

Full Length Research Paper

# Women's workload and role in livestock production in pastoral and agro-pastoral communities of Ethiopia: The case of Afar

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This study looked at three pastoral and agro pastoral communities of Afar, Ethiopia. By surveying women and men in households that were headed by women (WHH) and that were headed by men (MHH), we were able to go beyond simply how labor is allocated between genders. Women do close to 100% of the household chores, but men share more of these in MHHs. MHHs appear to have advantages from more labor. Women in these households spend half as much time fetching wood and water and more time on rearing livestock than women in WHHs. Women in WHHs are less educated, but take more advantage of technical trainings and involvement in associations. The result of the multiple regression analysis showed that male labor was the most important factor influencing output. Labor from women was found to be used less efficiently in both households, implying that the spare time gained by women in MHHs was productive but still less so than men. Perhaps the most important findings here is that households without men are more likely to be limited to a subsistence lifestyle, and that one important reason is the time it takes for simple tasks such as fetching wood and water.

**Key words:** Labor, livestock, elasticity, household, gender, pastoralist.

## INTRODUCTION

Agriculture is the mainstay of the Ethiopian economy; and women are necessary and important key to this food production system (MOFED and UNICEF, 1994). Women constitute 50% of the population but contribute 65% of the labor-force in agriculture (TGE and UNICEF, 1993a). It is not surprising that the issue of subsistence production by women is attracting a great deal of attention (Shmink *et al.*, 1988; Wudinesh, 1991). In addition, a growing number of countries like Ethiopia have become net importers of food stuffs and uncontrollable population migration to urban centers, which heightens the importance of women in the agricultural labor force. Yet the condition of the Ethiopian women, especially in rural areas, is often oppressed.

They perform laborious household tasks, such as grain grinding and fetching fuel wood and water. These activities sap much of their energies, which could have otherwise been spent in more productive farming activities. They also are often crowded into low skilled, low paying activities (GOE, 1995).

There is ample evidence that most efforts towards increasing the productivity of the pastoral sector and the real incomes of rural producers have been accompanied by an intensification of labor within the pastoral household (EIAR 2012). This has increased women's workloads in the absence of any measures to alleviate their already extremely heavy domestic burden. It, therefore, stands to reason that very little can be achieved in terms of increasing rural women's labor productivity without taking into account the exact modalities of their participation in livestock production and the intrinsic limitations imposed on such work by other time-consuming household tasks (MoA, 2012).

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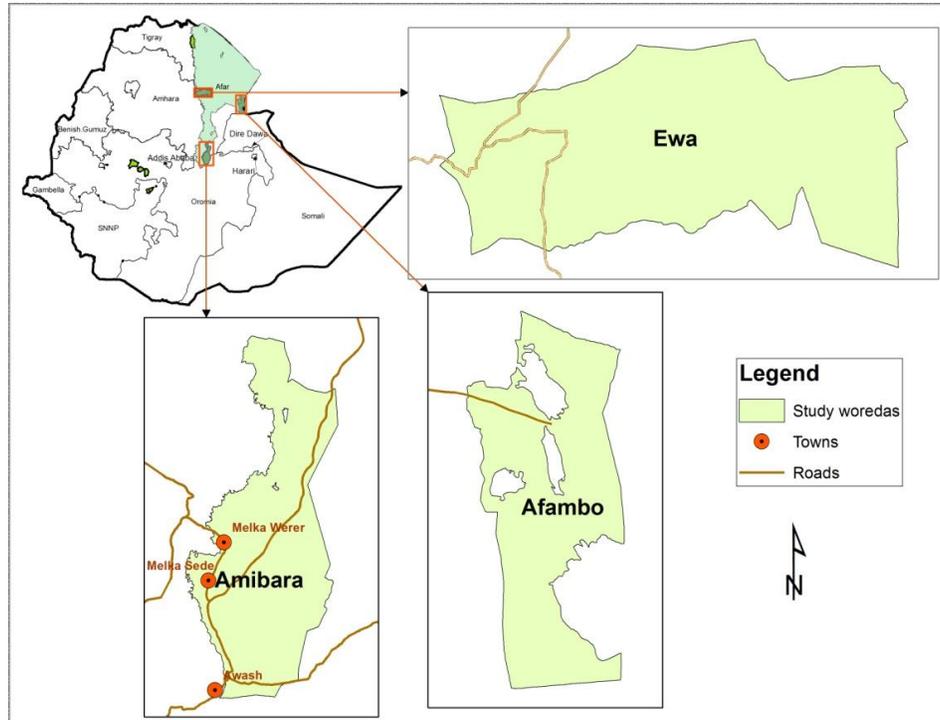


Figure1.

