Intra-household gender disparity: effects on climate change adaptation in Arsi Negele district, Ethiopia

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ABSTRACT

Women empowerment in agriculture influences adaptation capacity to climate change impacts. Women are disempowered in rural households. This affects household’s adaptive capacity to climate change negatively. Household survey, focus group discussion, key informant interview and workshop were used to track stakeholders’ opinions on gender disparity in agriculture and policy issues. The objective of the study was to assess the gender parity index in agriculture, resource governance patterns and how these impact the capacity to climate change adaptation. The results show wives were imparity with their husbands. The parity gap on ownership, access to, and decision-making power over agricultural equipment was as wide as 59% and this affects women’s adaptation capacity to climate change impacts. Indeed, 94% of the coupled households have got their land by redistribution and inheritance land acquisition forms by which both forms of acquiring land favored the husband. Half of the respondent households acknowledged that they have already acquired certification for their farmlands. However, the certification was mostly given by the names of husbands and in few cases by both. Certification of farmlands by the name of a wife and a husband has built confidence on ownership and manage their farmlands. This has helped a household to better adapt climate change impacts. Gender disparity in agricultural productive resources combined with policy and cultural distortions could exacerbate household’s vulnerability to the impacts of climate change. This indicates the need for gender mainstreaming in climate change policy reforms and formulation so as to empower women and build their adaptive capacity.

1. Introduction

Women play significant role in smallholder agriculture in Sub-Saharan Africa in general and in Ethiopia in particular (Huyer 2016). Gender gaps-for example insecure access to productive land (Kuusaana et al. 2013)-affect the ways how women and men respond to climate change impacts on agriculture and natural resources. This in turn influences the support needed by men and women to build their adaptive capacity. Women decision making, especially in terms of food security, is critical without questions (Villamor et al. 2014; CGIAR 2018; Ampaire et al. 2020). Narrowing the gender gaps in agricultural productivity not only increase the national income but also help to reduce poverty and improve nutrition as women get more engagement to increase production and productivity (Galie et al. 2015; UN Women 2015; Dossa 2018). Women make up a larger proportion of employment in the agricultural sector though their activities are portrayed by gender gap in vulnerabilities, access to resources, and productivity leading to have different abilities to adapt to climate change (Huyer 2016). These differences make women more impacted by climate change (Jonson 2011; Adzawla et al. 2019). Indeed, women farmers are playing greater role in crop and livestock diversification strategies into practice thereby playing key role in local climate change adaptation capacities. This entails tackling the basic issues of gender inequality by crafting gender-responsive climate policies at global and national levels (CIFOR 2015a, b, Jerneck 2018a, b).

Regardless of that women are key provider of food, energy and water, climate change is largely affecting them since they have fewer resources with which to adapt to changing conditions. This is because gendered differentials in access, use and control of natural resources; control of economic assets; physical mobility and migration; decision-making power; and community expectations have differential impacts on women and men to their exposure to physical hazards and capacity to cope with climate change risks (FAO, 2011b; ESCAP, 2017; Jerneck 2018a; b; UN Women and UNDP-UNEP PEI 2018; Adzawla et al. 2019; Nchu et al., 2019; Ampaire et al. 2020; Halle and Kellogg 2020; CIFOR Climate Gender briefs, www.CIFOR.org/gender-climate).

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In most cases, better rule of law with its effective implementation and understanding was found to positively influence sustainable land management, especially in sub-Saharan Africa (Nkonya et al. 2016). Indeed, poor rule of law with ineffective implementation and misunderstandings will do the reverse and undermine gender balance in their substantive and enabling rights. In addition, the roles of local institutions (Amede et al. 2006) and women (Sweetman and Ezpeleta 2017) have been overlooked. Natural resource governance includes the norms, institutions and processes that determine how power and responsibilities over natural resources are exercised, how decisions are taken, and how citizens participate in and benefit from the management of natural resources (IUCN 2017; Tadie and Fischer 2017). Studies show that policies that have been implemented as outlined in the policy documents could contribute for the increment of natural resources’ productivity (Bane et al. 2008). However, weak implementations of the policies and harmful customary practices and stereotypes have done the reverse and more importantly women were disadvantaged (Hebo and Shigeta 2014; Tura 2014; Benti et al., 2016; Amanaw and Tasew 2017; Wright 2020).

