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Original Research Article

Gender Roles on Climate Smart Agriculture on Small Holders Farmers of some Selected Root and Tuber Crops in Imo State, Nigeria

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Abstract

The study assessed gender roles on climate smart agriculture on small holder's farmers of some selected root and tuber crops (cassava, sweet potato, yam and ginger) in Imo state Nigeria. Gender disparities persist in agriculture, particularly among smallholder farmers cultivating root and tuber crops. A multi-stage sampling procedure was used in selecting 108 respondents. Purposively, male and female farmers who were involved in climate smart agriculture of root and tuber crops were selected. Data were collected with the aid of questionnaire and analyzed with statistical tools such as frequency tables, percentages, and mean. The result reveals that the mean age for both genders was 50 years with the majority being married (64.8%) and educated (63.8%). Family land was the primary source of land ownership (55.5%), with an average farm size of less than 1 hectare. Analysis of CSA practices utilization highlights gender disparities across various practices. In water management, males showed higher utilization rates in precision irrigation (52%) and drip irrigation (43%) compared to females. Similarly, in smart agricultural practices, males exhibited higher adoption rates in mixed farming (77%) and integrated pest management (76%) compared to females. However, females showed higher adoption rates in some practices like mulching (73%) and adjusting planting dates (85%). Age-related patterns in CSA practices adoption were observed, with older farmers utilized precision irrigation, drainage management, and bio-gas, while younger farmers preferred drip irrigation, cover crops, and mulching. The study recommends a well tailored age specific educational training program to address the gender gaps among farmers.

Keywords: Gender disparities, Climate-smart agriculture, Smallholder farmers, Root and tuber crops.

Introduction

Gender roles significantly influence the adoption and implementation of climate-smart agriculture (CSA) among smallholder farmers, particularly in regions like Imo State, Nigeria. Root and tuber crops, such as cassava, yam, and sweet potato, are staple foods in Imo State and are primarily cultivated by smallholder farmers who depend on these crops for both subsistence and income. Gender dynamics in agricultural practices, decision-making, and access to resources play a crucial role in determining the success of CSA strategies aimed at improving the resilience of these farmers to climate change (Adebayo et al 2020).

Gender roles are roles that women and men play which are not determined by biological factors but by socioeconomic and cultural environment or situation (Ogata *et al*, 2009; Agbasi *et al*,2021). In many rural communities in Nigeria, including Imo State, agricultural activities are often gender specific, with men and women performing different tasks and having varying levels of access to resources and decision-making power. Women, for example, are often responsible for planting, weeding, and harvesting, while men are more involved in land preparation and marketing (*Oseni et al*, 2021). This division of labor affects how CSA practices are adopted, as women may have less access to information, technology, and financial resources needed to implement these practices (Akpan *et al*,2018; Adebayo *et al*., 2020). Moreover, gender norms and expectations can limit women's participation in decision-making processes at the household and community levels, further hindering the effective implementation of CSA.

In the context of climate smart agriculture, there has also been a gender gap amongst small holder farmer of root and tuber crops in south Eastern zones most especially in Imo State, of which women have less access to productive resources, financial capital and to advisory services compared to men (FAO, 2011; Kiptot *et a*l,2022). This gap means that men and women are not starting off agricultural production on a level playing field. Gender specifically shapes both men and women live in the context of agricultural productivity. Therefore, women need to have equal position in comparison to men, so as to have access to adoption and sustainability of practices under CSA approach. It is important to understand gender roles on climate smart agriculture by considering their contribution to agricultural production. This understanding will ensure efficient allocation of scarce resources among competing enterprises in the households (Onyemauwa *et al*, 2008; Doss *et al* 2018,).

The increasing variability of climate events threatens the sources of livelihood of many rural farmers (gender) especially small holder farmers in Imo State Nigeria. The high occurrence of these extreme events of climate such as drought, high temperature, flood and shortening or lengthening of cropping season has been the unpredictable experience farmers are facing in the globe of which South East agro ecological zones are not left out. This has added to vulnerability of root and tuber farmers especially the producers that depend solely on natural resource base for farming. Farmers really need to find adaptation strategies to reduce the inevitability nature of climate change. Therefore, climate smart agriculture offers the unprecedented framework of transforming and adapting agricultural system to maintain food security and sustainable agriculture in the South Eastern Nigeria.

