Second hub Baseline Survey for Liberia and Mozambique

Improving Agricultural REsilience to SAlinity Through DEvelopment and Promotion of Pro-poor Technologies and Management Strategies in Selected Countries of Sub-Saharan Africa ``RESADE''

III. Country: Liberia

3.1. Country profile

Liberia, located in West Africa, spans 111,369 square kilometers and had an estimated population of 4.97 million in 2019. In 2016, nearly half of the population lived below the poverty line. The agriculture, forestry, fishing, and hunting sectors are central to Liberia's economy, contributing 70.3% of real GDP in 2017. A significant portion of the population depends on agriculture for food security and livelihoods. Therefore, advancements in the agricultural sector are crucial for alleviating poverty and ensuring food security. Key agricultural commodities include rubber, cocoa, and crude palm oil.

Despite its potential, the agricultural sector faces challenges such as limited infrastructure, including inadequate machinery, farming equipment, farm-to-market roads, fertilizers, pesticides, and food storage facilities. These deficiencies hinder farmers' productivity and market access. In 2022, the agriculture sector experienced a growth of 5.9%, up from 3.3% in 2021, primarily due to increased production of rice and cassava, which are staple foods in Liberia.

The Liberian government has initiated programs like the Liberia Agriculture Sector Investment Plan (LASIP II) for 2018–2022, aiming to diversify the economy and prioritize agriculture. LASIP II focuses on critical value chains such as rice, rubber, cassava, and livestock to boost productivity and economic growth.

Table 3.1. Country Profile – Liberia

Indicator	Unit	Estimation
Population (2019 est.)	Millions	4.97
Agricultural Land (2016 est.)	Sq. km	27,000
Agricultural Land (2016 est.)	% of land area	37.43
GDP (2019 est.)	Current US$	3.07 billion
GDP Per Capita (2019 est.)	Current US$	621.9
GDP Growth (2019 est.)	Annual %	2.47
Poverty Headcount (2016 est.)	% of population	50.9

Source: World Bank Microdata-World Development Indicators (World Bank, 2020)

3.2. Socioeconomic and Demography Characteristics of the Respondents

The baseline survey data analysis in Liberia reveals that 112 respondents were interviewed in the "Grand Bassa County" region. The distribution of respondents across districts shows a concentration in District #3, which accounts for 48.21% of participants. Other districts include District #2 (31.25%), District #5 (17.86%), District #4 (1.79%), and District #6 (0.89%).

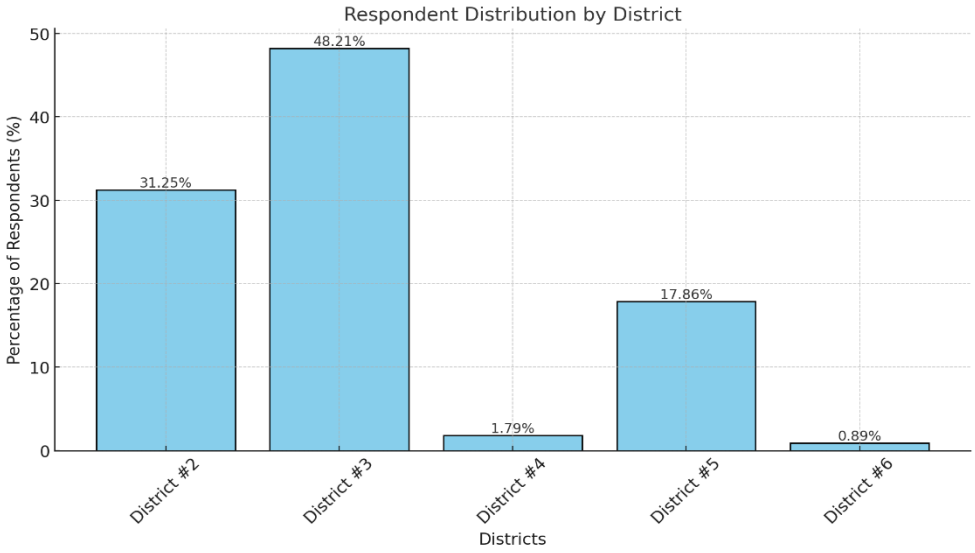

Figure 3.1. Respondent distribution by district

In terms of demographics, 66.07% of respondents are female, while 33.93% are male. The average age of respondents is 45.43 years, with a range from 18 to 80 years and a standard deviation of 13.65 years. Among males, the average age is 45.08 years (range 18–69), while females have a slightly higher average age of 45.61 years (range 21–80).

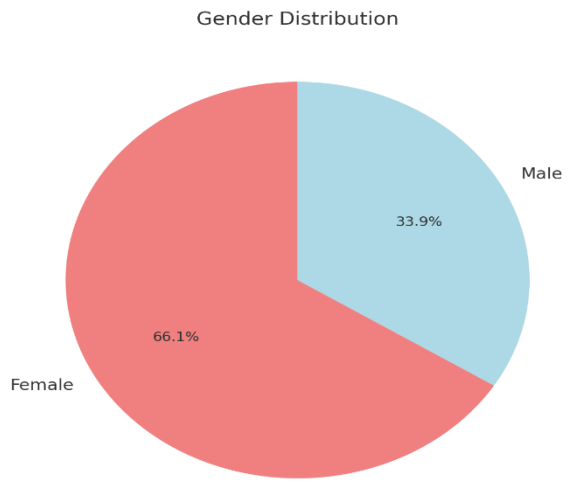

Figure 3.2. Gender distribution

Regarding household roles, 58.93% of respondents are household heads, and 41.07% are other household members. Among males, a significant 89.47% are household heads, while only 10.53% are other members. In contrast, among females, 43.24% are household heads, and 56.76% are other household members.

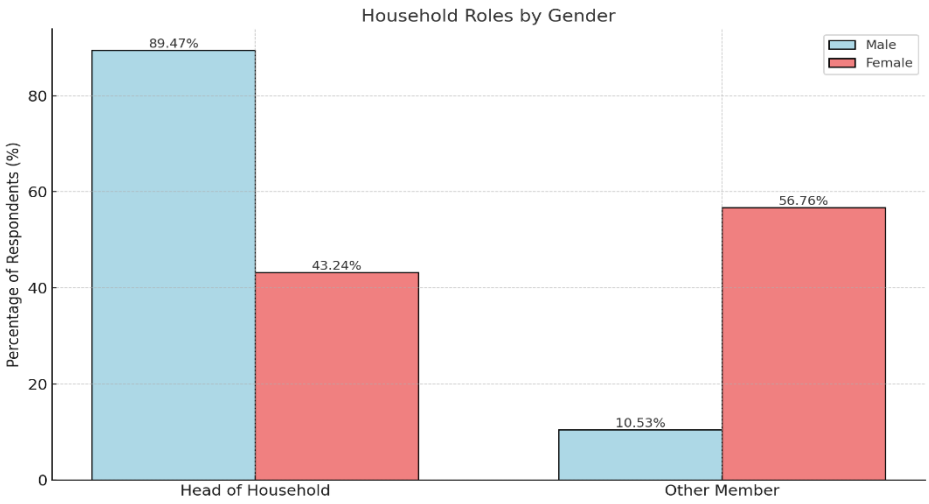

Figure 3.3. Household roles by gender

The household composition analysis reveals that, on average, households include 2.57 female adults aged 15–65 years, making up 32.31% of household members, followed by 2.32 female children, which account for 29.17%. Male adults aged 15–65 years average 1.92 per household, representing 24.11% of the total, while male children average 1.83, contributing 20.62%. Elderly individuals (65+ years) are rare, with an average of 0.09 elderly males (1.13%) and 0.08 elderly females (1.00%) per household.

These figures highlight that female adults and children form the largest proportion of household members, emphasizing their vital roles in household activities and economic contributions. The relatively smaller numbers and percentages of male members suggest gender dynamics that could influence household decision-making and labor allocation. The minimal presence of elderly individuals confirms a predominantly younger demographic structure, which has implications for labor availability

and dependency ratios within households. These insights are critical for designing targeted agricultural and socio-economic interventions.

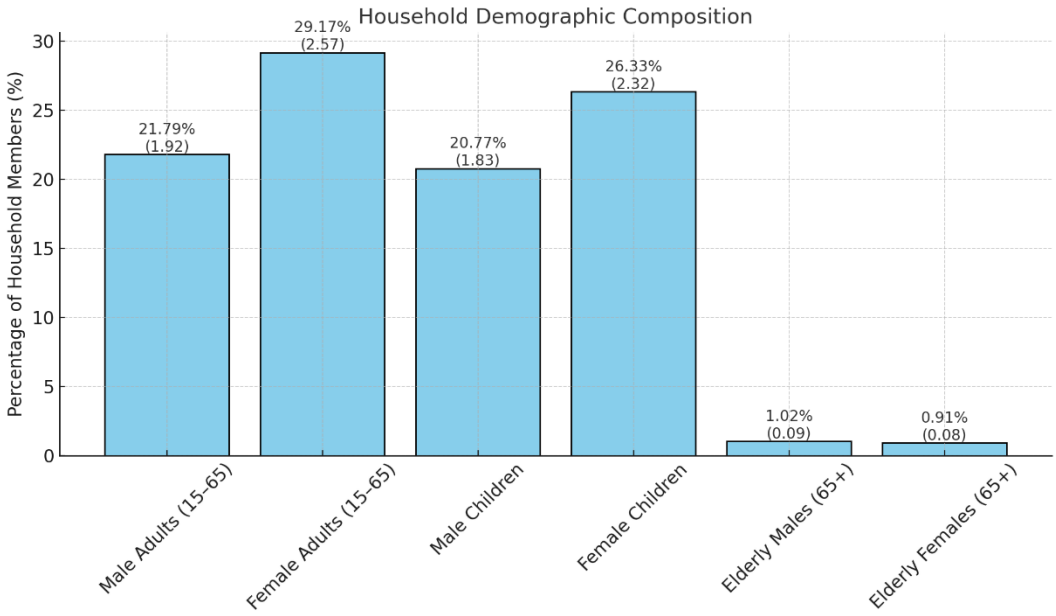

Figure 3.4. Household demographic composition by age range

The marital status of household heads reveals distinct gender differences. Among male household heads, the majority (80%) are married, while smaller proportions are single (12.73%) or engaged (7.27%). In contrast, female household heads are predominantly single (63.89%), with 22.22% married, 2.78% divorced or separated, and 11.11% widowed. This highlights a higher prevalence of single female household heads compared to their male counterparts.

In terms of literacy, 47.83% of household heads are literate, while 51.09% are illiterate, with 1.09% reporting no information on literacy. This suggests that over half of the household heads may face challenges in accessing written resources or participating in formal education-based interventions.

Educational attainment among household heads is generally low, with 52.17% reporting no formal degree. Among those with formal education, 4.35% completed primary school, 10.87% secondary school, and 8.7% high school, while 8.7% hold a diploma, 6.52% a bachelor's degree, 4.35% a master's degree, and 1.09% a PhD. A small proportion (3.26%) reported "other" educational achievements. These figures indicate limited access to higher education among household heads, which could influence decision-making and leadership capacities in agricultural and socio-economic contexts.

