result, there was a pervasive distrust on the allocation of funds among these communities. The lack of procedural trust is tied to unfounded rumors that the CHA land has been sold off and the incentive is the government's way of silencing unrest from the community. Thus, the presence of procedural and distributive inequity is tied to recognition equity in which the incentive-based arrangement alone, in the absence of trust and accountability ensuring mechanisms, was seen by the community as depriving them of their land rights.

4.4 Policy implications

Addressing equity concerns in conservation is an increasingly sought-after goal both as an ethical obligation towards people affected by conservation programs and for practical reasons of enhancing effective biodiversity conservation. In CBC programs, despite the quest to attain positive social outcomes, intra-communal differences in access to resources and decision-making power shape who benefits from such conservation efforts. Furthermore, the internal institutional arrangements of each community, the presence and strength of relations with external organizations, and the fit between design of conservation programs and the complex implementation context all have bearing on shaping equity outcomes.

We find that addressing heterogeneity among community groups affected by the conservation program is critical for achieving equity outcomes and should be considered in future equity assessments. In particular, the often-simplified notion of community needs to be disaggregated, in order to acknowledge the interplay of individual attributes, namely gender and wealth, as important factors in determining distributive equity outcomes. Second, our results show that bonding and linking social capital are key in shaping procedural and recognition dimensions of equity. Existing community networks and norms provide foundations of trust that can be harnessed to develop equitable conservation programs. There is a clear need to build the internal capacity of communities involved in conservation, which will in turn facilitate trust in the decision-making processes in conservation interventions such as CBC programs.

Beyond providing conservation incentives, our findings also stress the need to strengthen meaningful external linkages between communities and conservation organizations in order to achieve more positive equity perceptions. Linking social capital had a strong influence on the three different dimensions of equity. This underscores the need for conservation organizations to give

due emphasis on building trust, conferring respect and recognition to different actors, as well as disbursing incentives, when striving for more equitable conservation outcomes.

Finally, our results show that power sharing mechanisms within CBC programs can facilitate more positive equity perceptions. Thus, we suggest the CBC program in our study area continue to build on organizational arrangements in the new CBC model that strengthens a community's capacity to promote equitable distribution of benefits and costs, decision-making process, and recognition of rights, while recognizing the need to address vulnerable groups and their disproportional reliance on natural resources.

5. Conclusion

Despite the growing interest in social equity outcomes in conservation, there remains a paucity of rigorous studies quantitatively measuring equity and examining the factors that explain social equity outcomes in conservation. Our study provides important understanding on the household and institutional characteristics that are correlated with equity outcomes in a CBC program in Ethiopia. We found relatively low perceptions of all three dimensions of equity across the four kebeles. Gender, wealth, and access to land were important household determinants of distributive equity, with women and poorer households having more negative perceptions. Access to land was also associated with negative perceptions of procedural equity. Social capital, both internal community cohesion and strong relationships with external organizations, positively affected all three dimensions of equity but had the largest impact on procedural and recognition equity. Finally, we found that communities involved in a CBC model that emphasized joint management, monitoring, and transparency had higher perceived equity than communities involved in a model without these features. Overall, our results provide important advances in best practices for quantitatively measuring equity dimensions and understanding how household and

744 institutional factors influence perceived equity. Empirical evidence on factors explaining equity
745 outcomes can help to develop more just conservation programs that address intra-community
746 differences.

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APPENDIX

Appendix 1: Household Survey

An Evaluation of Perceptions of Social Equity and Conservation Attitudes in Controlled Hunting Areas of the Bale Mountains, Ethiopia

Instructions for Surveyors

1. *Read the all the text referring to each question when conducting the survey. The text is formatted with normal and italic letters. The surveyor should read everything in the question to those that are being surveyed, <u>except</u> for text that is in italics.*
2. *Every surveyed person has a unique identification number. The number is in the section "ID for data".*
3. *Make sure to complete all the questions that apply. DO NOT LEAVE QUESTIONS UNANSWERED.*
4. *At the end of the survey, make sure to collect all the material used in the survey.*
5. *Note the starting and finishing time for the survey.*

