



Original Paper

Gender Dynamics in Roles, Resources, Control, Decision Making and Household Welfare in Ghana: Implications for Agricultural Sustainability.

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Abstract—This study investigates the gender dynamics in cocoa farming households across the Ashanti and Western South regions, focusing on their implications for agricultural sustainability. Using a cross-sectional survey design, data were collected from 401 cocoa farmers through structured questionnaires. Data was analysed using descriptive (frequency, percentage) and inferential statistics (independent samples t-test). Results indicate that men dominate physically demanding tasks such as land preparation (82.8%) and pesticide application (85.0%). In comparison, women are more involved in less intensive tasks like drying cocoa beans (33.2%) and reproductive roles such as food preparation (74.6%). Men control essential resources, including land (82.3%), capital (78.6%), and agricultural tools, while women have greater control over processing resources like drying mats (20.4%). Decision-making is similarly male-dominated, with men leading in areas like farming inputs (82.0%) and household security (85.5%), although women exert influence in daily food decisions (42.4%). Despite these disparities, no significant gender-based differences were found in outcomes for yield, income, or food security. The study highlights the need for gender-inclusive policies and targeted interventions to promote equitable access to resources, enhance women's decision-making capacity, and encourage their involvement in sustainable cocoa farming.

Keywords—Decision-making, Gender, Resources, Roles, Welfare, Sustainability

I. INTRODUCTION

The agricultural sector is fundamental to rural development, with almost 80% of agricultural output originating from smallholder farmers. These smallholders typically farm fewer than two hectares of land and produce a variety of crops, with maize being the predominant staple [1]. Notwithstanding its significance, Ghana's agricultural sector faces multiple obstacles that hinder its growth and

development. Restricted access to agricultural inputs, insufficient mechanisation, and inadequate extension services have led to subpar output levels. The sector experiences poor commercialisation since numerous smallholder farmers participate in subsistence farming instead of market-oriented output. Climate fluctuation presents an added danger, exacerbating the sector's reliance on natural circumstances and subjecting smallholder farmers to considerable risks. Additionally, legislative failings, institutional deficiencies, and underdeveloped rural financial markets have impeded initiatives to modernise agriculture and promote technology adoption [2].

Comprehending gender dynamics in agriculture is essential for improving production, sustainability, and household well-being. Women significantly contribute to agricultural labour and decision-making but encounter inequalities in asset ownership and resource access [3]. Gender analysis is crucial for tackling injustice and exploitation in agriculture, acknowledging women's leadership positions and their utilisation of natural resources. Household surveys must be structured to gather gender-specific data on the control and ownership of agricultural resources, ensuring that women farmers are questioned and their perspectives are acknowledged [4]. The progression of gender analysis in agricultural value chains has transitioned from an emphasis on women's involvement to gender equality, and from standalone women's initiatives to the integration of gender across the entire chain [5]. Emphasising equitable resource allocation, ownership rights, and instruments that empower women is essential for sustained agricultural advancement [3].

In Ghanaian agriculture, gender roles are defined by specific responsibilities and uneven resource access. Women perform essential functions in agricultural activities, encompassing physically strenuous duties like as planting,

weeding, and harvesting [6]. Nonetheless, they encounter considerable obstacles like restricted access to land, capital, and effective processing technology [7]. Men generally manage land preparation, animal feeding, and financial administration [6]. Notwithstanding women's significant contributions, they possess diminished control over productive assets and exhibit restricted involvement in decision-making processes [7]. There are statistically significant disparities between women regarding access to land, labour, inputs, and agricultural information sources [8]. Women encounter an 80% disparity in agricultural acreage relative to men [7]. To rectify these gaps, governmental interventions are necessary to empower women and ensure equitable access to productive resources, especially land [6], [8].

Studies frequently demonstrate gender differences in access to and control of agricultural resources. Women frequently encounter restricted access to land, credit, enhanced inputs, and extension services in comparison to men [9], [10], [11]. These discrepancies influence household decision-making, with men generally exerting greater control over essential resources and decisions [10]. Women's limited access to resources impedes their production capacity and potential to enhance livelihoods [9], [11]. Although women are significantly engaged in agricultural activities, they frequently lack authority over key farm assets and marketing decisions [10]. To mitigate these disparities, research advocates for the provision of training and extension services specifically aimed at women [9], with the implementation of gender-inclusive policies to enhance equitable access to and control over agricultural resources [10].

