

Holden, Stein T.; Tilahun, Mesfin

**Working Paper**

## Gender Assessment of Youth Business Groups: Female Participation and Characteristics

Centre for Land Tenure Studies Working Paper, No. 6/19

**Provided in Cooperation with:**

Centre for Land Tenure Studies (CLTS), Norwegian University of Life Sciences (NMBU)

*Suggested Citation:* Holden, Stein T.; Tilahun, Mesfin (2019) : Gender Assessment of Youth Business Groups: Female Participation and Characteristics, Centre for Land Tenure Studies Working Paper, No. 6/19, ISBN 978-82-7490-280-0, Norwegian University of Life Sciences (NMBU), Centre for Land Tenure Studies (CLTS), Ås

This Version is available at:

<https://hdl.handle.net/10419/242777>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

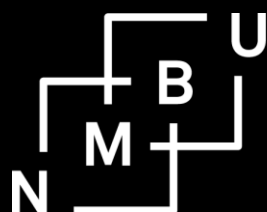
*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*

# Gender Assessment of Youth Business Groups: Female Participation and Characteristics

Stein T. Holden and Mesfin Tilahun



Norwegian University of Life Sciences  
Centre for Land Tenure Studies

Centre for Land Tenure Studies Working Paper 6/19  
ISBN: 978-82-7490-280-0



# Gender Assessment of Youth Business Groups: Female Participation and Characteristics

By

Stein T. Holden<sup>1</sup> and Mesfin Tilahun<sup>1,2</sup>

<sup>1</sup>School of Economics and Business  
Norwegian University of Life Sciences  
P. O. Box 5003, 1432 Ås, Norway.

<sup>2</sup>Mekelle University, Mekelle, Tigray, Ethiopia.

Email: [stein.holden@nmbu.no](mailto:stein.holden@nmbu.no); [mesfin.tilahun.gelaye@gmail.com](mailto:mesfin.tilahun.gelaye@gmail.com)

## Abstract

*This working paper is an output from the research project “Youth Business Groups for Sustainable Development: Lessons from the Ethiopian Model” that is funded by Research Council of Norway under the NORGLOBAL2 research program for the period 2019-2022. This working paper provides updated and extended information on the gender differences among group members and how these are related to likelihood of becoming group board members and leaders.*

*The study surveyed 274 groups in the period January-May 2019. 28 of the 274 groups have been dissolved by February 2019 for various reasons (internal conflicts, no land provided, low returns to their activity, migration, lack of motivation among members). Lack of support from the local authority was given as the main reason for groups being dissolved (23 of 28 groups). This means that close to 90% of the business groups are still active. Most of the statistics we present below are for the remaining 246 active groups that we intend to include in the training experiments (including control groups) and follow up surveys. Average group size in February 2019 for the 246 active groups was 17.6 members with group sizes varying from 7 to 175 members. The average number of male members was 10.9 against 6.7 female members. 41.4% of the male and 23.6% of female surveyed members are board members. 12.7% of the male and 1.1% of the female surveyed members were group leaders. Only 30.8% of the female members compared to 72.3% of the male members owned a mobile phone at the time of the survey. This puts females in a more disadvantaged position as the mobile phones are important for within-group communication and organization of group activities.*

**JEL Codes:** D02; D23; D7.

## Highlights

- In our sample of 246 active groups 31.3% of the sample of members in our survey are women.
- When we look at the composition of all the group members in these groups we find that there were 38.1% women in the groups.
- Our sampling strategy to include all group board members available has resulted on an under-sampling of female members because male members dominate in group boards.
- Female members tend to be younger, have slightly less education, fewer brothers, and have a lower birth rank.
- We use Cohen's  $d$ , which expresses the difference between means in standard deviation units.
- Males are significantly more wealthy and have higher incomes than female members on average.
- The Cohen's  $d$ s for gender differences in endowment and income variables indicate that these differences can be characterized as small based on Cohen's classification although men have significantly higher endowments and incomes (8 of 11 variables).
- 41.4% of the male and 23.6% of female surveyed members are board members.
- 12.7% of the male and 1.1% of the female surveyed members are group leaders.
- 59.3% of the group members had a mobile phone. Only 30.8% of the female members compared to 72.3% of the male members owned a mobile phone at the time of the survey.
- Of those owning a mobile phone only 10.8% owned a smartphone. Among mobile phone owners, 11.7% of the males and 6.4% of the females owned a smartphone.
- Males are significantly more likely to use the mobile phone for business purposes. The mobile phones are also important for within-group communication and organization of group activities.
- Group leaders and secretaries are those with highest likelihood of possessing mobile phones. The difference between leaders and vice leaders is substantial in likelihood of possessing mobile phones, and especially so among female leaders and vice leaders.
- Above 70% of the group members are married. About 11% of the women are divorced or widowed compared to very few men in these categories while a larger share of men are unmarried.
- About 34% live on the farm and in the house of their parents while about 43% live in their own house on a separate place. 11% live in a separate house on the farm of their parents. About 16% of the women live in the house of their in-laws.

## Introduction

This is a descriptive baseline survey report under the project “Youth Business Groups for Sustainable Development: Lessons from the Ethiopian Model” which is funded by the NORGLOBAL2 research program by Research Council of Norway. The School of Economics and Business at Norwegian University of Life Sciences is leading the project and has collaborating researchers at Mekelle University, Ethiopia, Christian Michelsen Institute, Norway, Wageningen University, The Netherlands, Osnabrück University, Germany, and University of Queensland, Australia.

The objectives of the project are as follows:

*Overall: Identify factors that enhance the performance and sustainability of formal youth groups as a business and livelihood option*

*Specific:*

- a) Evaluate the effect of group leader training and incentives on quality of leadership and group performance.*
- b) Evaluate the effect of gender empowerment training on within-group gender differences in performance and on overall performance of youth groups.*
- c) Evaluate how awareness of climate change, climate shock experiences and climate risk awareness and preparedness training affect youth preferences, behaviour, group production planning, livelihood strategies and performance.*
- d) Extract and disseminate the wider policy lessons from the Ethiopian youth group experience.*

The project goes from January 2019 to December 2022. The project builds on initial research on these youth business groups that started in 2016 under the NORAD-funded NORHED capacity building project “Climate Smart Natural Resource Management and Policy” (CLISNARP) and the following studies by Holden and Tilahun (2016, 2017a, 2017b, 2018a, 2018b, 2018c, 2018d).

This report serves primarily as baseline input into the design of the next stages of the research project, especially specific objective b) above; the gender empowerment training of female group members. The previous study “Gender Digital Divide and Youth Business Group Leadership” (Holden and Tilahun 2018c) serves as an important reference point that was based on the survey of 119 youth business groups and 1130 youth group members undertaken in 2016. This study found that 32% of the business group members were female and a large gender difference in mobile phone ownership with 37% of the females and 0% of the males owning mobile phones. The study also found that male members were twice as likely to become group board members and five times as likely to become group leaders. While there was a strong gender effect, having a mobile phone had an even stronger effect enhancing the likelihood of members becoming board members by 17.4 percentage points. A female member with a mobile phone was equally likely to become a board members as a male member without a mobile phone. Male members were also on average older than female members and age also had a significant effect on likelihood of becoming board members and contributed to the male dominance. Education also enhanced the likelihood of members becoming board members and leaders but this did not increase the gender gap in likelihood of becoming board members or leaders.

This report provides updated and extended information on the gender differences among group members and how these are related to likelihood of becoming group board members and leaders. The descriptive statistics provided in this report is for the 2019 survey of 246 active groups and 2427 group members from these active groups. This report complements the *2019 Group Leader and Member Survey Statistics* report (Holden and Tilahun 2019).

The study surveyed 274 groups in the period January-May 2019. 28 of the 274 groups have been dissolved by February 2019 for various reasons (internal conflicts, no land provided, low returns to their activity, migration, lack of motivation among members). Lack of support from the local authority was given as the main reason for groups being dissolved (23 of 28 groups). This means

that close to 90% of the business groups are still active. Most of the statistics we present below are for the remaining 246 active groups that we intend to include in the training experiments (including control groups) and follow up surveys. Figure 1 shows the distribution of group sizes, which also includes the dissolved groups, and shows that most groups consist of 10-20 members while a few groups are much larger. Average group size in February 2019 for the 246 active groups was 17.6 members with group sizes varying from 7 to 175 members. The average number of male members was 10.9 against 6.7 female members. The total number of members of the 246 groups in February 2019 is therefore 4328 members.

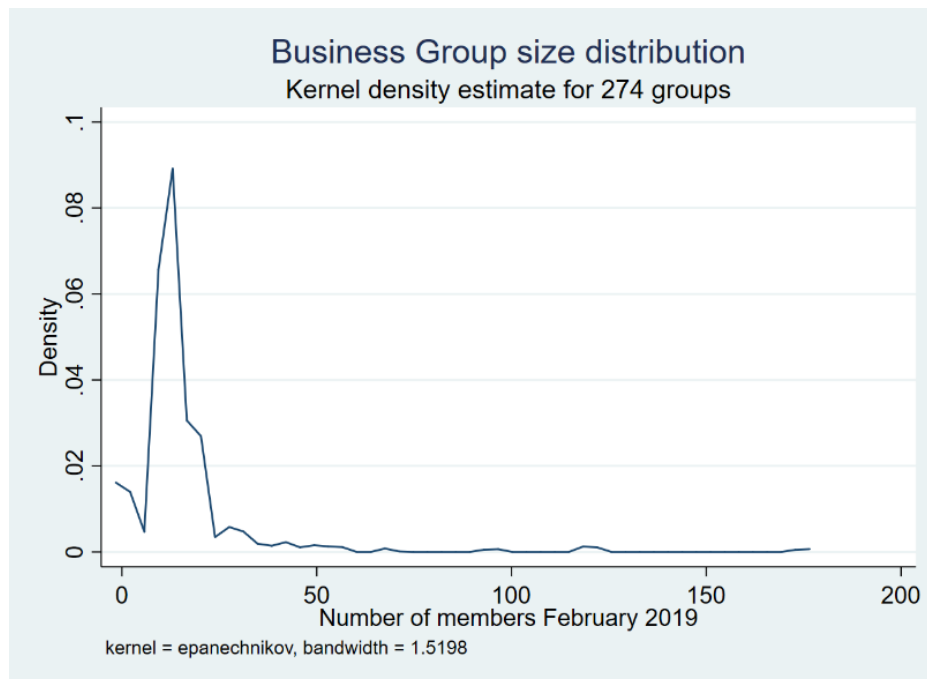


Figure 1. Group size distribution February 2019 for 274 surveyed groups

Of the remaining 246 active groups, 38.2% had at least one member dropping out the last three years (2016-2018). A total of 210 male and 144 female members had dropped out from these 246 groups over the three year period. These have to some extent been replaced by new members as these groups have received a total of 43 new male members and 29 new female members. The total number of members in these groups three years earlier was therefore 4610. This implies a net loss of 282 members or 6.1% of the members and a group size reduction and a reduction in average group size from 18.7 to 17.6 members over this three year period.

The group member survey included up to 12 members per group. The aim was to interview all group board members to the extent that they were available during our one-day visit, and additionally chosen non-board members that were available during our visit. 6.6% of the group members in our survey did not join their group at its start but at a later stage. The twelve members were interviewed simultaneously by twelve carefully trained enumerators using tablets for the interviews and questionnaires translated into the local language Tigrinya. The group leader and other board members were interviewed about the group activities and leadership issues. This report contains detailed information from both the 246 group level data and the 2427

group member data. Basic descriptive tables are presented and are given some limited interpretation. More work is need to carefully analyze the data for different purposes. Overall, we assess the data quality to be good and reliable. Still, we cannot rule out errors and potential biases and the report should be regarded as preliminary as it is based on quick descriptive analyses of the baseline data.

## Gender composition of groups

In our sample of 246 active groups 31.3% of the sample of members in our survey are women. However, when we look at the composition of all the group members in these groups we find that there were 38.1% women in the groups. Our sampling strategy to include all group board members available has resulted on an under-sampling of female members because male members dominate in group boards. With no gender bias in selection into youth business groups we should expect approximately 50-50 composition in groups. With only 38.1% women we see a male bias in the selection into groups. As we do not have data for the more general youth population we can only indirectly assess factors associated with recruitment into youth business groups. We can only make a comparison of gender differences for those that have been recruited in and are part of our sample. In addition to comparing individual characteristics such as age, education, number of siblings, and birth rank, we assess whether parent household characteristics differ significantly between female and male group members.

Table 1. A comparison of female and male member characteristics

	Females		Males		t-test
	Mean	St.Err.	Mean	St.Err.	Pr( T > t )
Age	29.7	0.27	33.5	0.25	0.0000
Education, years	4.41	0.15	4.77	0.09	0.0451
Number of brothers	2.57	0.05	2.78	0.04	0.0011
Number of sisters	2.55	0.05	2.60	0.04	0.4728
Birth rank	3.21	0.08	3.42	0.05	0.0338
Number of siblings in youth group	0.17	0.02	0.24	0.01	0.0010
Farm size of parents	2.31	0.08	2.68	0.06	0.0002
Education of head of parent household	0.43	0.06	0.46	0.04	0.7350
Sex of head of parent household, male dummy	0.75	0.02	0.70	0.01	0.0316
Does parent household have radio, dummy	0.26	0.02	0.28	0.01	0.3130
Oxen number of parent household	1.13	0.04	1.08	0.03	0.2022
Sample size	759		1668		

*Source:* 2019 Baseline survey data.

We see that female members tend to be younger, have slightly less education, fewer brothers, and have a lower birth rank. Their parents' household also have a smaller farm size and is more likely to be male headed.