****

Good morning/day/evening,

We are conducting a study from Colorado State University in the United States. The purpose of this study is to better understand the perceptions of local community related to the equity of the benefits from controlled hunting areas program in the Bale Mountains. We are interested in understanding the how socio-demographic, biophysical and institutional factors shape people's perceptions of equity and conservation attitudes and behavior. To complete this evaluation, we have randomly selected households from six communities in the Abansheba Demero and Besmena Udubulu Controlled Hunting Areas for household surveys. We will be speaking with households that live in communities that have joint CBOS, those that only have PFMs and those that do not have either program. Your participation in this survey is completely voluntary, however, we would be much appreciative if you could answer these questions. There are no risks or direct benefits to you, but this study will give inputs for the controlled hunting conservation program to improve its benefits you. The information from the survey will only be used for research purposes; the university researchers will not use your name and will be sure to submit information to the university with all personal details omitted. The survey will take approximately 60 minutes.

If you have any questions about this project at any time, you can contact the Co-Principal Investigator at: <bethya@colostate.edu; 251-912-00-55-24> or PI at: kelly.jones@colostate.edu; 001-970-491-4175. If you have any questions about your rights as a volunteer in this research, contact <the CSU IRB at: RICRO_IRB@mail.colostate.edu; 001-970-491-1553.

General Information (Complete before beginning the interview)

ID for Data: _____(to be entered after data collection)
Name of interviewer: _____
Name of the Kebele: _____
Date (month/day): _____/_____/2019/2020
Start time: _____
Finish time: _____

QUESTIONS FOR THE SELECTION OF THE PERSON TO BE INTERVIEWED

A. Are you a member of this household over the age of 18? 1.Yes ( ) 2. No ( )
(Surveyor: If the person is not a member of the household, DO NOT continue with the survey)
B. Are you willing to take the survey? 1. Yes ( ) 2. No ( )
(Surveyor: If the person is not willing to go ahead, DO NOT continue with the survey)
C. What is your relationship with the household head? *(It is perfectly okay to sample someone other than the household head but please record their relationship; the respondent does not become the household head automatically*.)
Mark only one:

Household Head		1
Spouse of household head		2
Child of household head		3
Sibling of household head		4
Parent of household head		5
Other (list):		6

A. HOUSEHOLD CHARACTERISTICS

1. I will begin by asking question about members of the family and characteristics of the household.
Enumerator, read this definition to respondent*: "A household is a group of persons who normally cook, eat and live together. These people may or may not be related by blood but make common provision for food or other essentials for living and they have only one person whom they all regard as the head of household. Such people are called members of the household. There can also be one-member households where a person makes provisions for his/her own food or other essentials for living."*

Please provide information about Members of this Household that live in this location (for at least 6 months/year):

1.1 How many men (older than 15 years of age): ----------_____

1.2 How many women (older than 15 years of age): _____

1.3 How many children (less than 15 years): _____

For all men and women older than 15 years (up to 6):

	1.4. 0. Person Member of household and relationship	1.4 Age of person *(Years)*	1.5 Sex 1. Female 2. Male	1.6 Can they read and/or write 1. Yes 2. No
1	Interviewee			
2	Significant Other			
3				
4				
5				
6				

2. Do you have any household members that live in a different location for at least 6 months/year:

		1.Yes 2. No	2.1 If yes, what is the Number of people	2.2 How many of these are dependent members of the household?	2.3 Reason for migration 1. Education 2. Job Seeking 3. Other
1	A rural location outside this community				
2	An urban location outside this community				
3	Another country				

3. How long have you lived in this community? (number of years): ----------_____

4. What is the distance from your house to the nearest …? (in *minutes* walking*)*

		Distance (minutes walking)
1	*Kebele* administrative center	
2	Protected CHA boundary	
3	Nearest paved road	
4	Market where you could buy or sell goods	
5	Nearest major town	

5. For your primary house, what is the main material of construction?

		1.Concrete 2. Thatch 3. Corrugated Iron 4. Dirt/Mud 5. Wood 6. Plastic 7. Other (list)
1	Floor	
2	Walls	
3	Roof	

6. Of the following list of services and goods, which of the following does your household currently have that are in good working order?

		1. Yes 2. No 999. Don't know
1	Cell phone	
2	Television	
3	Electricity	
4	Gas Stove	
5	Improved cooking stove (magedo kotabi midiga)	
6	Open wooden stove Sostu gulucha (ye enchet midiga)	
7	Sofa	
8	Bed	

9	Wooden Chair (tesso muka)	
10	Buffee	

B. LAND

The following questions will be about your land.