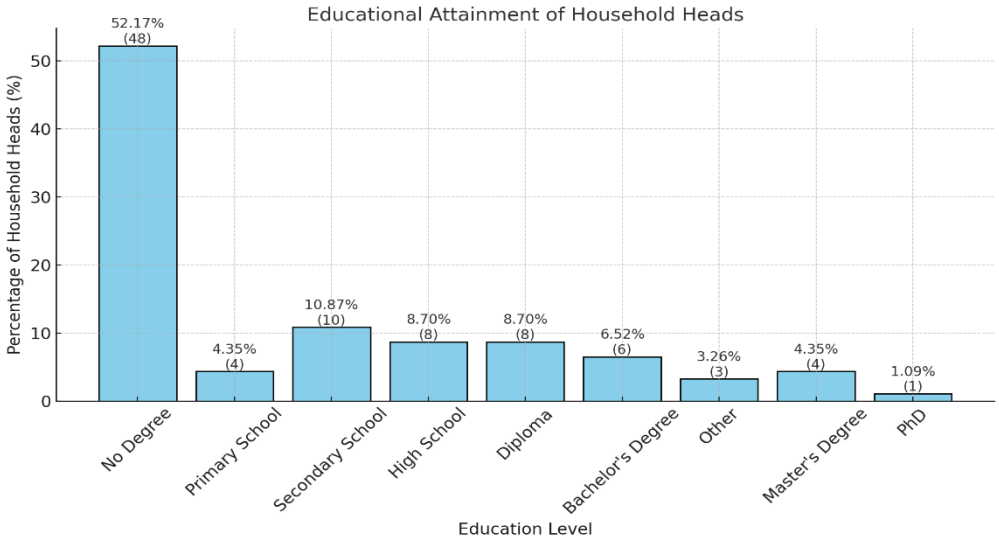

Figure 3.5. Educational attainment of household heads

Household income sources reveal that farming is the most common source, with 81.98% of households relying on it for their livelihoods. Other significant sources include aids (21.43%), trade (15.18%), and temporary employment (6.25%). Employment (4.46%), livestock (10.38%), and remittances (6.25%) are less frequently reported. Very few households derive income from contracting or other sources, highlighting the predominance of farming and limited diversification in income sources.

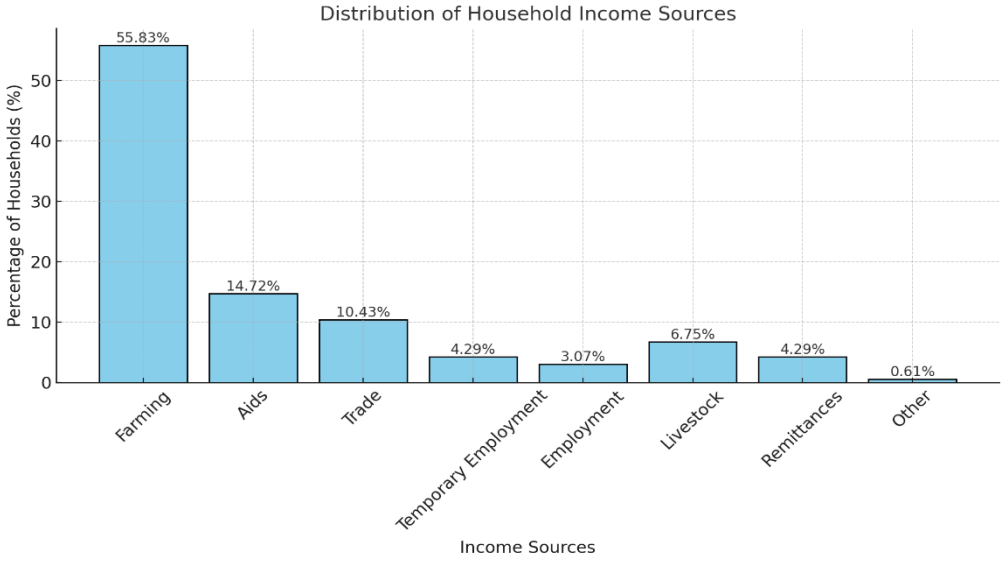

Figure 3.6. Households income sources

The average total household income is 8,154.85 units (local currency), but the substantial standard deviation of 50,309.71 indicates significant variation, with some households earning as little as zero and others reporting incomes as high as 1,213,000 units. This highlights stark income disparities among households.

In terms of income earned by gender, men earn an average of 1,401.27 units, slightly higher than women's average of 1,274.03 units. However, the standard deviations for both groups 11,685.87 for

men and 9,308.22 for women—indicate considerable variability in earnings. Joint income earned by both men and women is much lower, averaging 362.29 units, suggesting limited collaborative earning opportunities within households.

These findings underscore the importance of farming as the primary livelihood, significant income disparities among households, and potential gender dynamics in income generation. They suggest areas for targeted interventions to promote income diversification, reduce disparities, and enhance joint earning opportunities.

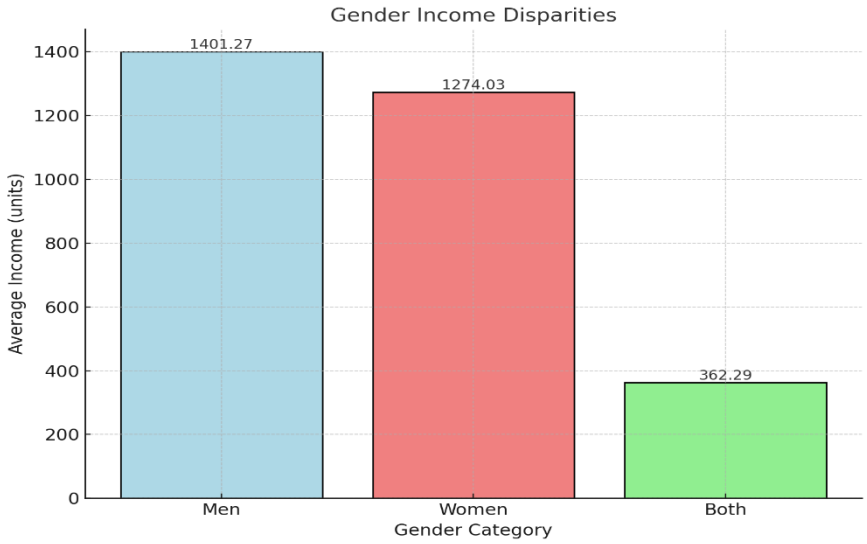

Figure 3.7. Gender income disparities

Household food and non-food expenditures reveal distinct patterns in spending and decision-making. On average, households spend 17,895.54 units on food, with a standard deviation of 9,521.71, indicating considerable variation. Reported expenditures range from 0 to 46,500 units. For non-food items, average expenditures are lower at 7,580.27 units, with a larger standard deviation of 12,874.29, reflecting even greater variability and a range of 0 to 95,000 units.

Decision-making responsibilities for expenditures differ by category. For food expenses, the majority of households (66.70%) report joint decision-making between men and women, while women independently decide in 30.56% of households, and men independently decide in only 2.78%. Some households report no clear decision-making structure or ambiguous responses. Similarly, for non-food expenses, joint decision-making is dominant at 63.64%, followed by women independently deciding in 32.73% of households, compared to just 3.64% for men.

Key insights include a clear disparity in expenditures, with food expenses being significantly higher than non-food expenses, underscoring the priority given to meeting nutritional needs. Joint decision-making is the prevailing structure for both expense categories, highlighting shared responsibilities in household financial management. However, women have a notable independent role, particularly in managing food expenses, while men rarely make decisions alone. These dynamics provide valuable insights into gender roles and household financial priorities.

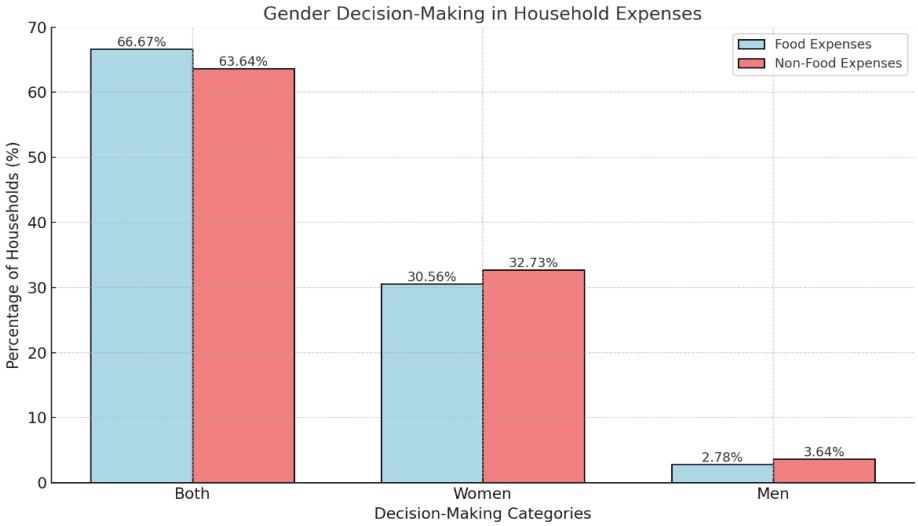

Figure 3.8. Gender decision-making in household food and non-food expenses

Household asset ownership patterns reveal that farming tools (89.29%), mobile phones (83.04%), houses (64.29%), and kitchen utensils (62.5%) are the most commonly owned items, reflecting their essential role in daily living and agricultural livelihoods. In contrast, ownership of solar panels (11.61%), TV/radio (46.43%), and bikes/motorbikes (5.36%) is less common. Advanced or luxury assets, such as refrigerators (0.89%), tractors, threshers, and washing machines, are nearly absent, highlighting economic constraints and limited access to such goods.

Most households (75.34%) own no assets or just one, with only 10.84% owning one asset and 13.82% owning two or more. Households with 10 or more assets are extremely rare, representing less than 2% of the total, further emphasizing the limited asset base of most families.

Asset ownership by gender is also limited. Among men, 96% of households report no assets owned, with only 2.5% owning one asset and fewer than 2% owning more. Similarly, 94.04% of households report no assets owned by women, though 5.96% indicate some ownership, primarily of one or two items. Joint ownership of assets is uncommon, with 85.32% of households reporting no shared assets. Only 6.03% share one asset, and 8.65% share two or more.

Key insights include the dominance of agricultural assets like farming tools, limited individual ownership by both men and women, and low levels of shared assets, which may reflect cultural or logistical challenges. The near absence of advanced or luxury goods underscores the economic constraints faced by households, limiting access to these higher-value items.