Sample

woredas

M= male labor hour in activities

W= women labor hour in activities

Y= livestock ownership

$\alpha$ ,  $\beta$ , and  $\lambda$  are the elasticity tests

To define the labor force of different age groups, the labor power unit (lpu) was used. The LPU is defined as a physically and mentally healthy, average person. A person defined as a full labor power unit works eight labor power hours (lph) per day (Wudnesh, 1991).

According to Wudnesh (1991) the labor input of household members in each activity will be calculated as follows:  $LHY = T * N * F$

Where: LHY= labor/hour/household/year

T= time taken to do the job

N= number of people engaged

F= frequency per year

## RESULTS AND DISCUSSION

### Descriptive Analysis

#### Characteristics of Household

Using adult equivalent (AE) to adjust for age and sex of individual family members revealed that the mean adjusted family size was 4.4 and 3.2 in MHH and WHH, respectively. Saito *et al.* (1994) also found that WHHs had a relatively lower family size compared to MHHs in their study conducted in Kenya and Nigeria. The result is also consistent with Dejene (1994) and Addis *et al.*

(2000). Therefore, WHHs had approximately one less family member for labor than the MHH (Table 1). About half of the labor force was made up by men in the WHH, but men constituted about 60% of the labor force in MHHs.

The age structure of sample households shows that the average age of male household heads was 46.6 compared to 47.8 years for women heads with the minimum and the maximum age of 17 and 80 for MHH and 21 and 75 years for WHH, respectively (Table 2). This difference was statistically significant ( $t = -0.5$ ,  $p = 0.6$ ) at 10%. Regarding economically active family members (15 to 65 years), the MHH had larger economically active members (2.4) than WHH (1.7), significantly different at 1% probability level ( $t = 4.0$ ). The age distribution in both groups shows that the economically active age groups constitute the largest share of the family members.

The educational status indicates that about 66% of women in the WHH were illiterate; about 13.8% attended literacy classes, while around 20% had primary education. In contrast, about 45.3% of men in the MHH were illiterate, 12% attended literacy classes, while 22.6% had primary education. On average, the head of MHHs attended 2.7 years of schooling, while the heads of WHH attended 0.8 years. This shows that there is a significant difference ( $t = 4.6$ ,  $p = 0.01$ ) in terms of access to formal education between MHH and WHH (Table 3).

These results are consistent with previous studies. In most sub-Saharan Africa, the adult literacy rate of men is almost twice that of women and the enrolment of boys is almost twice as that of girls in secondary school. Gender

**Table 1.** Average family size of the households in AE.

Sex	MHH	WHH	Total	t-value
Men family member	2.6	1.5	2.1	5.2***
Women family member	1.8	1.7	1.8	0.7
Total	4.4	3.2	3.9	4.6***

\*\*\*, \*\* and \* indicate significance at 1 %, 5% and 10% respectively.

Source: Own survey 2013.

**Table 2.** Average family size by age group.

Age group	MHH	WHH	Total	t-value
<5 year	0.5	0.3	0.4	2.5**
5-14	1.3	1.2	1.2	0.7*
15-65	2.4	1.7	2.1	4.0***
>65	0.1	0.1	0.1	1.2*
Total	4.4	3.2	3.8	4.6***

\*\*\*, \*\* and \* indicate significance at 1 %, 5% and 10% respectively.

Source: Own survey 2013.