1. What area of land does your household have access to (either own, rent, communal lands, public lands, etc.) both in the *kebele* or outside the *kebele* for crops, livestock, forests, houses, or other?

		1.1 Quantity/Number of Different Areas	1.2 Amount/ Unit in hectares (if use different unit, list it) 999. Don't know
1	Inside the *kebele*		
2	Outside the *kebele*		
3	TOTAL		

2. Of the total land you have access to, how much land do you…:

		2.1Unit in hectares (if use different unit, list it) 999. Don't know
1	Own?	
2	Rent from others?	
3	Lease to others?	
4	Is in communal use?	
5	Is in park/govt lands (CHA, OFWE/ forest land)?	
6	Other?	
7	TOTAL	

3. For each of the land use types below that you "own", do you have (Mark only one):

	Land Types	1. Land certificate or title from the government 2. No land certificate, but customary right to use the land from the community 3. Other (documentation)
3.1	Agricultural land	
3.2	Grazing Land	
3.3	Planation Forest (coffee,chat,banna)	
3.4	Other (list):	

4. Would you say you are confident that members of this household will be able to use/have access to these same lands in the next 20 years?

	1.Yes
	2. No

5. Do you think the land you own now will be sufficient to support your livelihood in the next 20 years?

	1.Yes
	2. No

C. LIVELIHOODS/WORK

The following questions will be about your livelihood activities.

1. What are the major livelihood activities for the household? (Mark all)

	Livelihood activity	1.Yes 2. No 999. Don't know	1.1 For the livelihood strategies marked as Yes, rank the top 3 in order of importance (1=most important, etc.)
1	Personal farming/agriculture		
2	Personal livestock raising		
3	Day laborer (on other's farm or livestock)		
4	Forestry activities (e.g bee keeping, fuelwood collection, non-timber products)		
5	Office work (school, government, etc.)		
6	Other (list):		

2. How many people over the age of 15 in your household work in the activities listed above? _____

3. In the previous year, did your household grow/farm any of the following crops for consumption or to sell in the market?

		1. Yes 2. No 999. Don't know
1	Maize	
2	Barley	
3	Wheat	
4	Coffee	
5	Sorghum	
6	Teff	
7	Bean, and pea/ bakle ena ater/	
8	Other (list):	

4. What part of this cultivation was for selling for other people or to the market?

	Top 3 Major Crops produced Last Year	4.1Amount produced in quintals	4.2 Amount sold for market/ other people
			1. None 2. Less than Half 3. Half

			4. More than half 5. All
1			
2			
3			

5. How many adult livestock did your household have in the past year?

		Number 999. Don't know
1	Cattel (>1 year)	
2	Goats (>6 month)	
3	Sheep (>6month)	
4	Equines	
5	Chickens &other fowl (>3 months)	
6	Other (list):	

6. What part of this livestock did you sell for other people last year?

	Top 3 Livestock type Sold Last Year	6.1 Number sold
1		
2		
3		

7. In the previous year, did your household collect/extract any of the following items from forests (native or plantation) for household use or to sell in the market?

	List of forest uses	1. Yes 2. No 999. Don't know	7.1 For any marked Yes, how often do you extract these products from the forest? 1. Daily 2.Weekly 3. Monthly 4. Yearly 5.Occassionally	7.2 For any marked Yes, what is the average distance walking in minutes from your house to where you obtain these products?
1	Fuelwood			
2	Medicinal plants			
3	Honey (from bee keeping)			
4	Wood/timber for construction			
5	Other (list):			

8. How much of the collection was for selling to other people/market in the last year?

8.1 Fuel Wood (donkey/horse load)	8.2. Construction wood or timber (donkey/horse load)	8.3 Honey (kilogram)

D. SOCIAL CAPITAL

I will now ask questions about general rules and management in your community and your participation in these.

1. Do you or someone in the household have a leadership role in *Kebele*?

	1.Yes
	2. No

2.How often do you or a member of your household attend *Kebele* meetings when they are held? We attend…

1	All	
2	More than half	
3	Half	
4	Less than half	
5	None	

3.Do people in your community self-organize to work together on community projects such as communal road construction, digging water holes, building community centers, cleaning up areas, etc.?