Although current research emphasises global gender discrepancies in access to and control over agricultural resources, there is a notable deficiency of material pertaining specifically to Ghana. Gender-based disparities in resource distribution, decision-making, and authority within agricultural households are insufficiently examined, especially concerning their intricate effects on productivity, welfare, and sustainability. Most studies concentrate on overarching trends of gender inequality, without a thorough examination of how these dynamics manifest at the household level in Ghana. Empirical information regarding the impact of unequal resource availability on intra-household decision-making and, consequently, household welfare outcomes is sparse. The absence of empirical insights into the interactions of gender dynamics, resource control, and decision-making in Ghanaian farming households limits the possibility of effective interventions.

Addressing this information gap is essential for comprehending how gender dynamics affect resource allocation and control, as well as broader consequences including food security, poverty alleviation, and sustainable development. Also, rectifying these deficiencies is crucial for advancing equitable resource distribution, improving agricultural efficiency, and cultivating sustainable rural progress. This study seeks to address these deficiencies by analysing gender dynamics in resource distribution, decision-making, and household welfare in Ghana, thereby aiding the creation of focused, gender-inclusive policies for sustainable agricultural advancement. The specific objectives are to examine gender-specific roles in agricultural production,

reproduction, and community roles, to assess gender disparities in access to and control over agricultural resources, to analyse the gender disparities in decision-making processes within agricultural households, and to evaluate the gender differences in household welfare.

II. METHODOLOGY

A. Study Area and Research Design

The research took place in the Ashanti and Western South Regions of Ghana, both of which are key agricultural areas in the country. These regions play a crucial role in Ghana's cocoa production, with a significant output of 498,477 metric tonnes (MT) during the 2019/2020 period [12]. Given their importance in the cocoa industry, they were ideal locations for studying the adoption of sustainable farming practices in cocoa cultivation. The Ashanti region, located in the southern part of Ghana experiences an average annual rainfall of 1,270 mm and has two main rainy seasons: the major one runs from April to mid-August, while the minor one lasts from September to November. Between December and March, and again from mid-August to mid-September, the region tends to be relatively dry. The Western South Region of Ghana is known for its lush greenery, rolling hills, and fertile soils, making it an ideal location for cocoa cultivation. For the study, a cross-sectional survey design was utilised. This approach, which gathers data from a population at one specific point in time, is particularly effective for examining the prevalence and characteristics of various phenomena in a given group.

B. Sample Size and Sampling Procedure

The study focused on cocoa farmers in the Ashanti and Western South Regions, areas recognised for their significant roles in Ghana's cocoa production. According to the Cocoa Health and Extension Division (CHED) and Cocoa Management System (CMS), there were approximately 160,400 cocoa farmers in these regions in 2023 [13], [14]. We employed Yamane's formula [15] to determine an appropriate sample size for this cross-sectional study. To enhance the reliability of the findings, we increased the initial sample size from 399 participants to 401. This adjustment allowed for a 95% confidence level with a 5% margin of error, ensuring statistical rigour.

A multi-stage sampling approach was adopted to guarantee that the sample accurately represented diverse regions and demographic groups. We used purposive sampling in the first stage to select the Ashanti and Western South Regions. Their prominence in cocoa production makes them ideal for exploring gender dynamics in sustainable farming practices. By targeting these regions, the study aimed to provide meaningful insights into the challenges and opportunities within Ghana's cocoa sector. In the next stage of the sampling process, purposive sampling was employed to select five (5) key cocoa farming districts from each of the two regions. We selected these districts due to their significant contribution to cocoa production and their capacity to yield a representative sample of cocoa farmers. This step ensured that the study included districts with a wide range of characteristics relevant to sustainable cocoa farming practices. For the Ashanti region, Obuasi, Brofoyedru, Bekwai, New Edubiase, and Effiduase

were selected, while Dunkwa, Asankrangwa, Huni Valley, Prestea, and Wassa Akropong were chosen from the Western South region. In the third stage, we chose communities within these selected districts through simple random sampling. This approach helped to capture a diverse range of farming practices and socioeconomic backgrounds. Using simple random sampling, we selected individual cocoa farmers from the chosen communities in the final phase. We compiled a complete list of eligible farmers in each district, which served as the sampling frame. We assigned a unique number to each farmer to ensure the selection process was random. We then selected participants using the lottery method. We carefully reviewed the selected farmers' list to ensure they met the study's criteria, including gender balance and relevant farming experience.