We use Cohen's *d*, which expresses the difference between means in standard deviation units (Cohen 1988; Nelson 2015; Byrnes et al. 1999). For the case of a male versus female comparison, it is estimated as follows

$$1) \quad d = \frac{\overline{x_m} - \overline{x_f}}{sd_i}$$

where  $\overline{x_m}$  is the male mean,  $\overline{x_f}$  is the female mean, and  $sd_i$  is the pooled standard deviation. This measure has the advantages of being easily compared across studies and of expressing the size of the cross-sex mean difference relative to the degree of within-sex variation. The larger this ratio, the more substantive difference there is between the sexes. Sample size only affects its reliability but not its expected value. Cohen (1988) suggested that a  $d=0.2$  is small,  $d=0.5$  is medium and  $d=0.8$  is large in the type of psychological studies of his concern. We present Cohen's  $d$ s graphically in Figure 2 for the variables in Table 1. All the differences are small to medium.

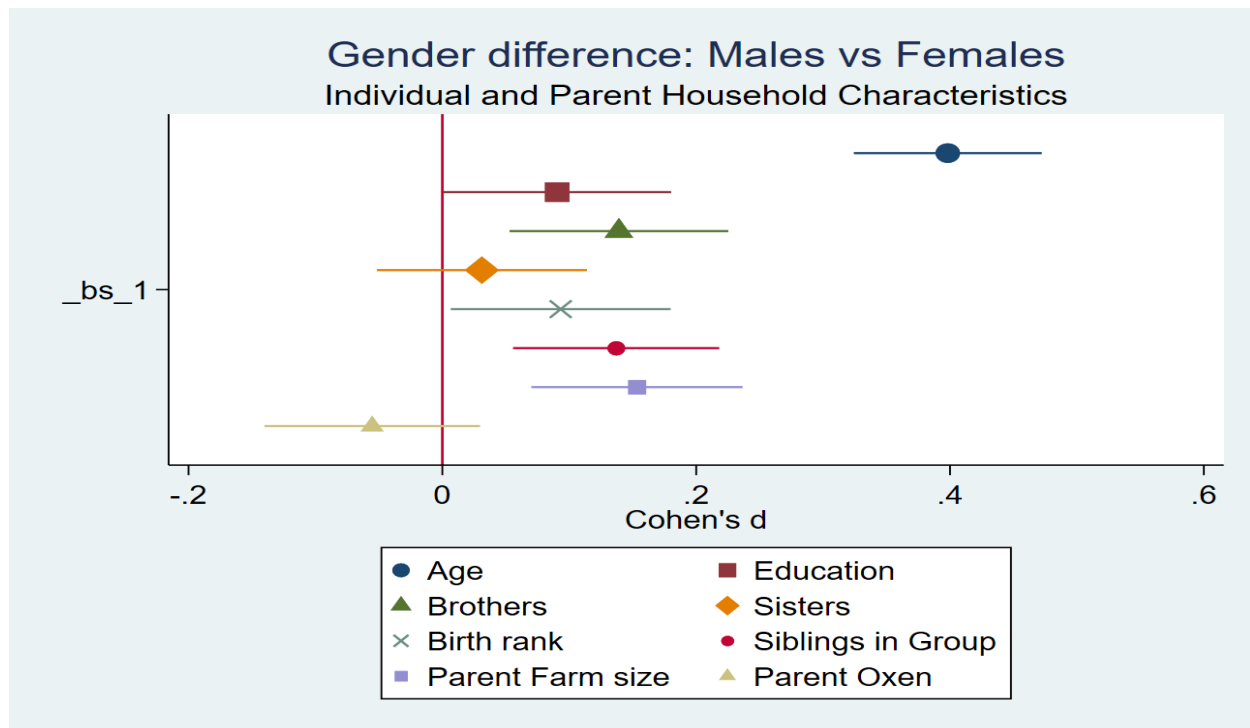


Figure 2. Cohen's  $d$ s for gender differences in individual and parent household characteristics

Table 2 provides an assessment of the gender differences in asset endowments and incomes by income source for the members during last year. The table shows that males are significantly more wealthy and have higher incomes than female members on average. Figure 3 assesses the Cohen's  $d$ s for gender differences in these endowment and income variables. All of these differences can be characterized as small based on Cohen's classification although men have significantly higher endowments and incomes (8 of 11 variables).



Table 2. Asset endowments and income sources of female and male members

	Females		Males		
	Mean	St.Err.	Mean	St.Err.	Pr( T > t )
Own and spouse land, <i>tsimdi</i> <sup>1</sup>	0.810	0.041	0.923	0.035	0.0377
Livestock endowment (TLU <sup>2</sup> )	1.381	0.057	1.748	0.047	0.0000
Number of oxen	0.792	0.031	0.965	0.024	0.0000
Number of ploughs	0.896	0.030	1.061	0.025	0.0000
Durable assets, number	1.627	0.052	1.799	0.042	0.0102
Farm income, ETB <sup>3</sup>	2804	234	3931	218	0.0004
Land rental income, ETB	2242	175	4576	242	0.0000
Construction work, ETB	1593	272	1382	135	0.4890
Trade income, ETB	1678	209	2293	193	0.0311
Other income sources, ETB	4921	361	4382	272	0.2338
Income from borrowed land, ETB	1590	178	1508	102	0.6901

Source: 2019 Baseline survey data. <sup>1</sup> 1 *Tsimdi*=0.25 ha. <sup>2</sup> TLU=Tropical Livestock Unites. <sup>3</sup> ETB=Ethiopian Birr.

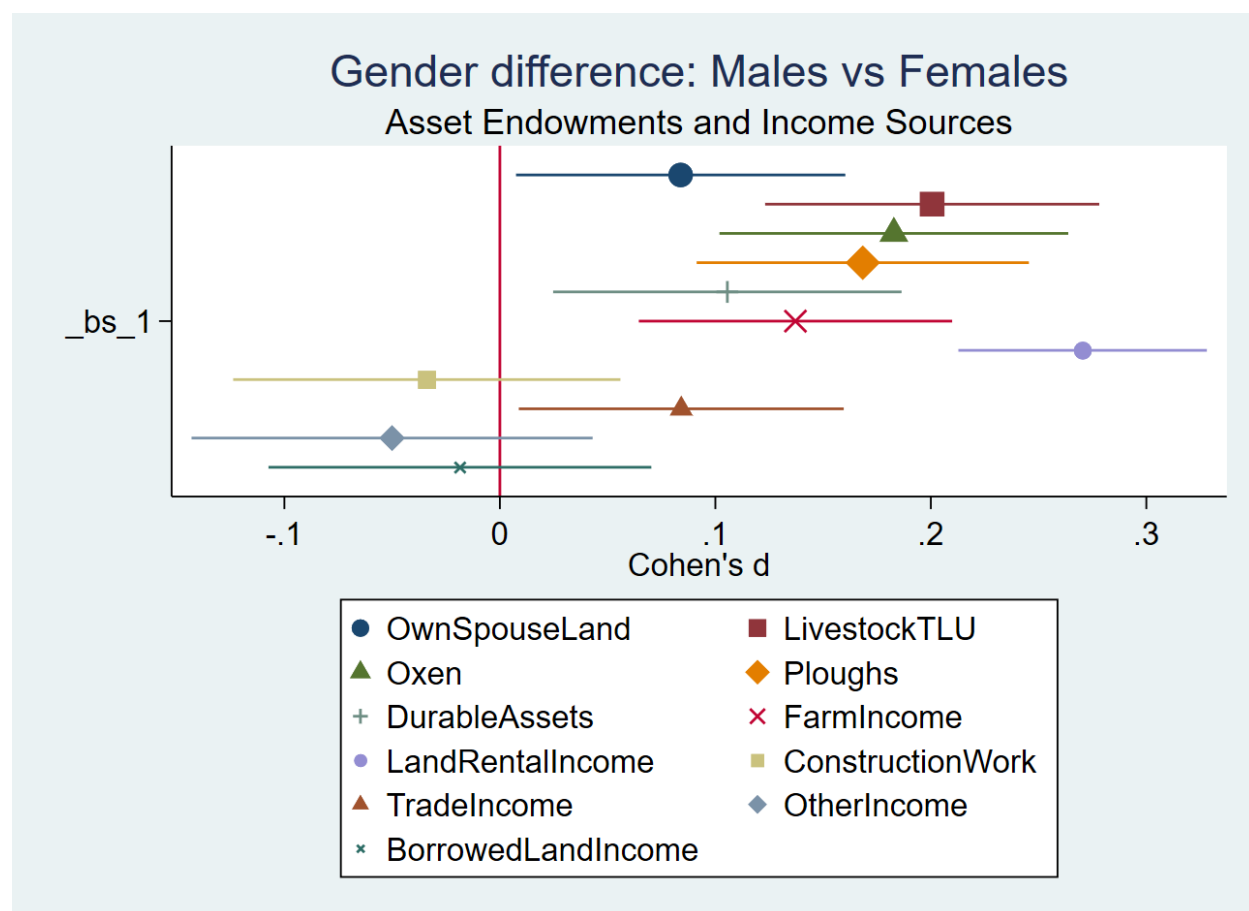


Figure 3. Cohen's *ds* for gender differences in asset endowments and income sources

We provide more information about this gender imbalance in group leadership positions in Table 3 below. Female members are much less likely to become group leaders or vice leaders than male members while the gender difference is lower for other group board positions.

Table 3. Number and % of female and male members in different board positions in our sample

Current position		Female	Male	Total
Leader	Freq.	8	212	220
	%	1.1	12.7	9.1
Vice leader	Freq.	23	147	170
	%	3.0	8.8	7.0
Secretary	Freq.	50	136	186
	%	6.6	8.2	7.7
Accountant	Freq.	58	133	191
	%	7.6	8.0	7.9
Treasury	Freq.	40	62	102
	%	5.3	3.7	4.2
Ordinary member	Freq.	580	978	1,558
	%	76.4	58.6	64.2
Total	Freq.	759	1,668	2,427
	%	100	100	100

Source: 2019 Baseline survey data.

Table 3 shows that 41.4% of the male and 23.6% of female surveyed members are board members. 12.7% of the male and 1.1% of the female surveyed members are group leaders.

We further inspect individual characteristics associated with different board positions in Table 4 based on simple OLS regressions, regressing board positions on individual characteristics. In addition to gender, age and education enhanced the likelihood of members becoming group leader and board member in general.

Table 4. Individual characteristics associated with board positions in groups

	Leader	Vice leader	Other board member	Board member
Male, dummy	0.0935***	0.0542***	-0.0187	0.129***
Age	0.00426***	0.000646	0.00397***	0.00888***
Education, years	0.0107***	-0.000334	0.0176***	0.0280***
Number of brothers	0.00422	0.00235	-0.0013	0.00526
Number of sisters	0.00532	0.00569	-0.00454	0.00646
Birth rank	-0.00149	0.0018	-0.000954	-0.000644
Number of siblings in youth group	0.0422**	0.0046	0.0122	0.0590**
Risk tolerance	-0.00925	-0.00436	0.0283	0.0147
Constant	-0.185***	-0.0121	-0.000683	-0.198***
N	2427	2427	2427	2427
R-sq	0.067	0.014	0.028	0.086

Note: Results from OLS regressions. Significance levels: \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

We explore potential interaction effects between the significant gender versus age and education variables. Age and education could have different effect on the likelihood of becoming leader and board members for female than for male members. The results are presented in Table 5.

Table 5. Individual characteristics associated with board positions, with interactions

	Leader	Vice leader	Other board member	Board member
Male, dummy	-0.052	0.0849*	0.014	0.047
Age	0.00186*	0.001	0.004	0.00671**
Education, years	0.002	0.002	0.023***	0.027***
Male*Age interaction	0.00297**	0.000	0.000	0.003
Male*Education interaction	0.0121***	-0.003	-0.008	0.001
Risk tolerance	-0.008	-0.005	0.028	0.015
Number of brothers	0.004	0.002	-0.001	0.005
Number of sisters	0.005	0.006	-0.005	0.006
Birth rank	-0.001	0.002	-0.001	-0.001
Number of siblings in youth group	0.043**	0.004	0.011	0.0581**
Constant	-0.078*	-0.034	-0.018	-0.129
N	2427	2427	2427	2427
R-sq	0.072	0.014	0.03	0.086

*Note:* Results from OLS regressions. Significance levels: \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Table 5 shows that age and education have stronger additional effects on the selection of group leaders for male members than for female members. Education is important for the selection of females in to other board member positions but does not enhance the likelihood of females becoming group leaders. Age increases significantly the likelihood of female members becoming leaders and board members.

### Education levels of group members

We assess the distribution of years of completed education among different group board positions, see Figure 4. It is the secretary position that has the best educated members. Surprisingly, quite may accountants had very limited education. We may wonder how that affects numeracy skills. Figure 5 shows that the gender differences in completed education are small.

