Does participation of household members in small ruminant management activities vary by agro-ecologies and category of respondents? Evidence from Rural Ethiopia

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Abstract
The data for this article is drawn from the research work on participatory epidemiology and gender in Ethiopia. The research project conducted focus group discussions (FGDs) and household survey in 2015 and 2016, respectively. Ninety-two focus group discussions were held with adult men and women, and youth male and female groups. In addition, a household survey from 646 respondents, 236 male household heads (36.5%), 88 women household heads (13.6%) and 322 women in male headed households (49.9%) were conducted. Using data on gender roles from the study we analysed gender differentials and the intensity of involvement of household members in small ruminant management and husbandry practices in the study sites. Our results suggest that all household members participate in the different small ruminant husbandry and management practices with varying degrees of involvement across agro-ecologies and from the perspectives of the different categories of respondents. Despite prevailing perceptions that women control small ruminants, men control the decision-making aspect of small ruminant husbandry and management practices whereas women are mainly responsible for executing all the husbandry related roles. Considering gendered perceptions about gender roles as well as agro-ecological dimensions, they potentially have important implications especially for the design of animal health interventions in the study areas.

Key Words: Agro-ecology, Ethiopia, Gender roles, Participation, Small Ruminant

Introduction

Small ruminants (sheep and goats) play an important role in the Ethiopian economy and ensure food security for millions of farmers (Aklilu et al, 2014). The country has a combined sheep and goat population exceeding 49 million (CSA, 2013). Sheep and goats are integral to the mixed crop-livestock farming system in the highlands, midlands and in the pastoral and agro-pastoral production system in the lowlands. Both men and women farmers in Ethiopia are actively involved in their management activities (Hulela, 2010; Regasa et al, 2012).

Literature on intra-household gender analysis with regard to livestock production in Ethiopia is scarcely available. Sex disaggregated data on work sharing, access to resources and benefits in livestock are scanty and what is available is based on headship (Njuki et al, 2013; Yisehak, 2008). Existing literature reveals that both men and women farmers in Ethiopia are actively involved in livestock production (Hulela, 2010; Regasa et al, 2012; Belete 2006; Konjit, 2006), though, the types of activities and degree of their involvement is not well studied. Although, the study conducted by Mulema et al. (2017) discussed the division of labor in small ruminant production and argued that even though livestock management and husbandry practices are shared among household members, the management of large animals fall under the control of men whereas that of small animals under the women. The study, however did not address the intensity of women's and men's involvement in the practices and

covers a few districts in Ethiopia. A considerable number of research reports reveal that generally, at national level, significant gender differentials exist in Ethiopian agriculture putting women in a disadvantaged position (Yisehak, 2008; Leulsegged, 2015; Lemlem et al, 2010). Nevertheless, rural women contribute to the process of agricultural production to a greater or lesser extent, they are generally perceived as marginal players.

Similarly, in analyzing gender roles in livestock management (Aklilu et al, 2014) in pastoralist and agro-pastoralist system of Afar (Yisehak, 2008); in crop-livestock mixed farming system, Jimma highland; and in North Eastern part of Ethiopia (Belete, 2006), the authors find a clear gender gap between male and female household members in terms of participation in livestock husbandry. Although, men and women jointly carryout some of the husbandry practices, they also have distinct roles played in animal management activities. This division of labor is influenced by socio-cultural, socio-economic (Hulela, 2010; Yisehak, 2008) and agro-ecological (Karmeback et al, 2015) factors. Apart from that, the person who reports about these roles from the household matters a lot and needs to be considered (Kamo, 2000). The division of farm tasks between women and men also varies according to the enterprise, the farming system, the technology used, and the wealth of the household (Lemlem et al, 2010). On the other hand, headship of a household determined, to a large extent, the participation of women in agriculture (Aklilu et al, 2014). These authors argued that gender roles and relationships influence the division of work, the use of resources, and the sharing of the benefits from livestock production between women and men.

This study highlights gender roles and intensity of participation in small ruminant management and husbandry practices in Ethiopia. In this article intensity of involvement means the extent of one's involvement in an activity in terms of frequency or number of hours spent on an activity by adult men and women, and youth male and female within a household. "Gender roles are those behaviors, tasks and responsibilities that a society considers appropriate for men, women, boys and girls" (Kamo, 2000).

Understanding the various roles of household members paves the way for understanding how these roles could affect interventions and vis-a-versa (Yisehak, 2008). Therefore, understanding the gender roles in small ruminant management is a stepping stone towards identification of entry points that ensure equal participation and equitable sharing of benefits from small ruminant production. Having the knowledge of gender roles in small ruminant production is also helpful for targeting and aiding the design and implementation of interventions. For instance, identifying who is responsible for specific livestock husbandry practices may reveal who within the household is best placed to observe clinical signs of animal health problems (WB/FAO/IFAD, 2009) and thus need to be targeted during the design and implementation of interventions in animal health. One more example worth to mention here is the Gender, Agriculture, and Assets Project (GAAP2) project in Mozambique where training was directed towards men for dairy cows, when women should have been the primary audience given that they were most directly involved in the activity (Johnson *et al*., 2015). This example reflects that there are risks of making assumptions about gender roles and who is knowledgeable about the roles of household members. In addition, changes in roles may be an intended or unintended consequence of interventions, so monitoring them over time is important, and the study helps establish a kind of baseline for initial variation with regards to gender roles in small ruminant management and husbandry practices in Ethiopia. The findings are expected to inform priority setting in resource allocation policy

during the design of interventions for improved small ruminant production, not only in the study areas but also in other similar countries.

In light of the above considerations, the objectives of this study were twofold (i) to examine intra-household gender differentials in the intensity of participation in small ruminant husbandry and management activities and (ii) to determine whether the intensity of involvement of household members in small ruminant husbandry and management practices varies by agro-ecology and category of respondents. We expect gender differentials in small ruminant management and husbandry practices based on prior work on gender roles in large animals (Karmeback *et al*., 2015; Hulela, 2010; Yisehak, 2008). Similarly, we expect the intensity of involvement of household members in small ruminant husbandry and management activities vary by agro-ecology and category of respondents. Data were generated from three categories of respondents ―male household heads (MHHs), women in male headed households (WMHHs), and women household heads (WHHs) from three agro-ecologies ―highland, midland and lowland. Knowing more about who does what in small ruminant production across the different farming systems from the perspectives of men, women and youth in different household types informs researchers, policy makers and development practitioners in order to avoid risks of making assumptions about gender roles and unintended consequences of interventions.

Methodology

Research Design

The exploratory study followed a mixed methods approach- qualitative using Focus Group Discussions (FGDs) and quantitative (Household (HH) survey) methods of data collection and analysis. The study sites were the target areas for the Consultative Group on International Agricultural Research (CGIAR) Research Program on Livestock and Fish and the project, African Research in Sustainable Intensification for the Next Generation (Africa RISING), implemented in the main regions of Ethiopia- Amhara, Oromia, Southern Nations and Nationalities People (SNNP) and Tigray. In Ethiopia, the CGIAR research program on Livestock and Fish focuses on small ruminant value chain development in the major regions of the country. Africa RISING is a U.S. Agency for International Development (USAID) funded project which tests and validates technologies for intensification of mixed crop livestock farming systems in Ethiopia.

The research project undertook a series of preparatory activities before the study commenced. A training workshop that targeted researchers at the national agricultural research institutes was held, who later on conducted the study. The aim of the training was to introduce researchers to the concepts of participatory epidemiology (PE) and gender analysis, to learn about participatory epidemiology tools, to develop the study protocol and plan for field work. "Participatory epidemiology […] is an evolving branch of veterinary epidemiology which uses a combination of practitioner communication skills and participatory methods to improve the involvement of animal keepers in the analysis of animal disease problems, and the design, implementation and evaluation of disease control programmes and policies" (Catley et al., 2011). As PE employs participatory approaches in addressing the analysis of animal diseases problems, it also gave due attention to the gender dimensions in the course of selection and implementation of the study.