C. Research Instrument and Data Collection Procedure

For this study, we used primary data gathered through a carefully crafted questionnaire. We developed the questionnaire based on a thorough review of existing literature and consultations with experts in the field to ensure its relevance and accuracy. It focused on understanding key gender dynamics in areas such as roles, access and control over resources, access to and control over services, and decision-making processes. All the questions were closed-ended, making the responses easier to analyse. Trained enumerators carried out the data collection process by conducting face-to-face interviews with farmers. This process spanned one month, from August to September 2023.

Before the main survey, we tested the questionnaire's validity through a pilot study involving 30 farmers, ensuring the instrument was effective and reliable. Before administering the questionnaire, we clearly explained the study's purpose, procedures, risks, and benefits to respondents in a language they understood. Respondents gave verbal consent before participating in the study. Survey participation was voluntary, and respondents could choose not to answer all questions. We assured participants that we would anonymise the collected data to protect their identities. We also informed them about the duration of the interview. If the respondent refused to participate, we terminated the interview.

D. Data Analysis

Data was cleaned and entered into IBM Statistical Product and Service Solutions Version 25 for analysis. Descriptive statistics like frequencies and percentages were employed to analyse gender-specific roles in agricultural production, reproduction and community roles, gender disparities in access to and control over agricultural resources and services, and to analyse gender disparities in decision-making processes within agricultural households. The differences between male and female cocoa farmers' yield, income and food security were analysed using an independent sample t-test.

III. RESULTS AND DISCUSSIONS

A. Gender Dynamics in Roles

From Table I, men significantly dominate most productive activities, particularly in physically demanding tasks such as preparing land (82.8%), applying pesticides (85.0%), and pruning (80.3%). Women are more involved in tasks such as

seeding cocoa beans in nursery bags (25.9%) and drying cocoa beans (33.2%), which are less labour-intensive and time-sensitive. Both young males and females play marginal roles in productive activities, with the notable exception of young males contributing to tasks like seeding (17.5%) and harvesting (13.2%). Traditional gender norms and role assignments virtually exclude young females from these activities. This gendered division of labour reflects the broader cultural and social constructs of masculinity and femininity. The masculinity associated with men allows them to dominate physically demanding productive activities, positioning them as the primary decision-makers and supervisors in the sector. Conversely, the perception of women as less masculine confines them to less technical, non-physically demanding roles [16]. The involvement of young boys in some productive tasks further reinforces the notion that certain duties are inherently masculine or feminine, as highlighted by [17]. These disparities in productive roles contribute to the gendered income inequalities among male and female cocoa farmers in Ghana. Women's limited access to income-generating activities results in lower incomes, high levels of household food insecurity, poor health outcomes, and increased economic vulnerability [17], [18].

Women predominantly handle household chores, such as preparing food (74.6%), bathing children (69.3%), and waking up the family (69.3%). Young females take on a significant share of domestic activities like washing dishes (59.9%), fetching water (47.4%), and house cleaning (41.1%), reflecting their early socialisation into reproductive responsibilities. Men's participation in household tasks is relatively low. However, they take the lead in financially demanding activities such as paying school fees (83.0%), ensuring healthcare (73.1%), and housekeeping money (76.3%), roles tied to their status as primary breadwinners. These findings echo the current study, which shows persistent disparities in reproductive roles due to deeply entrenched social norms passed down through generations [19]. Such inequitable distribution of responsibilities negatively impacts women and girls, limiting their educational opportunities, employment prospects, and personal development [16], [20].

Men are predominantly active in community roles, particularly in decision-making and leadership activities, such as village meetings (83.3%), community vigilantism (81.3%), and political meetings (80.0%). Women, on the other hand, are more involved in socially orientated roles, including naming ceremonies (47.4%), funerals (33.9%), and weddings (32.9%). Young males occasionally contribute to community vigilantism (8.0%) and communal labour (11.5%), while young females have minimal involvement in community roles, underscoring their exclusion from decision-making and collective activities. The relationship between community engagement and gender roles highlights the intersectionality of gender and social structures, often overlooked in rural ecosystems. The study's findings align with those of [21], [22] and [18], who reported significant disparities in community participation and decision-making.