Most of the rural lands in Ethiopia are in the hands of the elderly and by the name of a husband. Rights to own land and natural resources, to live in clean environments and to have equal gender opportunities are examples of substantive rights, while rights to get up to date information, to participation, to decision making and consultation are enabling rights (Feiring 2013; Pritchard et al. 2013). Property rights that are unclear, limited, insecure, short-term and/or gender exclusive not only hinder natural resource management and climate change adaptations, but also dampen willingness to take long-term actions in land and natural resources by different stakeholders (Aggarwal and Elbow 2006; Gilmour et al. 2012). The level of vulnerability of people to climate change impacts is directly or indirectly determined by their social status, gender, poverty, power and access to and control over resources (UNDP 2013a). In these regard, women are particularly disadvantaged. Even the well appreciated climate resilient green economy strategy of Ethiopia has failed to explicitly address gender dimensions of climate change problems (Mersha and van Laerhoven 2019). This in turn affect climate change adaptation as women play key roles to build household’s resilience which was also acknowledged in the UNFCCC COPs: (i) national adaptation programmes of action should be guided by gender equality (COP7 Marrakech, Morocco, 2001); (ii) adopting gender balance in bodies of the UNFCCC, and to include gender and climate change as a standing item on the COP agenda (COP18 Doha, Qatar, 2012); (iii) The Lima Work Programme on Gender (COP20 Lima, Peru, 2014); and (iv) the intersection of climate change and gender equality, empowerment of women, and realization of their rights was formally recognized (COP21 Paris, France, 2015). Irrespective of these international acknowledgments and improved efforts at national level, gender disparity, especially in rural Ethiopia in general and the study area in particular, remained wide which this study has tried to make its basis on.

Adaptation by natural resource management is one of the key responses to climate change and women are key actors to this action (Jerneck 2018a, b). Adaptive capacity is mainly the function of natural capital, decision making, income and public participation and information. That is, the more empowered with these women are, the more adaptive capacity do they have and vice versa (UNDP 2016a, b). Having limited information on climate change, which women do, has the same impact to do so on women. The study by Mekonnen and Kassa (2019) has shown that access to natural capital and knowledge contribute about 5% to the adaptive capacity of a household against the impacts of climate change. This indicates that less access to natural capitals mean, which women are liable for, more vulnerable to the impacts of climate change. Women have played increasing roles in agriculture and natural resource management and are vital agents of climate change adaptations. However, this potential of women remained untapped and there is limitation of research to showcase the gaps (Båtche 2010; Andrijevic et al. 2020; Sariyev et al. 2020). To achieve these roles of women, there should be enabling policies and institutions that are gender mainstreamed (Mishra et al. 2012; Glemarec et al. 2016; Holman et al. 2018). Gender mainstreaming in climate actions makes climate interventions more effective and efficient without additional costs. However, gender-differentiated consequences of climate change and resource governance (i.e. land) can intensify the pressure on women who rely on agriculture and use of natural resources for their livelihoods (Glemarec et al. 2016). Therefore, the objective of this study was to assess the gender gaps in intra-household (husband-wife perspectives) in respect to agricultural resource uses and resource governance and the consequences of this on household’s resilience building to climate change impacts.

2. Materials and methods

2.1. The study area

The study was conducted in Arsi Negele district in central rift valley of Ethiopia. The district is located between 7.15’N to 7.50’N and 38.25’E to 38.60’E (Figure 1). The topography stretches from the central rift valley floor at an altitude of about 1500 m to the eastern escarpment of the rift valley at about an altitude of 3000 m. The district’s average annual temperature varies from 10-25°C while annual rainfall varies between 500-1000 mm. The livelihood of the community is mixed agriculture with maize, barley, teff and wheat are dominant crops and cattle, sheep and goat are dominant in the community.