Four research teams were established to conduct the FGDs and HH survey in Amhara, Tigray, Oromia, and SNNP regions of the country. In each site, a preliminary meeting was held with local administration officials and site coordinators to introduce and explain the objectives of the study, emphasizing on the disease constraint in small ruminant production, its impact on household members and the roles/tasks in small ruminant production and management from gender perspectives. The site coordinators who knew the local knowledge of the area made contacts with development agents and farmers who were key stakeholders for this study.

Sampling Strategy

Study Sites

A study on participatory epidemiology and gender was conducted in four main regions of Ethiopia from July to August, 2015 and from November to December, 2015 in two phases, FGDs followed by a HH survey. A multi-stage sampling technique, beginning with the selection of study sites, was followed. Agro-ecology (highland, midland and lowland), farming system (mixed crop-livestock and agro-pastoralist farming system), small ruminant disease incidence were used as criteria for the selection of the study areas. In total, for the household survey, 36 *Kebeles* were selected from project sites within the 14 *woredas* (districts) of the four regions. Of the 36 *kebeles* selected 21, 8, and 7 *kebeles* are from highland, midland and lowland, respectively (table 1). A *kebele* is the smallest unit of administration in Ethiopia.

The highland (2,300 - 3,200masl) usually is a belt where crops such as barley, wheat, and pulses are grown and livestock such as cattle, equines, and sheep are kept. All major rain-fed crops can be grown in most parts of this belt, particularly *teff* and maize. This is a belt where both agro climatic as well as ecological conditions are highly suitable for rain-fed crop and livestock farming. The midland belt (1,500 - 2,300masl) usually has sufficient rainfall for mixed crop-livestock farming, allowing at least one cropping season per year whereas the lowland (500 - 1,500masl) is a belt where there are moisture limitations for major crops. However, crops such as sorghum is a dominant crop in the lowland belt, and *teff* and maize will also be grown there if rainfall permits. Moreover, livestock farming such as goat, cattle and camels are common.

Study Participants

In identifying the various groups for FGDs, purposive sampling strategy was followed in consultation with local facilitators. In doing so pre-agreed upon criteria was developed and used in identifying the FGD participants. The key criteria used includes those who are actively involved in small ruminant production, had their own herd and assumed to be representatives of small ruminant keepers in their communities. As part of the preparation, suitable locations were identified for the different groups. The project conducted in total of 92 FGDs with adult men and women, and youth male and female groups in 2015.

In 2016, the research team, together with the *kebele* administrators, conducted a HH survey. In doing so they constructed two sampling frames for this survey – i.e. men headed households and women headed households within each target *kebeles*. These were households who owned small ruminants. The original lists of households were obtained from the respective *kebele* administration offices. For sample size determination, Epi Info 7 sample

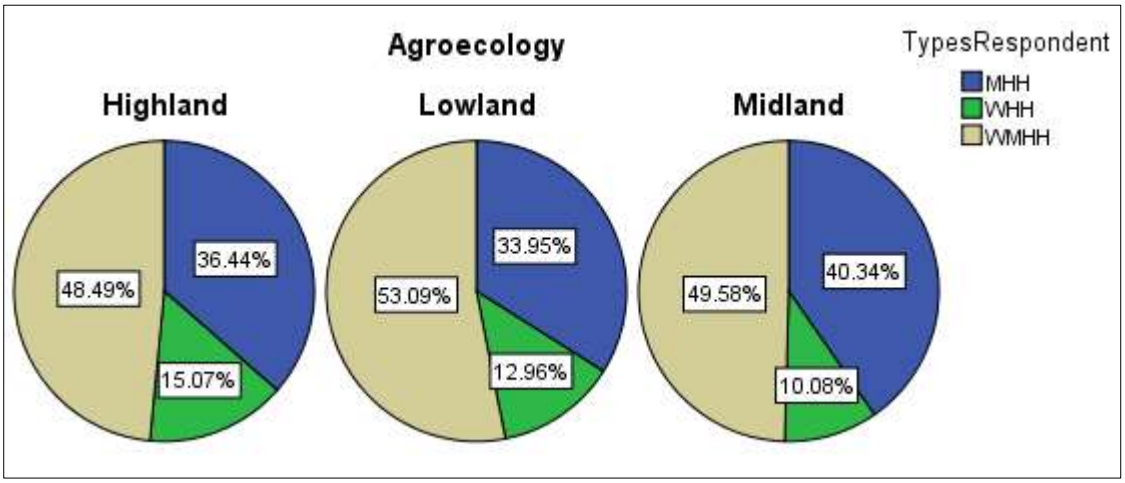
size and power for population survey was employed to identify a total of 430 households (men headed and women headed households) - i.e.132 from Amhara, 106 from Oromia, 96 from SNNPR, and 96 from Tigray regions (table 1). From the two sampling frames constructed, fifteen men headed households and four women headed households were selected from each *kebele* using systematic random sampling. The first ten men headed households and two women headed households from each strata were enrolled in the study. The remaining five male headed households and two women headed households were used for replacement. For the women headed households, if they were less than four in a Kebele, all the available households were included in the sample to be interviewed. In case, the number was more than four, the random sampling procedure was followed. Table 1 below shows sampled *kebeles* in each agro-ecology and sample size within the study sites whereas figure 1 shows the distributions of sampled male household heads (MHH), women in male headed households (WMHH) and women household heads (WHH) by agroecology.

Table 1. Sampled *kebeles* in each agro-ecology and sample size by category of respondents within the study sites

Region	***Woreda***	**Distribution of *Kebeles* in terms of Agro-ecology**			**Total Kebele**	**%**	**Sample size of HHs by Region**	**Sample size by Category of Respondents**			
		Highland	Midland	Low land				MHH	WHH	WMHH	Total
Amhara	Abergelle	-	-	2	2	5.4	132	11	20	4	35
	Bosona Worena	3	-	-	3	7.4		15	27	6	48
	Menz Gera	2	-	-	2	5.4		10	20	5	35
	Menz Mama	2	-	-	2	5.1		10	19	4	33
	Ziquala	-	-	2	2	5.1		10	18	5	33
Oromia	Horo	3	-	-	3	7.3	106	16	23	8	47
	Sinana	-	3	-	3	10.2		30	30	6	66
	Yabello	-	-	3	3	7.6		14	28	7	49
SNNPR	Adiyo	2	-	-	2	5.1	96	9	12	12	33
	Doyogena	3	-	-	3	7.9		16	29	6	51
	Lemu	-	3	-	3	8.2		17	30	6	53
Tigray	Astbi Wonberta	3	-	-	3	10.1	96	31	29	5	65
	Endamehoni	3	-	-	3	8.4		27	17	10	54
	Tanqua Abergelle	-	2	-	2	6.8		20	20	4	44
Total		**21**	**8**	**7**	**36**	**100**	**430**	**236**	**322**	**88**	**646**

In total 430 households were randomly sampled, however, in order to capture the views of women from each sampled male headed household, women spouses were also asked to answer few questions thought relevant and this increased the total sampled individuals to 646.

Figure 1. Category of respondents by agroecology for the HH survey



Data Collection

Focus Group Discussions (FGDs)

The participatory rural appraisal (PRA) methods used during the FGDs were semi-structured interviews and proportional piling. The key areas of discussion included: importance of livestock species, diseases in small ruminants using clinical signs, impact of diseases on different household members, and role of household members in small ruminant management. The focus of this paper is on the roles of household members in small ruminant management.

A team of trained researchers from the national agricultural research institutes in the respective regions conducted the FGDs. Each team comprised of a facilitator and note taker responsible for facilitation of the FGD and recording of information respectively. Separate FGDs were held with adult men, adult women, youth male and youth female, and these constituted the categories of participants for this study. The youths were within the age of 15-29 (Factsheet: Ethiopia, 2014) and living with their families. Therefore in each village, four separate FGDs took place making a total of 92 FGDs. Each FGD had 6-8 participants.