TABLE I. GENDER DYNAMICS IN ROLES

Productive Roles	Adult female	Adult male	Young female	Young male
Seeding of cocoa beans in nursery bags	104 (25.9)	217 (54.1)	10 (2.5)	70 (17.5)
Irrigation	78 (19.5)	252 (62.8)	5 (1.2)	66 (16.5)
Preparing of land	42 (10.5)	332 (82.8)	27 (6.7)	-
Planting	107 (26.7)	270 (67.3)	1 (0.2)	23 (5.7)
Application of Fertilizer	74 (18.5)	297 (74.1)	-	30 (7.5)
Application of Pesticide	30 (7.5)	341 (85.0)	-	30 (7.5)
Application of Fungicide	42 (10.5)	321 (80.0)	-	38 (9.5)
Weeding	61 (15.2)	285 (71.1)	-	55 (13.7)
Pruning	29 (7.2)	332 (80.3)	-	50 (12.5)
Harvesting	67 (16.7)	281 (70.1)	-	53 (13.2)
Pod breaking	89 (22.2)	256 (63.8)	2 (0.5)	54 (13.5)
Drying of cocoa beans	133 (33.2)	232 (57.9)	1 (0.2)	35 (8.7)
Fermenting of cocoa beans	94 (23.4)	286 (71.3)	-	21 (5.2)
Bagging of cocoa beans	66 (16.5)	289 (72.1)	-	46 (11.5)
Storage of cocoa beans	67 (16.7)	312 (77.8)	-	22 (5.5)
Selling of cocoa beans	77 (19.2)	309 (77.1)	1 (0.2)	14 (3.5)
Reproductive Roles	Adult female	Adult male	Young female	Young male
Ironing	106 (26.4)	102 (25.4)	39 (9.7)	154 (38.4)
Laundry	220 (54.9)	41 (10.2)	130 (32.4)	10 (2.5)
House cleaning	186 (46.4)	43 (10.7)	165 (41.1)	7 (1.7)
House maintenance	213 (53.1)	126 (31.4)	44 (11.0)	18 (4.5)
Waking up the family	278 (69.3)	107 (26.7)	10 (2.5)	6 (1.5)
Bathing kids	278 (69.3)	29 (7.2)	92 (22.9)	2 (0.5)
Preparing food	299 (74.6)	37 (9.2)	64 (16.0)	1 (0.2)
Washing dishes	120 (29.9)	27 (6.7)	240 (59.9)	14 (3.5)
Sending children to school	229 (57.1)	85 (21.2)	67 (16.7)	20 (5.0)
Paying school fees	61 (15.2)	333 (83.0)	1 (0.2)	6 (1.5)
Healthcare	106 (26.4)	293 (73.1)	1 (0.2)	1 (0.2)
Housekeeping money	92 (22.9)	306 (76.3)	2 (0.5)	1 (0.2)
Buying clothes	122 (30.4)	274 (68.3)	2 (0.5)	3 (0.7)
Fetching water	113 (28.2)	49 (12.2)	190 (47.4)	49 (12.2)
Fetching firewood	174 (43.4)	53 (13.2)	105 (26.2)	69 (17.2)
Paying rent and utilities	55 (13.7)	337 (84.0)	-	9 (2.2)
Family security	45 (11.2)	349 (87.0)	-	7 (1.7)
Community Roles	Adult female	Adult male	Young female	Young male
Weddings	132 (32.9)	249 (62.1)	3 (0.7)	17 (4.2)
Funerals	136 (33.9)	263 (65.6)	-	2 (0.5)
Village meetings	61 (15.2)	334 (83.3)	-	6 (1.5)
Community vigilantism	43 (10.7)	326 (81.3)	-	32 (8.0)
Naming ceremonies	190 (47.4)	205 (51.1)	-	6 (1.5)
Communal labour	72 (18.0)	283 (70.6)	-	46 (11.5)
Farmer group meetings	89 (22.2)	308 (76.8)	-	4 (1.0)
Political meetings	59 (14.7)	321 (80.0)	1 (0.2)	20 (5.0)
Religious meetings	135 (33.7)	260 (64.8)	1 (0.2)	5 (1.2)
Families and friends	93 (23.2)	305 (76.1)	-	3 (0.7)
Self-help projects	87 (21.7)	306 (76.3)	1 (0.2)	7 (1.7)

B. Gender Dynamics in Access and Control over Resources

Adult males have significantly greater access to nearly all resources compared to other groups. Adult males constitute 80.5% of those with access to land, compared to only 18.2% of adult females. Young individuals, particularly females, have minimal access. Access to spraying machines and wheelbarrows among adult males is exceedingly high (83.8% and 73.8%, respectively), while adult females have only 11.5% and 12.5%, respectively. Although male dominance persists (50.4%) in access to pollination forceps, adult females show slightly better access (21.4%) compared to other tools. Control over resources mirrors access disparities, with adult males overwhelmingly dominant. Regarding land and capital, adult males' control 82.3% and 78.6%, respectively, whereas adult