	1.Yes
	2. No

3.1. If yes, how often do you or a member of your household participate in these community services when they were held? We participate in…

1	All	
2	More than half	
3	Half	
4	Less than half	
5	None	

4. Does your community have (informal) rules that they have developed on how people can use and manage natural resources (e.g., forest, wildlife, water) in your community?

	1.Yes
	2. No

4.1. If yes, do the majority of people in your community follow these rules?

	1.Yes
	2. No

5. We want to understand your views on your community/*kebele* and how they make decisions, please answer the following statements based on whether you **agree** or **disagree**:

		Totally Disagree	Disagree	Neutral	Agree	Totally Agree		No answer or does

								not know
1	People cooperate in this community	1	2	3	4	5		999
2	It is clear how rules and sanctions are set in this community	1	2	3	4	5		999
3	People help me if I need help in this community	1	2	3	4	5		999
4	All contribute equally to solve problems encountered in this community	1	2	3	4	5		999
5	Everyone has a chance to participate equally in this community	1	2	3	4	5		999

E. CONTROLLED HUNTING AREA PROGRAM (NRM : Abasheba Demro) Besemena Udubulu (PFM-copperatioves)

I am now going to ask you questions about your awareness about the Controlled Hunting Area (CHA) program. CHA refers to the program implemented by Oromia Forest and Wildlife Enterprise and the community that provides monetary and community development benefit opportunities from hunting to the local community found in the controlled hunting area *kebeles*.

1. Have you heard about the CHA **if no Skip to F** .

	1.Yes
	2. No

2. Is your *Kebele* a part of the CHA program?

	1.Yes
	2. No
	999. Don't know

Procedural Equity

I will now ask questions about your participation in the CHA program.

1. Are you (or another member of your household) a CBO member? (that is, do you pay a fee to be a member in the CHA program in your *Kebele*?)

	1.Yes
	2. No
	999. Don't know

2. Do you know the people in your community that make decisions about the CHA program (e.g., CBO Committee, *Kebele* leaders, or others)?

	1. Yes

	2. No

3. Have you ever attended a meeting in your community regarding information about the CHA program?

	1. Yes
	2. No

4. Related to your participation in the CHA in your *Kebele*, please answer the following questions based on how much you **agree** or **disagree** with each statement.

		Totally Agree	Disagree	Neutral	Agree	Totally Agree	No answer or does not know
1	My community members can participate in developing rules for natural resource management in CHA program	1	2	3	4	5	999
2	My community members can participate in managing the finances from the CHA program	1	2	3	4	5	999
3	The management of the CHA include our communities concerns in decision-making	1	2	3	4	5	999
4	I am satisfied with the decisions making by the CHA management	1	2	3	4	5	999
5	I have received information on rules and regulations on access/restriction of resource use within CHA areas (such as not cutting down new trees, poaching, etc.)	1	2	3	4	5	999
6	I have received information about penalties on breaking rules within CHA areas (such as cutting down new trees)	1	2	3	4	5	999
7	I have received information on the amount of money	1	2	3	4	5	999

	received from CHA program						
8	I have information on how to report illegal activities by other members to authorities in the CHA program	1	2	3	4	5	999
9	I am able to report complaints about management of the CHA and get solutions	1	2	3	4	5	999
10	We can easily resolve conflicts related to natural resources with the CHA program	1	2	3	4	5	999

Recognition Equity

I will now ask questions about the recognition given to the values, rights and identities of different groups of people in the CHA program.

1. To what extent to you agree or disagree with the following statements?

		Totally Disagree	Disagree	Neutral	Agree	Totally Agree	No Answer
1	CHA program respects my community's rights to own and use land and natural resources	1	2	3	4	5	999
2	CHA program respects the rights and needs of youth in the community	1	2	3	4	5	999
3	CHA program respects the rights and needs of women in my community	1	2	3	4	5	999
4	Poorer groups in the community have the means to have their voices heard in the CHA management	1	2	3	4	5	999
5	The CHA program respects our community's traditional knowledge and culture	1	2	3	4	5	999

Distribution Equity

I will now ask questions about the distribution of benefits and cost from the CHA program.