**Table 3.** Literacy rate of household head.

Literacy	MHH	WHH	Total
Illiterate	45.3	66	55
Read and write	12	13.8	12.9
Grade 1-6	22.6	20.2	21.4
Grade 7-8	10.6	-	5.7
Grade 9 and above	9.5	-	5
$\chi^2=15.9$ $p=0.003$			
Mean years of schooling	2.7	0.8	1.7

$\chi^2$  is the Chi-square

Source: Own survey 2013 .

based educational discrepancies tend to be greater in countries where incomes are lower (Saito *et al.*, 1994; Saito and Surpling, 1992). Studies conducted by Addis *et al.* (2000), Tiruwork (1998) and Dejene (1994) in Ethiopia also show that WHH have less access to formal education in rural Ethiopia. While this study finds the same trend, we also found that adult training could be an issue. Table 4 shows the differences in training received by women in WHHs and women in MHHs. Women in WHHs attended on average about three trainings three years ago, while women in MHHs attended on average less than one training per year during the same time period. The difference in the training was highly significant. However, in more recent years, 2011/12 and 2012/13, there was no statistically significant difference between the number of trainings that women in each type

of household received. The results indicate stagnant training opportunities, although further research is advisable for the cause.

These findings have two major implications. First, although women received some training, the headship of a household determined to a large extent participation of women in the community. Women in male headed households were less likely to take part in capacity building and skill development exercises. In many cases, the male member of the households was the sole participant. Women, however, who were heading a household, were more likely to participate in training activities when they were available, despite that in many cases they have more time constraints due to limited labor and other productive resources. These findings are a reflection of the decision making process in many past-

**Table 4.** Mean differences in livestock training for women in WHHs versus MHHs.

Training	WHH		MHH		ATT
	Mean	Standard Deviation	Mean	Standard deviation	
Three years ago	3.14	2.01	0.82	1.48	1.66***
2011/2012	1.32	0.27	0.36	0.56	0.76
2012/2013	0.23	0.44	0.20	0.50	0.03

\*\*\*, \*\* and \* indicate significance at 1 %, 5% and 10% respectively  
Source: Own survey 2013.

**Table 5.** Difference in membership and community leadership for women in WHH and MHHs.

Group membership	Households		ATT
	WHH	MHH	
Membership in a pastoral community co-operative	69.2	17.0	52.2*
Membership in more than one co-operative	84.6	7.9	76.7***
Leadership position	46.2	20.5	25.7*

\*\*\*, \*\* and \* indicate significance at 1 %, 5% and 10% respectively  
Source: Own survey 2013.

oral households in the region, with the male household member being the sole decision maker and therefore participating in development activities. Women in WHHs, although more vulnerable, are better able to participate in development initiative related to livestock production system, as they are in many cases, also the only sole decision maker.

Table 5 shows that there were statistically significant differences between the levels of membership into community co-operatives between women in male headed households and women household heads. The results indicate that the majority of WHH (69.2%) had membership, while women in male headed households stated a much lower rate (17.0%). The difference between the levels of participation of 52.2% was found to be statistically significant at the 10% level of confidence. Furthermore, those women who household heads were also more likely to have membership into more than one community group as compared to women in male headed households. This is the case as the majority of the female household heads who had membership in a farmer group were found to have active membership into more than one group (84.6%), while a very small percentage of women in male headed households (7.9%) had membership in more than one group. The difference in the levels of participation in more than one group was 76.6%, which was highly statistically significant.

The implications of these findings are that women household heads in the community were more likely to be

empowered as compared to women in male headed households. This could be for different reasons like access and control over different resources, including information. These are important factors that increase self-reliance, which is an important aspect for empowerment. Generally, women headed households in many pastoral communities in the sample districts are worse off as compared to male headed households in terms of socio economic standing. This is due to limited access to resources such as livestock, finance and labor. This study demonstrates that agricultural research and development programs can allow women to have greater linkages with service providers and access to information and new knowledge.

### Division of Labor by Gender

We divide labor into two categories, household and livestock. This division is meant to sort out those activities that are necessary to maintain household survival (eating, drinking, heat, etc.) from the act of running an income generating enterprise (livestock).