females control only 17.5% and 20.2%. Adult males' control over 81.3% and 83.5% of harvesting tools and pruning saws, respectively, while adult females control less than 15.5% of both tools. Young males exhibit slightly better control over resources compared to young females, although their overall control is still minimal. Access and control over production resources also highlight responses to the question of who does what in production ecosystems [21] as well as the gender dynamics to household decision-making and the traditional view of ownership of resources that are accorded to genders due to their cultural roles in the family and community. Table II shows differences between men and women in this area, which is in line with what [17] and [22] found: that in rural food systems, men had more access to and control over

production resources. In their studies, access and control percentages for men ranged from 50% to 89%, whereas in this study, they ranged from 40% to 84%. Women have more substantial barriers than men when it comes to obtaining credit [23], [24].

TABLE II. GENDER DYNAMICS IN ACCESS AND CONTROL OVER RESOURCES

Resources	Access to Resources				Control over Resources			
	Adult Female	Adult Male	Young Female	Young Male	Adult Female	Adult male	Young Female	Young Male
Basket	202 (50.4)	168 (41.9)	17 (4.2)	14 (3.5)	196 (48.9)	179 (44.6)	5 (1.2)	21 (5.2)
Capital	77 (19.2)	316 (78.8)	-	8 (2.0)	81 (20.2)	315 (78.6)	-	5 (1.2)
Cutlass	66 (16.5)	299 (74.6)	1 (0.2)	35 (8.7)	63 (15.7)	315 (78.6)	-	23 (5.7)
Drying mat	87 (21.7)	291 (72.6)	4 (1.0)	19 (4.7)	82 (20.4)	303 (75.6)	2 (0.5)	14 (3.5)
Harvesting tool	59 (14.7)	318 (79.3)	1 (0.2)	23 (5.7)	62 (15.5)	326 (81.3)	-	13 (3.2)
Land	73 (18.2)	323 (80.5)	-	5 (1.2)	70 (17.5)	330 (82.3)	-	1 (0.2)
Pollination forceps	86 (21.4)	202 (50.4)	47 (11.7)	66 (16.5)	93 (23.2)	213 (53.1)	39 (9.7)	56 (14.0)
Pruning saw	56 (14.0)	320 (79.8)	-	25 (6.2)	55 (13.7)	335 (83.5)	-	11 (2.7)
Spraying machine	46 (11.5)	336 (83.8)	-	19 (4.7)	55 (13.7)	333 (83.0)	-	13 (3.2)
Watering can	82 (20.4)	260 (64.8)	7 (1.7)	52 (13.0)	100 (24.9)	258 (64.3)	4 (1.0)	39 (9.7)
Wheelbarrow	50 (12.5)	296 (73.8)	-	55 (13.7)	52 (13.0)	303 (75.6)	-	46 (11.5)
Cocoa seedlings	93 (23.2)	268 (66.8)	1 (0.2)	39 (9.7)	92 (22.9)	283 (70.6)	2 (0.5)	24 (6.0)
Fertilizer	68 (17.0)	317 (79.1)	-	16 (4.0)	64 (16.0)	324 (80.8)	-	13 (3.2)
Fungicide	63 (15.7)	315 (78.6)	-	23 (5.7)	63 (15.7)	324 (80.8)	-	14 (3.2)

C. Gender Dynamics in Access and Control over Service

Table III presents an overview of gender dynamics in terms of access to and control over various services in cocoa farming communities in Ghana. Access to communal labour is primarily among adult males (76.8%), with limited participation from other groups. Control over communal labour is also significantly favoured by adult males (79.6%). Access to family labour is mainly shared between adult females (19.5%) and adult males (70.8%), with limited involvement from young females (0.7%) and young males (9.0%). In terms of controlling family labour, adult males (73.1%) dominate, while adult females (19.0%) have a significant presence. Access to hired labour is predominantly among adult males (79.6%). Adult males also exert significant control over hired labour (78.8%). Access to paid work is mainly among adult males (79.6%). Control over paid work is significantly favoured by adult males (80.8%). This analysis illustrates gender dynamics in terms of service access and control within cocoa farming communities. Adult males generally have higher access to and control over labour-related services, both communal and hired, as well as paid work. In contrast, access and control over family labour are more balanced between adult males and females. In cocoa production, women and men do not have equal access to and control over essential services. This makes it harder for men and women to work together and complement each other in rural ecosystems.