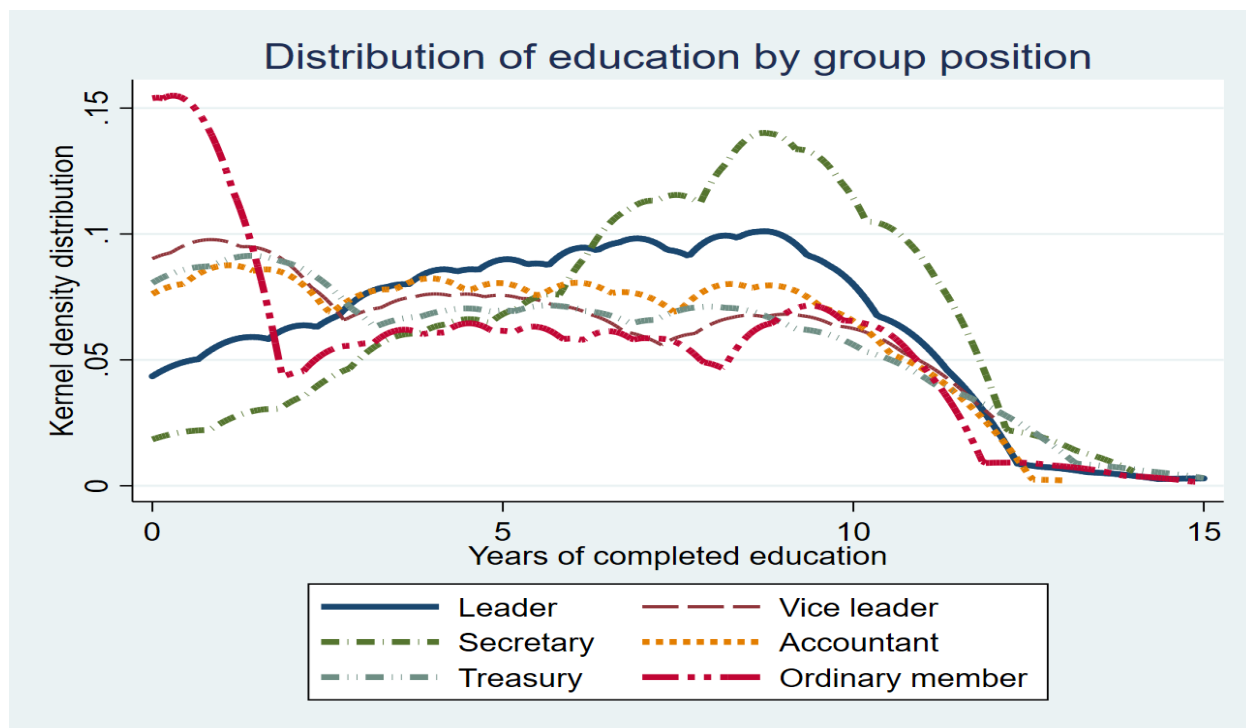


Figure 4. Distribution of years of education by position in the group

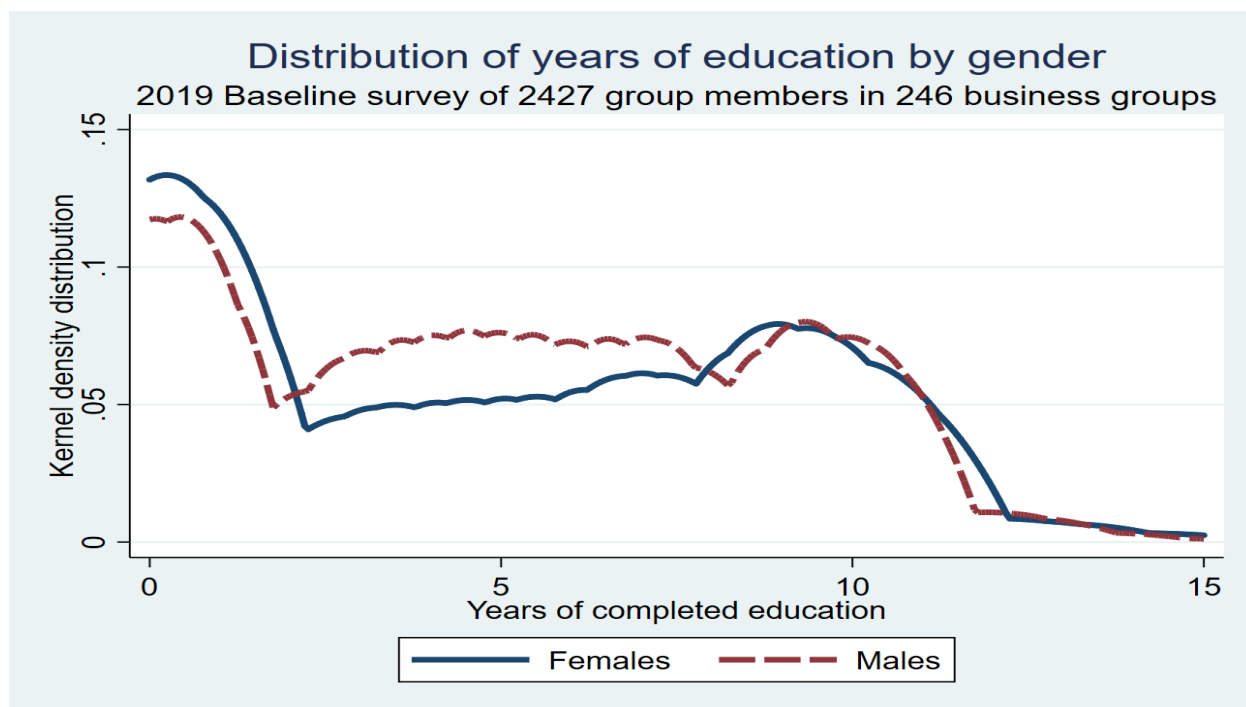


Figure 5. Distribution of years of education by gender

We want to assess whether and how the education of youth group members is related to some key parent household characteristics and whether and how gender and age are correlated with the number of years of completed education. Parents may have given more priority to educating their

male children. The education system has improved over recent decades in Ethiopia and that may imply that younger members are better educated. Parents with more education themselves and with more resources may also have been able to and more motivated to educate their children. We also assess whether there are district differences and whether the gender differences vary systematically across districts. The results of three alternative specified OLS models are presented in Table 6.

Table 6. Factors correlated with education of group members

	E1	E2	E3
Male, dummy	0.819***	0.773***	0.719**
Age	-0.155***	-0.151***	-0.152***
Parent household characteristics:			
Farm size	-0.164***	-0.011	-0.011
Education of head of household	0.298***	0.275***	0.274***
Sex of head of household	0.219	0.124	0.123
Parent hh has radio	0.683***	0.582**	0.581**
Number of oxen of parent hh	0.211*	0.159	0.160
Districts: Raya Azebo, baseline		0.000	0.000
Degua Tembien		1.318***	1.566***
Saharti Samre		1.293***	1.141*
Adwa		2.551***	2.680***
Male*Raya Azebo interaction			0.198
Male*Degua Tembien interaction			-0.161
Male*Saharti Samre interaction			0.402
Male*Adwa interaction			0.000
Constant	8.835***	6.868***	6.803***
N	2126	2126	2126
R-sq	0.179	0.229	0.229
AIC	11471.2	11344.2	11349

Note: Results from OLS regressions. Significance levels: \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Table 6 shows that males have on average 0.77-0.82 additional years of education than female members. One year additional age is associated with 0.15 years of reduced education, demonstrating the impact of the improved education system on the extent of completed education among youth. We find that the education of parents and whether the parents have a radio are strongly positively correlated with the education of members. We also see that the level of education is significantly lower in Raya Azebo district. There are no significant variations in the gender differences in education across districts.

### Mobile phone ownership and use by gender

Our 2019 survey data showed that 59.3% of the 2427 group members had a mobile phone. Only 30.8% of the female members compared to 72.3% of the male members owned a mobile phone at the time of the survey. Of those owning a mobile phone only 10.8% owned a smartphone. Among mobile phone owners, 11.7% of the males and 6.4% of the females owned a smartphone. Also this gender difference was significant. This implies that 8.4% of all male members and



2.0% of all female members have a smartphone. Limited internet access and higher cost of purchasing smartphones can explain the low share of members with such phones. The median purchase cost for those having smartphones was 1500 ETB compared to 500 ETB for simpler phones. The median monthly expenditure on use of mobile phones was 40 ETB for ordinary phones and 60 ETB for smartphones. The median monthly expenditure on use of mobile phones among females with phones was 30 ETB against 50 ETB among males.

Table 7 shows gender differences in mobile phone use for those owning such phones. We see that males are significantly more likely to use the mobile phone for business purposes. The mobile phones are also important for within-group communication and organization of group activities.

Table 7. Mobile phone use by type of use and gender among mobile phone owners

Mobile use	All Percent	Females Percent	Males Percent	Gender Sign. diff. Chi-square
Family and friends	99.7	99.6	99.7	
Communicate with other youth group members	92.9	86.3	94.2	***
Use it for private business	73.1	50.4	77.5	***
Use it to organize youth group activities	67.7	53.0	70.6	***
Use it to communicate with <i>tabia</i> authorities	47.9	24.8	52.4	***
Use it to obtain market information	52.9	32.5	56.8	***
Use it for entertainment	74.4	59.0	77.4	***
Number of mobile phone owners	1434.0	234	1200	

Source: 2019 Baseline survey data. Significance levels: \*\*\* p<0.001

Next, we asked the members to rank the three most important uses of their mobile phones (Rank 1 is most important). Table 8 lists the three highest ranked uses by all mobile phone owners. The table shows that communication with family and friends is ranked as most important by 79% of the respondents. Communication with other youth group members and organizing youth group activities are ranked as most important only by 3.5 and 2.9% of the respondents with mobile phones. However, these uses were ranked as the second most important use by 35.6 and 18% of the mobile phone owners and as the third most important use by additional 19.5 and 14.8% of the mobile phone owners.

We are also interested in seeing how this ranking differs across female versus male group members with mobile phones given the large gender differences detected in Table 7 above. The differences in rankings between females and males can be observed by comparing Tables 9 and 10. The rankings are quite similar so the main gender difference in having access to mobile phones.

Table 8. Ranking of most important mobile phone uses by all mobile phone owners

	Rank 1		Rank 2		Rank 3	
	Freq.	Percent	Freq.	Percent	Freq.	Percent
Communicate with family/friends	1,135	79.2	239	16.7	51	3.6
Communicate with other youth group members	50	3.5	511	35.6	279	19.5
Use it for private business	156	10.9	306	21.3	267	18.7
Use it to organize youth group activities	41	2.9	258	18.0	212	14.8
Use it to communicate with <i>tabia</i> authorities	6	0.4	5	0.4	58	4.1
Use it to obtain market information	34	2.4	46	3.2	151	10.6
Use it for entertainment (listening to music)	8	0.6	64	4.5	276	19.3
No more			4	0.3	134	9.4
Total current mobile owners	1,434	100.0				

Source: 2019 Baseline survey data.

Table 9. Ranking of most important mobile phone uses by female mobile phone owners

	Rank 1		Rank 2		Rank 3	
	Freq	Percent	Freq.	Percent	Freq	Percent
Communicate with family/friends	212	90.6	19	8.1	3	1.3
Communicate with other youth group members	8	3.4	119	50.9	28	12.1
Use it for private business	7	3.0	39	16.7	36	15.6
Use it to organize youth group activity	4	1.7	38	16.2	22	9.5
Use it to communicate with <i>tabia</i> authorities			2	0.9	7	3.0
Use it to obtain market information	1	0.4	2	0.9	26	11.3
Use it for entertainment (listening to music)	1	0.4	12	5.1	57	24.7
No more			3	1.3	52	22.5
Total	234	100.0				

Source: 2019 Baseline survey data.

Table 10. Ranking of most important mobile phone uses by male mobile phone owners

	Rank 1		Rank 2		Rank 3	
	Freq.	Percent	Freq.	Percent	Freq.	Percent
Communicate with family/friends	923	76.9	220	18.3	48	4.0
Communicate with other youth group members	42	3.5	392	32.7	251	20.9
Use it for private business	149	12.4	267	22.3	231	19.3
Use it to organize youth group activity	37	3.1	220	18.3	190	15.9
Use it to communicate with <i>tabia</i> authorities	6	0.5	3	0.3	51	4.3
Use it to obtain market information	33	2.8	44	3.7	125	10.4
Use it for entertainment (listening to music)	7	0.6	52	4.3	219	18.3
No more			1	0.08	82	6.8
Total	1,200	100				

Source: 2019 Baseline survey data.

Table 11 shows mobile phone use by group leaders. Mobile phones may be particularly important for their work to organize the groups, have contact with the authorities and get market information.

Table 11. Ranking of most important mobile phone uses by youth group leaders

	Rank 1		Rank 2		Rank 3	
	Freq.	Percent	Freq.	Percent	Freq.	Percent
Communicate with family/friends	135	70.0	41	21.2	12	6.2
Communicate with other youth group members	11	5.7	37	19.2	50	25.9
Use it for private business	31	16.1	46	23.8	44	22.8
Use it to organize youth group activities	11	5.7	58	30.1	44	22.8
Use it to communicate with <i>tabia</i> authorities	1	0.5	1	0.5	10	5.2
Use it to obtain market information	4	2.1	8	4.2	13	6.7
Entertainment			2	1.0	18	9.3
No more					2	1.0
Total	193	100.0				

Source: 2019 Baseline survey data.

Youth group leaders are more likely to use the mobile phone to organize youth group activities as we expected. Surprisingly, they use mobile phones to a small extent to obtain market information or to communicate with *tabia* authorities while using the mobile phone for private business is more common.

How is mobile phone ownership associated with the members having different board member positions in the group and does this vary systematically with gender? We cross-tabulate for each gender their position in the group and mobile phone ownership in Table 12.

Table 12. Female and male members' board position and mobile phone ownership

	Own a mobile phone?		Total	% with mobile
	No	Yes		
Females				
Leader	3	5	8	62.5
Vice leader	17	6	23	26.1
Secretary	22	28	50	56.0
Accountant	42	16	58	27.6
Treasury	20	20	40	50.0
Ordinary member	421	159	580	27.4
Total	525	234	759	30.8
Males				
Leader	24	188	212	88.7
Vice leader	34	113	147	76.9
Secretary	22	114	136	83.8
Accountant	31	102	133	76.7
Treasury	12	50	62	80.6
Ordinary member	339	639	978	65.3
Total	462	1,206	1,668	72.3

Source: 2019 Baseline survey data.