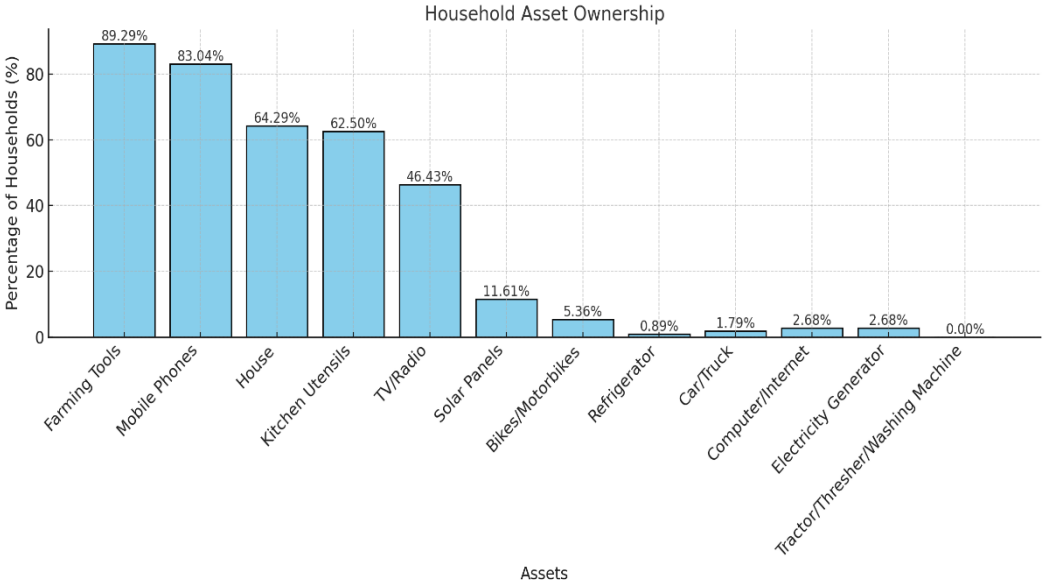

Figure 3.9. Household asset ownership

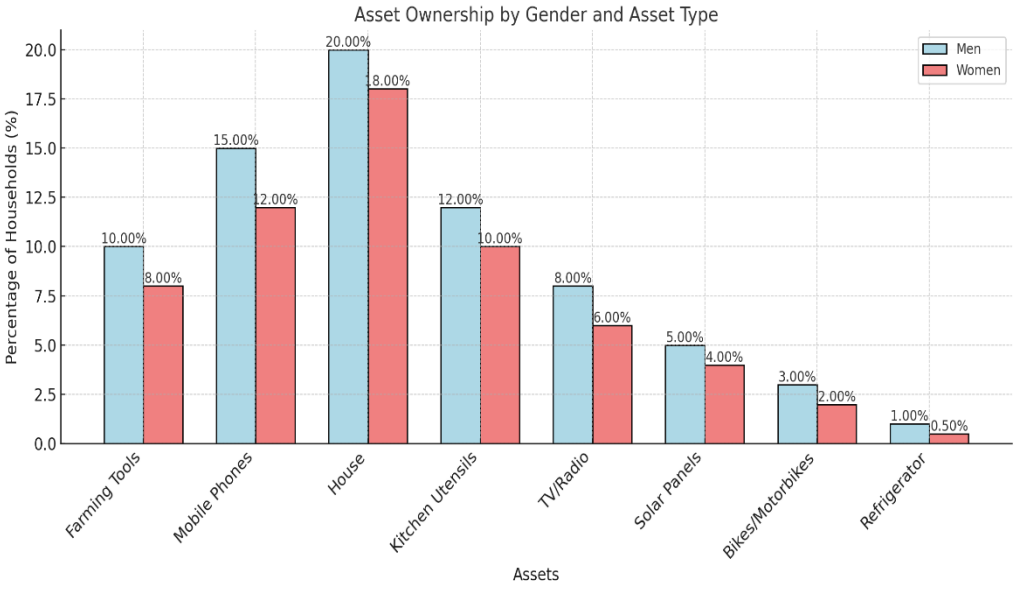

Figure 3.10. Asset ownership by gender

3.3. Landholding and Agriculture Production Portfolio

Households hold an average of 2.54 hectares of land, with a wide range from 0.02 to 50 hectares, indicating significant variability in landholding sizes. The majority of households (87.5%) report owning their land outright, highlighting the dominance of ownership as the primary landholding arrangement. Smaller proportions rely on share-cropping (7.14%) or leasing (1.79%). A small percentage (3.57%) rent out their land.

Irrigation usage is minimal, with households irrigating an average of only 0.024 hectares, primarily for cultivation (0.018 hectares), while irrigated land left fallow averages just 0.006 hectares. In contrast, rainfed agriculture is more prevalent, with households cultivating an average of 0.85 hectares and

leaving 0.76 hectares fallow, resulting in an average total of 1.61 hectares of rainfed land per household, far exceeding the irrigated area.

These findings emphasize the reliance on rainfed agriculture due to the limited availability of irrigation infrastructure. The presence of fallow land suggests underutilization, potentially caused by resource or infrastructural constraints. The variability in landholding sizes underscores disparities in agricultural capacity and productivity potential among households.

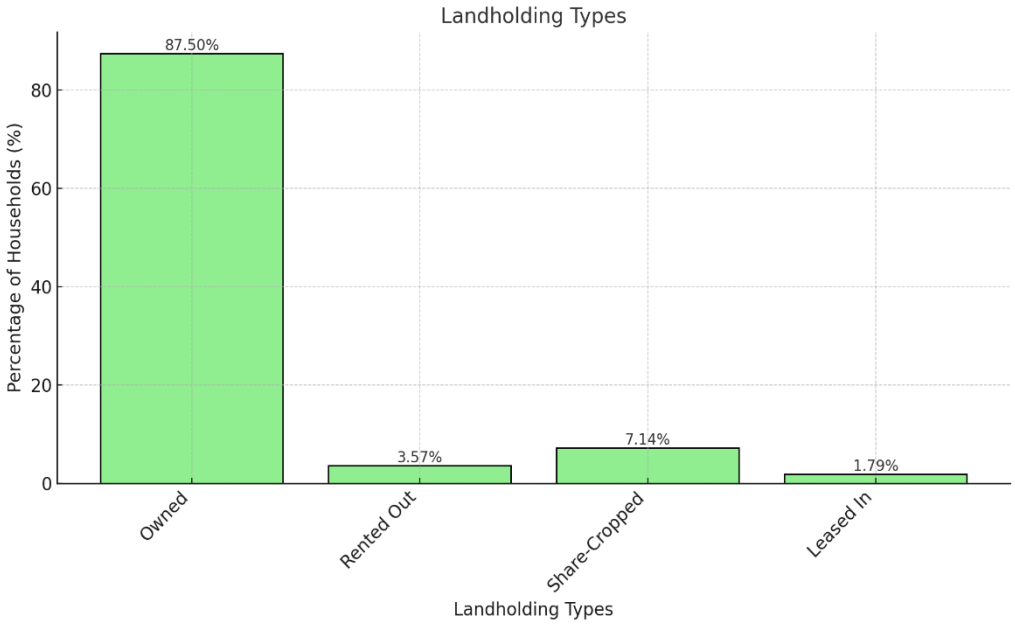

Figure 3. 11. Percentages of respondents by landholding types

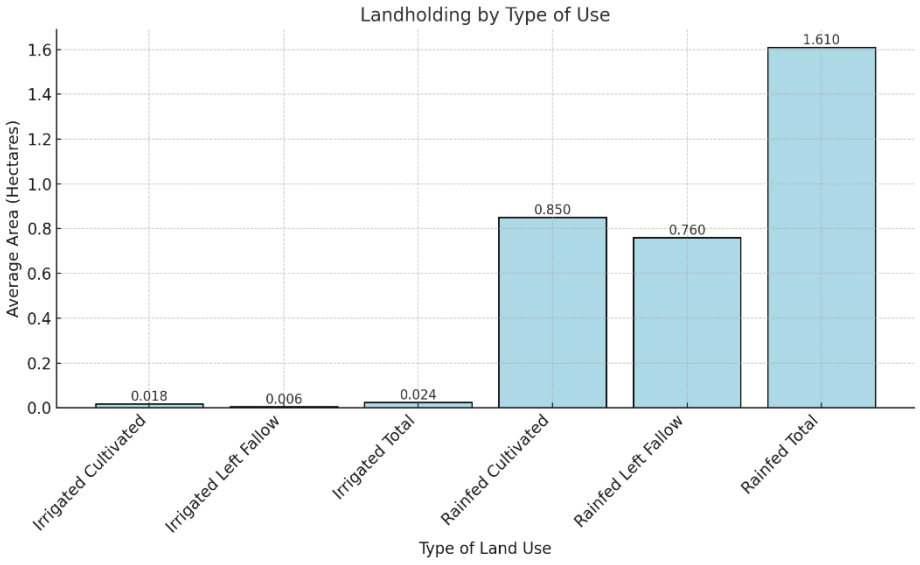

Figure 3.12. Landholding by type of use

The analysis of reported soil types reveals that the majority of respondents (80.18%) identified their soil as loam, a type commonly associated with good agricultural potential due to its balanced texture and nutrient-holding capacity. Sandy soils, known for their high drainage but lower fertility, were reported by 10.81% of respondents. Clay soils, which can retain nutrients but may pose challenges for drainage, were the least common, reported by 9.01% of respondents. This distribution underscores the dominance of loam soils in the surveyed areas, suggesting generally favorable conditions for farming, though households with sandy or clay soils may face specific challenges in managing soil fertility and water retention.

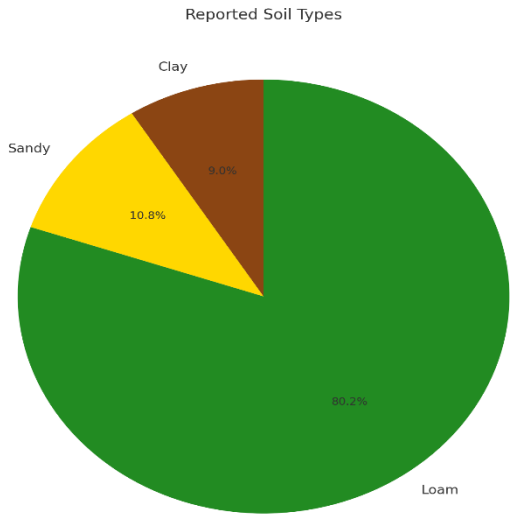

Figure 3. 13. Respondents soil types

The analysis of reported soil fertility indicates that the majority of respondents perceive their soil as having moderate to high fertility. A significant proportion (35.14%) categorized their soil as "Good," while 18.92% reported it as "Very Good," suggesting favorable conditions for agricultural productivity in these areas. Soils classified as "Average" were reported by 43.24% of respondents, indicating moderate fertility levels that may require targeted soil management practices to optimize productivity. Only 3.60% of respondents reported "Poor" soil fertility, highlighting that low fertility is a relatively minor issue in the surveyed areas. Overall, these findings suggest that most households operate under conditions conducive to agriculture, though opportunities exist for improving fertility management in areas with average or poor soil quality.

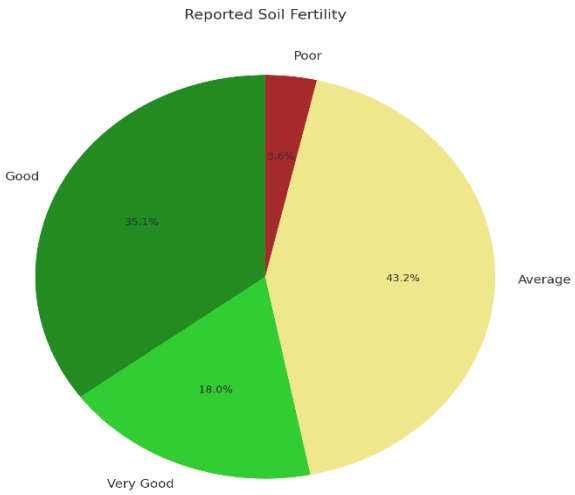

Figure 3.14: Soil fertility reported

The analysis of crops cultivated by respondents highlights cassava as the most commonly grown crop, reported by 25.00% of households, emphasizing its importance as a staple in agricultural activities. Other crops include maize (4.46%), rice (3.57%), pepper (0.89%), and vegetables (0.89%), indicating some level of crop diversification. A substantial proportion of respondents (65.18%) reported cultivating "other crops," which consolidates unspecified or additional crops, reflecting a broad spectrum of agricultural production practices.

On average, respondents reported producing 628.27 kg of their primary crop, with substantial variation. The production ranged from a minimum of 0 kg to a maximum of 3,500 kg, reflecting disparities in agricultural output likely influenced by factors such as land size, soil fertility, and access to resources. The variability in production underscores the need for targeted support to enhance productivity and reduce disparities among farmers.

This distribution underscores the centrality of cassava in local farming systems while also highlighting the diverse range of crops grown by households, likely influenced by varying land sizes, soil fertility, and local dietary or market preferences. The significant proportion of unspecified crops points to potential opportunities for further investigation into the range of crops contributing to livelihoods.