The study aligns with findings by [22] and [17], which highlight men's dominance in accessing and controlling production services. This imbalance exacerbates women's economic vulnerabilities in rural communities, where equitable access to such services is crucial for reducing these disparities. Limited access and control, coupled with societal norms and symbolic relations that discourage women from engaging in labour-intensive production activities, restrict their farmland sizes and income diversification prospects [25]. The lack of equitable labour access undermines the adoption of sustainable cocoa production practices because human labour remains vital in rural agriculture. Men's dominance in resource control

reflects broader socio-cultural norms that also influence leadership and decision-making processes. Promoting equitable gender roles in economic and social structures is essential for achieving sustainable food production.

D. Gender Dynamics in Access and Control over Decision-making

Table IV provides insights into gender dynamics concerning access to and control over decision-making within cocoa farming communities in Ghana. Access to decision-making about accommodation is primarily held by adult males (85.0%), while females have limited access (14.0%). Control over accommodation decisions is also significantly in favour of adult males (85.0%). Access to decisions about attending training programs is divided, with 19.0% for adult females and 77.1% for adult males. Control over attending training programs is similarly divided, with adult males (77.1%) having significant control. Access to clothing purchase decisions is divided, with 34.7% for adult females and 63.8% for adult males. Control over clothing purchase decisions is also shared, with adult males (63.8%) having a substantial presence. Access to capital decisions is distributed, with 17.7% for adult females and 81.5% for adult males. Control over capital decisions is similarly shared, with adult males (81.5%) dominating. Access to child education decisions is divided, with 20.4% for adult females and 78.8% for adult males. Control over child education decisions is predominantly in favour of adult males (78.8%). Access to decisions about children's occupations is divided between adult females (23.2%) and adult males (75.8%). Control over child occupation decisions is similarly shared, with adult males (75.8%) having significant control. Access to daily food-related decisions is mainly held by adult females (42.4%). Control over daily food decisions is in favour of adult males (56.6%).

TABLE III. GENDER DYNAMICS IN ACCESS AND CONTROL OVER SERVICES

Services	Access to Services				Control over Services			
	Adult Female	Adult Male	Young Female	Young Male	Adult Female	Adult Male	Young Female	Young male
Communal labour	56 (14.0)	308 (76.8)	1 (0.2)	36 (9.0)	56 (14.0)	319 (79.6)	-	26 (6.5)
Family labour	78 (19.5)	284 (70.8)	3 (0.7)	36 (9.0)	76 (19.0)	293 (73.1)	1 (0.2)	31 (7.7)
Hired labour	56 (14.0)	319 (79.6)	1 (0.2)	25 (6.2)	59 (14.7)	316 (78.8)	1 (0.2)	25 (6.2)
Paid work	71 (17.7)	319 (79.6)	-	11 (2.7)	67 (16.7)	324 (80.8)	-	10 (2.5)

Access to family planning decisions is shared, with 39.7% for adult females and 59.9% for adult males. Control over family planning decisions is also shared, with adult males (59.9%) having a significant presence. Access to decisions about family security is primarily held by adult males (85.5%), while adult females have limited access (12.5%). Control over family security decisions is also significantly in favour of adult males (85.5%). Access to decisions about family vacations is shared between adult females (23.2%) and adult males (75.6%). Control over family vacation decisions is also shared, with adult males (75.6%) dominating.

The analysis shows that men have decisive power over women's access to land, capital, and labour, but women have access to all three. This suggests that although women have access to these resources, they lack the authority to decide on how best to utilise them. This can be the result of cultural customs and norms that give men more power to make decisions [26], [27]. According to [19], traditional gender relations and inherent norms restrict women's ability to have an

impact on decisions about land use and productivity in addition to other components of social structures that require informed decision-making. This also reflects the findings of [18], [28] and [22].

E. Gender Differences in Household Welfare Outcome

Table V presents the results of gender differences in household welfare outcomes, specifically in terms of yield, income, and food security. Two statistical tests are performed: Levene's test for equality of variances and the t-test for equality of means.

The analysis of yield shows a significant result from Levene's test for equality of variances ($F = 6.816$, $p = .009$), indicating that the assumption of equal variances is violated. Despite this, the t-test reveals no significant gender differences, suggesting that yield disparities are not pervasive. Similar findings are discussed by [29], who highlights how household-level factors, rather than gender alone, often drive agricultural productivity.