The Central Statistical Agency of Ethiopia (CSA 2007) census has indicated an increasing trend of human population in the district. In the period 2007–2017, the population has been increased by 33%, of which females have accounted over 50% of the population (Table 1).

2.2. Research methods

Interviewing couples: Six kebeles (the lowest administration unit in Ethiopia) were selected in the district (Table 2). Samples of 268 couples (i.e. 268 wives and 268 husbands) were randomly selected for joint interview to gather information on household characteristics, land acquisition forms, policy awareness, land ownership, climate change impacts, gender gaps in a household and gender accountabilities. The samples per kebele were determined based on the proportion of the total population in the kebeles during the time of assessment. The interview was based on 14 intra-household decision-making indicators particular to a rural community. In order to correctly characterize intra-household decision-making dynamics, the interviews was directed to both husband and wife (joint interview) at a time whereby they were fully agreed on each issue with consent and freedom.

Key informant interviews and group discussions were made to gather information on the resource governance, trends of change and land holding right. The focus group discussions deal with historical natural resource governance situations as well as policy implications. In two kebeles per agro-ecology and three focus groups per kebele were selected randomly. Each group consisted of 8–10 members, of which 2–4 were women. A group was encompassed women, men, elders and youth in order to obtain accumulated knowledge and views from these diversified social groups. The focus group discussions had made use of participants’ feelings, perception and opinion about resource governance and climate change issues from gender perspectives. Key informants were selected based on a snow-ball method at which one informant to select the other until a saturation number is obtained, which was 4–5 per kebele.

Comprising of key stakeholders (key informants, public and civic office personnel) consultation workshop before fieldwork and feedback workshop after fieldwork were made to get information on policy responses and governance issues that might affect women. Secondary data from policy documents and briefs, governmental and non-governmental organizations’ reports, scientific articles and workshop proceedings have been used as resource materials.
The gender parity index within a coupled household (where both wife and husband are reside together) was calculated as in Eq. (1) and that for all respondent households in the study area was calculated as in Eq. (2).

\[
GP_i = \frac{E_i W_i}{E_i H_i}
\]

(1)

where: \(GP_i\) is the gender parity index in a coupled household where both husband and wife live together, \(E_i W_i\) share of a wife \(i\) on empowerment factor \(i\), \(E_i H_i\) is share of a husband \(i\) on empowerment factor \(i\) (\(E_i W_i + E_i H_i = 1\)). The assumption was that in intra-household a husband and wife should have to have equal decision making power on every decision making indicator. Based on this a question was framed referring to each indicator like: what is the relative decision making authority share of a husband and a wife on access to productive resources in a household?

\[
GP = \frac{GP_1 + GP_2 + ... + GP_n}{N}
\]

(2)

\(GP\) is the average gender parity index for coupled household respondents (\(N = 268\)) for a particular gender empowerment factor in the study area.

Climate change and variability impact (four-point scale impact score: 1 = low; 2 = medium; 3 = high; 4 = very high) was applied on how the different climate change and variability factors had been influencing women and men: the average impact score was determined as in Eq. (3).

\[
I_i = \frac{R_1 F_1 H_1 + R_2 F_2 H_2 + ... + R_n F_n H_n}{N}
\]

(3)

\(I_i\) is average impact score of climate factor \(F_i\), \(R_1\) is impact score of factor 1 given by couple 1 (\(H_1\)), \(R_2\) is impact score of factor 2 given by couple 2 (\(H_2\)), and so on. \(N\) is the total number of couples interviewed.

2.3. Data analysis

The qualitative data were organized in the form of narratives as interpreted by the key informants and group discussants. Whereas the quantitative data from coupled household interview were coded in to Microsoft excel and imported to SPSS 20 to produce the descriptive statistics in the form of tables and graphs. ANOVA also has been applied to show whether there was variation in wife’s parity across the six kebeles at 5% level of significant.