Group leaders and secretaries are those with highest likelihood of possessing mobile phones. The difference between leaders and vice leaders is substantial in likelihood of possessing mobile phones, and especially so among female leaders and vice leaders.

We ran regressions to assess the correlations between individual characteristics and mobile phone ownership, see Table 13.

Table 13. Factors correlated with mobile phone ownership

	M1	M2	M3
Male, dummy	0.398***	0.400***	0.449***
Age	-0.002	0.000	0.000
Education, years	0.0350***	0.0404***	0.0407***
Risk tolerance	0.034	0.035	0.033
Number of brothers	0.008	0.010	0.010
Number of sisters	0.009	0.010	0.009
Birth rank	0.002	0.003	0.002
Number of siblings in youth group	0.030	0.015	0.016
Livestock endowment (TLU)	0.0166**	0.009	0.010
Durable assets, number	-0.004	-0.003	-0.002
Raya Azebo district, baseline		0.000	0.000
Degua Tembien		-0.182***	-0.257***
Seharti Samre		-0.286***	-0.232***
Adwa		-0.222***	-0.297***
Male*Raya Azebo interaction			-0.118*
Male*Degua Tembien interaction			-0.008
Male*Seharti Samre interaction			-0.183***
Male*Adwa interaction			0.000
Constant	0.118*	0.223***	0.257***
N	2427	2427	2427
R-sq	0.242	0.276	0.28
AIC	2787	2680.4	2672.3

Note: Results from OLS regressions. Significance levels: \* p<0.05, \*\* p<0.01, \*\*\* p<0.001

We see that male members are about 40 percentage points more likely to own a mobile phone than female members. One additional year of completed education increases the likelihood of owning a mobile phone by 3.5-4.1 percentage points. We also see from model M2 that youth group members living in Raya Azebo district are 18-29 percentage points more likely to own a mobile phone than youth group members in the other three districts. Raya Azebo has high agricultural production potential, most of the population are Moslems and have more migration experience going to Arabian countries. In model M3 we have assessed potential gender and district interaction effects. We find that the gap in mobile phone ownership across districts is larger for female group members for Raya Azebo versus other districts. The gender gap was significantly lower in Raya Azabo and Seharti Samre than in Degua Tembien and Adwa.

## Migration history of members

Some of the youth group members are returning migrants. We assess the extent to which this is the case by categorizing youth into categories of returning migrants based on the type of migration experience they have. We also assess how the migration experiences in our sample is distributed over gender categories. We assume that members with such experiences also are much more likely to possess a mobile phone. Table 14 provides the details.

Table 14. Migration history of group members in our sample

Migration category	Freq.	Percent	% males	% with mobile phone
Never migrated	1,430	58.9	51.1	47.6
Internal seasonal or temporary migration	745	30.7	96.1	74.0
Internal temporary migration within Ethiopia	117	4.8	83.8	77.8
International migration (for work)	135	5.6	91.9	86.7
Total	2,427	100.0	68.7	59.3

*Source:* 2019 Baseline survey data.

We see a strong male dominance among the returned migrants and that returned migrants have a much higher likelihood of owning a mobile phone. We also assess the level of education by migration categories of members, see Figure 6.



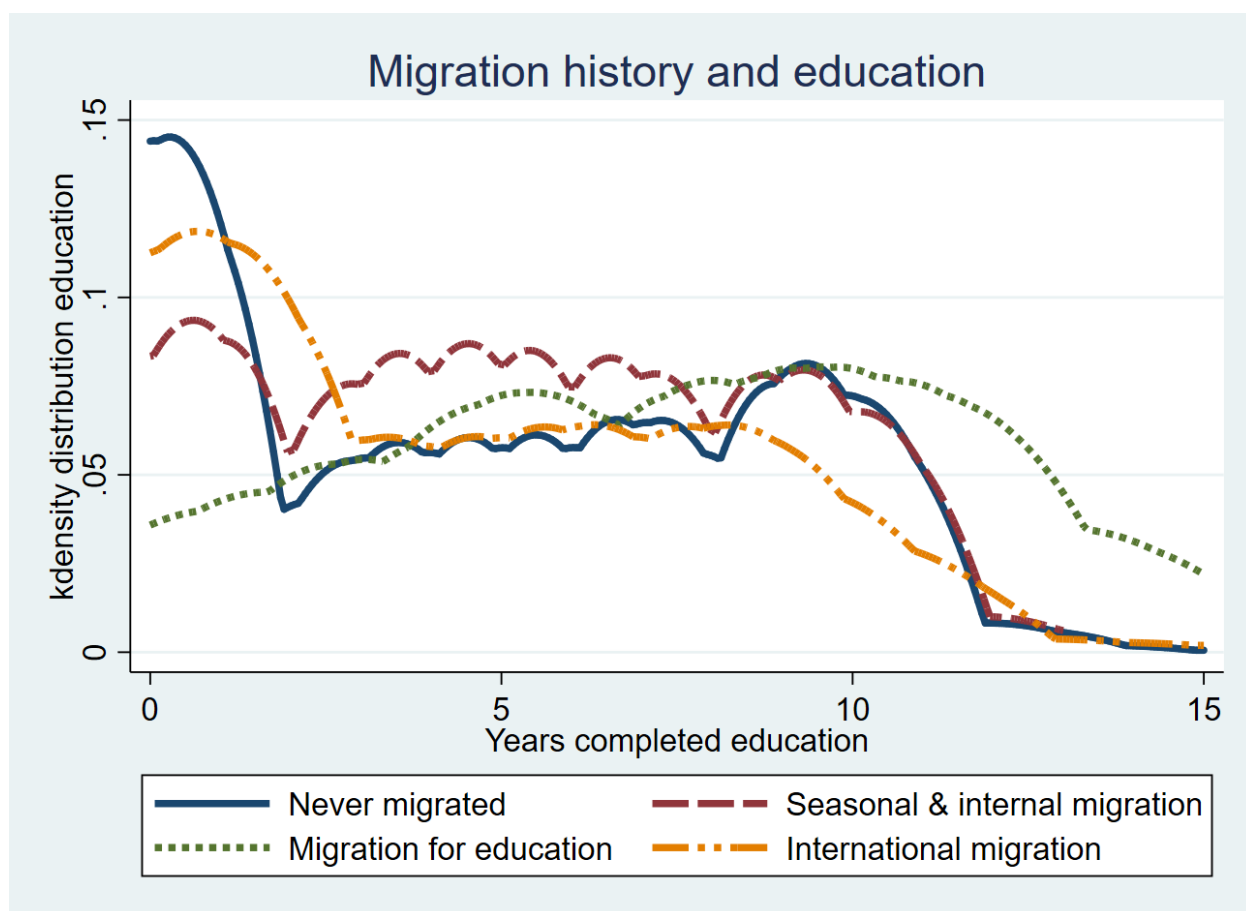


Figure 6. Migration history and education distribution

Figure 6 shows that those that never migrated are most likely to have no education. Those with international migration experiences were not particularly well educated. We assess the distribution of countries those with international migration history have gone to and how they are distributed across the districts in our sample, see Table 15.

Table 15. International migration history by country visited and district in Tigray

Destination	Raya Azebo	Degua Tembien	Seharti Samre	Adwa	Total
Saudi Arabia	104	0	1	1	106
Emirates	1	0	0	0	1
Sudan	13	0	8	2	23
Eritrea	0	3	0	2	5
Total	118	3	9	5	135

Source: 2019 Baseline survey data.

Table 15 shows that almost all returning migrants in the groups are found in Raya Azebo district and most of the migrants have visited Saudi Arabia. The population in Raya Azabo are mostly Muslims and that may also explain why they are more likely to have visited Muslim countries. Most of the returning migrants from Saudi Arabia were among those that were forced to return at the end of 2013 when Saudi Arabia returned 160 000 illegal migrants to Ethiopia.

## Marital status and housing conditions of members

The members are categorized by marital status and gender in Table 16. We see that more than 70% of the men as well as women are married. It was more common that women are divorced or widowed while a larger share of the men are unmarried.

Table 16. Marital status of members by sex

Marital status:	Freq.	Percent	Women	Percent	Men	Percent
Unmarried	600	24.7	118	15.6	482	28.9
Married	1,726	71.1	552	72.7	1,174	70.4
Separated	7	0.3	6	0.8	1	0.1
Divorced	72	3.0	63	8.3	9	0.5
Widowed	22	0.9	20	2.6	2	0.1
Total	2,427	100.0	759	100.0	1,668	100.0

Source: 2019 Baseline survey data.

We also investigated the kind of housing conditions the members had at the time of the survey to assess the extent to which they still lived with their parents or have been able to get their own house. The distribution by gender is shown in Table 17.

Table 17. Housing conditions of members by sex

	Freq.	Percent	Women	Percent	Men	Percent
On the farm of and in the house of parents	831	34.2	167	22.0	664	39.8
Own house on separate place	1,053	43.4	342	45.1	711	42.6
Own house on farm of parents	274	11.3	64	8.4	210	12.6
Live in house of in-laws	143	5.9	119	15.7	24	1.4
Other, specify	126	5.2	67	8.8	59	3.5
Total	2,427	100.0	759	100.0	1,668	100.0

Source: 2019 Baseline survey data.

We see that relatively more men live on the farm and in the house of their parents while women more often live in the house of their in-laws. A cross-tabulation of the the marital status and the housing conditions revealed that a large share of those living on the farm and in the house of parents were unmarried.

## Discussion and Project Implementation

It can be argued that endowments, including education, as well as risk tolerance can be endogenous in these models. We regard these results are preliminary and leave more sophisticated analysis of causal relations for future work. It is worth noting that Holden and Tilahun (2018c) found mobile phone ownership to be important for the likelihood of group members becoming group leaders and board members after controlling for endogeneity of mobile phone ownership and education. We plan to complement this analysis with the new data where we also will collect more information on the attitudes of male and female members towards other male and female members as candidates to getting such positions in the groups. The collection of panel data and combination with randomized treatments will be used to further investigate to power of mobile phones as an instrument for empowerment of female members

through provision of mobile phones and training in use of mobile phones for group-related business planning.

Holden and Tilahun (2018c) found that the number of years of completed education was correlated with parent household characteristics such as farm size, education of parents and whether parents had a radio. Our analysis confirms this and we find a significant gender difference in the level of education after controlling for age and parent characteristics. Education was also negatively correlated with the age of members. This makes sense as basic education has improved substantially over the recent three decades in Ethiopia. The education levels varied systematically across districts with Raya Azebo lagging behind. For mobile phone ownership the members in Raya Azebo were ahead of the members in other districts even though education was an important determinant of mobile phone ownership.

Holden and Tilahun (2018c) found risk tolerance to be correlated with mobile phone ownership but we found no such significant correlation this time. It has increasingly become common to question whether risk preferences (tolerance) can be considered as exogenous and we will leave also for our future work to more carefully investigate this and will assess alternative ways of measuring risk preferences as an integrated part of the project. The variable used in this paper and by Holden and Tilahun (2018c) was based on the Gneezy and Potters (1997) risk investment game. Holden and Tilahun (2019a) have tested more comprehensive approaches to measuring risk preferences and we will build on these findings as well in our future work.

We will implement two Randomized Control Trials (RCTs) with focus on training of group leaders and female group members. The fact that there is a strong male dominance among group leaders implies a strong gender bias in the training the group leader RCT. The women empowerment RCT also therefore creates more gender balance in the training experiments. We will assess the impacts of training mainly male group leaders versus training female group members. One worry may be that the trained female group members may be less able to influence the decisions of their groups than the male group leaders will be. The attitudes of male and female group members towards the trained male leaders and trained female group members will matter for their influence on their groups. The insights from these experiments will in our opinion give interesting insights of high policy relevance for how to support the development of these youth business groups and enhance their sustainability.

## References

Gneezy, U., & Potters, J. (1997). An experiment on risk taking and evaluation periods. *The Quarterly Journal of Economics*, 112(2), 631-645.

Holden, S. T. and Tilahun, M. (2019). [The Devil is in the Details: Risk Preferences, Choice List Design, and Measurement Error. CLTS Working Paper No. 3/2019](#). Centre for Land Tenure Studies, Norwegian University of Life Sciences, Aas, Norway. [Link](#)

Holden, S. T. and Tilahun, M. (2019b). 2019 Group Leader and Member Survey Statistics. Baseline study under the NORGLOBAL2 Research Project “Youth Business Groups for

Sustainable Development: Lessons from the Ethiopian Model.” CLTS Working Paper. Centre for Land Tenure Studies, Norwegian University of Life Sciences, Aas, Norway.

Holden, S. T. and Tilahun, M. (2018a). The importance of Ostrom's design principles: Youth group performance in Northern Ethiopia. *World Development* 104: 10-30. **Link**

Holden, S. T. and Tilahun, M. (2018b). Land rental as a complementary income source for land-poor youth. CLTS Working Paper No. 6/2018. Centre for Land Tenure Studies, Norwegian University of Life Sciences, Aas, Norway. **Link**

Holden, S. T. and Tilahun, M. (2018c). Gender Digital Divide and Youth Business Group Leadership. CLTS Working Paper No. 5/2018. Centre for Land Tenure Studies, Norwegian University of Life Sciences, Aas, Norway. **Link**

Holden, S. T. and Tilahun, M. (2018d). Gender Differences in Risk Tolerance, Trust and Trustworthiness: Are They Related? CLTS Working Paper No. 3/2018. Centre for Land Tenure Studies, Norwegian University of Life Sciences, Aas, Norway. **Link**

Holden, S. T. and Tilahun, M. (2017). Group Trust in Youth Business Groups: Influenced by Risk Tolerance and Expected Trustworthiness. CLTS Working Paper No. 13/2017. Centre for Land Tenure Studies, Norwegian University of Life Sciences, Aas, Norway. **Link**

Holden, S. T. and M. Tilahun (2016). Youth as Environmental Custodians: A Potential Tragedy or A Sustainable Business and Livelihood Model? CLTS Working Paper No. 6/2016. Centre for Land Tenure Studies, Norwegian University of Life Sciences, Aas, Norway. **Link**

Ostrom, E. (1990). *Governing the commons: The evolution of institutions for collective action*. Cambridge university press.