TABLE IV. GENDER DYNAMICS IN ACCESS AND CONTROL OVER SERVICES

Decision Making	Access to Decision Making				Control over Decision Making			
	Adult Female	Adult Male	Young Female	Young Male	Adult Female	Adult Male	Young Female	Young Male
Accommodation	56 (14.0)	341 (85.0)	-	4 (1.0)	56 (14.0)	341 (85.0)	4 (1.0)	4 (1.0)
Attending training programmes	76 (19.0)	309 (77.1)	-	16 (4.0)	76 (19.0)	309 (77.1)	-	16 (4.0)
Buying clothes	139 (34.7)	256 (63.8)	1 (0.2)	5 (1.2)	139 (34.7)	256 (63.8)	1 (0.2)	5 (1.2)
Capital	71 (17.7)	327 (81.5)	-	3 (0.7)	71 (17.7)	327 (81.5)	-	3 (0.7)
Child education	82 (20.4)	316 (78.8)	1 (0.2)	2 (0.5)	82 (20.4)	316 (78.8)	1 (0.2)	2 (0.5)
Child Occupation	93 (23.2)	304 (75.8)	2 (0.5)	2 (0.5)	93 (23.2)	304 (75.8)	2 (0.5)	2 (0.5)
Daily food	170 (42.4)	227 (56.6)	3 (0.7)	1 (0.2)	170 (42.4)	227 (56.6)	3 (0.7)	1 (0.2)
Family planning	159 (39.7)	240 (59.9)	1 (0.2)	1 (0.2)	159 (39.7)	240 (59.9)	1 (0.2)	1 (0.2)
Family security	50 (12.5)	343 (85.5)	2 (0.5)	6 (1.5)	50 (12.5)	343 (85.5)	2 (0.5)	6 (1.5)
Family vacation	93 (23.2)	303 (75.6)	3 (0.7)	2 (0.5)	93 (23.2)	303 (75.6)	3 (0.7)	2 (0.5)
Farmer group meetings	70 (17.5)	322 (80.3)	1 (0.2)	8 (2.0)	70 (17.5)	322 (80.3)	1 (0.2)	8 (2.0)
Farming Inputs	67 (16.7)	329 (82.0)	-	5 (1.2)	67 (16.7)	329 (82.0)	-	5 (1.2)
Healthcare	102 (25.4)	298 (74.3)	-	1 (0.2)	102 (25.4)	298 (74.3)	-	1 (0.2)
Housekeeping money	102 (25.4)	296 (73.8)	2 (0.5)	1 (0.2)	102 (25.4)	296 (73.8)	2 (0.5)	1 (0.2)
Labour	63 (15.7)	321 (80.0)	1 (0.2)	16 (4.0)	102 (25.4)	296 (73.8)	2 (0.5)	1 (0.2)
Land	68 (17.0)	327 (81.5)	1 (0.2)	5 (1.2)	63 (15.7)	321 (80.0)	1 (0.2)	16 (4.0)
Marriage of children	64 (16.0)	332 (82.8)	1 (0.2)	4 (1.0)	68 (17.0)	327 (81.5)	1 (0.2)	5 (1.2)
Political party preference	68 (17.0)	320 (79.8)	1 (0.2)	12 (3.0)	64 (16.0)	332 (82.8)	1 (0.2)	4 (1.0)
Religious preference	111 (27.7)	284 (70.8)	2 (0.5)	4 (1.0)	68 (17.0)	320 (79.8)	1 (0.2)	12 (3.0)
Water	181 (45.1)	154 (38.4)	48 (12.0)	18 (4.5)	111 (27.7)	284 (70.8)	2 (0.5)	4 (1.0)

This aligns with evidence from [30], which emphasises that women can achieve comparable yields to men when provided with equal access to agricultural inputs and decision-making authority. Studies suggest that when women have equal access to inputs such as land and fertilisers, they achieve comparable or even higher yields than men [29]. However, structural barriers, such as inequities in land ownership and access to fertilisers, continue to limit women's agricultural productivity [31]. Kassie et al. [32] further highlight that access to training and extension services disproportionately benefits male farmers, reinforcing resource gaps that could indirectly influence yield.

For income, Levene's test shows no significant variance difference ($F = 2.956$, $p = .086$), allowing for the assumption of equal variances. The t-test results indicate no significant gender-based differences in income, with a mean difference of 2,754.67 units ($p = .709$) under the equal variance assumption. Similarly, the unequal variance assumption confirms this non-significance ($p = .798$). The Levene's test and the t-test confirm no significant income differences between genders, aligning with findings from [33], who observed that while income levels may not differ significantly, male-headed households often control more profitable income sources. In contrast, female-headed households allocate income towards essential needs such as food and education. Broussard [29] notes that income equity alone is insufficient for gender parity; women's control over income is a critical determinant of household-level welfare outcomes.