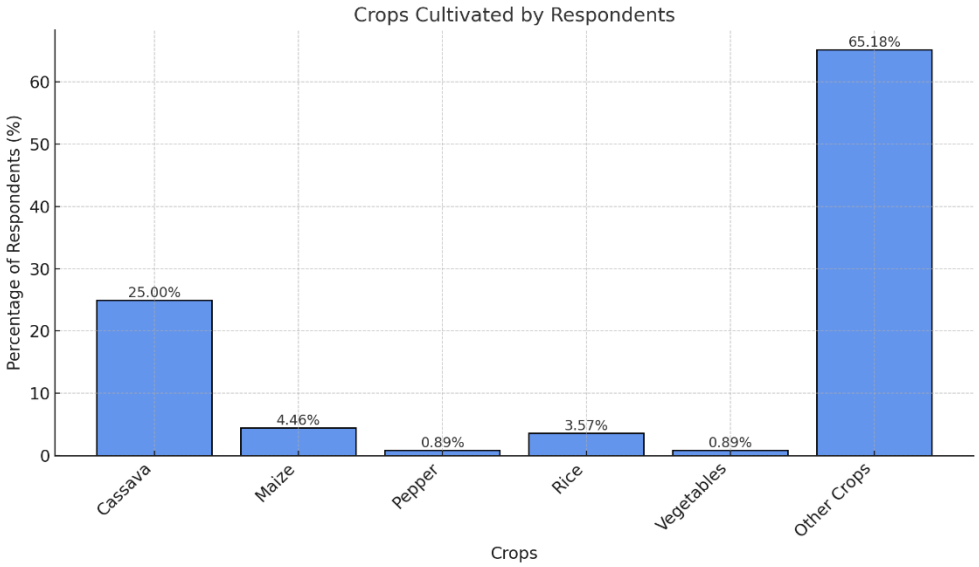

Figure 3. 15. Crops cultivated by the respondents

The analysis of crop production highlights significant variability across different crop types. Rice and cassava emerge as the most productive crops, with average yields of 1,262.5 kg and 1,215 kg, respectively, underscoring their importance in household agricultural systems. Pepper has a moderate average yield of 600 kg, while vegetables and maize show lower average yields of 200 kg and 163.8 kg, respectively.

These findings highlight the central role of rice and cassava in agricultural productivity while showcasing the diversity in crops grown by households. The variability in yields across crop types points to disparities in resource allocation, land quality, or farming practices, presenting opportunities for targeted interventions to enhance productivity.

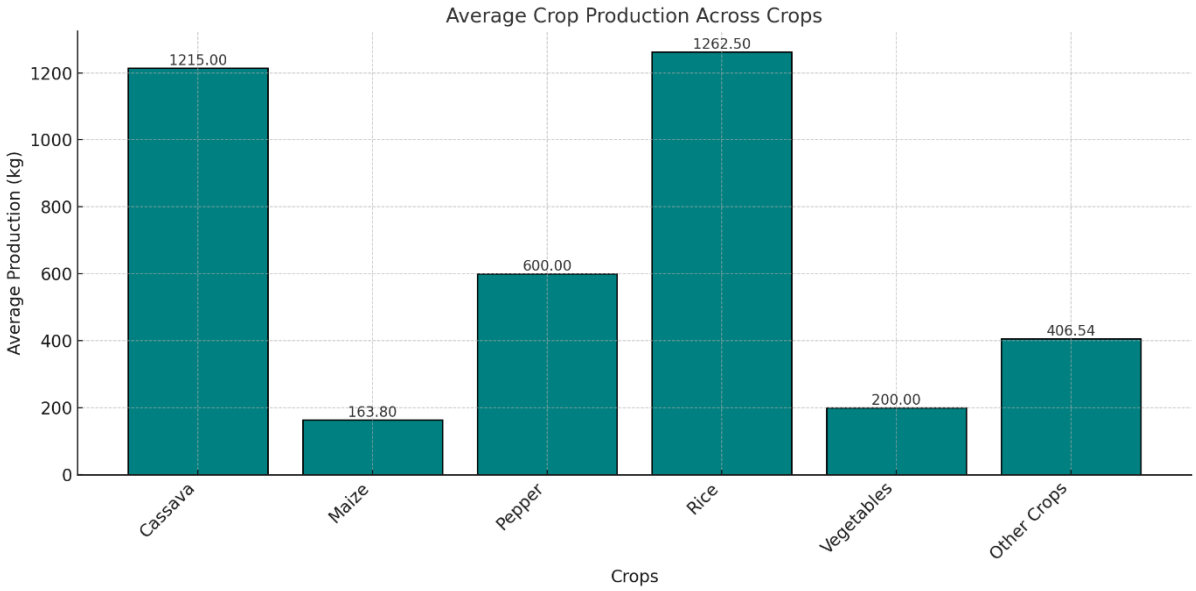

Figure 3.16. Average crop production across crops

The analysis of livestock ownership reveals that chickens are the most commonly owned livestock, with 55.36% of households reporting ownership. On average, households owning chickens have 12 birds, with a wide variability (standard deviation of 8.21) and numbers ranging from 1 to 50. A smaller proportion of households (3.57%) own pigs, with an average of 15.25 pigs per household, and variability ranging from 3 to 39 pigs.

A significant portion of households (39.29%) reported no livestock ownership. These findings indicate that while chickens dominate livestock ownership, a notable share of households do not own any livestock, reflecting potential economic or resource constraints. The variability in the number of animals owned suggests disparities in capacity or livestock management practices among households.

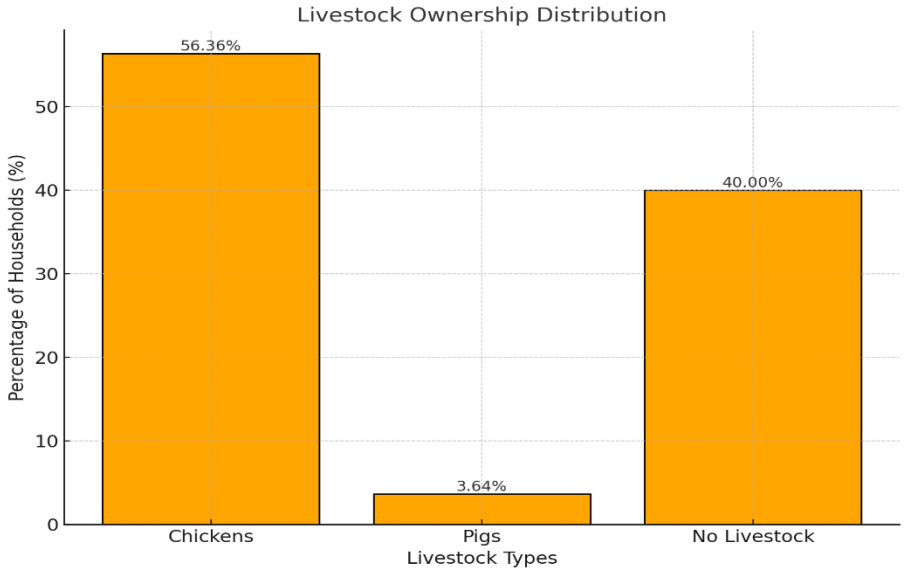

Figure 3. 17. Livestock ownership distribution among the respondents

3.4. Cooperative Membership and Access to Extension Services

The analysis reveals that a substantial majority of respondents (95.08%) are members of an organization or cooperative, indicating strong engagement in collective initiatives. A small proportion (4.92%) of an organization. The most common types of organizations include Cooperatives (38.52%) and Farmer-Based Organizations (27.87%), with smaller proportions participating in groups such as CONCERN (10.66%) and other associations like Suppliers Associations and Mother Groups.

Membership duration varies widely, with the highest participation occurring in 2021 (26.23%) and 2022 (22.13%). Recent memberships in 2023 (18.03%) reflect growing involvement, while older memberships (e.g., from 2009 to 2018) constitute a smaller share, suggesting an increasing trend of participation in recent years.

Respondents reported accessing diverse services through these organizations, including agriculture-related support such as crop growing, land preparation, and planting, as well as non-agriculture services like cleaning, training, and record-keeping. Organizational roles also extend to management, supervision, and technical support, highlighting their multifaceted contributions.

The effectiveness of these services is affirmed by 95.90% of respondents, who found them helpful, with only a small proportion (4.10%) expressing dissatisfaction. The findings emphasize the critical role of cooperatives and organizations in supporting agricultural and community development. The high membership rates, recent growth in participation, and overwhelmingly positive feedback on service effectiveness reflect their importance in improving livelihoods and fostering collective progress.

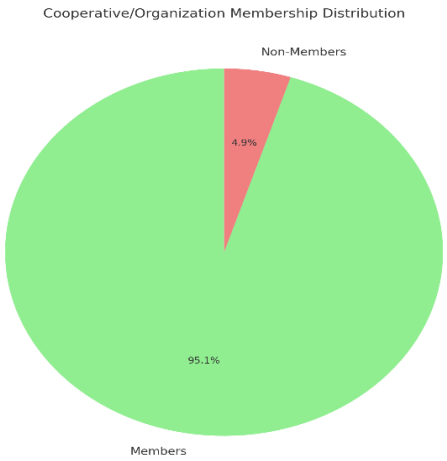

Figure 3.18. Cooperative membership distribution

The analysis of access to extension services reveals that 86.89% of respondents have access to such services, while 13.11% lack access. Extension agent visits vary in frequency, with 43.44% of respondents receiving two visits, 33.61% receiving one visit, and 9.02% benefiting from at least one visit per week. However, 13.93% of respondents reported no visits from extension agents.

Respondents reported receiving a diverse range of services at different frequencies. Most services are provided "rarely" (once every three months) or "sometimes" (once or twice a month). For instance, 67.21% of respondents accessed technical production support rarely, while 16.39% received it sometimes. Similarly, services for adopting new technologies (63.11% rarely), pest and disease management (52.46% rarely, 27.05% sometimes), and climate change adaptation (45.90% rarely, 30.33% sometimes) were commonly accessed. Crop diversification/rotation (45.00% sometimes) and input supply/markets (43.33% sometimes) also featured prominently. Irrigation water management and farm credit advice were accessed sometimes by 52.46% and 47.54% of respondents, respectively. Other services were reported by only 0.82% of respondents.

These findings highlight the widespread availability and importance of extension services in supporting agricultural practices. Most respondents benefit from diverse services, particularly technical support, pest and disease management, and crop diversification. However, gaps remain, as a notable minority lacks access to critical services like irrigation, market information, and farm credit advice. Increasing the frequency of visits and expanding service coverage could enhance agricultural productivity further.

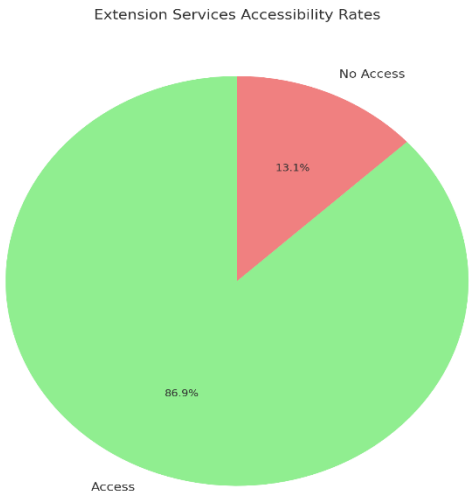

Figure 3.19. Extension services accessibility rated by farmers

3.5. Labor Involved in Farming Activities

The analysis shows that 89.29% of households rely on labor from within the family for farm activities, while 10.71% do not hire household members for such tasks. On average, households engage 12.84 members, with a wide range from 0 to 102 members (standard deviation of 13.39). These members typically work 4.71 days (ranging from 0 to 07 days) and 6.78 hours per day (ranging from 0 to 8 hours), reflecting moderate labor intensity. The average wage for hired labor is 490.04 units, with significant variability (standard deviation of 371.91) and a range from 0 to 3,000 units.

For off-farm employment, 29.46% of households reported having members engaged in such activities, while 70.54% indicated no off-farm work. On average, 0.24 household members work full-time off-farm (ranging from 0 to 4 members), while 0.32 members work part-time (also ranging from 0 to 4 members).

These findings highlight the high reliance on household labor for farming, with moderate labor demands in terms of days and hours worked. However, the low engagement in off-farm activities suggests limited income diversification opportunities. Additionally, the wide variability in wages for farm labor points to disparities that may stem from differences in farm size, labor demand, or financial

capacity. This reliance on household labor underscores the need for strategies to enhance labor efficiency and explore income diversification opportunities through off-farm employment.