Ostrom, E. (2010). Beyond markets and states: polycentric governance of complex economic systems. *American Economic Review*, 100(3), 641-72.

# Gender Assessment of Youth Business Groups: Female Participation and Characteristics

By

Stein T. Holden<sup>1</sup> and Mesfin Tilahun<sup>1,2</sup>

<sup>1</sup>School of Economics and Business  
Norwegian University of Life Sciences  
P. O. Box 5003, 1432 Ås, Norway.

<sup>2</sup>Mekelle University, Mekelle, Tigray, Ethiopia.

Email: [stein.holden@nmbu.no](mailto:stein.holden@nmbu.no); [mesfin.tilahun.gelaye@gmail.com](mailto:mesfin.tilahun.gelaye@gmail.com)

## Abstract

*This working paper is an output from the research project “Youth Business Groups for Sustainable Development: Lessons from the Ethiopian Model” that is funded by Research Council of Norway under the NORGLOBAL2 research program for the period 2019-2022. This working paper provides updated and extended information on the gender differences among group members and how these are related to likelihood of becoming group board members and leaders.*

*The study surveyed 274 groups in the period January-May 2019. 28 of the 274 groups have been dissolved by February 2019 for various reasons (internal conflicts, no land provided, low returns to their activity, migration, lack of motivation among members). Lack of support from the local authority was given as the main reason for groups being dissolved (23 of 28 groups). This means that close to 90% of the business groups are still active. Most of the statistics we present below are for the remaining 246 active groups that we intend to include in the training experiments (including control groups) and follow up surveys. Average group size in February 2019 for the 246 active groups was 17.6 members with group sizes varying from 7 to 175 members. The average number of male members was 10.9 against 6.7 female members. 41.4% of the male and 23.6% of female surveyed members are board members. 12.7% of the male and 1.1% of the female surveyed members were group leaders. Only 30.8% of the female members compared to 72.3% of the male members owned a mobile phone at the time of the survey. This puts females in a more disadvantaged position as the mobile phones are important for within-group communication and organization of group activities.*

**Key words:** Land-poor rural youth; youth business groups; gender composition; female participation; Ethiopia.

**JEL Codes:** D02; D23; D7.



## Highlights

- In our sample of 246 active groups 31.3% of the sample of members in our survey are women.
- When we look at the composition of all the group members in these groups we find that there were 38.1% women in the groups.
- Our sampling strategy to include all group board members available has resulted on an under-sampling of female members because male members dominate in group boards.
- Female members tend to be younger, have slightly less education, fewer brothers, and have a lower birth rank.
- We use Cohen's  $d$ , which expresses the difference between means in standard deviation units.
- Males are significantly more wealthy and have higher incomes than female members on average.
- The Cohen's  $d$ s for gender differences in endowment and income variables indicate that these differences can be characterized as small based on Cohen's classification although men have significantly higher endowments and incomes (8 of 11 variables).
- 41.4% of the male and 23.6% of female surveyed members are board members.
- 12.7% of the male and 1.1% of the female surveyed members are group leaders.
- 59.3% of the group members had a mobile phone. Only 30.8% of the female members compared to 72.3% of the male members owned a mobile phone at the time of the survey.
- Of those owning a mobile phone only 10.8% owned a smartphone. Among mobile phone owners, 11.7% of the males and 6.4% of the females owned a smartphone.
- Males are significantly more likely to use the mobile phone for business purposes. The mobile phones are also important for within-group communication and organization of group activities.
- Group leaders and secretaries are those with highest likelihood of possessing mobile phones. The difference between leaders and vice leaders is substantial in likelihood of possessing mobile phones, and especially so among female leaders and vice leaders.
- Above 70% of the group members are married. About 11% of the women are divorced or widowed compared to very few men in these categories while a larger share of men are unmarried.
- About 34% live on the farm and in the house of their parents while about 43% live in their own house on a separate place. 11% live in a separate house on the farm of their parents. About 16% of the women live in the house of their in-laws.

## Introduction

This is a descriptive baseline survey report under the project “Youth Business Groups for Sustainable Development: Lessons from the Ethiopian Model” which is funded by the NORGLOBAL2 research program by Research Council of Norway. The School of Economics and Business at Norwegian University of Life Sciences is leading the project and has collaborating researchers at Mekelle University, Ethiopia, Christian Michelsen Institute, Norway, Wageningen University, The Netherlands, Osnabrück University, Germany, and University of Queensland, Australia.

The objectives of the project are as follows:

*Overall: Identify factors that enhance the performance and sustainability of formal youth groups as a business and livelihood option*

*Specific:*

- a) Evaluate the effect of group leader training and incentives on quality of leadership and group performance.*
- b) Evaluate the effect of gender empowerment training on within-group gender differences in performance and on overall performance of youth groups.*
- c) Evaluate how awareness of climate change, climate shock experiences and climate risk awareness and preparedness training affect youth preferences, behaviour, group production planning, livelihood strategies and performance.*
- d) Extract and disseminate the wider policy lessons from the Ethiopian youth group experience.*

The project goes from January 2019 to December 2022. The project builds on initial research on these youth business groups that started in 2016 under the NORAD-funded NORHED capacity building project “Climate Smart Natural Resource Management and Policy” (CLISNARP) and the following studies by Holden and Tilahun (2016, 2017a, 2017b, 2018a, 2018b, 2018c, 2018d).

This report serves primarily as baseline input into the design of the next stages of the research project, especially specific objective b) above; the gender empowerment training of female group members. The previous study “Gender Digital Divide and Youth Business Group Leadership” (Holden and Tilahun 2018c) serves as an important reference point that was based on the survey of 119 youth business groups and 1130 youth group members undertaken in 2016. This study found that 32% of the business group members were female and a large gender difference in mobile phone ownership with 37% of the females and 0% of the males owning mobile phones. The study also found that male members were twice as likely to become group board members and five times as likely to become group leaders. While there was a strong gender effect, having a mobile phone had an even stronger effect enhancing the likelihood of members becoming board members by 17.4 percentage points. A female member with a mobile phone was equally likely to become a board members as a male member without a mobile phone. Male members were also on average older than female members and age also had a significant effect on likelihood of becoming board members and contributed to the male dominance. Education also enhanced the likelihood of members becoming board members and leaders but this did not increase the gender gap in likelihood of becoming board members or leaders.

This report provides updated and extended information on the gender differences among group members and how these are related to likelihood of becoming group board members and leaders. The descriptive statistics provided in this report is for the 2019 survey of 246 active groups and 2427 group members from these active groups. This report complements the *2019 Group Leader and Member Survey Statistics* report (Holden and Tilahun 2019).

The study surveyed 274 groups in the period January-May 2019. 28 of the 274 groups have been dissolved by February 2019 for various reasons (internal conflicts, no land provided, low returns to their activity, migration, lack of motivation among members). Lack of support from the local authority was given as the main reason for groups being dissolved (23 of 28 groups). This means

that close to 90% of the business groups are still active. Most of the statistics we present below are for the remaining 246 active groups that we intend to include in the training experiments (including control groups) and follow up surveys. Figure 1 shows the distribution of group sizes, which also includes the dissolved groups, and shows that most groups consist of 10-20 members while a few groups are much larger. Average group size in February 2019 for the 246 active groups was 17.6 members with group sizes varying from 7 to 175 members. The average number of male members was 10.9 against 6.7 female members. The total number of members of the 246 groups in February 2019 is therefore 4328 members.

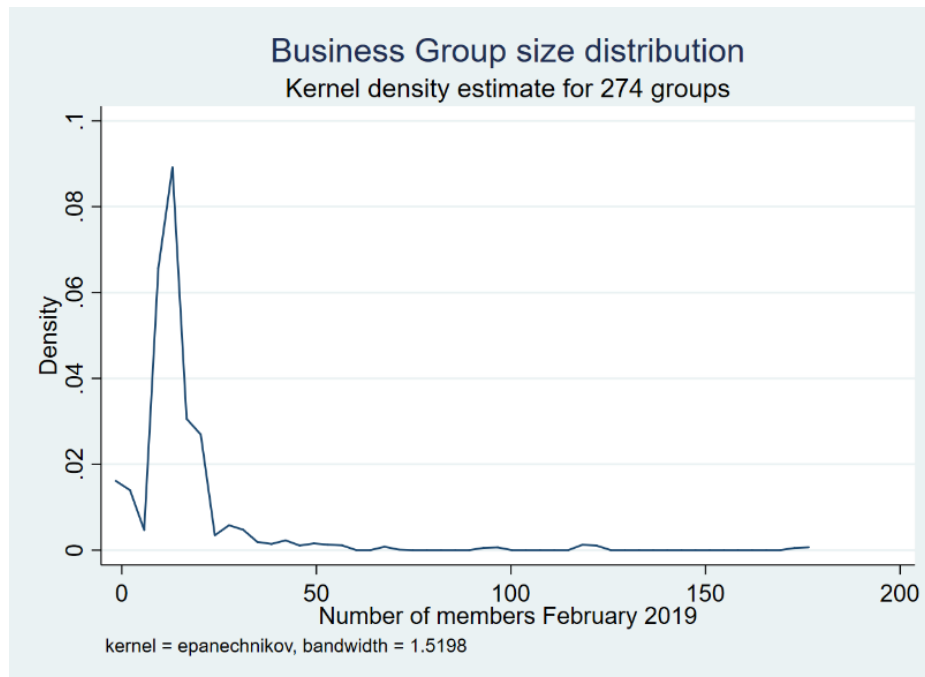


Figure 1. Group size distribution February 2019 for 274 surveyed groups

Of the remaining 246 active groups, 38.2% had at least one member dropping out the last three years (2016-2018). A total of 210 male and 144 female members had dropped out from these 246 groups over the three year period. These have to some extent been replaced by new members as these groups have received a total of 43 new male members and 29 new female members. The total number of members in these groups three years earlier was therefore 4610. This implies a net loss of 282 members or 6.1% of the members and a group size reduction and a reduction in average group size from 18.7 to 17.6 members over this three year period.

The group member survey included up to 12 members per group. The aim was to interview all group board members to the extent that they were available during our one-day visit, and additionally chosen non-board members that were available during our visit. 6.6% of the group members in our survey did not join their group at its start but at a later stage. The twelve members were interviewed simultaneously by twelve carefully trained enumerators using tablets for the interviews and questionnaires translated into the local language Tigrinya. The group leader and other board members were interviewed about the group activities and leadership issues. This report contains detailed information from both the 246 group level data and the 2427 group member data.

Basic descriptive tables are presented and are given some limited interpretation. More work is needed to carefully analyze the data for different purposes. Overall, we assess the data quality to be good and reliable. Still, we cannot rule out errors and potential biases and the report should be regarded as preliminary as it is based on quick descriptive analyses of the baseline data.

## Gender composition of groups

In our sample of 246 active groups 31.3% of the sample of members in our survey are women. However, when we look at the composition of all the group members in these groups we find that there were 38.1% women in the groups. Our sampling strategy to include all group board members available has resulted in an under-sampling of female members because male members dominate in group boards. With no gender bias in selection into youth business groups we should expect approximately 50-50 composition in groups. With only 38.1% women we see a male bias in the selection into groups. As we do not have data for the more general youth population we can only indirectly assess factors associated with recruitment into youth business groups. We can only make a comparison of gender differences for those that have been recruited in and are part of our sample. In addition to comparing individual characteristics such as age, education, number of siblings, and birth rank, we assess whether parent household characteristics differ significantly between female and male group members.

Table 1. A comparison of female and male member characteristics

	Females		Males		t-test
	Mean	St.Err.	Mean	St.Err.	Pr( T > t )
Age	29.7	0.27	33.5	0.25	0.0000
Education, years	4.41	0.15	4.77	0.09	0.0451
Number of brothers	2.57	0.05	2.78	0.04	0.0011
Number of sisters	2.55	0.05	2.60	0.04	0.4728
Birth rank	3.21	0.08	3.42	0.05	0.0338
Number of siblings in youth group	0.17	0.02	0.24	0.01	0.0010
Farm size of parents	2.31	0.08	2.68	0.06	0.0002
Education of head of parent household	0.43	0.06	0.46	0.04	0.7350
Sex of head of parent household, male dummy	0.75	0.02	0.70	0.01	0.0316
Does parent household have radio, dummy	0.26	0.02	0.28	0.01	0.3130
Oxen number of parent household	1.13	0.04	1.08	0.03	0.2022
Sample size	759		1668		

Source: 2019 Baseline survey data.

We see that female members tend to be younger, have slightly less education, fewer brothers, and have a lower birth rank. Their parents' household also have a smaller farm size and is more likely to be male headed.

We use Cohen's  $d$ , which expresses the difference between means in standard deviation units (Cohen 1988; Nelson 2015; Byrnes et al. 1999). For the case of a male versus female comparison, it is estimated as follows

$$1) \quad d = \frac{\overline{x_m} - \overline{x_f}}{sd_i}$$

where  $\overline{x_m}$  is the male mean,  $\overline{x_f}$  is the female mean, and  $sd_i$  is the pooled standard deviation. This measure has the advantages of being easily compared across studies and of expressing the size of the cross-sex mean difference relative to the degree of within-sex variation. The larger this ratio, the more substantive difference there is between the sexes. Sample size only affects its reliability but not its expected value. Cohen (1988) suggested that a  $d=0.2$  is small,  $d=0.5$  is medium and  $d=0.8$  is large in the type of psychological studies of his concern. We present Cohen's  $d$ s graphically in Figure 2 for the variables in Table 1. All the differences are small to medium.