3. Results

3.1. Household characteristics

The assessment of 268 intra-households show that the average age of the husband was 37.5 ± 0.8 and that of the wife was 33.7 ± 1.3 (mean ± se) indicating some significant differences (\(p < 0.04\)). The average educational level of the husband was 6.30 ± 0.22 while that of the wife was 2.23 ± 0.46 (\(p < 0.001\)). The average place attachment ratio in years for a husband was 0.98 ± 0.04 and that of a wife was 0.80 ± 0.04 (\(p < 0.001\)). Indeed, the time lived in a village in years by a husband was 36.63 ± 0.8 as compared to a wife with 27.04 ± 1.7 (\(p < 0.001\)). The lower place attachment ratio and time lived in a village for wives have shown that wives were migrated from a different place during marriage than where they lived currently with their husbands. The other socio-economic characteristics of the respondent couples, which have them in common, are as shown in Table 3.
3.2. Decision-making in agriculture

From focus group discussions and key informant interviews, it was revealed that women play key roles in agricultural activities and natural resources management in order to diversify household’s livelihood options. By doing so, women are the most active in doing coping and adaptation strategies in the farming system to build household’s resilience by doing diversified activities than men. However, the results of this study show that women are not empowered in getting access to productive resources, decision-making over production, control over use of income, community leadership roles and time allocation in a household. This disempowerment of women in important agricultural domains will hamper women’s efforts in enhancing production and productivity in the farming system and make them vulnerable to the impacts of climate change. The study shows that the overall agricultural gender parity index in the study was 0.62. This indicates that wives were not empowered in a household as compared to husbands. Since a parity index closer to 1 represents full parity and that closer to zero represents no parity at all, a parity index of at least 0.85 (still with 15% gap) to be considered that she has parity with her husband (Table 4). In general, lower GPI indicates larger gaps in access to and control over resources, access to information, and equal rights and access to decision-making processes that define women’s economic independence in a particular context of climate change. In doing so, this has hampered women’s capacity and potential to be actors of climate action to build resilience.

Access to productive resources: The results showed that, in coupled households, the gender parity index (GPI) of a wife on access to productive resources was 0.64. This indicator encompassed four-indicator indices to come up with the overall index for the major indicator. The gender parity index of ownership, access to, and decision-making power over land was 0.63. The indices for other sub-components of productive resources such as livestock, agricultural equipment and credit services were 0.71, 0.41, and 0.81 respectively. Wives have lower parity with their husbands on all four sub-components.

Decision-making over production: The study showed that a wife has GGI 0.65 on decision-making over production in the study area. The gender parity index on decision making over food crop farming was 0.72. It was 0.69 on decision making over cash crop farming, 0.71 over livestock rearing and 0.41 over agricultural autonomy. In all the four components of decision making over production, the wives were disempowered with the highest disparity on decision making over agricultural autonomy.

Control over use of income: The main income sources in rural households in the study communities are crop and livestock sale, eucalyptus pole sale, fuelwood and few petty trades. In most of these income sources, the husbands were taking the leading role to control the income and expenditures. The results showed that the overall gender parity index on control over the use of income in a coupled household was 0.69. Specifically, the GPI on control over different sources of income was 0.68 and that on over income expenditures was 0.70. In both components, wives in rural areas have disparity with their husbands in a household and unable to equally decide on income and expenditures.

Community leadership: The GPI on community leadership was 0.58. The index on participation of membership in economic or social groups was 0.63 and that on making comfort in speaking in public was 0.53. In the focus group discussions and workshops during field assessment, this was triangulated that there were only few wives in the discussions and workshops that have made speeches to share their ideas and most of them were shy to do it. Wives are considered to stay at home by the community and do home activities and care children. This has widened the gap to confront on public speaking and participation on other social groups.