1. Has your household directly benefited from the CHA, for example, from jobs, cash or community projects?

	1. Yes
	2. No

1.1. Which of the following items has your household benefited from in the CHA program?

		1.Yes 2. No 999. Don't know
1	Paid employment (monitoring, employed at the hunting lodge, etc)	
2	Cash received at household level	
3	Cash received at community level	
4	Community development projects. **Mark 1 for each type**:	
	4.1 Community centers, schools, or health center	
	4.2 Roads	
	4.3 Mills	
	4.4 Electricity	
	4.5 Water Wells	
	4.6 Other:	

2. To what extent do you agree with following statements about how benefits are distributed in your community?

		Totally Disagree	Disagree	Neutral	Agree	Totally Agree	No Answer
1	I believe my community has received sufficient monetary benefits from the CHA program	1	2	3	4	5	999
2	I believe the CHA money received at the CBO level is fairly distributed to member households in my community	1	2	3	4	5	999
3	I believe my community has received sufficient community development benefits from the CHA program	1	2	3	4	5	999
4	I believe the CHA community development benefits are distributed fairly in our community	1	2	3	4	5	999
5	I believe my community has lost access to resources (grazing, beekeeping, fuel wood) due to CHA rules and regulations	1	2	3	4	5	999
6	I believe my community is receiving replacement land in exchange for the losses due to restrictions on land from the CHA	1	2	3	4	5	999

7	Women in my community are the most likely to benefit from the CHA program	1	2	3	4	5	999
8	The Youth in my community are benefiting from the CHA program.	1	2	3	4	5	999

Preferences for Future Benefit Distribution from the CHA program

The following questions are related to potential ways benefits could be distributed in the CHA program – please note that we are not suggesting that there will be changes to the design of the CHA program, but we want to understand your preferences for how benefits could be distributed.

1. If you were offered the following choice of how the benefits in the CHA program were to be offered, which option would you prefer? (Mark only one)

1	In Program A, you receive the cash payment from the CHA program directly to your household.	
2	In Program B, the cash payment from the CHA program first goes to the village leaders/CBO to be decided on collectively how it is used.	
3	Program C, the cash payment from the CHA program be paid to organized group of jobless youth in our community	
4	I prefer none of these CHA programs.	
5	Indicate if any other option	

2. If the benefits were to be distributed to the community and you were offered the following choice of how the benefits in the CHA program were to be offered, which option would you prefer? (Mark only one)

1	In Program A, the cash payment from the CHA program goes to the community and is used for collective development projects (e.g., community buildings, roads) that benefit everyone in your community.	
2	In Program B, the cash payment from the CHA program goes to the community and is used for livelihood improvement projects (e.g., agriculture projects, bee keeping) that benefit everyone in the community.	
3	I prefer neither of these CHA programs.	
4	Indicate if any other option	

E. General Attitudes and perceptions about changes in your livelihood related to the CHA rules

1. As a result of the CHA program in your *Kebele*, have you or anyone in your household changed the following …?

		1. Yes 2. No 999. Don't know
1	The location of where you access natural resources due to CHA areas, for example, where you collect fire wood, medicinal plants, graze livestock, or harvest honey?	
2	The timing during the year of when you access natural resources within CHA areas, for example, where you collect fire wood, medicinal plants, graze livestock, or harvest honey?	

2. I am now going to ask you statements related to your general attitudes towards the CHA rules. Please state how much you **agree** or **disagree** about each of the following statements.

		Totally Disagree	Disagree	Neutral	Agree	Totally Agree	No answer or does not know
1	I believe there should be no CHA restrictions on harvesting of forest products (fuelwood, honey and grasses) in the CHA area	1	2	3	4	5	999
2	I believe grazing should be allowed everywhere in the CHA	1	2	3	4	5	999
3	I believe the CHA land should be open to agriculture and settlement	1	2	3	4	5	999
4	I believe it is important to have CHA rules and programs that protect our forests and wildlife	1	2	3	4	5	999
5	Members of my community report illegal practices on natural resources within the CHA to authorities	1	2	3	4	5	999
6	Younger members of my community follow CHA rules related to natural resources	1	2	3	4	5	999
7	People from outside this community follow CHA rules related to natural resources	1	2	3	4	5	999
8	I believe members of my community follow CHA rules and regulations on natural resources	1	2	3	4	5	999
9	I believe CHA rules on natural resources are not effectively implemented in our community	1	2	3	4	5	999