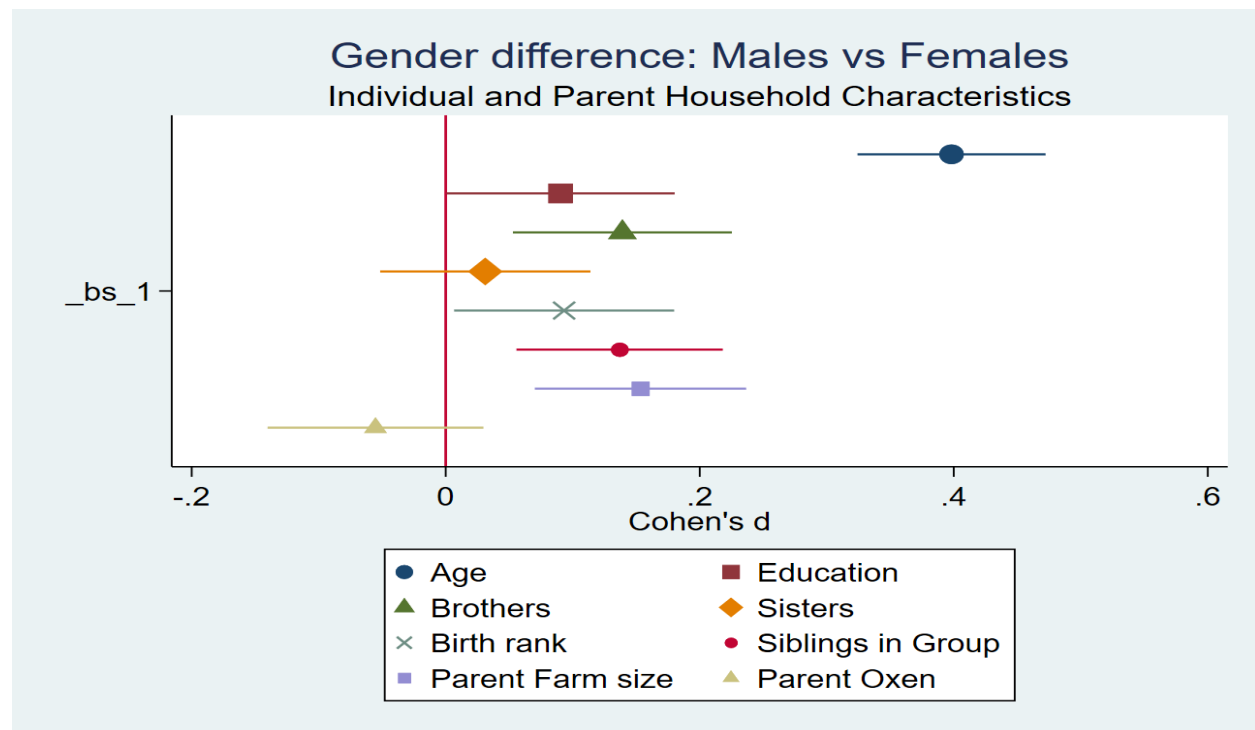


Figure 2. Cohen's  $d$ s for gender differences in individual and parent household characteristics

Table 2 provides an assessment of the gender differences in asset endowments and incomes by income source for the members during last year. The table shows that males are significantly more wealthy and have higher incomes than female members on average. Figure 3 assesses the Cohen's  $d$ s for gender differences in these endowment and income variables. All of these differences can be characterized as small based on Cohen's classification although men have significantly higher endowments and incomes (8 of 11 variables).



Table 2. Asset endowments and income sources of female and male members

	Females		Males		Pr( T > t )
	Mean	St.Err.	Mean	St.Err.	
Own and spouse land, <i>tsimdi</i> <sup>1</sup>	0.810	0.041	0.923	0.035	0.0377
Livestock endowment (TLU <sup>2</sup> )	1.381	0.057	1.748	0.047	0.0000
Number of oxen	0.792	0.031	0.965	0.024	0.0000
Number of ploughs	0.896	0.030	1.061	0.025	0.0000
Durable assets, number	1.627	0.052	1.799	0.042	0.0102
Farm income, ETB <sup>3</sup>	2804	234	3931	218	0.0004
Land rental income, ETB	2242	175	4576	242	0.0000
Construction work, ETB	1593	272	1382	135	0.4890
Trade income, ETB	1678	209	2293	193	0.0311
Other income sources, ETB	4921	361	4382	272	0.2338
Income from borrowed land, ETB	1590	178	1508	102	0.6901

Source: 2019 Baseline survey data. <sup>1</sup> 1 *Tsimdi*=0.25 ha. <sup>2</sup> TLU=Tropical Livestock Unites. <sup>3</sup> ETB=Ethiopian Birr.

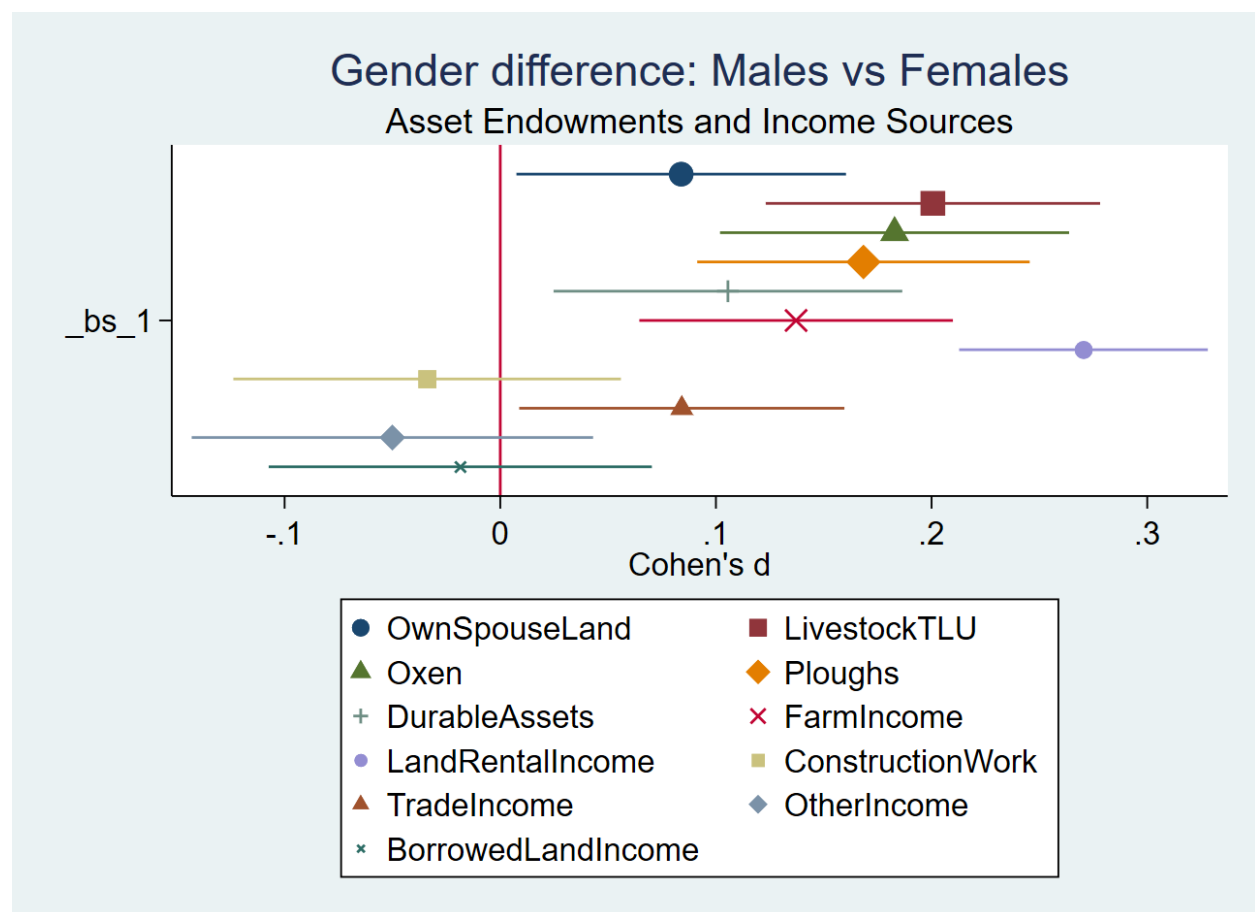


Figure 3. Cohen's *ds* for gender differences in asset endowments and income sources

We provide more information about this gender imbalance in group leadership positions in Table 3 below. Female members are much less likely to become group leaders or vice leaders than male members while the gender difference is lower for other group board positions.

Table 3. Number and % of female and male members in different board positions in our sample

Current position		Female	Male	Total
Leader	Freq.	8	212	220
	%	1.1	12.7	9.1
Vice leader	Freq.	23	147	170
	%	3.0	8.8	7.0
Secretary	Freq.	50	136	186
	%	6.6	8.2	7.7
Accountant	Freq.	58	133	191
	%	7.6	8.0	7.9
Treasury	Freq.	40	62	102
	%	5.3	3.7	4.2
Ordinary member	Freq.	580	978	1,558
	%	76.4	58.6	64.2
Total	Freq.	759	1,668	2,427
	%	100	100	100

Source: 2019 Baseline survey data.

Table 3 shows that 41.4% of the male and 23.6% of female surveyed members are board members. 12.7% of the male and 1.1% of the female surveyed members are group leaders.

We further inspect individual characteristics associated with different board positions in Table 4 based on simple OLS regressions, regressing board positions on individual characteristics. In addition to gender, age and education enhanced the likelihood of members becoming group leader and board member in general.

Table 4. Individual characteristics associated with board positions in groups

	Leader	Vice leader	Other board member	Board member
Male, dummy	0.0935***	0.0542***	-0.0187	0.129***
Age	0.00426***	0.000646	0.00397***	0.00888***
Education, years	0.0107***	-0.000334	0.0176***	0.0280***
Number of brothers	0.00422	0.00235	-0.0013	0.00526
Number of sisters	0.00532	0.00569	-0.00454	0.00646
Birth rank	-0.00149	0.0018	-0.000954	-0.000644
Number of siblings in youth group	0.0422**	0.0046	0.0122	0.0590**
Risk tolerance	-0.00925	-0.00436	0.0283	0.0147
Constant	-0.185***	-0.0121	-0.000683	-0.198***
N	2427	2427	2427	2427
R-sq	0.067	0.014	0.028	0.086

Note: Results from OLS regressions. Significance levels: \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

We explore potential interaction effects between the significant gender versus age and education variables. Age and education could have different effect on the likelihood of becoming leader and board members for female than for male members. The results are presented in Table 5.

Table 5. Individual characteristics associated with board positions, with interactions

	Leader	Vice leader	Other board member	Board member
Male, dummy	-0.052	0.0849*	0.014	0.047
Age	0.00186*	0.001	0.004	0.00671**
Education, years	0.002	0.002	0.023***	0.027***
Male*Age interaction	0.00297**	0.000	0.000	0.003
Male*Education interaction	0.0121***	-0.003	-0.008	0.001
Risk tolerance	-0.008	-0.005	0.028	0.015
Number of brothers	0.004	0.002	-0.001	0.005
Number of sisters	0.005	0.006	-0.005	0.006
Birth rank	-0.001	0.002	-0.001	-0.001
Number of siblings in youth group	0.043**	0.004	0.011	0.0581**
Constant	-0.078*	-0.034	-0.018	-0.129
N	2427	2427	2427	2427
R-sq	0.072	0.014	0.03	0.086

Note: Results from OLS regressions. Significance levels: \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Table 5 shows that age and education have stronger additional effects on the selection of group leaders for male members than for female members. Education is important for the selection of females in to other board member positions but does not enhance the likelihood of females becoming group leaders. Age increases significantly the likelihood of female members becoming leaders and board members.

### Education levels of group members

We assess the distribution of years of completed education among different group board positions, see Figure 4. It is the secretary position that has the best educated members. Surprisingly, quite may accountants had very limited education. We may wonder how that affects numeracy skills. Figure 5 shows that the gender differences in completed education are small.