### Household Activities

Household activities include bread baking, injera baking, preparing wet, grain grinding, water fetching, fuel-wood

**Table 6.** Average labor-hours spent (% of activity) by men and women on household activities.

Activities	MHH		WHH	
	Men	Women	Men	Women
Bread baking	0	100	0	100
Injera baking	0	100	0	100
Preparing wet	0	100	0	100
Grain grinding	0	100	0	100
Water fetching	25	75	18	82
Fire wood collecting	33	67	22	78
Washing clothes	20	80	0	100
House cleaning	0	100	0	100

Source: Own survey 2013

**Table 7.** Mean difference in time spent water fetching for women in MHH and WHH.

	MHH	WHH
Average labor-hour per house hold per 270 days	422.15	936.44
t-value	7.16***	

\*\*\*, \*\* and \* indicate significance at 1 %, 5% and 10% respectively

Source: Own survey 2013.

collecting, washing clothes, and house making. The ones that are performed daily are baking, making wet for fetching water. Fuel wood collection is performed daily or once every two days depending on livestock owned and availability of fuel wood.

As shown in Table 6, baking bread or injera, cooking wet, grain grinding and house cleaning were done entirely by women, while the other activities were shared between the two sexes. The proportion of help from men was never more than one third of the time, and men helped proportionally more in MHHs than in WHHs.

The time that women must spend on the household competes with time that they could spend earning income with livestock. Women in MHHs have more flexibility as there are more adult workers in the family. Men help out more in MHHs because there are more men in the household. Since women shoulder almost all of the household activities, we further examined how much time was lost to the most time consuming chores, which were fetching water and wood.

### Water Fetching

Information gathered from observation and interviews showed that water, in the selected households, is used for drinking (for household and livestock at home), cooking, washing clothes, and taking baths. Many households fetched water from rivers and springs that

were far away. The length of time considered for fetching water was only 9 months, to account for the presence of rain. The average labor-hour is calculated per 9 months, per household using the formula:

$$ALH = T * N * F * 270$$

**Where:** ALH=average labor-hour per 270 days per household

T=time (hr) required for the activity/day

N=number of people involved (Ih)

F=the frequency of the activity

A t-test was used to determine if there was a significance difference between women in WHH and MHH as shown in Table 7. The calculated t-value shows that labor-hour requirement for the women in MHH was significantly different from the WHH at 1% significance level, with women in WHH spending 936.44 hours per year compared to less than half as much for women in MHHs.

### Wood collection

Woods were commonly used for baking, cooking, house and barn making etc. The households grind different woods for baking injera and bread, making wet and other purposes. The survey revealed that they carry the wood frequently in small amounts. The average labor hour per household per year was calculated as:

**Table 8.** Mean difference of time spent collecting wood for women in MHHs and WHHs.

	MHH	WHH
Average labor-hour per house hold per 12 months	219.23	599.33
t-value	6.35***	

\*\*\*, \*\* and \* indicate significance at 1 %, 5% and 10% respectively  
Source: Own survey 2013

**Table 9.** Mean difference of labor requirements of women in MHH and WHH for livestock management.

	MHH	WHH
Average labor-hour per house hold per 12 months	813.7	1454
t-value	7.21***	

\*\*\*, \*\* and \* indicate significance at 1 %, 5% and 10% respectively  
Source: Own survey 2013.

$$ALH=T*N*F*12$$

**Where:** ALH = average labor-hour per 12 months per household

The average labor-hour requirement and the t-value for collecting wood for the household are shown in Table 8. Again, the extra burden of having to attend to household duties is heavier on women in WHHs than on women in MHHs. At nearly 600 hours per year, women in WHHs spend nearly triple the time of the counterparts in MHHs.

### Livestock Management

Women participated actively in sowing, weeding, transporting and storing cereals and pulses. Whereas males were very active in land preparation, plowing, weeding, harvesting and threshing in crop production. With respect to livestock production, women were active in barn cleaning, herding small ruminants, milking (sheep and cow) and preparing manure dung. Women also did most of the processing. In production and marketing, men had control over the majority of the decisions, although women had input especially about when to sell livestock products like milk.

Consistent with previous results above, we found that there was a significant difference in labor-hour requirements in the sampled household. The average labor time required was computed as:

$$ALH=T*N*E$$

**Where:** E = Number of livestock

As shown in Table 9, the average labor hours required per household per year was 813.7 for women in MHHs

and 1454 for WHHs. Women in WHHs spend more time on household chores and livestock, again because there are fewer men in WHHs.