The FGDs for adult men and adult women (constituting both WMHHs and WHHs) were held concurrently and findings of each group were briefly presented in a joint session at the end of each exercise. Similarly, FGDs for male youth and female youth were held in parallel and the findings shared at the end of every exercise.

Household Survey

Using a semi-structured questionnaire, a follow-up household survey was conducted in order to explore, in detail, the key issues revealed during the FGDs. The majority of the participants in the FGDs also participated in the household survey to triangulate the information collected. With regards to gender roles in small ruminant production, the key activities identified through FGDs, as perceived by men and women small ruminant keepers are cleaning, feeding and watering, breeding management, marketing, herding, caring for sick animals, coordinating vet inputs, slaughtering, and assisting during delivery. A section on gender roles on these key activities was included in to the questionnaire. Trained researchers from the national research institute administered the questionnaire with support from respective *woreda* and *kebele* officials.

Proportional piling was used in order to establish household members' participation and extent of their involvement in each of the key small ruminant husbandry and management activities identified. In doing so, simple scoring was done by asking the participants to indicate the extent to which household members' were involved in the key small ruminant activities as perceived by the participants. This was done by allocating a certain score to each household members out of 20 counters. The higher the score allocated (using beans) the more a household member is involved in a given activity in terms of time spent and frequency

The interview was administered in such a way that, for the randomly selected male headed households, if the first respondent from the first male headed household was male, the respondent in the second randomly selected male headed household was a female spouse. Moreover, we also allowed spouses to respond to the gender section of the questionnaire to which the male spouse responded. This was done in order to capture the views of women in male headed households (WMHHs). In a contemporary literature there is a growing argument that collecting data from multiple family members, having both spouses' responses to the same question, is advantageous (Kamo, 2000). As a result, a total of 646 individuals (410 women and 236 men) were interviewed (table 1).

Analytical Techniques

The data collected were entered into Epi info software version 7 and exported in to a Microsoft Excel 2013 spreadsheet and analysed using SPSS version 23 for descriptive statistics. Moreover, nonparametric approach in Stata version 14 was employed to conduct equality-of-populations rank test. Kruskal-Wallis equality-of-populations rank test allows one to compare location equality for three or more groups and it is found to be one of the most useful available hypothesis testing procedures for behavioural and social science research. It is also a relatively popular method and mostly used by researchers as it provides valid analyses under conditions where the data are non-normal but other criteria are met (Meyer and Seaman, 2011).

The study addressed two research objectives (1) to determine the intra-household gender differentials in terms of participation in small ruminant husbandry and management practices among small ruminant keepers in the study areas as measured by proportional scores and (2) determine whether the perceived level of involvement varies by agro-ecology and category of respondents. The independent variables used in the non-parametric test were agro-ecology and category of respondents whereas the dependent variables were the key small ruminant management and husbandry practices considered important by the respondents, including: cleaning, feeding and watering, breeding, marketing, herding, caring for sick animals, coordinating vet inputs, slaughtering, and assisting delivery .

Descriptive statistics were computed in order to answer the first research question. Kruskal-Wallis equality-of-populations rank test was conducted with agro-ecology and category of respondents entered as independent variables, to determine whether the obtained scores for adult men, adult women, youth and children varies across the independent variables in order to answer the second research question. By categories of respondents we mean that the perceptions of adult men and women in men headed households and adult women in women headed households with regards to household members' intensity of involvement in the small ruminant management and husbandry practices considered.

Table 2. Summary of Research Questions and Instrumentation

Research questions	Instrument	Variables	Data analysis
- What is the intra-household gender differentials in the intensity of participation in small ruminant management activities?	Household survey: proportional scoring	- Numerical outcome	Descriptive
- Does the intensity of involvement of household members in small ruminant management vary by agro-ecology and category of respondents?	Household survey: proportional scoring	**Independent Variable**: - Agro-ecology and Category of respondents - Non-numerical outcome (Categorical type) **Dependent Variable**: - Key small ruminant activities (Cleaning, Feeding & Watering , Breeding, Marketing, Herding, Caring for sick animals, Coordinating vet inputs, Slaughtering, Assisting Delivery) - Numerical outcome	Kruskal-Wallis equality-of-populations rank test

Results and Discussions

In the first part of our analysis we considered gendered participation status in small ruminant management and husbandry practices followed by analyzing the extent/intensity of participation of household members across the key small ruminant management and husbandry practices activities considered important. In order to do that we started by examining whether all the categories of respondents agree on status of household members' participation (i.e. men, women, youth and children). We presented the patterns of agreement among categories of respondents regarding participation in small ruminant activities in table 6. The next step of our analysis is to examine intensity of participation and whether these vary for household members across agro-ecologies and by categories of respondents. Tables 7 and 8 under annex presents the results of these tests. In doing so, we begin by describing the household characteristics first.

Description of Sample Households' Characteristics

The results of the descriptive and inferential analysis (table 3) show that most of the respondents were in the productive age with the mean age of the women in male headed household being lower. Across the agro-ecologies, the distribution of age is the same ($p>0.1$). The distribution of the household size is significantly different ($p<.05$) across agro-ecologies with the highest being in the midland and lowest in the highland. Disaggregating the respondents by gender reveals that there are statistically significant differences among sampled households in terms of composition. The distribution of adult male and children is significantly different ($p<.05$) across the households with the lowest number of adult men in women headed households (table 3). Close to half of the female household heads reported that they do not have adult male members in their family (table 4). A significant proportion of the female household heads are widowed whereas almost all the male respondents are married.

Table 3. HH characteristics by agro-ecology and category of respondents

Variables		Agro-ecology						Total sample		Test statistic
		Highland		Midland		Lowland				
		Mean	SD	Mean	SD	Mean	SD	Mean	SD	
Age		43.4	13.542	43	11.227	41.7	12.515	42.9	12.91	1.518
HH size		6.2	2.369	8.2	3.076	6.7	2.034	6.7	2.526	32.523***
HH structure	Adult male	1	0.4544	1.3	1.2678	1	0.3095	1	0.671	2.65
	Adult female	1.1	0.5212	1.2	0.4777	1.1	0.2245	1.1	0.461	3.716
	Youth male	1.5	1.3069	1.9	1.5983	1.8	1.586	1.7	1.454	2.975
	Youth female	1.4	1.1045	1.6	1.2521	1.3	1.025	1.4	1.120	3.582
	Children	2.8	1.625	3.1	1.7749	2.9	1.3613	2.9	1.591	2.638
		Respondent Category								
		MHH		WHH		WMHH		Total sample		Test statistic
		Mean	SD	Mean	SD	Mean	SD	Mean	SD	
Age		46.3	13.687	41.8	11.5974	38.3	10.7482	42.9	12.91	30.47***
HH size		6.9	2.6282	5.4	2.2847	6.95	2.2801	6.7	2.526	24.88***
HH structure	Adult male	1.1	0.781	0.7	0.825	1.7	1.4457	1	0.671	24.61***
	Adult female	1.1	0.4941	1.1	0.5056	1	0.3773	1.1	0.462	2.254
	Youth male	1.4	1.1856	1.8	1.2995	1.7	1.4457	1.7	1.454	0.939
	Youth female	1.4	1.1856	1.3	0.883	1.4	1.1324	1.4	1.120	0.006
	Children	3	1.6603	2.4	1.3648	2.9	1.5504	2.9	1.591	7.770*

Source: Authors' calculations from the participatory epidemiology and gender HH survey
Note: Sample size is 430 HHs
*** and * significant at P < 0.01 and 0.05 levels, respectively

Out of the total households 20.5% (N=88) can read and write, 44% (N=189) cannot read and write, 26% (N=112) attained primary education, 8.6% (N=37) attained secondary education, and only 0.9% (N=4) reached college and above. Overall, men have higher literacy levels compared to women. On average, 49.64% (N=213), 28.74% (N=124) and 21.62% (N=93) of the total sampled HHs own small, medium and large flock size respectively (table 4), with the largest flock size being in the lowlands and smaller flock sizes in the mid and highlands.