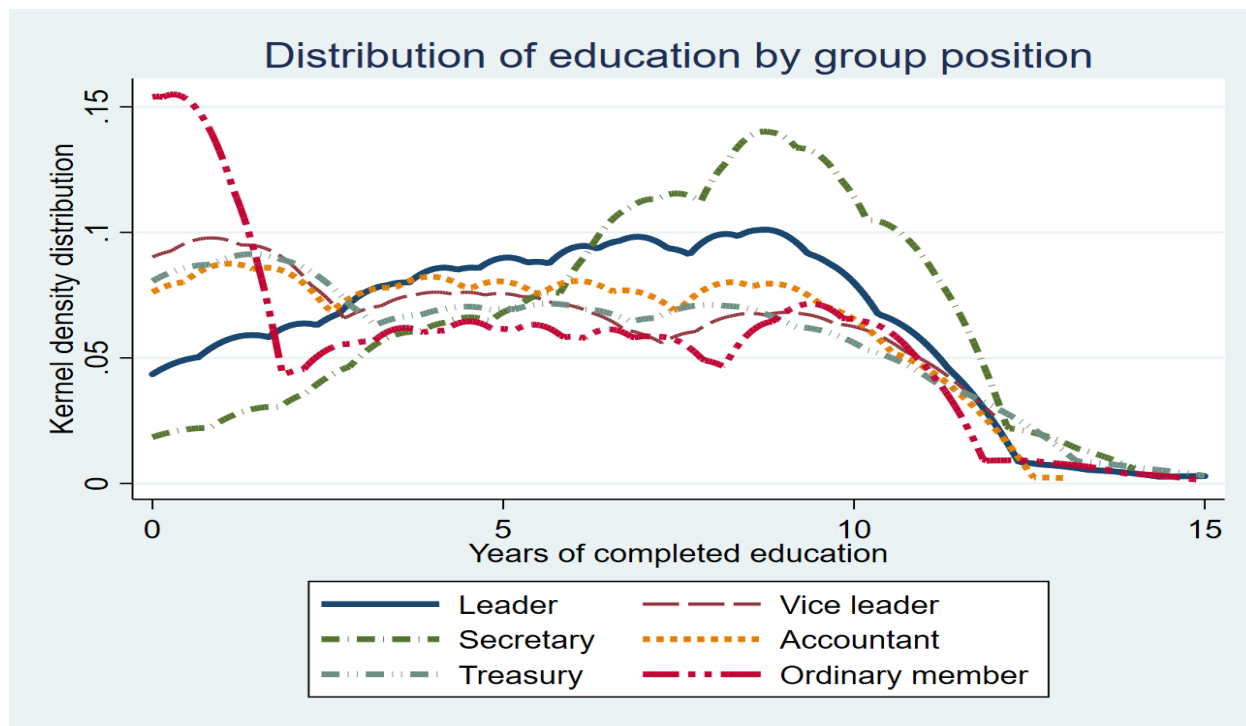


Figure 4. Distribution of years of education by position in the group

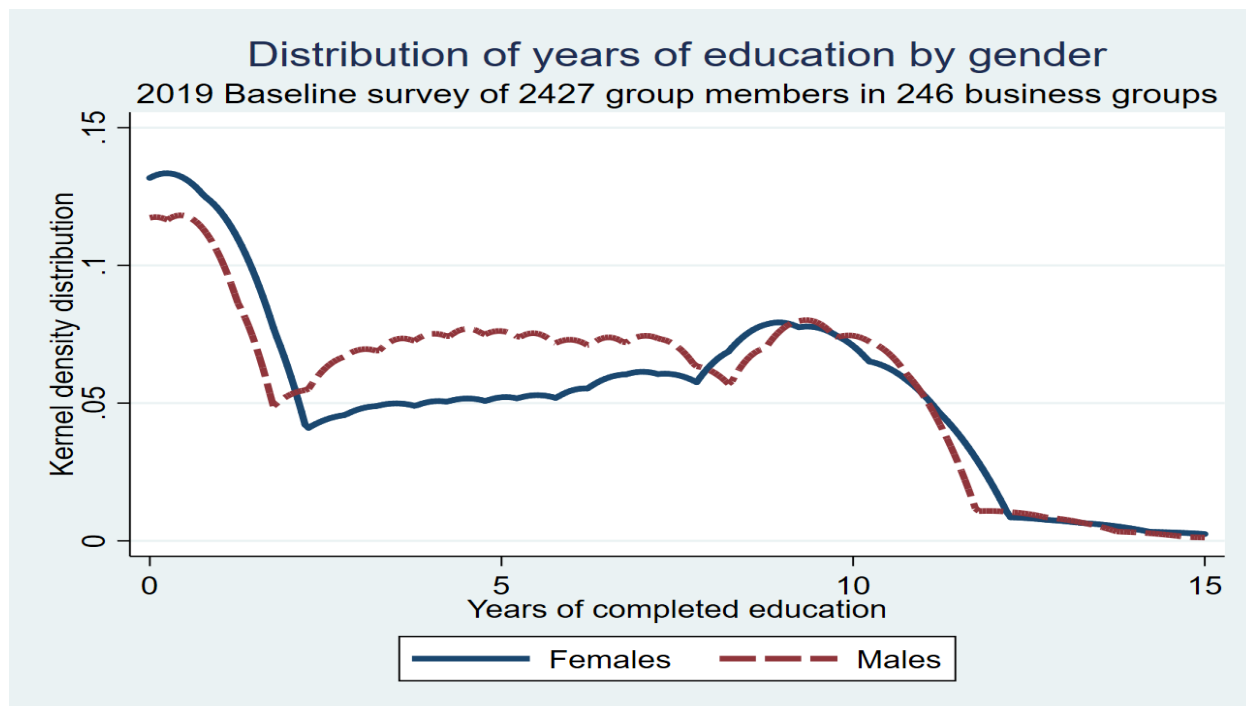


Figure 5. Distribution of years of education by gender

We want to assess whether and how the education of youth group members is related to some key parent household characteristics and whether and how gender and age are correlated with the number of years of completed education. Parents may have given more priority to educating their

male children. The education system has improved over recent decades in Ethiopia and that may imply that younger members are better educated. Parents with more education themselves and with more resources may also have been able to and more motivated to educate their children. We also assess whether there are district differences and whether the gender differences vary systematically across districts. The results of three alternative specified OLS models are presented in Table 6.

Table 6. Factors correlated with education of group members

	E1	E2	E3
Male, dummy	0.819***	0.773***	0.719**
Age	-0.155***	-0.151***	-0.152***
Parent household characteristics:			
Farm size	-0.164***	-0.011	-0.011
Education of head of household	0.298***	0.275***	0.274***
Sex of head of household	0.219	0.124	0.123
Parent hh has radio	0.683***	0.582**	0.581**
Number of oxen of parent hh	0.211*	0.159	0.160
Districts: Raya Azebo, baseline		0.000	0.000
Degua Tembien		1.318***	1.566***
Saharti Samre		1.293***	1.141*
Adwa		2.551***	2.680***
Male*Raya Azebo interaction			0.198
Male*Degua Tembien interaction			-0.161
Male*Saharti Samre interaction			0.402
Male*Adwa interaction			0.000
Constant	8.835***	6.868***	6.803***
N	2126	2126	2126
R-sq	0.179	0.229	0.229
AIC	11471.2	11344.2	11349

Note: Results from OLS regressions. Significance levels: \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Table 6 shows that males have on average 0.77-0.82 additional years of education than female members. One year additional age is associated with 0.15 years of reduced education, demonstrating the impact of the improved education system on the extent of completed education among youth. We find that the education of parents and whether the parents have a radio are strongly positively correlated with the education of members. We also see that the level of education is significantly lower in Raya Azebo district. There are no significant variations in the gender differences in education across districts.

### Mobile phone ownership and use by gender

Our 2019 survey data showed that 59.3% of the 2427 group members had a mobile phone. Only 30.8% of the female members compared to 72.3% of the male members owned a mobile phone at the time of the survey. Of those owning a mobile phone only 10.8% owned a smartphone. Among mobile phone owners, 11.7% of the males and 6.4% of the females owned a smartphone. Also this gender difference was significant. This implies that 8.4% of all male members and 2.0% of all

female members have a smartphone. Limited internet access and higher cost of purchasing smartphones can explain the low share of members with such phones. The median purchase cost for those having smartphones was 1500 ETB compared to 500 ETB for simpler phones. The median monthly expenditure on use of mobile phones was 40 ETB for ordinary phones and 60 ETB for smartphones. The median monthly expenditure on use of mobile phones among females with phones was 30 ETB against 50 ETB among males.

Table 7 shows gender differences in mobile phone use for those owning such phones. We see that males are significantly more likely to use the mobile phone for business purposes. The mobile phones are also important for within-group communication and organization of group activities.

Table 7. Mobile phone use by type of use and gender among mobile phone owners

Mobile use	All Percent	Females Percent	Males Percent	Gender Sign. diff. Chi-square
Family and friends	99.7	99.6	99.7	
Communicate with other youth group members	92.9	86.3	94.2	***
Use it for private business	73.1	50.4	77.5	***
Use it to organize youth group activities	67.7	53.0	70.6	***
Use it to communicate with <i>tabia</i> authorities	47.9	24.8	52.4	***
Use it to obtain market information	52.9	32.5	56.8	***
Use it for entertainment	74.4	59.0	77.4	***
Number of mobile phone owners	1434.0	234	1200	

Source: 2019 Baseline survey data. Significance levels: \*\*\* p<0.001

Next, we asked the members to rank the three most important uses of their mobile phones (Rank 1 is most important). Table 8 lists the three highest ranked uses by all mobile phone owners. The table shows that communication with family and friends is ranked as most important by 79% of the respondents. Communication with other youth group members and organizing youth group activities are ranked as most important only by 3.5 and 2.9% of the respondents with mobile phones. However, these uses were ranked as the second most important use by 35.6 and 18% of the mobile phone owners and as the third most important use by additional 19.5 and 14.8% of the mobile phone owners.

We are also interested in seeing how this ranking differs across female versus male group members with mobile phones given the large gender differences detected in Table 7 above. The differences in rankings between females and males can be observed by comparing Tables 9 and 10. The rankings are quite similar so the main gender difference in having access to mobile phones.

Table 8. Ranking of most important mobile phone uses by all mobile phone owners

	Rank 1		Rank 2		Rank 3	
	Freq.	Percent	Freq.	Percent	Freq.	Percent
Communicate with family/friends	1,135	79.2	239	16.7	51	3.6
Communicate with other youth group members	50	3.5	511	35.6	279	19.5
Use it for private business	156	10.9	306	21.3	267	18.7
Use it to organize youth group activities	41	2.9	258	18.0	212	14.8
Use it to communicate with <i>tabia</i> authorities	6	0.4	5	0.4	58	4.1
Use it to obtain market information	34	2.4	46	3.2	151	10.6
Use it for entertainment (listening to music)	8	0.6	64	4.5	276	19.3
No more			4	0.3	134	9.4
Total current mobile owners	1,434	100.0				

Source: 2019 Baseline survey data.

Table 9. Ranking of most important mobile phone uses by female mobile phone owners

	Rank 1		Rank 2		Rank 3	
	Freq.	Percent	Freq.	Percent	Freq.	Percent
Communicate with family/friends	212	90.6	19	8.1	3	1.3
Communicate with other youth group members	8	3.4	119	50.9	28	12.1
Use it for private business	7	3.0	39	16.7	36	15.6
Use it to organize youth group activity	4	1.7	38	16.2	22	9.5
Use it to communicate with <i>tabia</i> authorities			2	0.9	7	3.0
Use it to obtain market information	1	0.4	2	0.9	26	11.3
Use it for entertainment (listening to music)	1	0.4	12	5.1	57	24.7
No more			3	1.3	52	22.5
Total	234	100.0				

Source: 2019 Baseline survey data.

Table 10. Ranking of most important mobile phone uses by male mobile phone owners

	Rank 1		Rank 2		Rank 3	
	Freq.	Percent	Freq.	Percent	Freq.	Percent
Communicate with family/friends	923	76.9	220	18.3	48	4.0
Communicate with other youth group members	42	3.5	392	32.7	251	20.9
Use it for private business	149	12.4	267	22.3	231	19.3
Use it to organize youth group activity	37	3.1	220	18.3	190	15.9
Use it to communicate with <i>tabia</i> authorities	6	0.5	3	0.3	51	4.3
Use it to obtain market information	33	2.8	44	3.7	125	10.4
Use it for entertainment (listening to music)	7	0.6	52	4.3	219	18.3
No more			1	0.08	82	6.8
Total	1,200	100				

Source: 2019 Baseline survey data.

Table 11 shows mobile phone use by group leaders. Mobile phones may be particularly important for their work to organize the groups, have contact with the authorities and get market information.

Table 11. Ranking of most important mobile phone uses by youth group leaders

	Rank 1		Rank 2		Rank 3	
	Freq.	Percent	Freq.	Percent	Freq.	Percent
Communicate with family/friends	135	70.0	41	21.2	12	6.2
Communicate with other youth group members	11	5.7	37	19.2	50	25.9
Use it for private business	31	16.1	46	23.8	44	22.8
Use it to organize youth group activities	11	5.7	58	30.1	44	22.8
Use it to communicate with <i>tabia</i> authorities	1	0.5	1	0.5	10	5.2
Use it to obtain market information	4	2.1	8	4.2	13	6.7
Entertainment			2	1.0	18	9.3
No more					2	1.0
Total	193	100.0				

Source: 2019 Baseline survey data.

Youth group leaders are more likely to use the mobile phone to organize youth group activities as we expected. Surprisingly, they use mobile phones to a small extent to obtain market information or to communicate with *tabia* authorities while using the mobile phone for private business is more common.

How is mobile phone ownership associated with the members having different board member positions in the group and does this vary systematically with gender? We cross-tabulate for each gender their position in the group and mobile phone ownership in Table 12.

Table 12. Female and male members' board position and mobile phone ownership

	Own a mobile phone?		Total	% with mobile
	No	Yes		
Females				
Leader	3	5	8	62.5
Vice leader	17	6	23	26.1
Secretary	22	28	50	56.0
Accountant	42	16	58	27.6
Treasury	20	20	40	50.0
Ordinary member	421	159	580	27.4
Total	525	234	759	30.8
Males				
Leader	24	188	212	88.7
Vice leader	34	113	147	76.9
Secretary	22	114	136	83.8
Accountant	31	102	133	76.7
Treasury	12	50	62	80.6
Ordinary member	339	639	978	65.3
Total	462	1,206	1,668	72.3

Source: 2019 Baseline survey data.



Group leaders and secretaries are those with highest likelihood of possessing mobile phones. The difference between leaders and vice leaders is substantial in likelihood of possessing mobile phones, and especially so among female leaders and vice leaders.

We ran regressions to assess the correlations between individual characteristics and mobile phone ownership, see Table 13.