3. I am now going to ask you questions about your perceptions of the effectiveness of CHA program.

		Totally Disagree	Disagree	Neutral	Agree	Totally Agree	No answer or does not know
1	The CHA program is helping improve the quality of the air and water in this area	1	2	3	4	5	999
2	The CHA program is leading to protection of wildlife and their habitat	1	2	3	4	5	999
3	The CHA program helps preserve our community's culture and tradition	1	2	3	4	5	999
4	The CHA program is safeguarding our natural resources for our future generations	1	2	3	4	5	999
5	The CHA program is helping to improve our local climate	1	2	3	4	5	999
6	The CHA program is leading to conflict with wildlife	1	2	3	4	5	999
7	The CHA program is promoting our cooperation with other communities in other *kebeles*	1	2	3	4	5	999
8	The CHA is creating improved management practices in our community to protect our natural resources	1	2	3	4	5	999
9	The CHA program is negatively affecting our community's quality of life	1	2	3	4	5	999
10	The CHA program is increasing income for our community	1	2	3	4	5	999

F. ATTITUDES TOWARD NATURAL RESOURCES and NR ORGANIZATIONS

1. We want to understand your general views on natural resources in your area. Please answer how much you agree or disagree about the following questions.

		Totally Disagree	Disagree	Neutral	Agree	Totally Agree		No answer or does not know

1	Forests and wildlife are important to my community and who we are	1	2	3	4	5		999
2	Wildlife causes more damage than benefits to my community	1	2	3	4	5		999
3	Forests and wildlife are less important to the younger generations	1	2	3	4	5		999
4	Forests and wildlife are important to me because they can provide income/money	1	2	3	4	5		999
5	Forests and wildlife have a right to exist in this place	1	2	3	4	5		999
6	Forests and wildlife are not compatible with our current livelihood practices	1	2	3	4	5		999
7	Forests and wildlife are important to me because they provide food and other products like fuelwood	1	2	3	4	5		999
8	Forests and wildlife are important because they help clean the water and the air we breathe	1	2	3	4	5		999
9	It is important that we protect forests and wildlife for future generations	1	2	3	4	5		999
10	Forests are important for regulating the climate and having regular rainfall							

2. Please answer these questions related to conservation organizations in your community. Which of the following conservation organizations have you heard of?

		1.Yes 2. No 999. Don't know	2.1 Rank the Top 3 of these organizations that you work closely with
1	OFWE		
2	EFCA (Woreda Environment, Forest and Climate and Change Authority)		
3	Ethiopian Wildlife Conservation Authority		
4	Hunting Concessionaire / Ethiopia Rift valley Safari/ Mr Nassau		
5	Farm Africa		
6	Frankfurt Zoological Society		
7	Other		

4. Please state how much you ***disagree*** or ***agree*** with each of the following statements about the top ranked conservation organizations in your community.

		Totally Disagree	Disagree	Neutral	Agree	Totally Agree		No answer or does not know

1	This conservation organization has a strong presence in my community.	1	2	3	4	5	999
2	This conservation organization provides trainings or support for members of my community.	1	2	3	4	5	999
3	It is very easy to contact a conservation organization to receive help with projects.	1	2	3	4	5	999
4	Many people in my community work with this conservation organization.	1	2	3	4	5	999
5	This conservation organization listens to our community's concerns and try to help.	1	2	3	4	5	999

G. SUBJECTIVE Human Well-being

We are close to the end of the survey. I just have a few more questions for you regarding changes in your quality of life in the last 5 years, in 2015/2007 (If they need a reminder, you can tell them there were parliamentary elections that year and a severe drought in parts of the country).

1. Do you think your household quality of life is better, the same, or worse, than what it was 5 years ago (in 2015)?

1	Better	
2	Same/Equal	
3	Worse	

2. Do you think the quality of your community (overall the organization of your community) is better, the same, or worse, than what it was 5 years ago (in 2015/2007)?

1	Better	
2	Same/Equal	
3	Worse	

3. Do you think the quality of your natural resources (forest, water, wildlife) is better, the same, or worse, than what it was 5 years ago (in 2015)?

1	Better	
2	Same/Equal	
3	Worse	

We have reached the end of the survey. I want to thank you for your time and the information you shared during the survey.

Do you have any questions about what we talking about?
(If they have any relevant questions about the survey, make a note of them. If you are unable to answer the question, tell them that you will check with the research team conducting the study and they will get back to them.)
Make sure that you have gathered all the materials and noted the finish time for the survey.