From the information gathered from formal survey, focus group interview and observation, there is a strong justification that showed the extra time gained by women in MHHs had been used for producing forages and milk sales. The average production of forage and milk selling purpose per household per year was used to compare the difference between mean productions in MHH and WHH. As shown in Table 10, women in WHHs have only one-third as much time to raise supplemental forage compared to women in MHHs. One woman said (translated into English) "previously, let alone producing forage much in our backyards for feed, we did not even have enough time to manage sick livestock. But at moment, my daughters are involved in other responsibilities in helping so that we are trying to manage the forage production for animal feed".

### Production Functions

A production function is the mathematical relationship between the quantity of output and the quantities of inputs required in the production process. It is represented as  $Y = f(x_1, x_2, \dots, x_n)$ , where Y is the output and the  $X_i$  is the inputs (Heady and Dillon, 1998).

Results of this study depict that MHHs have access to labor and time saving technologies, as shown in descriptive statistics below. It follows that these technologies have helped women in MHHs obtain more time and energy compared to the WHH. Fitting production functions to the two sample categories can show the marginal productivity of activities by men and women, which could indicate what the benefit would be of freed labor (e.g. if wood or water fetching time could be

**Table 10.** Mean differences in forage production at the backyard.

	WMHH	WHH
Average labor-hour per house hold per 12 months	363.2	122.9
t-value	4.44**	

\*\*\*, \*\* and \* indicate significance at 1 %, 5% and 10% respectively.

**Table 11.** Estimated parameters for production of livestock in WHH.

Cobb-Douglas		
Variables	MHH elasticity	WHH elasticity
Intercept	0.74(0.07)**	3.57 (0.88)***
Male labor hour	0.57(0.14)***	0.46 (0.16)***
Women labor hour	0.11(0.08)**	0.32(0.12)***
Number of livestock	0.04(0.11)***	-0.04(0.09)**
Livestock ownership	-0.05(0.12)***	-0.09(0.07)**
Farm land ownership	0.38(0.16)***	0.09(0.11)***
N	150	150
R-square	87.3	80.3
Adjusted R <sup>2</sup>	78.4	75.1
Std. Error	0.13	0.24
F-statistics	52.09	58.02
F-probability	0.000	0.000

**Note:** results of parenthesis = robust standard errors; \*\*\*, \*\*, \* indicate significance 1 %, 5%, 10% respectively  
Source: Own survey 2013.

reduced, how valuable would that labor be if used for livestock).

The Cobb-Douglas production function was estimated for MHH and WHH, respectively as follows.

$$PMHH = 0.74M^{0.57} W^{0.11} L^{0.04} Y^{-0.05} F^{0.38}$$

$$PWHH = 3.57M^{0.46} W^{0.32} L^{-0.04} Y^{-0.09} F^{0.25}$$

**Where:** M=Male labor hour in production activities (Mlpu)

W=women labor hour in production activities (Wlpu)

L=Number of livestock in the year

Y=Livestock ownership (Tlu)

F=Farm land ownership (Ha)

P=Production level of livestock

As shown in Table 11, all variables were significant at least at the 5% level. The adjusted coefficient of multiple determinations is a statistic which gives the proportion of the variation in the output observations explained by the fitted function. Correction has been made for the size of the sample studied. The R<sup>2</sup> values were 87.3 and 80.3 percent for MHH and WHH, respectively, with standard

errors of 0.27 and 0.22. In both cases, the estimates were more than three times of their standard errors. Therefore, the values were significant at 1% level. It appears that the majority of the variability is captured by the regressed function.

In both estimated functions, labor is the most important factor. Farm size was also important for the MHH. The remaining variables were statistically significant but had marginal influence in comparison. Male labor was much more productive in the MHH, probably due to the division of duties. That is, since women had less time to devote to livestock, they focused on less productive but still important activities. However, men in WHHs were still more productive than women in WHHs, indicating that either men are more productive at the same tasks or that the tasks men focus on are the ones that matter most to productivity. An important question then is what women do with their time if freed up from time-consuming household chores. Culturally, would they devote it to livestock, or can their efforts be applied more effectively elsewhere?