Table 4. Summary statistics by category of respondents and agro-ecology

Variable		Respondent Category						Total sample	
		MHH		WHH		WMHH			
		None	> One	Non	> One	None	> One	None	> One
HH structure	Adult male	2.5%	97.5%	48.6%	51.4%	5.2%	94.8%	7.9%	92.1%
	Adult female	2%	98%	5.4%	94.6%	6%	94%	3.9%	96.1%
	Youth male	13.5%	86.5%	12.3%	87.7%	18.7%	81.3%	14.9%	85.1%
	Youth female	15.7%	84.3%	15.7%	84.3%	18.6%	81.4%	16.6%	83.4%
	Children	1.1%	98.9%	0%	100%	2.4%	97.6%	1.3%	98.9%
Education	Cannot read and write	30%		**61%**		**56.6%**		44%	
	Can read and write	28.6%		14.3%		11%		20.5%	
	College and above	1.8%		0%		0%		0.9%	
	Primary education	28.6%		18.2%		26.5%		26%	
	Secondary education	11.1%		6.5%		5.9%		8.6%	
Flock Size	Large(>25)	22.9%		19.5%		20.9%		21.6%	
	Medium(11-25)	33.8%		24.7%		23.1%		28.7%	
	Small(<10)	43.3%		55.8%		56%		49.6%	
Characteristics by Agro-ecology		**Highland**		**Midland**		**Lowland**		**Total sample**	
Education	Cannot read and write	35.7%		33.3%		**69.7%**		44%	
	Can read and write	26.1%		12.5%		12.8%		20.5%	
	Collage and above	0.4%		1.4%		1.8%		0.9%	
	Primary education	30.5%		30.6%		12.8%		26%	
	Secondary education	7.2%		22.2%		2.8%		8.6%	
Flock Size	Large(>25)	15.4%		5.6%		45.9%		21.6%	
	Medium(11-25)	30.4%		25%		27.5%		28.7%	
	Small(<10)	54.2%		69.4%		26.6%		49.6%	

Source: Authors' calculations from participatory epidemiology and gender HH survey data
Note: Sample size is 430 HHs.

What are the intra-household gender differentials in the participation of small ruminant husbandry and management practices?

According to the result from the FGDs, livestock keepers identified nine small ruminant management and husbandry practices as key activities important for small ruminant production. These are cleaning, feeding and watering, breeding, marketing, herding, caring for sick animals, coordinating vet inputs, slaughtering, and assisting during delivery. Although, during the discussions, participants noted that these activities are composite in nature and constitute sub activities (table 7), and it is at this level that they were referring when responding to the gender role questions, the data generated on gender roles using counters out of 20 was at the aggregate level ―meaning at cleaning, feeding and watering, breeding, marketing, herding, caring for sick animals, coordinating vet inputs, slaughtering, and assisting during delivery levels. Participants were asked about who does these activities and allowed to estimate the extent of each HH member's involvement using counters out of 20. Similarly, later on during the HH survey the project collected information on gender roles at aggregate level and thus we could not able to analyse at the sub activities level ―meaning at the components of each activities. For example, sub activities for cleaning includes activities such as removing dungs from barn, cleaning and tethering animals inside the barn, monitoring barn to make sure that barn is cleaned by someone assigned (table 7).

In table 5 below, the results in the cells are percentage of cases were the categories of respondents reported that they agree on the participation of household members in small ruminant management and husbandry practices. Overall, the respondents tend to agree that all members of the household participate in the various activities. We observe relatively the highest agreement between male household heads and women in male headed households on men's and women's participation and least agreement between women household heads and the other categories of respondents.

To be more specific, regardless of agro-ecologies, there are clear differences among respondent's perception about participation of household members. While 68.2% of the men household heads said yes to men's involvement in barn cleaning, only close to half of the married women mentioned the same. In feeding and watering, majority of men (88.6% and 74.6%) and married women (82.6% and 79.2%) agreed that both adult men and women participate, respectively (table 5). All the categories of respondents closely showed that they have similar responses on the participation of all household members in feeding and watering except that of men's involvement where women household heads almost completely differ with the men's and married women's perceptions giving higher mean scores to adult women. Given that only close to half of the women household heads have on average at least one adult male member in their household (table 4), one could expect such result.

Table 5. Similarities between respondent categories on household members' participation in small ruminant husbandry and management activities

Variables	Men participate			Women participate			Youth Male participate			Youth Female participate			Children participate		
	MHH	WMHH	WHH	MHH	WMHH	WHH	MHH	WMHH	WHH	MHH	WMHH	WHH	MHH	WMHH	WHH
Cleaning	68.2%	53.4%	23.9%	81.4%	85.1%	61.4%	39.4%	34.8%	30.7%	49.2%	49.1%	42.1%	38.6%	42.9%	42.1%
Feeding & watering	88.6%	82.6%	29.6%	74.6%	79.2%	63.6%	46.6%	46.6%	38.6%	42.0%	39.1%	39.8%	42.0%	47.0%	38.6%
Breeding	85.6%	86.7%	33.0%	37.9%	39.1%	48.9%	50.0%	54.0%	44.3%	19.1%	18.6%	21.6%	26.3%	35.4%	29.6%
Herding	78.4%	72.7%	28.4%	53.8%	60.3%	52.3%	48.3%	51.2%	42.1%	29.2%	29.5%	27.3%	53.4%	58.1%	51.1%
Marketing	97.0%	96.9%	35.2%	40.7%	47.2%	54.6%	36.0%	34.8%	44.3%	8.5%	11.5%	19.3%	92.0%	91.3%	86.4%
Caring for Sick Animals	83.5%	82.0%	28.4%	64.8%	74.2%	62.5%	40.7%	40.4%	37.5%	27.1%	27.3%	18.2%	23.7%	29.5%	27.3%
Coordinating vet inputs	86.9%	90.1%	29.6%	45.8%	54.4%	59.1%	38.1%	39.4%	43.2%	16.1%	18.6%	18.2%	13.6%	17.1%	17.1%
Assisting Delivery	78.4%	80.1%	26.1%	55.9%	66.8%	59.1%	47.5%	46.9%	38.6%	17.4%	23.9%	22.7%	23.3%	27.6%	29.6%
Slaughtering	80.5%	85.7%	30.7%	24.6%	30.8%	26.1%	41.1%	44.1%	46.6%	9.3%	12.7%	12.5%	11.4%	16.5%	21.6%

Source: Authors' calculations from participatory epidemiology and gender HH survey data.
Note: Sample for each decision is individuals in each category of respondents who mentioned that participation was made. Sample is 646 individuals from 430 HHs.

On the other hand, high proportion of male household heads and married women said that adult men participate in breeding followed by youth male and adult women in the study areas. Herding is an activity that is mostly done by men according to male household heads and married women whereas 53.8% of male household heads and 60.3% married women stated that adult women also participate in herding.

With regards to marketing, almost all of the male household heads and married women said adult men participate in marketing while less than 50% said yes to the participation of adult women in marketing of small ruminant animals implying that marketing of sheep and goats is mainly in the domain of men. Majority of male household heads and married women said adult men are involve in assisting during delivery followed by adult women and a smaller proportion of respondents indicate that youth female and children participate in this activity as well. The majority of the male household heads and married women reported that men participate in caring for sick animals while 64.8% of male household heads and 74.2% of married women said the same for women's participation implying that it is relatively shared between adult men and women.