The results for food security demonstrate no significant variance differences according to Levene's test ($F = .092$, $p = .762$). The t-test for equality of means also shows no statistically significant gender-based differences in food security outcomes. Under the equal variance assumption, the mean difference is 0.99 units ($p = .255$), and the result remains non-significant under the unequal variance assumption ($p = .253$). This indicates that gender does not significantly influence food security outcomes in the households studied. The lack of significant differences in food security aligns with literature showing that female-headed households often achieve comparable or better food security outcomes despite income disadvantages. Silva et al. [34] attribute this to women's prioritisation of food security and children's nutrition over other expenditures. Similarly, Kassie et al. [32] emphasise that resource allocation, rather than absolute income, often determines food security outcomes, with women demonstrating more effective use of limited resources for household welfare. Gebre et al. [31] further explore how joint decision-making in households improves food security outcomes, highlighting the role of equitable partnerships in mitigating resource gaps.

IV. CONCLUSION AND RECOMMENDATIONS

This study sheds light on the persistent gender disparities in roles, resources, decision-making, and household welfare within Ghana's cocoa farming communities. While both men and women play critical roles in agricultural production and household management, traditional gender norms continue to favour men in accessing and controlling key resources and decision-making processes. Women, despite their crucial contributions to agricultural labour and household

responsibilities, face persistent barriers to resource ownership, equitable decision-making, and participation in community leadership. These structural inequalities not only perpetuate socioeconomic vulnerabilities but also hinder the broader goal of sustainable agricultural practices. From the findings of the study, these disparities have significant differences in productivity, income and household welfare.

When women, who contribute substantially to agricultural labour, are denied equitable access to resources such as land, inputs, and credit, their productivity remains constrained. This inefficiency undermines the overall output and limits the potential for sustainable agricultural growth. Limited access to resources and decision-making power means women are less likely to adopt innovative and sustainable agricultural practices. This could reduce the resilience of cocoa farming systems to environmental challenges, such as climate change, and compromise long-term productivity. Gender disparities restrict women's participation in leadership and community decision-making. This exclusion prevents the incorporation of diverse perspectives and knowledge systems, key elements for developing holistic and inclusive approaches to sustainability. Socioeconomic vulnerabilities among women create barriers to equitable participation in value chains. Unequal income distribution weakens household welfare and the reinvestment capacity needed for sustainable farm management, perpetuating cycles of poverty and dependency. Persistent inequalities foster social dissatisfaction and reinforce existing divides within communities. This can hinder collective action, which is critical for the successful implementation of community-level sustainability initiatives.

The findings emphasise the urgent need for gender-inclusive policies and initiatives that empower women by providing equitable access to land, credit, and essential agricultural services. Empowering women as decision-makers, particularly in areas related to farming inputs, resource control, and training, can enhance productivity, reduce household vulnerability, and foster greater social and economic equity.

On a policy level, integrating gender-sensitive approaches into agricultural extension services and promoting inclusive decision-making frameworks are essential steps toward mitigating these inequities. Efforts should also be directed at reshaping cultural norms that limit women's participation in productive and leadership roles. Managerially, organisations and cooperatives within the cocoa sector should prioritise programmes that build women's capacity in sustainable farming practices and strengthen their leadership in farmer groups. Offering targeted training and credit opportunities for women could address systemic barriers and promote more balanced power dynamics within rural households and communities.

TABLE V. GENDER DIFFERENCES IN HOUSEHOLD WELFARE OUTCOME

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		<i>F</i>	<i>Sig.</i>	<i>t</i>	<i>df</i>	<i>Sig. (2-tailed)</i>	<i>Mean Difference</i>	<i>Std. Error Difference</i>	95% Confidence Interval of the Difference	
									<i>Lower</i>	<i>Upper</i>
<i>Yield</i>	Equal variances assumed	6.816	.009	1.346	399	.179	5.85481	4.35021	-2.69739	14.407
	Equal variances not assumed			.894	121.726	.373	5.85481	6.54773	-7.10737	18.82
<i>Income</i>	Equal variances assumed	2.956	.086	.373	399	.709	2754.666	7384.112	-11761.96	17271.29
	Equal variances not assumed			.257	126.084	.798	2754.666	10727.477	-18474.56	23983.89
<i>Food security</i>	Equal variances assumed	.092	.762	1.140	399	.255	.99271	.87080	-.71921	2.70464
	Equal variances not assumed			1.146	233.594	.253	.99271	.86623	-.71391	2.69933

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