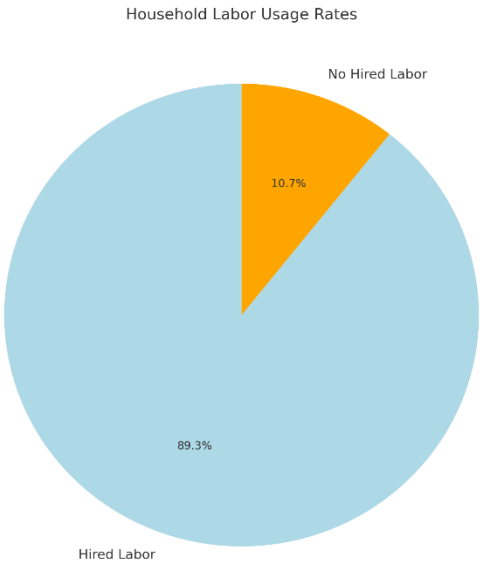

Figure 3. 20. Labor hired rate from household

The analysis of male and female labor hired from the market for farm activities reveals notable differences in their numbers, work duration, and wages. On average, 0.86 male workers are hired per household, with a wide range from 0 to 43 workers (standard deviation of 2.96). Male workers typically work 0.74 days (standard deviation of 2.86) and 0.97 hours per day (standard deviation of 2.42), with hours ranging from 0 to 9. Their average wage is 68.59 units, with substantial variability (standard deviation of 355.71) and wages ranging from 0 to 11,500 units.

In contrast, 0.39 female workers are hired per household on average, with a range from 0 to 35 workers (standard deviation of 2.20). Female workers typically work 0.65 days (standard deviation of 3.27) and earn an average wage of 30.00 units (standard deviation of 117.58), with wages ranging from 0 to 1,500 units. Information on hours worked per day for female labor was not available.

These findings highlight a gender imbalance, with male labor hired more frequently than female labor, likely reflecting gender-specific preferences or availability in the labor market. Male workers also tend to work slightly more days and hours compared to female workers. Furthermore, wage disparities favor male labor, suggesting differences in work intensity, tasks, or prevailing market conditions. Addressing these gaps could enhance equitable labor practices and improve efficiency in farm operations.

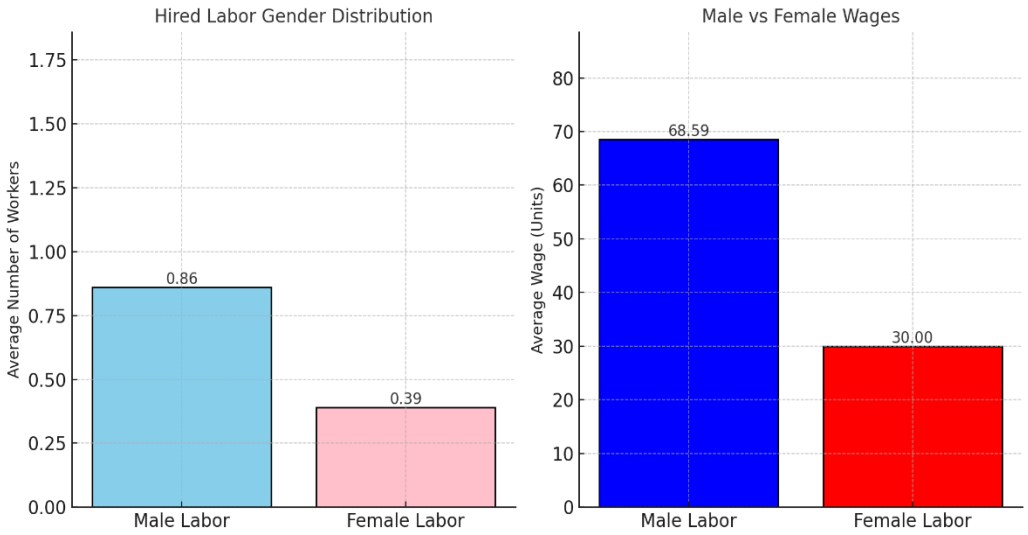

Figure 3.21. Labor hired from the market distribution

3.6. Natural Disasters, Soil Salinity and Coping Strategies

Farmers reported experiencing various natural disasters and shocks, with some being more prevalent than others. Unusual price increases were the most frequently reported issue, affecting 79.46% of respondents. Reduced availability of food and water was reported by 60.71% and 28.57%, respectively. Crop pests and diseases impacted 42.86% of farmers, while extreme weather conditions were experienced by 41.96%. Other significant challenges included drought (32.14%), floods (18.75%), and insecurity or violence (11.61%). A smaller proportion of households (5.36%) reported losses of house, land, or assets, while no respondents experienced other natural disasters like earthquakes.

The severity of disasters was categorized into three levels. Low severity was reported by 5.40% of respondents, medium severity by 12.13%, and high severity by 8.11%. Displacement due to disasters was relatively rare, with only 2.50% of households affected.

The findings indicate that the most common disasters include crop pests and diseases, extreme weather, and price increases. While most disasters were perceived as low or medium in severity, a smaller but significant portion experienced highly severe impacts. Displacement rates remained low, suggesting that while disasters are widespread, they rarely force households to relocate. Addressing these issues requires targeted interventions to mitigate risks, enhance resilience, and alleviate economic pressures faced by farming households.

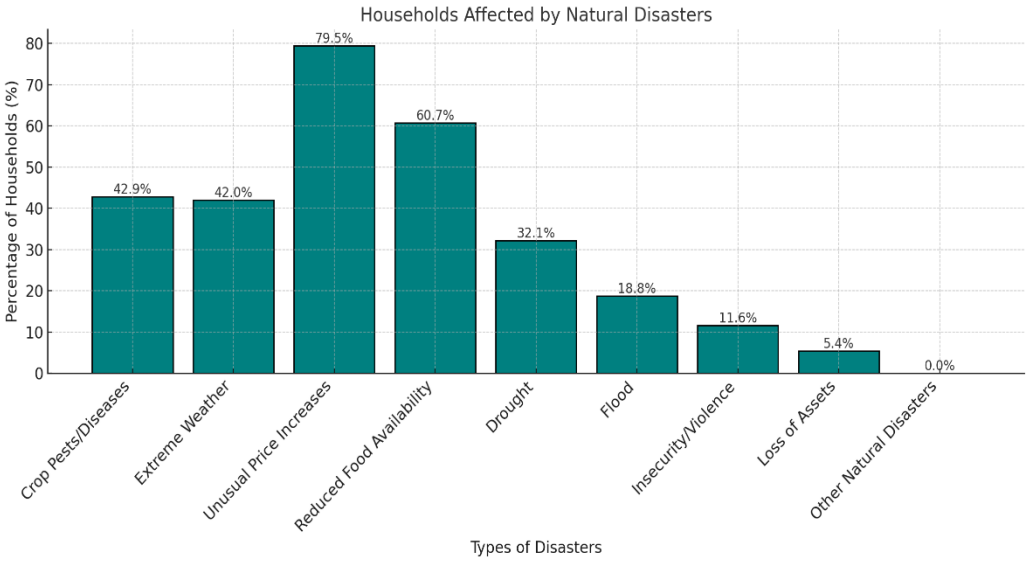

Figure 3.22. Farmers affected by natural disasters and shocks

The analysis shows that 41.07% of respondents have heard of soil salinization, while 58.93% are not aware of it. This indicates a significant gap in awareness about soil salinization, a critical issue affecting agricultural productivity and soil health. Enhancing awareness and education about soil salinization could help farmers adopt practices to mitigate its effects and improve sustainable land management. Among respondents who are aware of soil salinization, the majority (57.14%) reported no specific source of information. However, a significant proportion (33.93%) cited RESADE as their primary source of knowledge. Other sources included CONCERN (2.68%), RETRAP (2.68%), personal experience (1.79%), and other farmers (1.79%). These findings suggest that institutional sources like the RESADE project play a key role in disseminating information on soil salinization. However, the large percentage of respondents without a source of information highlights the need for more widespread and accessible educational initiatives on this issue.

The analysis reveals that 30.36% of respondents consider salinity a common problem in their village or district, while the majority (69.64%) do not perceive it as an issue. These findings suggest the need for targeted interventions in areas where salinity is a known issue to mitigate its impact on agriculture and livelihoods. The data indicates that 26.79% of respondents believe their land is affected by salinity, while the majority (73.21%) do not perceive salinity as an issue affecting their land. This highlights a significant subset of farmers who recognize salinity as a problem, suggesting the need for targeted measures to address salinity in affected areas while raising awareness among those who may not yet identify it as a concern.

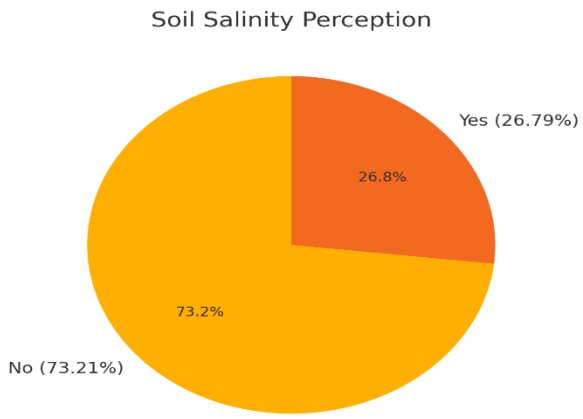

Figure 3.23. Soil salinity perception

The data reveals that 40.43% of respondents believe soil salinization significantly decreases crop yield, while the majority (59.57%) do not share this view. This indicates a divided perception among farmers about the impact of salinization on agricultural productivity. Addressing this disparity through education and evidence-based outreach could help farmers better understand the consequences of soil salinization and adopt effective mitigation strategies.

The data shows that only 0.89% of respondents have abandoned their land due to soil salinization, while the overwhelming majority (99.11%) have not. This suggests that despite the presence of soil salinity, it has not yet led to widespread land abandonment among respondents. However, it underscores the importance of proactive measures to prevent salinity from escalating to levels that could force more farmers to leave their land.

The analysis reveals that 34.82% of respondents have received training in salinity management, while 65.18% have not. This indicates that while some farmers have had access to training on managing soil salinity, a significant majority have not been trained. Expanding access to salinity management training could help farmers implement effective practices to mitigate the impacts of soil salinization on agricultural productivity. 20.54% of respondents received training from research centers, only 12.61% of respondents were trained by government institutions, 13.51% of respondents received training from NGOs. From other sources, 18.75% cited RESADE as the provider of training, while smaller contributions came from CONCERN (2.68%). The majority (77.68%) reported no training from other sources.

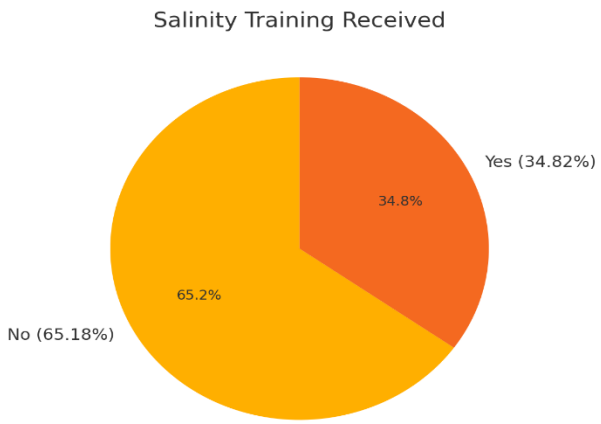

Figure 3.24. Soil salinity training received by the respondents

The analysis of training content on soil salinity management indicates significant gaps in the information provided to farmers. Only 11.61% of respondents reported receiving training on soil reclamation methods, while the majority (88.39%) did not have access to this critical information. Training on alternative crops suitable for salt-affected soils was slightly more common, with 39.64% of respondents benefiting from such guidance, leaving 60.36% without exposure. Similarly, only 24.11% of respondents received training on improved irrigation water application methods, while 75.89% lacked this knowledge. Notably, none of the respondents (100%) reported receiving other types of information during the training sessions.