Climate smart agriculture is a holistic approach that increases productivity of agricultural produce and resilience that reduces the effects of green house gas emission (FAO, 2018; FAO 2014). CSA practice aim at reorienting agricultural system to ensure food security for all people at all times despite changing climatic condition. Nigeria Agricultural Resilience Framework (NARF) provides guidance on the implementation of CSA practices across the country, with a focus on regions most vulnerable to climate change. This framework also highlights the need for capacity building and extension services to support farmers in adopting CSA practices (World Bank, 2019). More so, the integration of gender considerations into CSA strategies is not just a matter of equity but also of efficiency. Research suggests that when gender roles are recognized and addressed, CSA interventions are more likely to succeed, leading to greater resilience among smallholder farmers, especially those cultivating root and tuber crops in vulnerable regions like Imo State (Nkegbe *et al* 2019; Alemu & Negash, 2020). This, in turn, can contribute to enhanced food security, poverty reduction, and overall economic development in these communities. In view of these, this paper investigated gender roles on climate smart agriculture on small holders farmers of some selected root and tuber crops in Imo State, Nigeria**.** The specific objectives were to ascertain socioeconomics characteristics and level of awareness of climate smart agricultural practices on the production pattern (cassava, sweet potato, yam and ginger) by both gender in the study area, identify the different roles been done by both gender in climate smart- agricultural practices of these crops, access the level of utilization of climate smart agricultural practices by gender in the study area and identify the constraints both farmers encountered in the adoption of climate smart agricultural in the area.

Methodology

The study was conducted among root and tuber crops farmers in Imo State. The State lies within latititude 4’45’N and 7’15’N, and longitude 6’50’E and 7’25’E. It occupies the area between the lower River Niger and the Upper and middle Imo River. The State is bounded on the east by Abia state, on the west by River Niger and Delta state, and on the North by Anambra state and on the south by River state. The state is located within the rainforest belt of Nigeria, and the temperature ranges between 20’C and 30’C. The State has 27 local Government Areas (LGAs) and three Agricultural Zones of Owerri, Okigwe and Olru.

A multistage random sampling technique was adopted in the study area. Purposively male and female farmers who were involved in climate smart agriculture/ cultivation of root ad tuber crops were selected for the study. First, the three agricultural zones of the state were selected for the study. Two blocks each was randomly selected from the three agricultural zones to give a total of 6 blocks (Owerri- Owerri North and Owerri west blocks: Okigwe- Mbano and Ihite-uboma blocks), Orlu- Orlu and Nkwere blocks). Also, two circles each was randomly selected from the selected blocks which gave a total of 12 circles. Finally, 9 farmers each were randomly selected from each of the selected circles to give a sample size of 108 (54 male and 54 females respectively). A well structure questionnaire was used to elicit information both online and offline with open data kit (ODK). Data collected was subjected to Microsoft excel. Statistical tools such as frequency tables, percentages, and mean will also be used in the analysis of data.

Results and Discussion

Socioeconomic Characteristics of the Respondents

The socioeconomic characteristics of gender are presented on the charts 1-11 below. The results showed that 64 out of 108 interviewed were female (59.2%), while 44 were male showing 40.7% respectively. The mean age of both genders was 49.95 years and majorities 64.8% were married and 63.8% were educated. Majority 69.44% of the respondents have no contact with the extension agent only 30.56% had contact. Greater number sourced their capital from isusu and personal savings 49(45.3%) and 32(29.6%) respectively, while 55.5% acquired their land through family land, and annual farm income is 28.7% and the average farm size was less than 1ha.

The findings on fig.12-15 provides an insight into the distribution of climatic smart agricultural practices utilization based on sex and age group of the respondents highlighting variations in utilizations rates across different practices and demographic categories in the study area.