However, during the focus group discussion it is noted that this activity is a composite and all the activities involving labour are entirely done by women whereas men only carryout those activities involving decisions such as assigning someone to do the job of caring sick animals. Similarly, majority of male household heads (86.9%) and married women (90.1%) said that men participate in coordinating vet inputs while majority of women household heads contends to such claims. Whereas, close to half of the respondents (45.8% of male household heads and 54.4% of married women) agreed to women's participation in coordinating vet inputs. In general, less than 50% of all categories of the respondents agree with the participation of the rest of the household members in this particular activity (table 5).

Regardless of category of respondents, the descriptive statistics shown that close to half of the respondents (45-60%) considered barn cleaning as an activity not performed at all by men, youth and children whereas in contrary only 8.8% of the respondents indicated that women are not engaged in this work at all (table 6).

Table 6. Involvement status in small ruminant activities by Gender

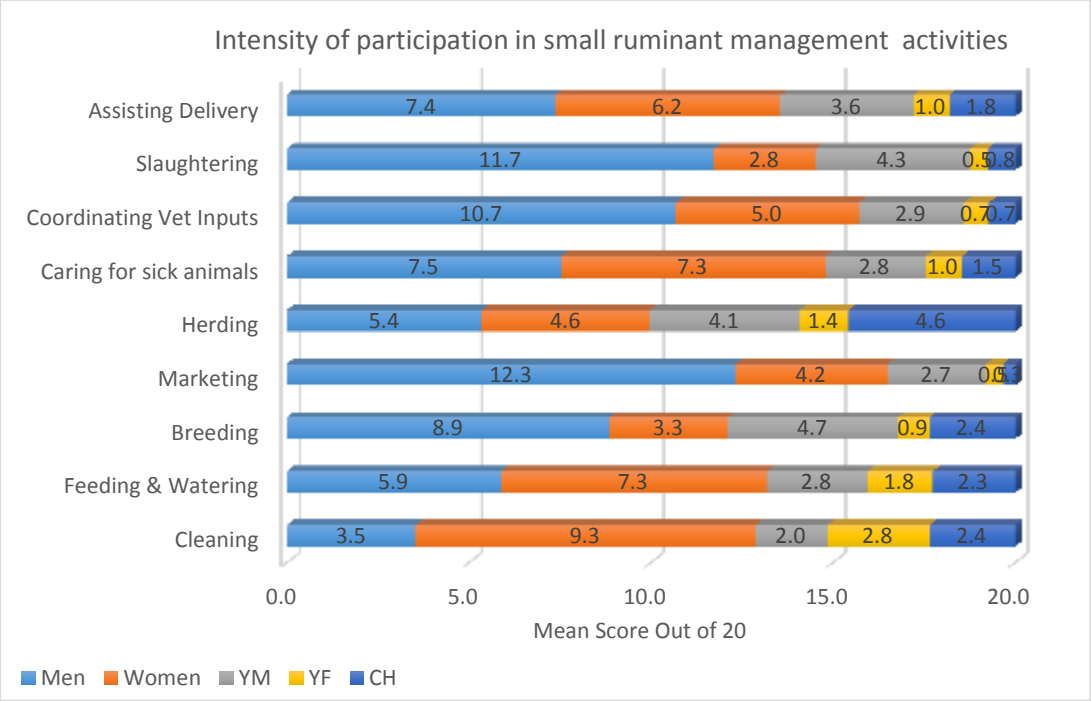
Small Ruminant		**Only Done by (%)**					**Not Done at all by (%)**				
Activities	N	M	W	YM	YF	CH	M	W	YM	YF	CH
Cleaning	646	1.7	7	0.5	0	0.9	45.2	8.8	59.6	46.3	54.8
Feeding & Watering	645	1.7	4.8	0	0	0.2	22.3	13.5	48.7	56	51.8
Breeding	626	10.7	2.4	3	0	2.2	18.5	54.3	40.6	78.1	62.3
Marketing	646	28.5	3.3	1.2	0.2	0	11.5	47.4	58.5	87.5	90.6
Herding	637	2.5	2.5	2.8	0	3.6	30.3	35.3	44.3	67.8	37
Caring for sick animals	644	7.1	5.1	3	0	0.6	19.3	21.6	55.3	72.2	69.3
Coordinating vet inputs	638	18.8	3.8	1.1	0	0	12.2	39	55	80.9	82.6
Slaughtering	609	23	2.1	3.9	0	0	11.8	65.5	49.9	87.8	81.9
Assisting Delivery	630	7.1	5.6	2.5	0	1.4	21.7	28.4	47.3	76.3	69.2

Source: Authors' calculations from participatory epidemiology and gender HH survey data.
M-Men, W-Women, YM-Youth male, YW-Youth female, CH-Children.

As to the figure 2 below, all household members participate in all the small ruminant activities considered by the respondents. However, the intensity of participation varies among household members based on the type of small ruminant husbandry and management

practices. Adult women mainly do the work of barn cleaning, feeding and watering (with average mean of 9.3 and 7.3 out of 20 counters, respectively) and followed by adult men whereas marketing of animals, slaughtering, coordination of veterinary inputs and breeding activities of small ruminants are dominated by adult men (with average mean score of 12.3, 11.7, 10.7 and 8.9 out of 20, respectively). On the other hand, activities such as caring for sick animals and assisting during delivery are mainly shared between adult men and women. Herding is a work relatively shared by all household members except youth females with low involvement. The result is in agreement with what is reported by Nicola and Stephen (2015), women carry out most of the roles in managing the small ruminant animals up to the point of sale which is seen as reproductive roles while the adult men are more engaged in productive and knowledge intensive roles (such as breeding, slaughtering, coordinating vet inputs and marketing).

Figure 2. Intensity of household members' participation in small ruminant management activities



Source: Authors' calculations from participatory epidemiology and gender HH survey data.

The results from the quantitative analysis tend to agree with what was reported in the literature on gender roles in livestock (Galiè et al, 2015; Lemlem et al, 2010; Yisehak, 2008; Lemlem et al, 2007). However, the qualitative study revealed a different story. Discussants in the different FGDs noted that each of the husbandry and management practices reported are composed of various sub activities where role divisions are more clearly observed along gendered lines. For example, the work of barn/shade/pens cleaning constitutes sub activities such as the daily removal of dungs, tethering of animals inside the cleaned barn/sheds/pens, and assigning and monitoring in order to make sure that it is cleaned by someone else. Similarly, the work of taking care of sick animals is composed of sub activities such as regularly diagnosing and separating sick animals from the herd, instructing/assigning HH members to take care of sick animals, daily monitoring of health situation of the overall flock, and the daily feeding and watering of sick animals (table 7).

Table 7. Small ruminant management and husbandry practices identified and used as operational definition of variables for the analysis

Small Ruminant Activities	Components of the activities	Nature of the Activity
Barn/shade/Pens Cleaning	- Remove dungs from barn/shade/pen	Physical Labour
	- Clean and tether animals inside the barn	Physical Labour
	- Assign, monitor barn to make sure that barn is cleaned by someone else (assigned)	Management/Decisions
Feeding & Watering	- Oversee feeding and feed situations for mall ruminants	Management/Decisions
	- Assign others where & how to feed	Management/Decisions
	- Process available feeds by mixing with concentrate feeds	Physical Labour
	- Feed small ruminants with supplements & household left overs	Physical Labour
	- Collect straws, grass and feeds used for animals feeding	Physical Labour
	- Purchase of feed in case of grazing shortage	Physical Labour
	- Bring animals to watering points	Physical Labour
	- Water animals at homestead	Physical Labour
Breeding	- Select rams/ewes and take them for mating	Physical Labour
	- Assign others when & where to take for mating	Management/Decisions
	- Assign others on where & how to herd	Management/Decisions
Herding	- Construct enclosures around herding areas	Physical Labour
	- Gather animals from grazing field	Physical Labour
	- Oversee herd in the barn overnight	Physical Labour
	- Oversee pasture/grazing conditions for herding	Physical Labour
	- Herd flock simultaneously while operating other agricultural activities	Physical Labour
	- Tether animals in the homestead or in the field/along farm sides and monitor them	Physical Labour
Assisting Delivery	- Monitor & assist during delivery at home & grazing areas	Physical Labour
Caring for sick animals	- Diagnose & separate sick animals from the herd	Physical Labour
	- Instruct HH members to take care of sick animals and not to mix them with others	Management/Decisions
	- Monitor health situation of flock at home	Management/Decisions
	- Follow up the daily care of sick animals	Physical Labour
	- Feed & water sick animals	Physical Labour
Coordinating vet inputs	- Identify and assign someone where and when to take sick animals to vet clinic	Physical Labour
	- Take sick animals to vet clinics and cover service costs	Physical Labour
Slaughtering and disposal	- Identify animals to be slaughtered & culled out	Management/Decisions
	- Make decision on which animal to slaughter	Management/Decisions
	- Slaughtering and skinning live & dead animals	Physical Labour
	- Bury or burn dead animals due to diseases	Physical Labour
	- Clean the blood & rumen during slaughtering	Physical Labour
	- Process meat & make ready for cooking	- Physical Labour
Marketing	- Buy & sell animals at market place	Physical Labour
	- Taking animals to market place & back home	Physical Labour
	- Negotiate with others to borrow/buy animals for restocking	Physical Labour
	- Collect & deliver market information regarding where & when to sell or buy	Physical Labour
	- Participate in the decision of which animal to sell and buy	Management/Decisions