Time allocation: The overall GPI on time allocation in a household was 0.49. The GPs on allocation of time to productive tasks and to leisure activities were 0.44, and 0.54 respectively. Wives have less time allocation to leisure activities than husbands. However, the time allocation for domestic tasks for wives is much higher which a burden is for wives. They collect firewood, fetch water, prepare food for the family, clean house, care children, and so on.

The result form the ANOVA (Table 5) shows that there is no significant difference in intra-household decision making along the different locations (kebeles) at 5% level of significance. This indicates that gender parity is less affected by location in the study area whereby in all cases a wife was characterized by lower parity as compared to a husband. Climate change tends to exacerbate these inequalities and affects the adaptation role of women in rural areas.

3.3. Policy and cultural disparity

The land redistribution to peasants during 1970s had provided land to a household by the name of a husband. Leave alone this, it has been asked

### Table 3. Some socio-economic characteristics the respondents (Mean ± se).

| Household profile (n = 268) | (Mean ± se) |
|-----------------------------|-------------|
| Family size (no.)           | 8.09 ± 0.26 |
| Land size (ha)              | 1.71 ± 0.08 |
| Per capita income of 2014/15 (1000 birr) | 59.4 ± 3.6 |
| Farming experience (years)  | 19.0 ± 0.65 |
| Livelihood diversity index of 2014/15 | 0.58 ± 0.01 |

### Table 4. Intra-household wife’s decision share and parity index in Arsi Negele district.

| Intra-household decision making indicators | Mean | Std. Dev | Std. Error | Minimum | Maximum | PI |
|-------------------------------------------|------|----------|------------|---------|---------|----|
| Ownership, access to, and decision-making power over land | 0.39 | 0.1314 | 0.0080 | 0.05 | 0.60 | 0.63 |
| Ownership, access to, and decision-making power over livestock | 0.41 | 0.1223 | 0.0075 | 0.05 | 0.75 | 0.71 |
| Ownership, access to, and decision-making power over agricultural equipment | 0.29 | 0.1458 | 0.0089 | 0.05 | 0.60 | 0.41 |
| Ownership, access to, and decision-making power over credit | 0.45 | 0.1162 | 0.0071 | 0.05 | 0.75 | 0.81 |
| Decision making over food-crop farming | 0.42 | 0.1328 | 0.0081 | 0.05 | 0.80 | 0.72 |
| Decision making over cash-crop farming | 0.41 | 0.1212 | 0.0074 | 0.10 | 0.75 | 0.69 |
| Decision making over livestock farming | 0.42 | 0.1198 | 0.0073 | 0.10 | 0.75 | 0.71 |
| Autonomy in agricultural production | 0.33 | 0.1406 | 0.0086 | 0.05 | 0.75 | 0.49 |
| Control over income | 0.40 | 0.1406 | 0.0086 | 0.05 | 0.90 | 0.68 |
| Control over expenditures | 0.41 | 0.1350 | 0.0082 | 0.10 | 0.80 | 0.70 |
| Membership in economic or social groups | 0.39 | 0.1430 | 0.0087 | 0.05 | 0.80 | 0.63 |
| Comfort in speaking in public | 0.34 | 0.1340 | 0.0082 | 0.05 | 0.75 | 0.53 |
| Allocation of time to productive tasks | 0.30 | 0.1156 | 0.0071 | 0.05 | 0.80 | 0.44 |
| Allocation of available time for leisure activities | 0.35 | 0.2039 | 0.0125 | 0.05 | 0.80 | 0.54 |
forms that both favor men (Table 6). Moreover, the discussants foretold have got their land by redistribution and inheritance land acquisition rather than daughters. Nearly 94% of the households in the study area claimed that land inheritances were accustomed to provide land for sons land. In focus group discussions and key informant interviews, it has been granted the same right to both women and men to control, use and own policy of Ethiopia, the policy is not followed in practice even if it.