Water Management Practices:

Precision Irrigation: More males (52%) utilize precision irrigation compared to females (45%). This indicates a gender disparity in the utilization of this water management practice.

Drip Irrigation: Males (43%) show a higher utilization rate compared to females (39%). The difference is less pronounced but still reflects a gender gap.

Cover Crops Method: A significant difference exists, with more males (59%) adopting cover crops compared to females (38%).

Furrow-Irrigated Raised Bed Planting: This practice is less popular overall, but the utilization rates are slightly higher among females (19%) compared to males (18%).

Drainage Management: A substantial difference is observed, with more males (76%) utilizing drainage management compared to females (50%). **Collecting Rainwater:** The adoption rate is higher among females (61%) compared to males (58%). **Sprinkler Irrigation:** A higher percentage of females (56%) utilize sprinkler irrigation compared to males (47%).

Smart Agricultural Practices:

Mixed Farming: A significant gender gap is evident, with more males (77%) utilizing mixed farming compared to females (58%).

Zero Tillage or Minimum Tillage: This practice has lower overall utilization, but males (17%) adopt it more than females (22%).

Agro-Forestry: More males (71%) adopt agro-forestry compared to females (60%).

Integrated Pest Management: There is a gender gap, with more males (76%) utilizing integrated pest management compared to females (58%).

Bio-Gas: The utilization rate is higher among males (19%) compared to females (9%).

Mulching: Majority of females (73%) showed a higher adoption rate compared to males (15%).

Nutrient Management Practices:

Precision Fertilizing: Both genders have low utilization rates, but it is slightly higher among females (17%) compared to males (10%).

Intercropping: Males (65%) have a higher utilization rate compared to females (52%). **Organic Fertilizer Application:** More males (77%) utilize organic fertilizer application compared to females (54%).

Crop Rotation: A higher percentage of males (69%) utilize crop rotation practices compared to females (17%).

Weather and Knowledge Practices:

Timely Meteorological and Climatic Data: A higher percentage of males (46%) utilize timely meteorological and climatic data compared to females (35%).

Planting Improved Variety: Both genders show low utilization rates, with males (21%) slightly higher than females (15%).

Adjusting Planting Dates: More females (85%) utilize adjusting planting dates compared to males (77%).

Contingent Crop Planting: Females (69%) show a higher utilization rate compared to males (15%).

Distribution of Utilization of Climate-Smart Practices by Age:

The result on the distribution of climate-smart practices by age sheds light on how different age groups engage with and utilized these practices. The percentages represent the proportion of respondents in various age brackets who have either utilized or not adopted specific practices within each category.

Water Management Practices:

Precision Irrigation: utilization increases with age, with higher rates among older respondents. This suggests that older farmers are more likely to utilize precision irrigation.
Drip Irrigation: The utilization of drip irrigation is more prominent among younger age groups, indicating a preference for this efficient water management practice among the youth.
Cover Crops Method: utilization decreases with age, with older farmers showing lower rates. Younger farmers are more inclined to utilize cover crops.
Furrow-Irrigated Raised Bed Planting: No significant age-related pattern is evident, but the utilization rates are slightly higher among older farmers.
Drainage Management: Older farmers exhibit a higher utilization rate for drainage management, suggesting an increased awareness of the importance of this practice among the elderly.
Collecting Rainwater: No clear age-related pattern is evident for rainwater collection.
Sprinkler Irrigation: Utilization is relatively consistent across age groups.
Smart Agricultural Practices:
Mixed Farming: Older farmers show a higher utilization rate, indicating a preference for mixed farming practices among the elderly.
Zero Tillage or Minimum Tillage: utilization increases with age, with older farmers more likely to adopt zero tillage.
Agro-Forestry: utilization is higher among middle-aged farmers (25-40 years), suggesting that individuals in their productive age are more inclined towards agro-forestry.

Integrated Pest Management: Adoption is higher among farmers aged 25-40, indicating a preference for integrated pest management practices among the youth.
Bio-Gas: Older farmers exhibit a higher utilization rate for bio-gas, suggesting a greater willingness to utilize alternative energy sources.
Mulching: utilization is higher among younger farmers, indicating a preference for mulching practices among the youth.