Source: own data, FGD with men, women and youth groups, 2015.

Distinct roles on gender lines within the sub activities observed, for instance, in the particular examples mentioned, it is the women, supported by youth female and children, are found to be the key players in carrying out the labour intensive components of these activities. For example, such activities include the daily removal of dungs from barn, tethering of animals inside the cleaned barn, regularly diagnosing and separating sick animals from the herd, feeding and watering of sick animals, and monitoring of health situation of the flock. Whereas, men's role is found to be assigning appropriate HH members and monitoring them in order to make sure that barn/shade/pens is cleaned, and instructing/assigning HH members to take care of sick animals which could imply that men tend to control the decision making aspect of small ruminant husbandry and management practices. These results are in agreement with findings reported by Nicola and Stephen (2015) who argue that generalisations about men and women's roles in mixed-sex households practising livestock husbandry include the notion that men (typically, older men), are more involved in the decision making aspects of livestock husbandry practices whereas women may be more commonly responsible for tasks which 'reproduce' the income-generating workforce.

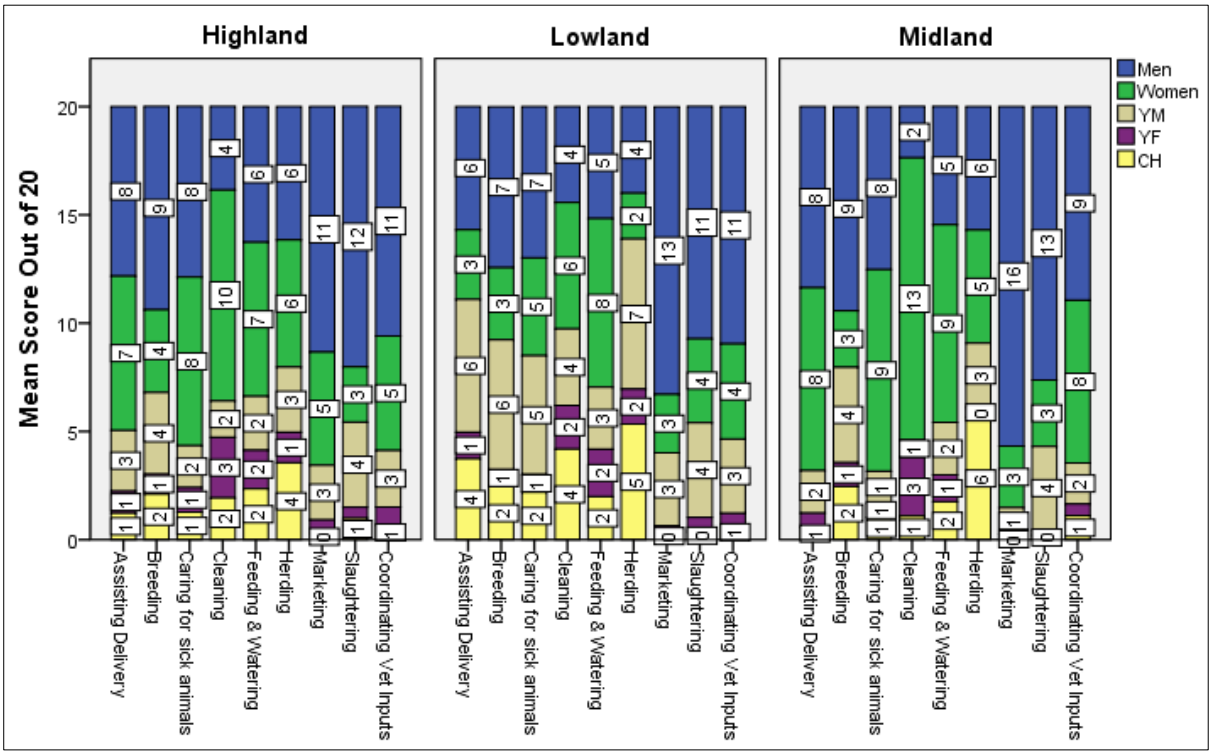
Does the intensity of involvement of household members in small ruminant management vary by agro-ecology and categories of respondents?

Variation by Agro-Ecology

Generally speaking, shared participation by men, women and youth male is observed in most of the practices in the lowland agro-ecology whereas men and women actively engaged in the high and midland areas of the study sites. Active youth involvement in lowland areas could be as a result of their low level of access to education and thus tend to remain in livestock rearing (CSA, 2013). Women in midland tend to be more involved in cleaning, feeding and watering, caring for the sick animals, assisting in delivery and coordinating vet inputs than women in highland areas except for marketing and breeding activities where the reverse is true (figure 3).

Whereas men active engagement is observed in coordinating vet inputs, slaughtering, marketing and breeding across agro-ecologies with higher level of participation in lowland, highland and midland, respectively. Men's dominance in these activities could be related to their upper hand in decision making over household finance as the activities such as coordination of vet inputs and marketing involves cost/income (Zahra et al, 2014; Hebo, 2014). The result is in line with the findings of (Mengistu, 1997) in the high land parts of the country where he reported that women alone contribute 50% of the labour force for barn cleaning. However, in contrary to our findings he reported that men contribute 90% of the time for hand feeding animals. Nevertheless, hand feeding is not as such common in Ethiopia and if practiced it is usually for oxen feeding. Youth male are seen having active involvement in lowland areas than mid and highland areas whereas youth female participation in small ruminant activities is generally low across the agro-ecologies.

Figure 3. Intensity of participation in small ruminant husbandry and management activities by agro-ecology



Source: Authors' calculations from participatory epidemiology and gender HH survey data.

Using Kruskal-Wallis equality-of-populations rank test, we have tested whether the observed variation in terms of intensity of household members' participation across agro-ecologies and by category of respondents are as a result of random chance or not. The results (see table 9 in the Annex) suggest that the perceived intensity of all household members' involvement in barn/shade cleaning and herding activities changes with agro-ecology, for example, women in midland participate more in cleaning than women in other agro-ecologies. In contrast, for feeding and watering activities, only men's level of involvement changes across agro-ecologies, suggesting that men in the highlands involve more in this activities than men in other agro-ecologies. Except for youth female and children, the perceived level of involvement of household members in breeding activities is not the same across agro-ecologies, adult men and women are believed to have a higher level of participation in breeding in the highland areas than adult men and women in the other agro-ecologies whereas youth male in the lowland areas compared with youth in the rest of agro-ecologies.