The analysis shows that only 14.41% of respondents reported using the information they obtained during training to reduce the effects of salinization on their farmland. The majority (85.59%) did not apply the knowledge acquired. This highlights a significant gap between training participation and practical application, suggesting potential barriers such as lack of resources, limited understanding, or unsuitability of the techniques to local conditions. The complexity of methods (5.36% of respondents) has been cited as a reason for not using the information, while 4.46% indicated no interest in using the techniques.

Farmers recognize soil salinity problems using a variety of indicators, though awareness appears limited among respondents. The most commonly reported visible sign is white crust formation, identified by 18.75% of farmers. Other physical indicators include soil compactness (8.93%) and low water infiltration (8.04%). A smaller proportion (2.68%) noted dark brown soil color as a sign of salinity. Beyond physical characteristics, 17.86% of respondents associated salinity with declining agricultural yields. However, the majority (80.36%) did not recognize any specific salinity-related signs.

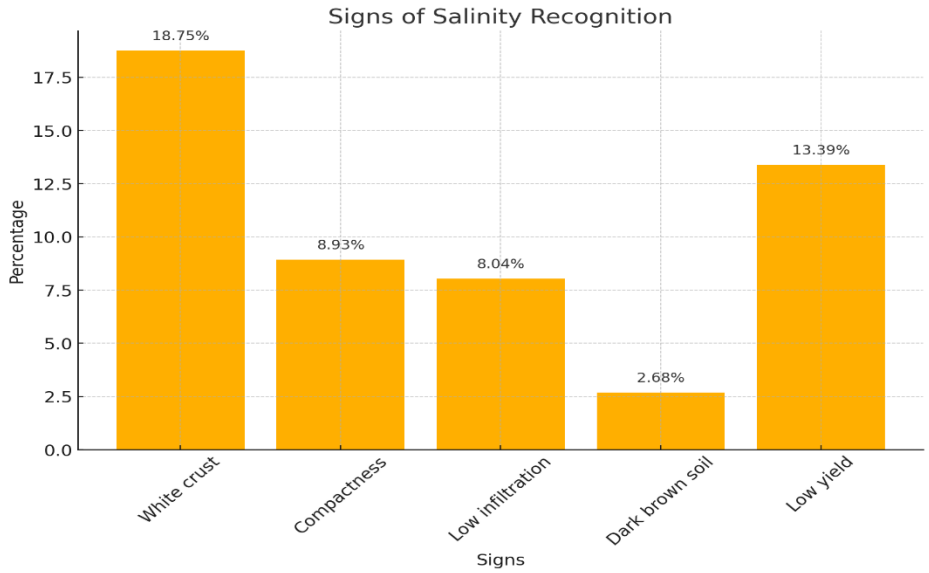

Figure 3.25. Signs of soil salinity recognition

The analysis shows that the majority of respondents (91.07%) reported no land affected by salinity. Among the remaining 8.93%, the land affected varies across small-scale measurements: 0.5 hectares was the most frequently reported affected area, noted by 3.57% of respondents. Other responses included smaller or ambiguous measurements such as 0.3 acres, 1 lot, 1 acre, 1 hectare, 2 lots, and 3 acres, each reported by 0.89% of respondents.

The analysis indicates that soil salinity is reported as more common in rainfed land by 85.71% of respondents, while only 14.29% associate salinity with irrigated land. This suggests that salinity issues are primarily linked to rainfed agricultural practices, possibly due to factors such as insufficient water management or natural soil conditions. These findings highlight the need for targeted interventions in rainfed areas to address salinity and improve soil health. The majority of respondents (78.57%) perceive the effect of salinity on crop yields as high. A smaller proportion reported the impact as medium (12.50%), while only 8.93% categorized the effect as low.

The analysis indicates varying levels of yield or productivity losses due to salinity among respondents: 78.57% reported no losses, indicating that their land is either unaffected or they do not perceive salinity as impacting yields. 10.71% estimated a 50% loss in productivity, highlighting significant challenges for these farmers. 6.25% experienced a 25% reduction in yields. 3.57% reported a 10% loss, while 0.89% indicated a 100% loss, suggesting complete crop failure.

The analysis of farmers' responses about the most resistant crops against salinity reveals the following: Cassava is the most frequently mentioned crop, either alone or in combination with other crops, cited by 16.07% of respondents. Maize is identified by 5.36% of respondents as resistant to salinity. Other crops like cowpea and combinations such as sorghum, millet, and cassava were mentioned by smaller proportions, collectively accounting for 4.46% of responses. The majority of respondents (78.57%) indicated "None," suggesting either a lack of awareness or belief that no crops are resistant to salinity. These findings emphasize cassava's perceived resilience among farmers, making it a potential focus for promoting salinity-resistant agricultural practices.

Farmers identified several causes of soil salinity, with salty irrigation water being the most commonly reported factor, cited by 15.18% of respondents. Climatic conditions in arid or semi-arid regions and

irrigation practices were each recognized by 10.71%, reflecting the impact of environmental factors and agricultural water management. Parent material (natural causes) and lack of drainage systems were mentioned by 8.04%, highlighting the role of inherent soil properties and inadequate infrastructure. Similarly, irrigation methods and land leveling problems were identified by 7.14% as contributors to salinity. A minimal proportion (1.20%) pointed to other unspecified causes. These findings suggest that farmers perceive salinity as a multifaceted issue, influenced by water quality, climate, and agricultural practices. Addressing these causes through improved water management, infrastructure development, and farmer education could mitigate the effects of salinity and enhance agricultural productivity.

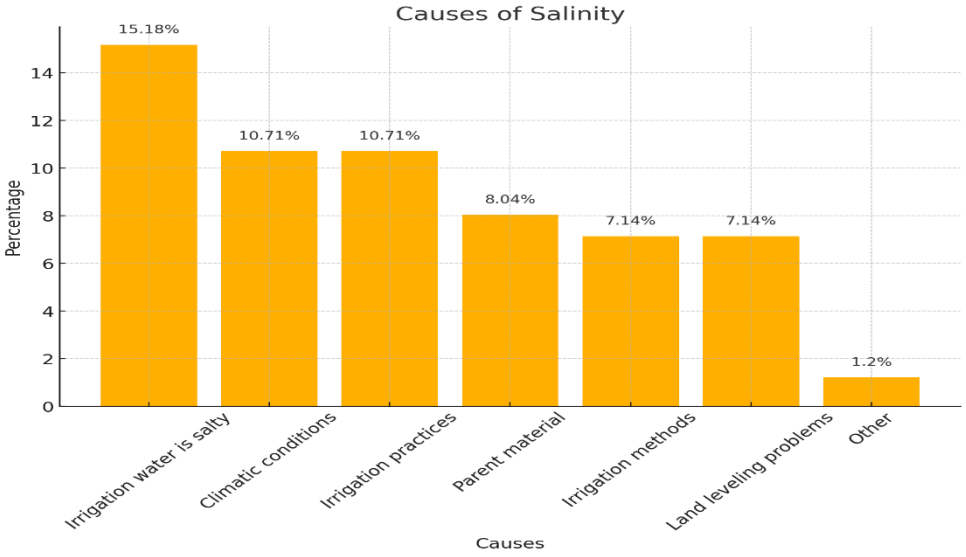

Figure 3.26. Causes of soil salinity highlighted by the respondents

Farmers proposed various interventions to address soil salinity, with some methods being more frequently mentioned than others. The majority (90.87%) either indicated "don't know" or did not specify any intervention, suggesting a significant knowledge gap in salinity management. Better irrigation techniques/methods were the most frequently proposed intervention, cited by 2.08% of respondents. Using green manure, compost, or biochar was suggested by 1.62%, followed closely by crop rotation (1.50%) and drainage or leaching (1.50%). Soil amendments, such as applying gypsum, were proposed by 0.81% of respondents. Less frequently mentioned were deep plowing (1.04%) and crop diversification (0.46%), with 0.12% identifying other unspecified interventions. Most respondents (91.68%) reported that the proposed interventions did not work effectively in addressing soil salinity issues. Only 8.32% of respondents indicated success with the interventions. These findings underscore the need to revisit and enhance the design, implementation, and accessibility of salinity management interventions to ensure broader and more consistent positive impacts on crop yields.

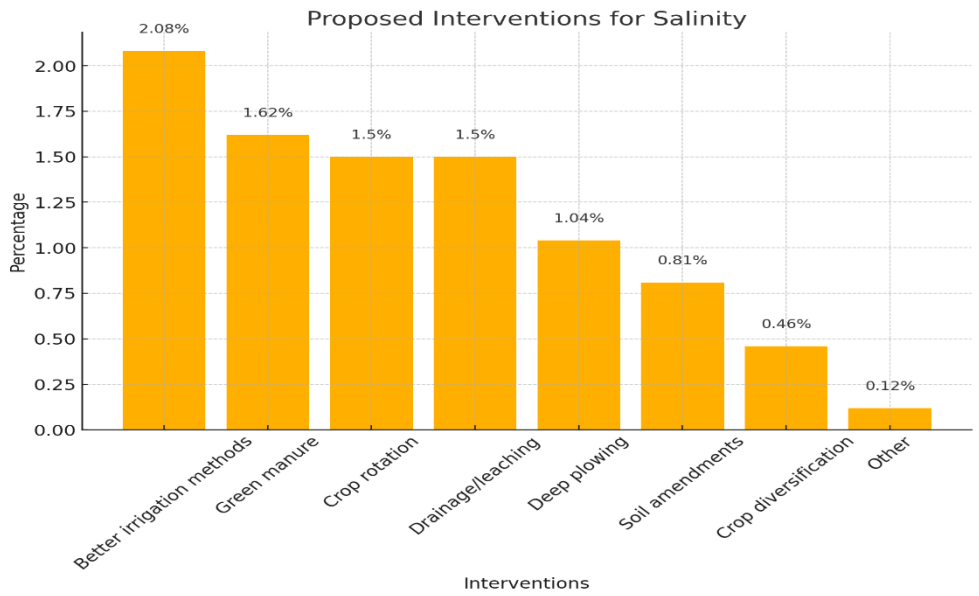

Figure 3. 27. Proposed strategies to overcome salinity impact

3.7. Gender and Women's Involvement in Agricultural Activities

The analysis of household decision-making reveals a significant level of collaboration between men and women in key farming and household activities. Shared decision-making is the most common dynamic, reported in the majority of households for activities such as buying or renting land (59.09%), deciding the type of crops to grow (56.36%), purchasing agricultural tools or machinery (59.09%), and spending income from farming (63.64%). Women independently make decisions in a substantial proportion of households, particularly in selling products (56.36%), deciding on crop types (38.18%), and spending income (33.63%). Men independently make decisions in a smaller proportion of households, with their highest involvement reported in hiring labor (7.27%). These findings highlight an inclusive decision-making structure, with women playing a prominent role alongside men, particularly in activities related to agricultural production and financial management. This dynamic suggests a shift towards more equitable participation in farming and household governance.