1. geda system in which concerns of economic, political and social de-
2. that women are not involved in the Oromo cultural institution of the
3. because they are called by their fathers
4. cations have built con-
5. About 50% of the respondent farmers acknowledged that they have
6. the sons and daughters in each household as “whose son/daughter are you?” All of the sons and daughters have replied as they are their fathers’ because they are called by their fathers’ name. This shows that gender disparity is just starts at home and become higher when it is externalized in the community, particularly in rural areas. From workshop and focus group participants, it has been understood that even in the current land use policy of Ethiopia, the policy is not followed in practice even if it grants the same right to both women and men to control, use and own land. In focus group discussions and key informant interviews, it has been claimed that land inheritances were accustomed to provide land for sons rather than daughters. Nearly 94% of the households in the study area have got their land by redistribution and inheritance land acquisition forms that both favor men (Table 6). Moreover, the discussants foretold that women are not involved in the Oromo cultural institution of the Geda system in which concerns of economic, political and social decisions are made.

About 50% of the respondent farmers acknowledged that they have already acquired certification for their farmlands (Table 6). The farmland certifications have built confidence to farmers on holding ownership and manage their farmlands. Nonetheless, the land certificate was all about land use rights while land ownership is still under state control (FDRE 1994, article 40/3) and the certification did not include for forests and rangelands. Certification of land for use rights does not mean certification of land for ownership (FDRE, 2005, article 10/1). This has its own negative impacts on land management as well as on land use/cover change, because it determines the use rights and ownership of other resources such as trees on the land. The land reform proclamation in 1975 which had granted land to Ethiopian farmers, “Land to the Tillers”, had favored men during redistribution of farm and grazing lands. Despite this, there were prohibitory policies of conservation strategies without the willingness and consultation of the communities. These regulations prohibit, for example, collection of fuelwood from forest lands and have put greater burden on women who are responsible to collect fuelwood.

From the respondents interview it was understood that, on average, only less than 10% of them have clear understanding and knowledge of the environmental, energy, land and forest policies of Ethiopia. Indeed, about 54% of them didn't have clear understanding and knowledge of these policies and about 37% of them have blurred understand of the policies. This makes it difficult to maintain a policy implementation on the ground and make women to benefit according to what the policy states in a policy document. The respondents emphasized that smoothing gender taboos in the community and mainstream gender issues in key policies could reduce the disparities of gender in agriculture and natural resource use, and build the resilience of women against the impacts of climate change and variability.

3.4. Climate change effects on women

The narrations from the opinions of key informants, focus group discussants and workshop participants have shown that women are more
vulnerable to the effects of climate change and variability. The four-point scale average impact score weight for the question “are women or men more impacted by climate change/variability extremes such as heat wave, flooding and frost occurrences as well as the resulting indirect effects of loss of biodiversity, water shortage and food insecurity?” was 2.40 for women and 1.20 for men. This shows that women are more vulnerable to the effects of climate change/variability. In addition to lower parity index of wives with their husbands which determines their economic independence, focus group discussants have mentioned conditions to exacerbate (-) the susceptibility of women to the effects of climate change and variability based on the question “why women are more liable to the effects of climate change/variability than men?” These were (i) natural burdens of pregnancy, giving birth and breast feeding; (ii) women are liable to indoor air pollution during food preparation; (iii) women have little options to move from place to place like men; (iv) women shoulder the burden to bring water and fuelwood; (v) women are economically dependent on their husbands; (vi) lack of enough balanced food diet-rural women eat left over foods after they fed their family. Regardless of these burdens, women do different farming activities as alternative options (+) to diversify income and livelihoods so as to maintain household’s resilience against the effects of climate change and variability. On the other hand, men are less susceptible (+) to the effects of climate change and variability in that they have enough resting time compared to women; can migrate to nearby town to trade; can get information on weather and farming conditions; are flexible to changes to change themselves; and have access to productive resources, control over production and income. These differences are directly correlated with lower parity index of wives to their husbands and have created different abilities to adapt to climate change between men and women in the study district. In this regard, the highest vulnerability to the effects of climate change and variability was inclined to women which in turn affects their productivity as well as their adaptive capacity. ‘The effects of climate change and variability can threat all family members but not equally’, the discussants said. The burden on women is higher when combined with other burdens such as firewood collection, water fetching, child caring, marketing and collection of ration commodities. These are among the major factors, as mentioned by key informants and focus group discus- sants, which have lead to the lower gender parity of women with their husbands and making them highly vulnerable to the effects of climate change and variability.