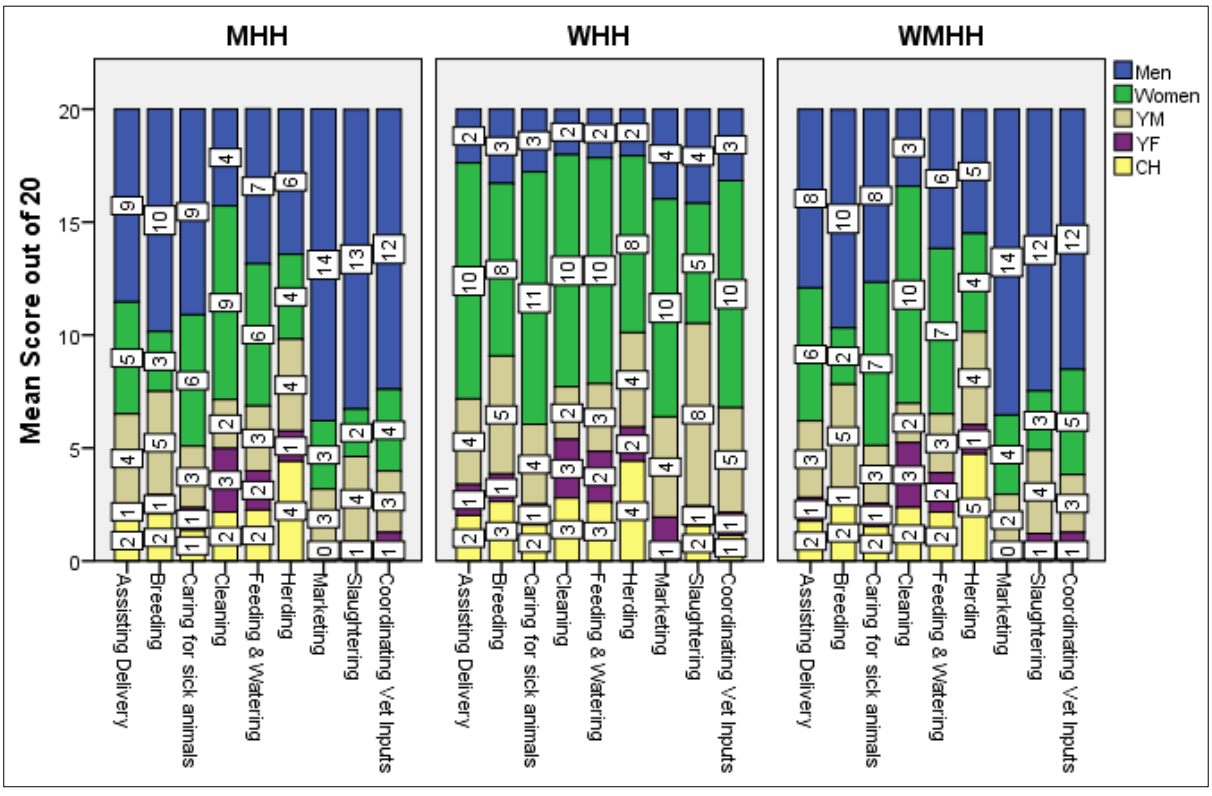
Similarly, with regards to marketing, while youth female and children's perceived intensity of involvement kept constantly low, it varies for men, women and youth male across agro-ecologies suggesting that men, women and youth male have higher level of involvement in midland, highland and lowland, respectively. Intensity of involvement in taking care of sick animals vary with agro-ecology for all household members except for that of children's. Participation in this activity is higher for men and youth female in highland, women in midland and youth male in lowland areas. With respect to coordinating vet inputs, intensity of involvement only vary for women and youth male and remains the same for other household members across agro-ecologies suggesting that women and youth male have higher

involvement in midland and lowland areas than women and youth male in the other agro-ecologies, respectively. Except for that of youth female, the level of participation in assisting during delivery and slaughtering changes across agro-ecologies for all categories of household members. Men and women have higher level of involvement in these activities in midland areas than men and women in the other agro-ecologies while youth male and children in lowland areas than youth male and children in the rest of agro-ecologies (see Table 8 under Annex).

Variation by Respondent Category

Level of household members' participation in the small ruminant activities from the perspectives of the respondent categories revealed similarities between adult men and women in male headed households on almost all the considered small ruminant management and husbandry practices. Whereas adult women in women headed households completely differ from both categories of respondents particularly on adult men and women's participation status. This could be as a result of a significant proportion of the female household heads do not have adult male members in their households (table 4).

Figure 4. Intensity of household members' participation in small ruminant management activities by categories of respondents



Source: Authors' calculations from participatory epidemiology and gender HH survey data.

Disaggregating the results by respondent categories, the descriptive result revealed that adult men and women in male headed households tend to have similar responses on the level of household members involvements across all the small ruminants activities considered in the analysis. Both categories of respondents gave higher scores for adult men followed by adult women except for cleaning barn and feeding and watering activities. In contrary, women

household heads differs with the perceptions of adult men and women in male headed households by giving higher scores to adult women for all the activities followed by young male (figure 4).

However, results from Kruskal-Wallis equality-of-populations rank test (see table 9 under Annex) has shown that the mean scores given to adult men and women by the respondent categories is not equal across all the activities considered implying variations in perceptions about level of household members participation in these activities among men household heads, women household heads and women in men headed households. Likewise, for youth male, they held the same perception disparities with regards to marketing, caring for sick animals, coordination of veterinary inputs and slaughtering activities whereas for youth female and children differences in response among respondent categories was observed only for marketing and slaughtering activities, respectively. Men observed giving higher scores for themselves than others except for cleaning activities. Women in men headed households tend to respond in a similar way with their male counterparts except for feeding and watering activities (figure 4), they gave men lower scores than what the men gave for themselves. However, women household heads almost did the opposite to the adult men and women in male headed households by giving higher scores for adult women in all the activities considered except for slaughtering implying for the importance of intra household gender disaggregated analysis. As indicated above by the HH characteristics, the reason could be since most women headed households lack adult men labour in their family members the entire activities often carried out by the adult women themselves.

Conclusions and Recommendations

Finding literature on gendered perceptions on the involvement of household members in small ruminant activities is hardly possible. The study tried to capture the extent of household member's participation in small ruminant husbandry and management activities across agro-ecologies and differences in responses by adult men and women in men headed households and adult women in women headed households to inform small ruminant intervention designs and policy. Analysing perspectives of different categories of respondents is crucial to understand the gender dynamics at household level which is not the case in most of agricultural value chain studies. Knowing more about who does what in small ruminant production across the different farming systems from the perspectives of men, women and youth in different household types informs researchers, policy makers and development practitioners in order to avoid risks of making assumptions about gender roles and unintended consequences of interventions.

Although, women actively participate in key small ruminant activities such as cleaning barns, feeding and watering than men, their participation in marketing is marginal, implying that women might be marginalized from the benefits of their work. From the FGDs it is noted that youth male are active in the marketing of small ruminants they own which is not often the case for women in MHHs. Although, these gender division of labour seems the case in small ruminant production, a closer look in to these roles through a more detailed probing reveals that men are exclusively engaged in those activities involving income and decision-making which likely enable them control the decision making aspect of small ruminant husbandry and management practices.

Women's heavy engagement in the reproductive roles related to small ruminant animal husbandry and management practices could influence their position in livestock management, putting them into a secondary position, which could influence equity in decision making and benefit sharing. The findings from the study could have potential implications: (1) headship based analysis of gender roles could be potentially misleading as the views of women in male headed household could be overlooked ―a good example from the results of this study is that women and men in male-headed households differ on reporting who takes the primary responsibility when it comes to feeding, watering, and cleaning which are the key activities in small ruminant production. It is found that men gave higher scores for themselves underestimating women's time on these activities whereas women did the reverse; (2) given the differences in level of involvement of household members in small ruminant activities observed, there could be differences in level of knowledge on different aspect of small ruminants. For instance, women might be better aware of disease transmission in barns, at feeding and watering points and could play an important role in provision of animal health advisory services, roles that so far have been mainly filled by men; (3) the gender based differences could disproportionately expose household members to the risk of zoonotic diseases based on the type of activities they are responsible for; (4) moreover, the result of this study shade some light on the importance of considering gender roles across agro-ecologies for small ruminant related interventions in the study areas. This calls for more emphasis on gender relations both in research and policy formulation and transform gender relations that disadvantage women and youth in small ruminant value chain development.