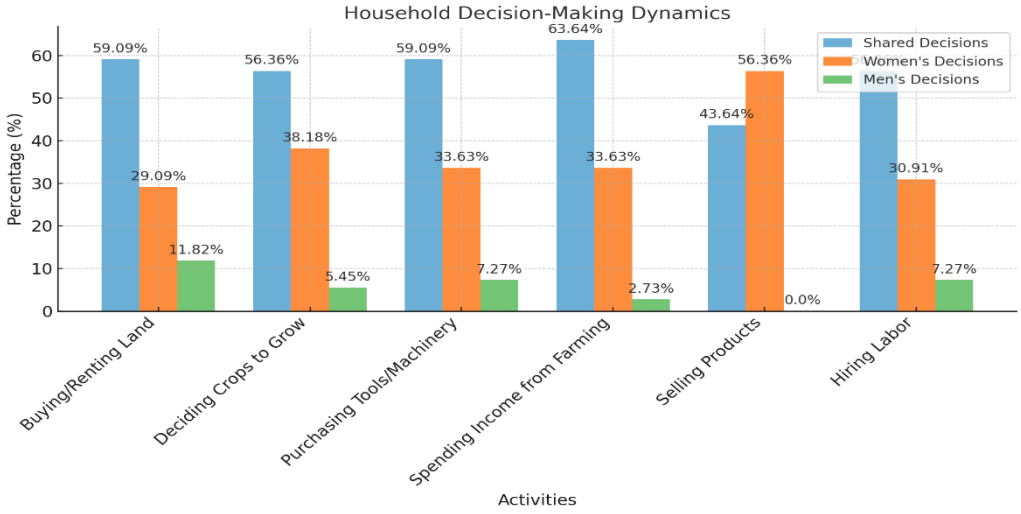

Figure 3.28. Household decision-making by gender and activities

The analysis of common activities performed by women highlights their significant involvement in both agricultural and household tasks. Farming activities are the most frequently reported, accounting for 27.78% of all responses, followed by weeding (13.64%) and planting (10.61%). Harvesting (9.09%) and processing (2.53%) are also notable agricultural contributions. Non-agricultural activities include cooking, cleaning, and caring for the home, reflecting women's dual roles in production and domestic responsibilities. Additionally, activities such as land preparation, sowing, and selling products showcase their integral role in farming operations. These findings underscore women's pivotal contributions to both household and agricultural productivity.

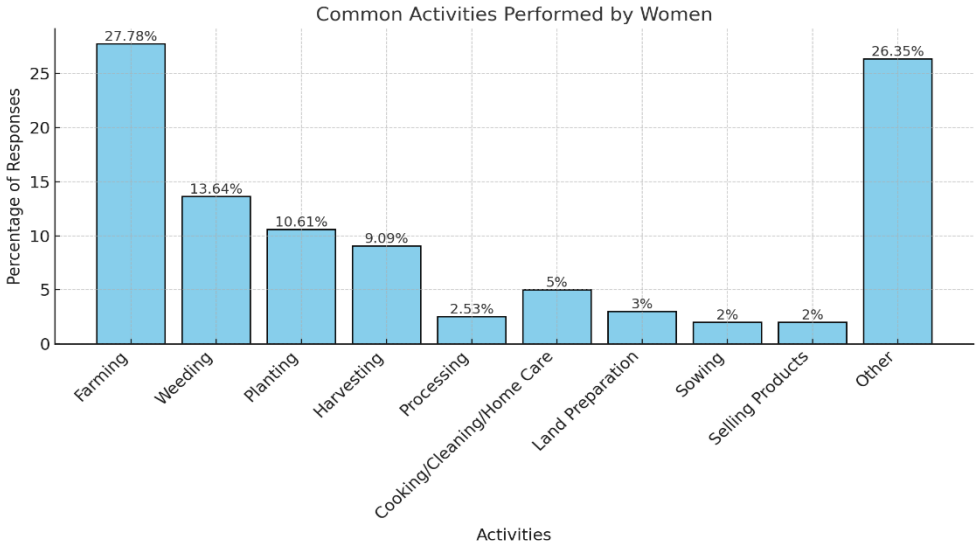

Figure 3. 29. Commun activities performed by women

The analysis of women's involvement in household and farming activities highlights a diverse range of participation levels. Approximately 26.02% of activities are exclusively performed by women, showcasing their significant role in specific tasks. A substantial proportion, 41.33%, involves shared responsibilities between men and women, reflecting collaboration within households. Conversely, 9.69% of tasks are rarely performed by women and are predominantly managed by men, indicating gendered labor dynamics in certain areas. Additionally, 22.45% of tasks were categorized as "none," suggesting a lack of active involvement in these activities. These findings underline the crucial role women play in both household and agricultural activities while also pointing to areas where gender-specific roles persist.

3.8. Food Security and Nutrition

The analysis of household food security status reveals diverse experiences with food consumption over the past year. A significant proportion of households (34.82%) reported experiencing food shortages throughout the year, indicating chronic food insecurity. An additional 29.46% faced occasional food shortages, highlighting intermittent struggles to meet food needs. Approximately 34.82% of households achieved food sufficiency, meeting their consumption needs without any surplus, while only a marginal 0.89% reported having a food surplus. These findings underscore the prevalence of food insecurity among households, with a substantial majority either experiencing

shortages or just meeting their basic needs without surplus, reflecting vulnerabilities in food access and availability.

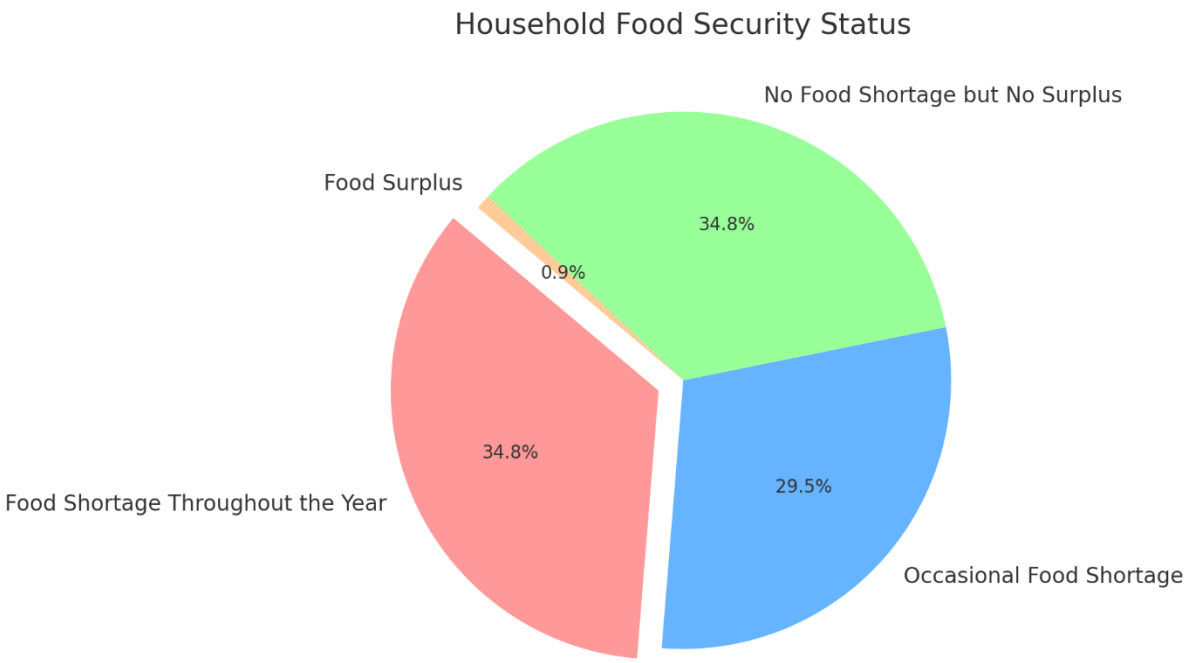

Figure 3.30. Household food security status

Household food consumption patterns reveal a strong reliance on staple foods, with cassava being the most widely consumed, reported by 92.86% of households, followed by rice (95.54%) and maize (63.96%). Protein sources, such as beans and peas, are consumed by 59.82% of households, while meat and poultry/eggs are consumed by 50% and 30.36%, respectively. Dairy products, however, are consumed by only 16.96%, indicating limited reliance on this protein source. Vegetables and fruits are moderately included in diets, consumed by 50.89% and 35.71% of households, respectively. Oil and butter are widely consumed by 95.54%, underscoring their role as essential dietary components. Less commonly consumed items, such as potatoes, nuts, and other grains (e.g., barley), reflect limited dietary diversity, with proportions of 21.43%, 40.18%, and negligible levels of consumption, respectively. These findings highlight a heavy reliance on staples, moderate protein consumption, and potential gaps in dietary diversity, which may affect overall nutritional adequacy.

Food sources for households over the last seven days indicate a diverse range of origins. The majority of food consumed (55.46%) was not sourced during this period, suggesting households may rely on stored food or limited food availability. Market purchases, whether on cash or credit, constituted 32.98%, highlighting the importance of market access in household food security. Own production contributed 11.15%, emphasizing the role of agriculture in food provision. Gifts and charity accounted for a small proportion (0.30%), while food aid from organizations like government agencies and WFP was negligible. These findings underline the significant reliance on markets for food acquisition, with limited contributions from own production or external aid, pointing to potential vulnerabilities in food access and resilience.

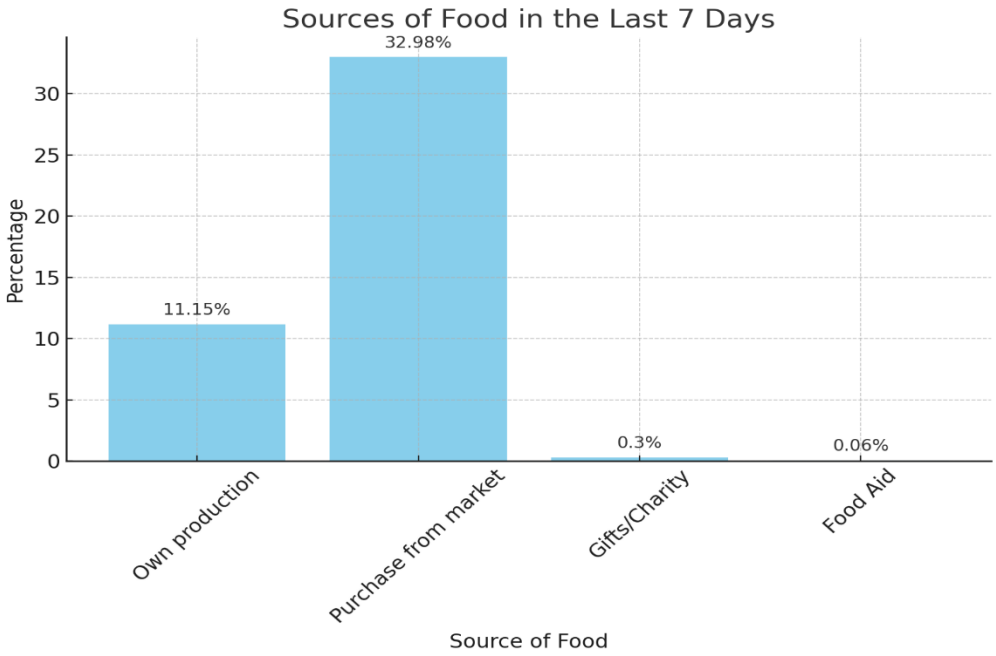

Figure 3.31. Sources of food consumed by the respondents

3.9. Access to Infrastructure and Services

The baseline survey results highlight the roles of infrastructure in supporting farmers' needs. Hospitals are primarily accessed for healthcare, with 38.8% of farmers citing "treatment" and 15.3% citing "treatments" as intended uses. Schools are key hubs for education, with 40% of farmers associating them with "education" and 18% with "learning." Transport facilities are critical for mobility and logistics, with 22% of farmers using them for "mobility," 31% for "movement," and 11% for "moving." Storage facilities, accessed by only 11.8% of farmers for "storage" or "preserve," indicate a potential gap in availability or awareness. The results demonstrate alignment between infrastructure and its primary functions but also highlight disparities in access, particularly to storage facilities, suggesting opportunities for targeted interventions to improve rural farmers' productivity and well-being.