4. Discussion

The results reflect that women are less empowered (with an average parity gap of 38%) in access to productive resources leading them more vulnerable to climate change effects. Although women are effective agents of change in relation to both mitigation and adaptation, unequal access to resources and to decision-making processes has made them disproportionately affected by the effects of climate change and variability (UN Women, 2009; Bäthge, 2010; Dimitrov, 2019; Mai et al., 2018; IDB, 2020). In a particular household in the study, a wife was disempowered with, for example, male domination in receiving infor- mation and extension services, limited role in access to productive re- sources, decision-making over production, control over use of income, community leadership and time allocated in a household. This is in line with other studies and reports (GIWPS, 2015, Djoud et al., 2016, Eastin, 2018, Ylipaa et al., 2019, Ampaire et al., 2020). Indeed, the results of this study show a GGI score of 0.62 for sampled rural households in agri- cultural domain of empowerment in 2015. Despite that women are key to end hunger; disempowerment of women in access to agricultural pro- ductive resources in a household contradicts with the sustainable development goals: ending poverty, and achieve gender equality and empower women and girls (Assan et al., 2018, Dosia et al., 2018, Jer- neck, 2018a, b). FAO and other reports outlined that the global number of hungry people could be reduced by as many as 135 million if women had equal access to productive resources (FAO, 2011a, b). This is because, if access to productive resources has been balanced between men and women as 50:50, women could increase yields up to 30% on their farms which could raise total agricultural output in developing countries by up to 4% and hence increases the adaptive capacity of a household against the effects of climate change (FAO, 2014).

Ownership of resources supported by proper legislation is another concern where women should be empowered. Legislations encompass the distribution of resource, for instance forest and land, ownership as an important element and provide legal support for policy implementation (FAO, 2010). From the opinions of focus group discussants, key in- formants and respondents, it was understood that there was policy dis- tortions often associated with weak law enforcement, corruption and lack of transparency. Despite well written policies, there was lack of enforcement of the policies on the ground (Ayana et al., 2015; Stephen et al., 2017; IDRC, 2020) and the knowledge of major policies by the community is minimal. This will directly or indirectly affects women’s access to productive resources and decision making over production.

The results of this study have shown higher gender gaps (average G PI of 0.62), lower land governance of women in practical implementation (7% on average) and higher vulnerability of women from climate change effects due to different factors (e.g. indoor air pollution during food preparation). In parallel to this study, other studies (e.g. Jensen and Halle 2013; Oezelberger 2014; GGCA 2016; Sanz et al.2017) had shown that climate change, poor resource governance and gender inequality are tackled altogether; it is likely to deliver sustainable development and tackle poverty. It was briefed by Kreft et al. (2016) that the climate risk index score and rank of Ethiopia for the period 1996–2015 was 70.33 and 66 respectively. In the same token, the average death toll and economic losses (in millions USD (PPP)) per year was 88.35 and 153.929. For the year 2015, the score and rank were 64.33 and 65 with economic losses of USD 1314.02 million (PPP). On the other hand, for the assessed sector of mining, the resource governance index score and rank of Ethiopia for the year 2017 was 40 and 57th (NRGI, 2017) which encompassed scores of 46, 38 and 37 for value realization, revenue management and enabling environment, respectively. This shows that Ethiopia has a mix of strong and problematic areas of governance where resource extraction can help society, but it is likely that the eventual benefits are weak. This was also true in the agricultural sector in Ethiopia. Gini Index of primary house- hold income distribution of Ethiopia from early 1990s to late 2000s show low status at both ends with falling direction of change of the index by -22.2% (UNDP, 2013a, b). Nevertheless, in most of the key equality in- dicators for gender empowerment in Ethiopia, women share the lowest figure as compared to men (UNDP, 2016). The World Economic Forum report 2021 has shown that Ethiopia has been ranked 97th out of 156 countries with a global gender gap index (GGGI) score of 0.691 (Table 7). These inequality indices are analogous to the intra-household parity indices computed in this particular study. These further exacerbate the vulnerability of rural poor, such as women, by climate change effects as it affects agricultural production (Mwengu et al., 2017).