Time finished: _____

Name of respondent: _____

APPENDIX II. Full and Parsimonious Regression Models with Dummy Coded Enumerator Variables

	Full model			Parsimonious model		
Variables	Distributive equity	Procedural equity	Recognition equity	Distributive equity	Procedural equity	Recognition equity
	Coefficient *Std Error*	Coefficient *Std Error*	Coefficient *Std Error*	Coefficient *Std Error*	Coefficient *Std Error*	Coefficient *Std Error*
Gender	-0.128** *0.112*	-0.098 *0.140*	-0.092 *0.170*	-0.186* 0.108		
Age	0.021 *0.003*	0.030 *0.004*	0.045 *0.05*			
Roof type	-0.128** *0.119*	-0.046 *0.148*	-0.012 *0.176*	-0.284** *0.139*	-0.167** *0.182*	-0.168** *0.217*
Crops sold	0.098 0.101	0.065 0.128	0.093 0.152	0.113* 0.097		
Future land access	-0.025* *0.189*	-0.022** *0.240*	-0.115 *0.283*			-0.138** *0.262*
Bonding social capital	-0.030 *0.069*	0.0266*** *0.084*	0.196* *0.102*		0.276*** *0.082*	0.198** *0.099*
Linking social capital	0.437*** *0.010*	0.415*** *0.013*	0.394*** *0.015*	0.431*** *0.009*	0.441*** *0.012*	0.415*** *0.015*
Enmerator1	0.020* *0.134*	-0.187 *0.174*	-0.337* *0.207*			
Enmerator2	-0.311 *0.129*	-0.391* *0.164*	-0.791*** *0.192*		-0.180* *0.195*	*-0.223** *0.311*
Enmerator3	0.082 *0.629*	0.324 *0.800*	-0.966 *0.938*			
Enmerator4	-0.423 *0.203*	-0.665 *0.261*	-0.900 *0.312*	-0.171** *0.123*		*-0.288*** *0.190*
R^2	41%	45%	43%	33%	39%	39%
N	*185*	*184*	*181*	*185*	*184*	*181*

APPENDIX III. Full and Parsimonious Regression Model with CBC Model and Dummy Coded Enumerator Variables

Variables	Full Model			Parsimonious Model		
Variables	Distributive equity	Procedural equity	Recognition equity	Distributive equity	Procedural equity	Recognition equity
	Coefficient *Std Error*	Coefficient *Std Error*	Coefficient *Std Error*	Coefficient *Std Error*	Coefficient *Std Error*	Coefficient *Std Error*
Gender	*-0.192*** *0.109*	*-0.09* *0.134*	*-0.087* *0.164*	-0.187** 0.107	-0.100* 0.133	
Age	*0.20* *0.003*	*0.021* *0.004*	*0.044* *0.05*			
Roof type	*-0.236** *0.142*	*-0.151** *0.182*	*-0.140** *0.216*	-0.235** 0.139	-0.133* *0.177*	-.132 *0.213*
Crops sold	*0.107* *0.100*	*0.067* *0.124*	*0.100* *0.148*			
Future land access	*-0.027* *0.186*	-0.038 0.233	*-0.119* *0.276*			
Bonding social capital	*-0.035* *0.067*	*0.277**** *0.081*	*0.205*** *0.100*		*0.295**** *0.080*	0.231** *0.099*
Linking social capital	*0.393**** *0.010*	*0.351**** *0.013*	*0.348**** *0.016*	0.389*** *0.009*	0.357*** *0.013*	0.354*** *0.016*
CBC dummy variable	*0.134** *0.100*	*0.199*** *0.124*	*0.150*** *0.149*	0.145** *0.096*	0.205** *0.121*	0.164* *0.149*
Enumerator1	*0.033** *0.133*	*-0.172** *-0.168*			-0.391** *0.152*	
Enumerator2	*-0.312** *0.128*	*-0.398** *0.160*		-0.350** *0.121*		-0.772* *0.183*
Enumerator3	*0.052** *0.625*	*0.263** *0.780*	*-1.26** *0.926*		-0.148* *0.24*	
Enumerator4	*-0.369** *0.204*	*-0.556** *0.257*	*-0.810*** *0.310*	0.203* *0.096*		-0.643** *0.302*
R^2	34%	44.6%	42.6%	32.9%	41.1%	39.7%
N	*185*	*184*	*181*	*185*	*184*	*181*