Nutrient Management Practices:

Precision Fertilizing: utilization increases with age, with older farmers more likely to adopt precision fertilizing.
Intercropping: Older farmers show a higher utilization rate for intercropping, suggesting a preference for diversified cropping practices among the elderly.
Organic Fertilizer Application: utilization increases with age, with older farmers more likely to adopt organic fertilizer application.
Crop Rotation: utilization is higher among older farmers, indicating a preference for crop rotation practices among the elderly.

Weather and Knowledge Practices:

Timely Meteorological and Climatic Data: utilization is higher among respondents aged below 25, indicating a greater awareness of the importance of timely weather data among the youth.

Planting Improved Variety: No clear age-related pattern is evident for planting improved varieties.

Adjusting Planting Dates: utilization is higher among respondents aged below 25, indicating a greater willingness to adjust planting dates among the youth.

Contingent Crop planting: utilization is higher among respondents aged 25-40, suggesting a preference for contingent crop planting practices among individuals in their productive age.

The result on **table 1** shows ranking based on the severity of constraints as it affects both genders in the study area, limited access to resources male 44.4% and 55.5% for female and it has a highest combined percentage and is a crucial issue particularly for female. Limited access to modern agricultural technologies male 55.5% female 44.4% this constraint has a high combined percentage indicating a significant challenge for both genders. Limited access to extension service contact male 46.2%, female 53.7%, it is more pronounced for females making it a crucial area for targeted interventions. Limited access to land ownership male 48.1, 51.8% female and is evenly distributed between genders and is an essential area for addressing land related challenges. Climate related-risk male 48.1%, 51.8%female, this is evenly distributed between genders, indicating the need for gender-neutral strategies to address climate-related risks. Limited access to information on climate-smart agriculture male 50.0%, 50.0% female, these constraints affects both genders equally and is an important area for improvement. Poor access to credit facilities 46.6% male, 50.9% this constraint is evenly distributed between genders, highlighting importance of improving access to credit for both. High cost of labor is also relatively even distributed 48.1% male 51.8% female, highlighting the importance of addressing labor cost for both.