The assessment shows that the assumed equivalence scale between husband and wife was highly skewed to the husbands indicated by lower parity index (Abbe et al., 2016; Harris-Fry et al., 2017; Fialova and Myskova, 2021). Unequal intra-household decision making power on resources has a significant impact on income poverty and income inequality thereby increasing the vulnerability of a household to the

| Indicators                          | 2006 score | 2021 score | Closer to parity |
|------------------------------------|-----------|-----------|-----------------|
| Global Gender Gap Index            | 100       | 0.595     | 97              | 0.691 0.096 |
| Economic participation and opportunity | 74   | 0.568     | 128             | 0.560 -0.008 |
| Educational attainment             | 108       | 0.739     | 141             | 0.850 0.111 |
| Health and survival                | 87        | 0.969     | 77              | 0.971 0.002 |
| Political empowerment              | 61        | 0.102     | 28              | 0.382 0.280 |

Table 7. Gender gap index in Ethiopia (WEF 2021).
effects of climate change by lowering the adaptive capacity (Anderson et al., 2017; Coates et al., 2018). Moreover, the disparity between a husband and wife leads to have divergent opinions in managing climate change risks (Hung, 2018).

5. Conclusions

Women in rural areas are found to be disempowered both within a household and in public spaces. In this particular study, women in rural areas were found in disparity with men with regard to access to productive resources, decision making over production, control over the use of income, community leadership and time allocation for domestic tasks in a household. For the key empowerment indicators used in this study, the gender parity gaps range as wide as 59%-19%. When these disparities amalgamated with the effects of climate change and variability, they hamper women’s efforts in agricultural development and as well as climate change adaptation. Closing these disparities might not be easy, but it can be started with simple interventions like putting the names and photos of wives and husbands in land certificate which improve women access to productive resources. Women in rural areas are disadvantaged from general land distribution and titling efforts. This is also added up by inheritance provision of land, at which women are less likely to be benefited. Educating women and men farmers about the key policies in the country, specifically those policies dealing on natural resources such as land, forest and water, are very important in promoting gender equitable land programmes and sustainable agricultural development. Putting joint names, both wife and husband in the land certificate, as it was done by the land administration bureau in the study district, was one of the good initiatives to improve security of land tenure and build confidence in both men and women.

There are good land use policies in Ethiopia in the policy documents that have mainstream gender. However, they are deficient by implementation in practice to maintain gender equality particularly in agricultural and natural resource management. Formulating proper resource policies alone neither enhance productivity of resources nor alleviate poverty; rather it needs efficient and effective enforcement and implementation on the ground that mainstream gender equality. Poor resource governance and climate change have resulted the depletion of water and forest resources and thereby increased the burden on women by forcing them to travel long distances to obtain water and fuelwood as these tasks are given ‘women tasks’ in rural Ethiopia. The result of this study could enable to understand the current state of knowledge on the interlinkages of climate change and gender disparity with the different levels of sensitivity on men and women. The study highlighted how to develop effective policies and strategies that mainstream gender equality in agriculture so as to increase productivity through the proper management of the resources thereby provides food security enhancement and sustainable environmental benefits for climate change adaptation. Indeed, this study cannot be generalized, however it provides indicative information to develop and inform strategies for reducing gender inequalities or empowering women in rural agricultural households; and the author suggests further research in broader scale in Ethiopia.

Declarations

Author contribution statement

Zenebe Mekonnen: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Wrote the paper.

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Data availability statement

Data will be made available on request.

Declaration of interests statement

The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

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