In a Cobb-Douglas production function, the estimated coefficient for each input is the elasticity of that input. It indicates the expected percentage increase or decrease in production that would occur if the amount

of the input resource was increased or decreased by 1 percent, other input factors being held constant. And because of the models' nature, the estimates of the elasticity remain unchanged over the range of input levels to which the function is fitted and to which it might be applied.

In addition, the sum of the elasticity is an indication of the returns to scale under the assumption that no relevant input factors have been excluded. The sums of the estimates were 1.05 and 0.91 for MHH and WHH areas, respectively. These results imply the existence of nearly constant returns to scale in the operation of the farms, with a slight advantage in MHHs. This shows that a proportional change (increase or decrease) in the levels of all of the inputs together will bring a proportional change (increase or decrease) in the level of the output.

## CONCLUSIONS AND RECOMMENDATIONS

Skewed and unequal gender divisions of labor often characterize pastoral livelihoods, disadvantaging women in terms of heavy workloads. This study confirms that household activities are time consuming and limit the role of women raising livestock. However, it is difficult to tell how much time women would devote to livestock if time were freed up from these responsibilities, and whether the reason for that choice is that they are excluded from many livestock rearing activities or stems from a lack of interest. We surveyed women in male-headed households and in female headed households to help shed light on these questions. Women in women-headed households are not directly controlled by a spouse, however they are in a sense constrained by less time because they have fewer family members to work the farm. We found that WHHs had a 25% smaller family of eligible workers than MHHs.

We found that the additional labor in MHHs was linked to many advantages for the MHHs compared to WHHs, which women in MHHs also enjoyed. Women in both types of households did almost all of the household chores, but men helped a little more in MHHs. Therefore, women in WHHs spent a much larger fraction of their time on household activities, since they had less help. Women in WHHs spent over 1500 hours per year, more than 4 hours per day, collecting wood and water alone. Women in MHHs spent less than half that. Women in MHHs were able to use this advantage in time to apply 75% more hours to livestock activities, giving the entire MHH another advantage. In addition, they were able to spend three times more time raising supplemental feed.

We are unable, of course, to detect any equity issues or other negative social consequences for women in either type of home. However, we can show some interesting contrasts. Women in MHHs spend more time on livestock activities and less time on household chores

than women in WHHs. However, women in WHHs take more advantage of training opportunities and participating in farm groups like cooperatives. This appears to show either that women have less interest in working with livestock or that they are partially excluded from these activities in male-dominated homes. Women in WHHs don't spend as much time on livestock, but given the time it takes to do household activities, they probably can't. There is no question that freeing ups some of this burden would result in an increase in family livelihood in both types of households, but there is some question about how much of that time would be applied to rearing livestock.

In comparison to pastoral men, women in the case study areas are at the margins of development interventions and their voices and needs remain unheard. They continue to have limited access to development resources, trainings, extension services, credit, and inputs. Hence, development efforts aimed at supporting pastoralist are less able to have meaningful and equitable impact. Perhaps the most important finding here is that households without men are more likely to be limited to a subsistence livelihood, and that one important reason is the time it takes for simple tasks such as fetching wood and water. Cultural limitations may also be important, but time seems to be a pressing issue.

### The following recommendations follow from our study:

- There are many household chores, but fetching wood and water take over 4 hours per day. Therefore, our first and perhaps most important, recommendation is to identify and promote gender-sensitive and culturally appropriate workload management technologies and development practices that decrease the household workloads of pastoral women, especially fetching water and wood.
- Ensure greater gender analysis and integration in research and analysis of pastoral livelihoods in order to fill urgent gaps in knowledge and encourage gender positive development.
- Strengthen pastoral women's access to development services such as trainings and employment through affirmative action (e.g., women scholarships, quotas, gender sensitive policies, dedicated gender desks in local governance offices, etc.) in order to ensure equitable and sustainable development. Offer more trainings for women.
- Increase networking opportunities for women and opportunities to participate in farm groups

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