SOCIOECONOMICS CHARACTERISTICS OF RESPONDENTS

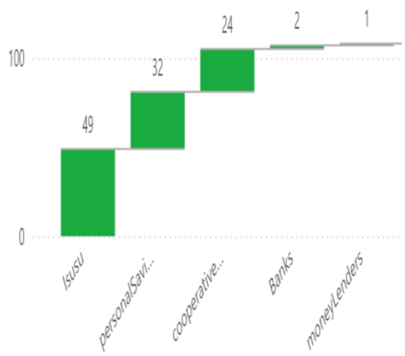

Fig. 1: Source of Capital

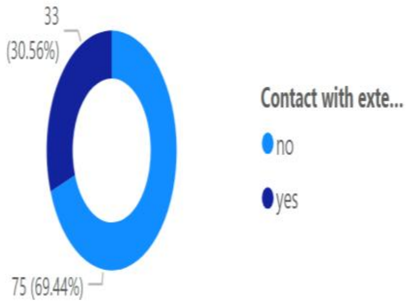

Fig. 2: Contact with Extension Agents

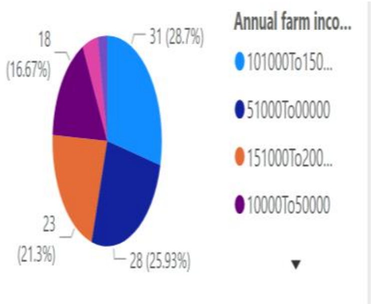

Fig. 3: Annual Income

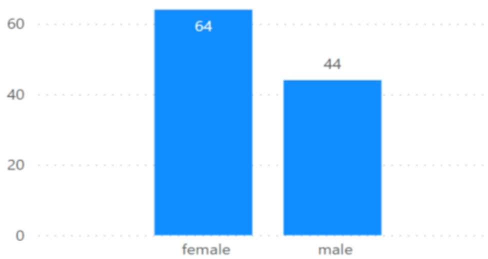

Fig. 4: Gender

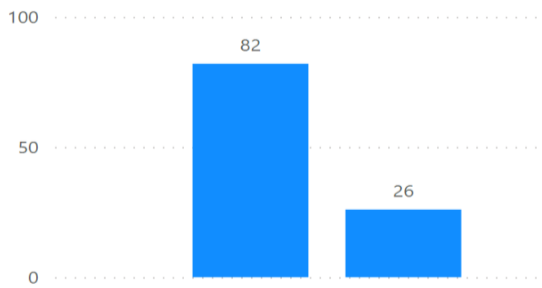

Fig. 5: Membership of Cooperative

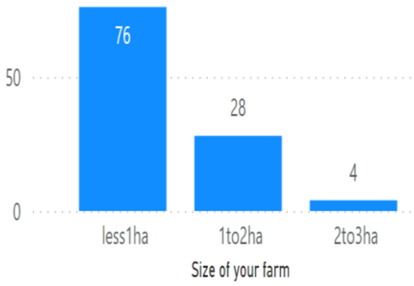

Fig. 6: Farm size

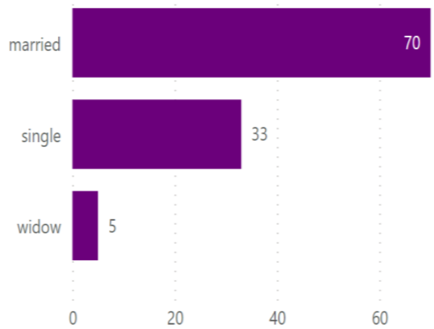

Fig. 7: Marital statues

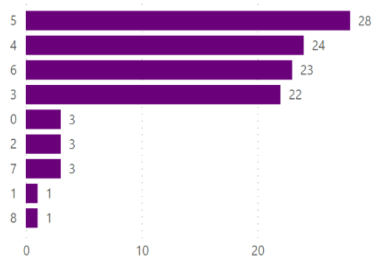

Fig. 8: HH size

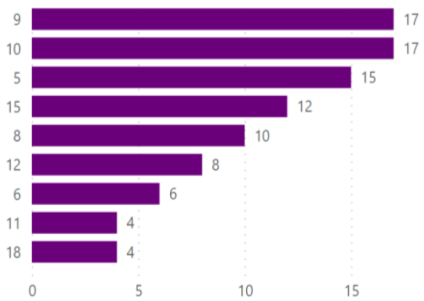

Fig. 9: Farming Experience

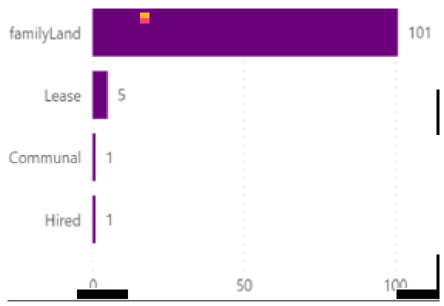

Fig. 10: Source of land

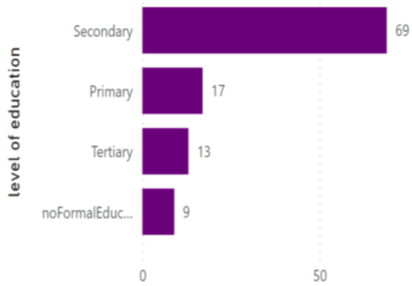

Fig. 11: Education

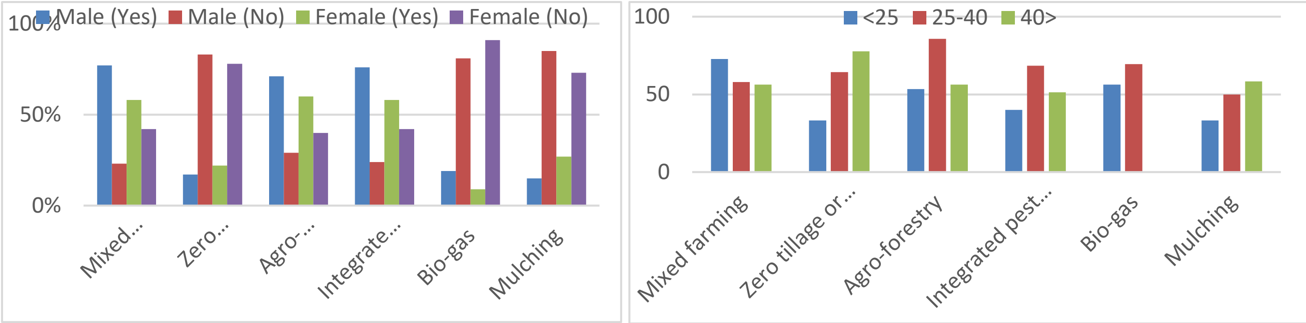

Fig. 12: Smart Agricultural Practices

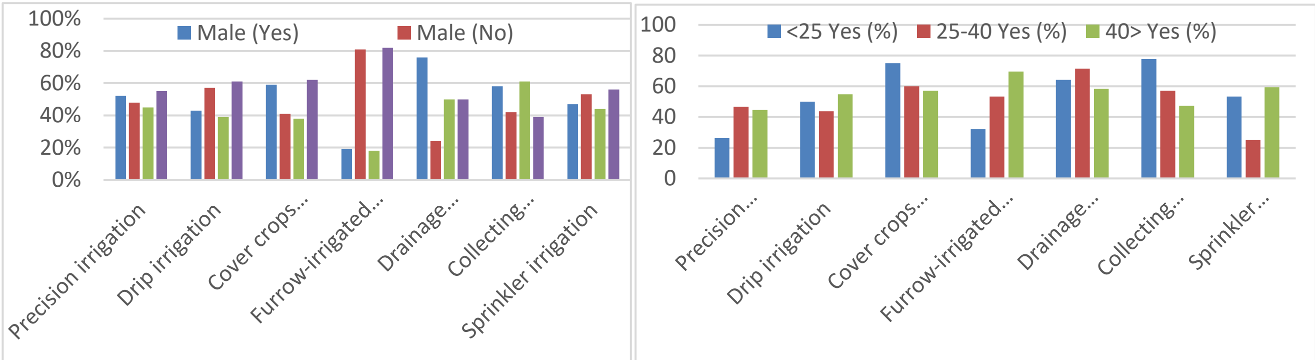

Fig. 13: Water Management Practices

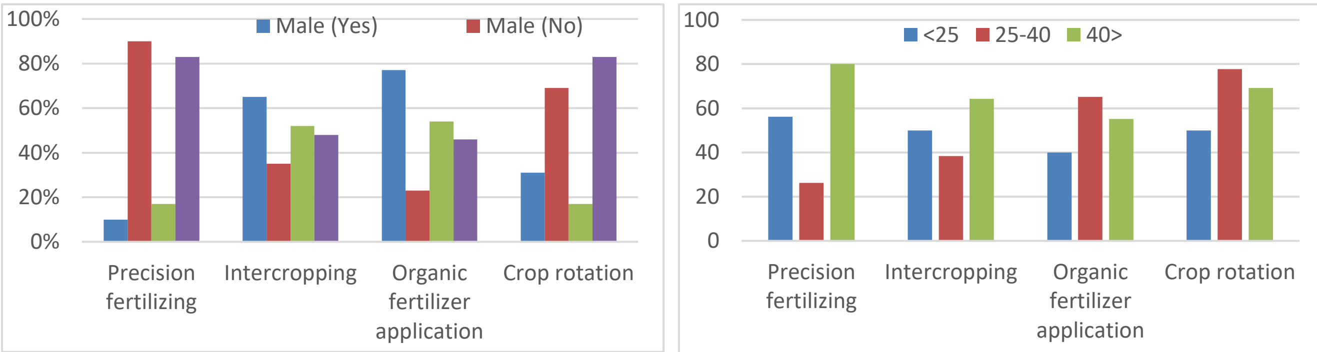

Fig. 14: Nutrient Management Practices

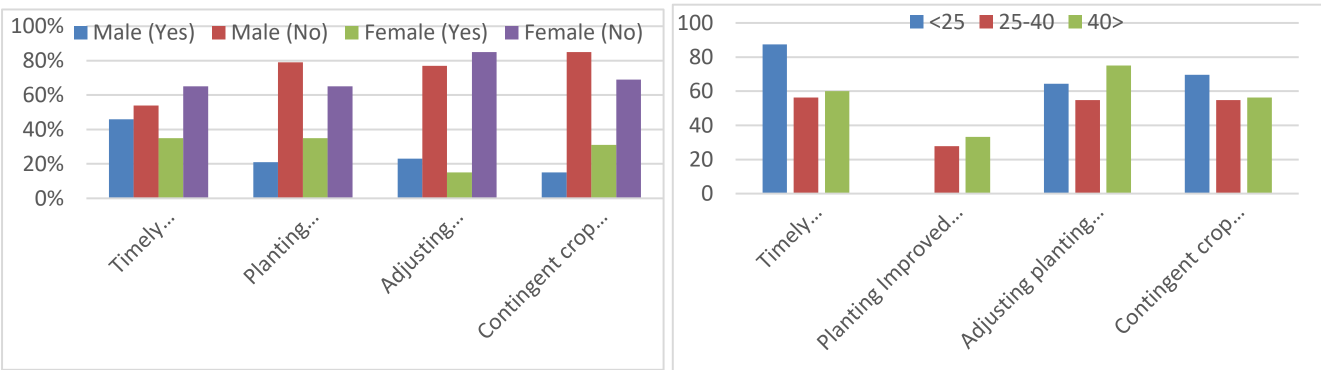

Fig. 15: Weather and Knowledge Practices

Table 1: Distribution of Constraints Encountered by Gender in The Study Area

Constraints	Frequency	Percentage male	Frequency	Percentage Female	Rank
Limited access to resources	48	44.4	60	**55.5**	1st