Table 13. Factors correlated with mobile phone ownership

	M1	M2	M3
Male, dummy	0.398***	0.400***	0.449***
Age	-0.002	0.000	0.000
Education, years	0.0350***	0.0404***	0.0407***
Risk tolerance	0.034	0.035	0.033
Number of brothers	0.008	0.010	0.010
Number of sisters	0.009	0.010	0.009
Birth rank	0.002	0.003	0.002
Number of siblings in youth group	0.030	0.015	0.016
Livestock endowment (TLU)	0.0166**	0.009	0.010
Durable assets, number	-0.004	-0.003	-0.002
Raya Azebo district, baseline		0.000	0.000
Degua Tembien		-0.182***	-0.257***
Seharti Samre		-0.286***	-0.232***
Adwa		-0.222***	-0.297***
Male*Raya Azebo interaction			-0.118*
Male*Degua Tembien interaction			-0.008
Male*Seharti Samre interaction			-0.183***
Male*Adwa interaction			0.000
Constant	0.118*	0.223***	0.257***
N	2427	2427	2427
R-sq	0.242	0.276	0.28
AIC	2787	2680.4	2672.3

Note: Results from OLS regressions. Significance levels: \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

We see that male members are about 40 percentage points more likely to own a mobile phone than female members. One additional year of completed education increases the likelihood of owning a mobile phone by 3.5-4.1 percentage points. We also see from model M2 that youth group members living in Raya Azebo district are 18-29 percentage points more likely to own a mobile phone than youth group members in the other three districts. Raya Azebo has high agricultural production potential, most of the population are Moslems and have more migration experience going to Arabian countries. In model M3 we have assessed potential gender and district interaction effects. We find that the gap in mobile phone ownership across districts is larger for female group members for Raya Azebo versus other districts. The gender gap was significantly lower in Raya Azabo and Seharti Samre than in Degua Tembien and Adwa.

## Migration history of members

Some of the youth group members are returning migrants. We assess the extent to which this is the case by categorizing youth into categories of returning migrants based on the type of migration experience they have. We also assess how the migration experiences in our sample is distributed over gender categories. We assume that members with such experiences also are much more likely to possess a mobile phone. Table 14 provides the details.

Table 14. Migration history of group members in our sample

Migration category	Freq.	Percent	% males	% with mobile phone
Never migrated	1,430	58.9	51.1	47.6
Internal seasonal or temporary migration	745	30.7	96.1	74.0
Internal temporary migration within Ethiopia	117	4.8	83.8	77.8
International migration (for work)	135	5.6	91.9	86.7
Total	2,427	100.0	68.7	59.3

*Source:* 2019 Baseline survey data.

We see a strong male dominance among the returned migrants and that returned migrants have a much higher likelihood of owning a mobile phone. We also assess the level of education by migration categories of members, see Figure 6.

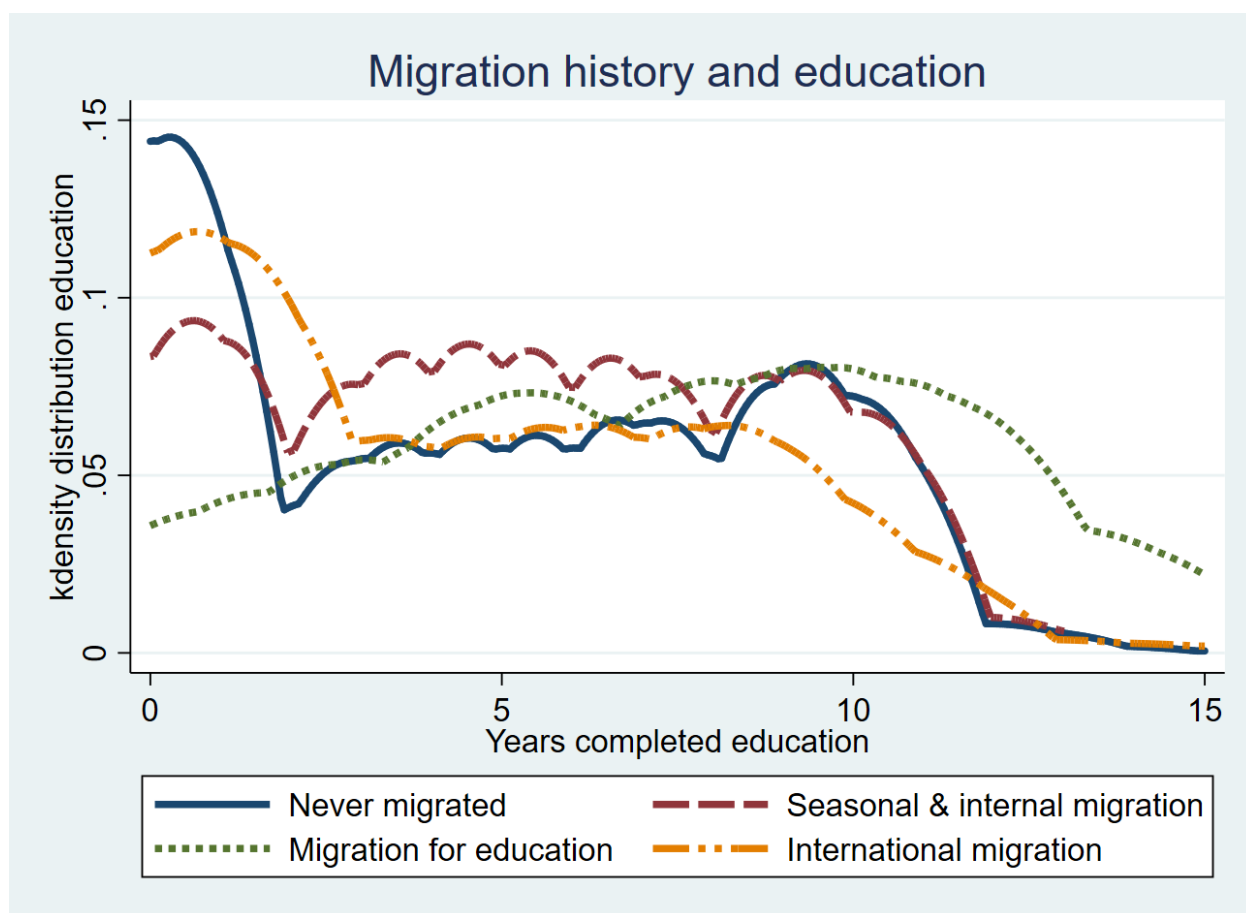


Figure 6. Migration history and education distribution

Figure 6 shows that those that never migrated are most likely to have no education. Those with international migration experiences were not particularly well educated. We assess the distribution of countries those with international migration history have gone to and how they are distributed across the districts in our sample, see Table 15.

Table 15. International migration history by country visited and district in Tigray

Destination	Raya Azebo	Degua Tembien	Seharti Samre	Adwa	Total
Saudi Arabia	104	0	1	1	106
Emirates	1	0	0	0	1
Sudan	13	0	8	2	23
Eritrea	0	3	0	2	5
Total	118	3	9	5	135

Source: 2019 Baseline survey data.

Table 15 shows that almost all returning migrants in the groups are found in Raya Azebo district and most of the migrants have visited Saudi Arabia. The population in Raya Azabo are mostly Muslims and that may also explain why they are more likely to have visited Muslim countries. Most of the returning migrants from Saudi Arabia were among those that were forced to return at the end of 2013 when Saudi Arabia returned 160 000 illegal migrants to Ethiopia.

## Marital status and housing conditions of members

The members are categorized by marital status and gender in Table 16. We see that more than 70% of the men as well as women are married. It was more common that women are divorced or widowed while a larger share of the men are unmarried.

Table 16. Marital status of members by sex

Marital status:	Freq.	Percent	Women	Percent	Men	Percent
Unmarried	600	24.7	118	15.6	482	28.9
Married	1,726	71.1	552	72.7	1,174	70.4
Separated	7	0.3	6	0.8	1	0.1
Divorced	72	3.0	63	8.3	9	0.5
Widowed	22	0.9	20	2.6	2	0.1
Total	2,427	100.0	759	100.0	1,668	100.0

Source: 2019 Baseline survey data.

We also investigated the kind of housing conditions the members had at the time of the survey to assess the extent to which they still lived with their parents or have been able to get their own house. The distribution by gender is shown in Table 17.

Table 17. Housing conditions of members by sex

	Freq.	Percent	Women	Percent	Men	Percent
On the farm of and in the house of parents	831	34.2	167	22.0	664	39.8
Own house on separate place	1,053	43.4	342	45.1	711	42.6
Own house on farm of parents	274	11.3	64	8.4	210	12.6
Live in house of in-laws	143	5.9	119	15.7	24	1.4
Other, specify	126	5.2	67	8.8	59	3.5
Total	2,427	100.0	759	100.0	1,668	100.0

Source: 2019 Baseline survey data.

We see that relatively more men live on the farm and in the house of their parents while women more often live in the house of their in-laws. A cross-tabulation of the the marital status and the housing conditions revealed that a large share of those living on the farm and in the house of parents were unmarried.

## Discussion and Project Implementation

It can be argued that endowments, including education, as well as risk tolerance can be endogenous in these models. We regard these results as preliminary and leave more sophisticated analysis of causal relations for future work. It is worth noting that Holden and Tilahun (2018c) found mobile phone ownership to be important for the likelihood of group members becoming group leaders and board members after controlling for endogeneity of mobile phone ownership and education. We plan to complement this analysis with the new data where we also will collect more information on the attitudes of male and female members towards other male and female members as candidates to getting such positions in the groups. The collection of panel data and combination with randomized treatments will be used to further investigate the power of mobile phones as an

instrument for empowerment of female members through provision of mobile phones and training in use of mobile phones for group-related business planning.

Holden and Tilahun (2018c) found that the number of years of completed education was correlated with parent household characteristics such as farm size, education of parents and whether parents had a radio. Our analysis confirms this and we find a significant gender difference in the level of education after controlling for age and parent characteristics. Education was also negatively correlated with the age of members. This makes sense as basic education has improved substantially over the recent three decades in Ethiopia. The education levels varied systematically across districts with Raya Azebo lagging behind. For mobile phone ownership the members in Raya Azebo were ahead of the members in other districts even though education was an important determinant of mobile phone ownership.

Holden and Tilahun (2018c) found risk tolerance to be correlated with mobile phone ownership but we found no such significant correlation this time. It has increasingly become common to question whether risk preferences (tolerance) can be considered as exogenous and we will leave also for our future work to more carefully investigate this and will assess alternative ways of measuring risk preferences as an integrated part of the project. The variable used in this paper and by Holden and Tilahun (2018c) was based on the Gneezy and Potters (1997) risk investment game. Holden and Tilahun (2019a) have tested more comprehensive approaches to measuring risk preferences and we will build on these findings as well in our future work.

We will implement two Randomized Control Trials (RCTs) with focus on training of group leaders and female group members. The fact that there is a strong male dominance among group leaders implies a strong gender bias in the training the group leader RCT. The women empowerment RCT also therefore creates more gender balance in the training experiments. We will assess the impacts of training mainly male group leaders versus training female group members. One worry may be that the trained female group members may be less able to influence the decisions of their groups than the male group leaders will be. The attitudes of male and female group members towards the trained male leaders and trained female group members will matter for their influence on their groups. The insights from these experiments will in our opinion give interesting insights of high policy relevance for how to support the development of these youth business groups and enhance their sustainability.

## References

Gneezy, U., & Potters, J. (1997). An experiment on risk taking and evaluation periods. *The Quarterly Journal of Economics*, 112(2), 631-645.

Holden, S. T. and Tilahun, M. (2019). [The Devil is in the Details: Risk Preferences, Choice List Design, and Measurement Error. CLTS Working Paper No. 3/2019](#). Centre for Land Tenure Studies, Norwegian University of Life Sciences, Aas, Norway. [Link](#)

Holden, S. T. and Tilahun, M. (2019b). 2019 Group Leader and Member Survey Statistics. Baseline study under the NORGLOBAL2 Research Project “Youth Business Groups for

Sustainable Development: Lessons from the Ethiopian Model.” CLTS Working Paper. Centre for Land Tenure Studies, Norwegian University of Life Sciences, Aas, Norway.

Holden, S. T. and Tilahun, M. (2018a). The importance of Ostrom's design principles: Youth group performance in Northern Ethiopia. *World Development* 104: 10-30. **Link**

Holden, S. T. and Tilahun, M. (2018b). Land rental as a complementary income source for land-poor youth. CLTS Working Paper No. 6/2018. Centre for Land Tenure Studies, Norwegian University of Life Sciences, Aas, Norway. **Link**

Holden, S. T. and Tilahun, M. (2018c). Gender Digital Divide and Youth Business Group Leadership. CLTS Working Paper No. 5/2018. Centre for Land Tenure Studies, Norwegian University of Life Sciences, Aas, Norway. **Link**

Holden, S. T. and Tilahun, M. (2018d). Gender Differences in Risk Tolerance, Trust and Trustworthiness: Are They Related? CLTS Working Paper No. 3/2018. Centre for Land Tenure Studies, Norwegian University of Life Sciences, Aas, Norway. **Link**

Holden, S. T. and Tilahun, M. (2017). Group Trust in Youth Business Groups: Influenced by Risk Tolerance and Expected Trustworthiness. CLTS Working Paper No. 13/2017. Centre for Land Tenure Studies, Norwegian University of Life Sciences, Aas, Norway. **Link**

Holden, S. T. and M. Tilahun (2016). Youth as Environmental Custodians: A Potential Tragedy or A Sustainable Business and Livelihood Model? CLTS Working Paper No. 6/2016. Centre for Land Tenure Studies, Norwegian University of Life Sciences, Aas, Norway. **Link**

Ostrom, E. (1990). *Governing the commons: The evolution of institutions for collective action*. Cambridge university press.

Ostrom, E. (2010). Beyond markets and states: polycentric governance of complex economic systems. *American Economic Review*, 100(3), 641-72.