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Annex

Table 8. Variation of involvement of HH members across agro-ecologies, Kruskal-Wallis equality-of-populations rank test

HH members	Rank Sum			Chi-squared
	Agro-ecology			
	Highland	Midland	Lowland	
Barn/ shade Cleaning	**(N=365)**	**(N=119)**	**(N=162)**	
Men	125231.00	26676.50	57073.50	41.592***
Women	24818.00	52857.00	31306.00	132.239***
Youth Male	115281.00	29938.00	63762.00	41.138***
Youth Female	118340.00	45964.00	44677.00	24.049***
Children	115386.00	32142.00	61453.00	24.815***
Feeding & Watering	**N=365**	**N=119**	**N=161**	
Men	124881.50	37391.50	46062.00	10.430**
Women	118493.50	36387.50	53454.00	1.421
Youth Male	115463.00	41492.50	51379.50	2.796
Youth Female	118807.50	36250.00	53277.50	1.514
Children	120063.00	40222.00	48050.00	3.937
Breeding	**N=346**	**N=118**	**N=162**	
Men	113031.50	38589.00	44630.50	9.651***
Women	116436.00	29151.50	50663.50	21.540***
Youth Male	99683.50	40500.00	56067.50	15.272***
Youth Female	111061.50	36261.50	48928.00	1.384
Children	108875.00	39405.00	47971.00	3.018
Marketing	**N=365**	**N=119**	**N=162**	
Men	106349.00	45353.00	57279.00	26.369***
Women	133841.50	32520.00	42619.50	45.142***
Youth Male	114297.00	37744.50	56939.50	4.901*
Youth Female	121981.00	36282.50	50717.50	2.887
Children	118463.50	39051.00	51466.50	0.243
Herding	**N=361**	**N=115**	**N=161**	
Men	127955.50	33325.00	41922.50	32.623***
Women	136377.00	34271.50	32554.50	103.170***
Youth Male	104484.00	34622.50	64096.50	40.168***
Youth Female	104484.00	34622.50	64096.50	40.168***
Children	106616.50	44607.50	51979.00	22.155***
Caring for sick animals	**N=364**	**N=119**	**N=161**	
Men	122559.50	36348.50	48782.00	4.890*
Women	125243.50	46371.50	36075.00	65.473***
Youth Male	110087.50	35001.50	62601.00	27.460***
Youth Female	121491.50	38626.00	47572.50	4.745*
Children	117863.00	36316.00	53511.00	1.502
Coordinating vet inputs	**N=361**	**N=116**	**N=161**	
Men	112773.00	37479.00	53589.00	1.426
Women	120707.50	36861.00	46272.50	7.241**
Youth Male	110173.50	38374.00	55293.50	5.328*
Youth Female	118906.50	36081.50	48853.00	2.504
Children	114948.00	38529.00	50364.00	0.770
Slaughtering	**N=330**	**N=118**	**N=161**	
Men	103575.50	38387.50	43782.00	8.096**
Women	99336.50	33021.00	53387.50	6.262**
Youth Male	96523.50	40026.00	49195.50	6.128**
Youth Female	101262.50	33957.50	50525.00	1.572
Children	106188.00	35004.00	44553.00	7.426**
Assisting Delivery	**N=350**	**N=119**	**N=161**	
Men	115921.50	41278.00	41565.50	22.115***
Women	123382.50	41900.50	33482.00	75.496***
Youth Male	102033.50	34856.00	61875.50	30.925***
Youth Female	112913.00	35027.50	50824.50	2.141
Children	106676.00	33556.50	58532.50	16.470***

***, ** and * significant at P < 0.01, 0.05 and 0.1 levels, respectively; df: 2

Source: Authors' calculations from participatory epidemiology and gender HH survey data

Note: Sample is 646 individuals from 430 HHs.

Table 9. Variation of involvement of HH members across categories of respondents, Kruskal-Wallis equality-of-populations rank test

HH members	Rank Sum Category of Respondents			chi-squared
	MHH	WHH	WMHH	
Barn/ shade Cleaning	**N=236**	**N=88**	**N=322**	
Men	85813.50	20499.00	102668.50	31.824***
Women	69738.00	30751.50	108491.50	8.681***
Youth Male	79788.50	29206.50	99986.00	3.178
Youth Female	76742.00	27680.00	104559.00	0.235
Children	74566.00	30792.50	103622.50	2.175
Feeding & Watering	**N=235**	**N=88**	**N=322**	
Men	85540.00	14521.50	108273.50	76.260***
Women	67331.50	35813.00	105190.50	27.002***
Youth Male	78034.00	28945.00	101356.00	1.272
Youth Female	76840.00	30433.00	101062.00	2.203
Children	74910.00	9243.00	104182.00	0.344
Breeding	**N=226**	**N=86**	**N=314**	
Men	76721.50	13120.50	106409.00	78.946***
Women	67393.50	36975.00	91882.50	41.452***
Youth Male	69598.00	28201.00	98452.00	0.759
Youth Female	70442.00	29059.00	96750.00	1.865
Children	66781.50	28126.50	101343.00	3.544
Marketing	**N=236**	**N=88**	**N=322**	
Men	84998.00	10368.00	113615.00	123.952***
Women	68795.50	40894.00	99291.50	59.431***
Youth Male	76237.00	33722.00	99022.00	11.368***
Youth Female	73429.50	32239.50	103312.00	5.741**
Children	75916.50	30038.50	103026.0	0.943
Herding	**N=231**	**N=88**	**N=318**	
Men	82436.00	16434.50	104332.50	55.998***
Women	66549.00	35968.50	100685.50	27.492***
Youth Male	73456.00	28282.50	101464.50	0.022
Youth Female	74249.00	28231.50	100722.50	0.097
Children	72618.50	27791.00	102793.50	0.343
Caring for sick animals	**(N=235)**	**(N=87)**	**(N=322)**	
Men	88806.00	13825.00	105059.00	88.230***
Women	65093.50	38688.50	103908.00	51.588***
Youth Male	75732.00	31479.00	100479.00	4.904***
Youth Female	76401.50	26955.00	04333.50	0.471
Children	73798.00	29058.00	104834.00	0.907
Coordinating vet inputs	**N=230**	**N=87**	**N=321**	
Men	84261.50	10180.50	109399.00	124.144***
Women	63661.00	39849.00	100331.00	61.953***
Youth Male	71951.50	33055.00	98834.50	10.929***
Youth Female	72109.00	29371.50	102360.50	1.085
Children	72710.50	29790.00	101340.50	1.558
Slaughtering	**N=225**	**N=75**	**N=309**	
Men	77063.50	9604.50	99077.00	88.512***
Women	64301.00	26780.00	94664.00	9.270***
Youth Male	65952.50	29625.50	90167.00	22.390***
Youth Female	66680.00	23314.50	95750.50	0.863
Children	65030.00	26019.50	94695.50	6.135**
Assisting Delivery	**N=227**	**N=87**	**N=316**	
Men	79550.50	12776.00	106438.50	87.403***
Women	63122.50	37189.00	98453.50	42.666***
Youth Male	73551.00	27734.00	97480.00	0.995
Youth Female	68307.50	29188.50	101269.00	2.744
Children	70926.00	28567.50	99271.50	0.516

Source: Authors' calculations from participatory epidemiology and gender HH survey data
Note: Sample is 646 individuals from 430 HHs.
*** and ** significant at P < 0.01 and 0.05 levels, respectively; df: 2