Limited access to information on climate smart agriculture	54	**50.0**	54	**50.0**	6th
Lack of extension service contact	50	46.2	58	**53.7**	3rd
Climate related risk	52	48.1	56	**51.8**	4th
Limited market access	53	49.0	55	**50.9**	5th
Limited access to land ownership	52	48.1	56	**51.8**	4th
Limited access to modern agricultural technologies	60	**55.5**	48	44.4	2nd
Poor access to credit facilities	53	49.0	55	**50.9**	5th
High labour cost	52	48.1	56	**51.8**	4th

Conclusion and Recommendations

The utilization patterns revealed significant gender disparities in several practices. Understanding these differences is crucial for designing targeted interventions to bridge the gap. Utilization rates also vary across different practices. Policymakers should consider this variation when developing strategies to promote climate-smart agriculture. Some practices, such as precision fertilizing and planting improved varieties, show low overall adoption rates. Identifying and addressing barriers to adoption for these practices is important. The result further highlights the importance of knowledge-related practices in influencing adoption. Efforts to improve access to timely meteorological data and climate-related information can enhance overall adoption rates. Different age groups exhibit varying preferences in adopting specific climate-smart practices. Younger farmers show a higher inclination towards certain practices, such as drip irrigation, mulching, and adjusting planting dates. Targeting youth engagement programs can tap into this enthusiasm for sustainable practices. Practices related to weather and knowledge, such as timely meteorological data and adjusting planting dates, showcase age-related variations, emphasizing the role of knowledge and awareness in adoption patterns. The identified constraints affecting both genders encompassed, limited access to resources, modern agricultural technologies, extension services, land ownership, and climate related risks.

Recommendation

- The study therefore recommends well-tailored age-specific educational training programs to address gaps identified in climate smart agricultural practices among the gender.
- Efforts should be made to improve accessibility and affordability of modern agricultural technologies to the farmers in the area.
- Extension service outreach should be enhanced to increase outreach, effective communication strategies and utilizing digital platforms to disseminate information on climate smart agriculture.

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