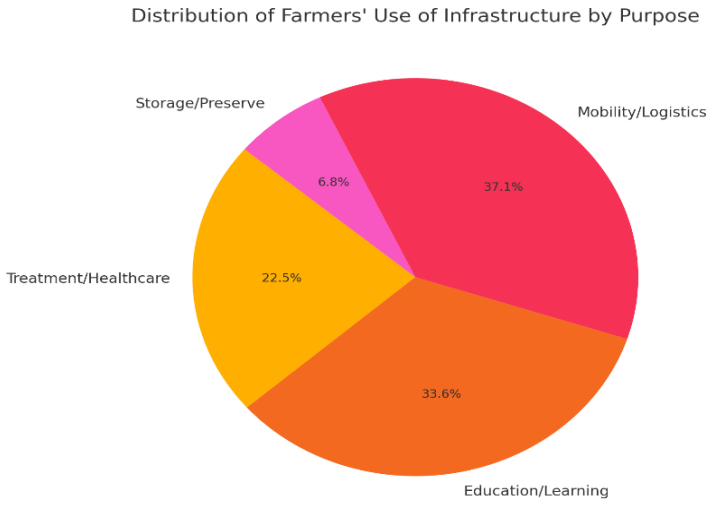

Figure 3.32. Infrastructure use

Regarding access to other facilities, the analysis reveals that transport services (91.96%) and schools/colleges (74.11%) are the most accessible facilities, primarily through public sources. Health facilities (67.86%) and clean drinking water (45.54%) have moderate access, with reliance on public infrastructure for the majority. Access to electricity (4.50%) and micro-finance/credit (13.39%) is minimal, highlighting significant gaps in service provision. Private sources contribute modestly to clean drinking water (9.82%) and micro-finance/credit (8.04%), while other facilities are almost entirely inaccessible. These findings emphasize the need for targeted investments to improve access to essential services, particularly electricity and financial resources.

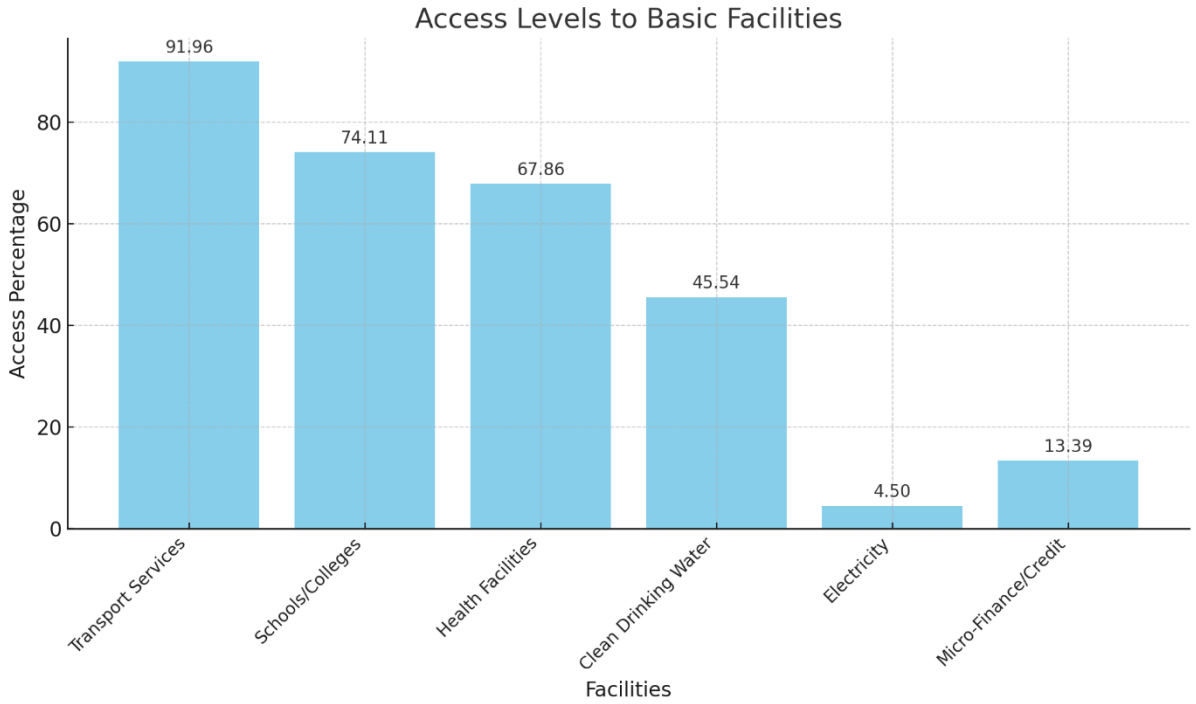

Figure 4. 33. Access to facilities

The survey reveals that the majority of farmers, 96.4%, have access to markets, indicating strong market connectivity within the surveyed population. This high level of access suggests that most farmers can sell their produce, purchase agricultural inputs, and benefit from market-related opportunities. However, 3.6% of farmers reported no access to markets, which highlights a small but significant segment potentially facing barriers such as distance, poor infrastructure, or limited resources. Addressing these challenges could further enhance market inclusivity and improve overall agricultural productivity.

The survey indicates that most farmers rely on walking as their primary means to access markets, with 55.86% reporting "walking, suggesting a need for data refinement. Meanwhile, 42.34% of farmers use bicycles, reflecting some access to basic transportation that facilitates market mobility. The reliance on walking underscores the potential challenges of distance or inadequate transportation infrastructure, which could hinder market integration and efficiency. Improving rural transport infrastructure or providing affordable transportation options could significantly enhance farmers'

market access and economic opportunities. The survey also reveals that most farmers have access to roads, particularly paved roads (93.69%), which is essential for facilitating market connectivity and transportation. However, gaps remain, with 7.14% lacking general road access and 28.57% without unpaved road access, possibly hindering mobility in remote areas. These findings emphasize the importance of maintaining and expanding road networks to ensure equitable access for all farmers, especially in less connected regions.

Conclusion for Liberia: The baseline survey conducted in Liberia engaged 112 respondents from Grand Bassa County, with interviews distributed across District 3 (48.21%), District 2 (31.25%), District 5 (17.86%), and smaller proportions in Districts 4 and 6. The sample comprised 66.07% female and 33.93% male respondents, with an average age of 45.43 years, ranging from 18 to 80 years. These demographics provide a comprehensive foundation for understanding the socio-economic and agricultural conditions in the region.

The findings reveal critical areas of strength and opportunities for improvement as we prepare to introduce climate-smart agricultural technologies and practices aimed at addressing soil salinity, drought, and improving productivity, food security, and revenue. Farming is the primary livelihood for the vast majority of households, yet significant disparities in landholding sizes, productivity, and income levels persist. While cassava and rice are the dominant crops with high productivity, variability in output underscores the need for targeted support to enhance agricultural efficiency and equity. Soil fertility and the predominance of loam soils suggest favorable agricultural conditions, but challenges such as soil salinity and underutilization of irrigated land highlight areas for intervention.

Infrastructure access is a mixed picture. While most farmers have access to markets (96.4%) and paved roads (93.69%), the reliance on walking (55.86%) to reach markets and limited access to unpaved roads (28.57% lack access) underline mobility constraints. Enhancing rural transportation networks and storage infrastructure can significantly improve market integration and productivity.

Social dynamics such as high cooperative membership (95.08%) and shared household decision-making indicate strong community engagement and gender inclusivity in agricultural activities. However, gaps in access to extension services, with 13.11% of farmers reporting no contact with extension agents, and limited training on salinity management reflect opportunities for capacity building and improved outreach.

Food security remains a pressing concern, with 34.82% of households experiencing chronic food shortages. The reliance on staples such as cassava and rice, moderate protein consumption, and limited dietary diversity suggest the need for interventions to improve nutrition and food access.

This baseline analysis underscores the importance of targeted, inclusive interventions to address identified gaps and build on existing strengths. By introducing climate-smart technologies and practices, the project aims to enhance agricultural productivity, mitigate the impacts of climate change, and improve food security and livelihoods for farmers in Liberia.

IV. Country: Mozambique

4.1. Country Profile

Mozambique, located in southeastern Africa, is bordered by the Indian Ocean to the east, Tanzania to the north, Malawi and Zambia to the northwest, Zimbabwe to the west, and Eswatini and South Africa to the southwest. The country covers approximately 799,380 square kilometers. As of 2022, Mozambique's population was estimated at 33 million, with about two-thirds residing in rural areas. The nation's economic growth has been modest, with a GDP per capita of $491.80 in 2019. In 2014, 46.1% of the population lived below the poverty line. Given the slow economic progress, significant reductions in poverty levels are unlikely. Agriculture plays a crucial role in Mozambique's economy, accounting for 26.73% of the GDP in 2022. Approximately 80% of the labor force is engaged in agriculture, primarily at the subsistence level. The sector's performance is hindered by low productivity and vulnerability to climate-related challenges.

More than 60% of Mozambique's land is dedicated to agriculture, underscoring the sector's importance to the national economy and its significant impact on rural livelihoods, food security, and poverty alleviation. Agriculture, as the largest sector of Mozambique’s economy, contributes about a quarter of the national GDP and is a key driver of overall growth. Approximately 80% of households are involved in the sector.

Mozambique has implemented several strategies to enhance agricultural productivity and promote sustainable economic growth including, for example, the Strategic Plan for the Development of the Agrarian Sector (PEDSA) 2011–2020; the National Investment Plan for the Agrarian Sector (PNISA) 2013–2017; the Strategic Plan for the Development of the Agrarian Sector 2030 (PEDSA II); the Promotion of Large-Scale Investments and Agribusiness; the Support for Smallholder Farmers; and the promotion of Climate Resilience and Sustainable Practices. These strategies collectively aim to modernize Mozambique's agricultural sector, improve livelihoods, and achieve sustainable economic development.

Table 4.1: Country Profile Indicators

Indicator	**Unit**	**Value**
Population (2019)	Millions	30.37
Agricultural Land (2016)	Sq. km	499,500
Agricultural Land (2016)	% of land area	63.52
GDP (2019)	Current US$	14.94 billion
GDP Per Capita (2019)	Current US$	491.80
GDP Growth (2019)	Annual %	2.22
Poverty Headcount Ratio (2014)	% of population	46.1

Sources: World Bank Microdata-World Development Indicators (World Bank, 2020)

4.2. Socioeconomic and Demography Characteristics of the Respondents

The baseline survey data provides insights into the geographic and demographic distribution of respondents for the agricultural development project in Mozambique. All 251 participants are from the southern region, specifically the Gaza Province, with the district of Chokwe as the focal area. Within Chokwe, respondents are distributed across four villages: Conhane (27.89%), Kotwane (23.90%), Massavasse (22.31%), and Nwachicoluane (25.90%).

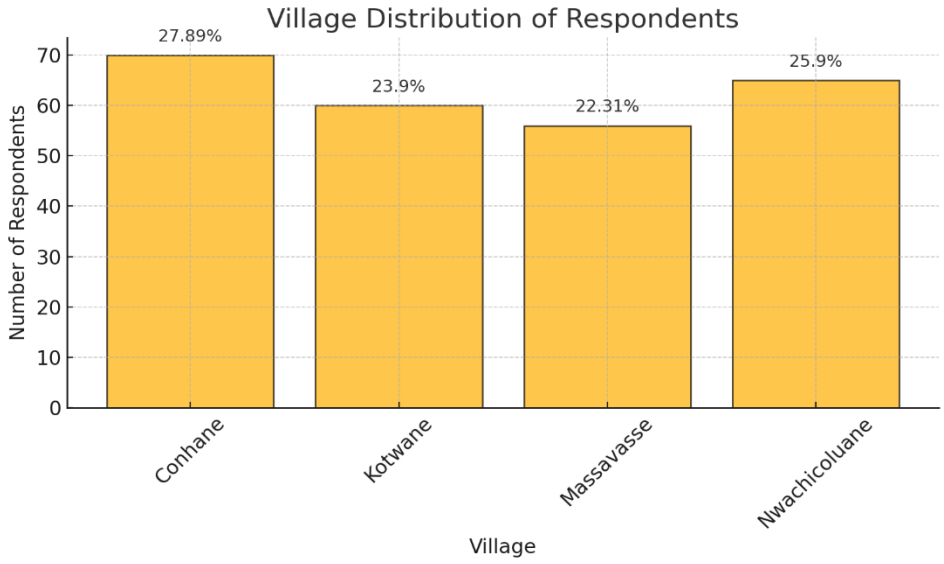

Figure 4.1. Village distribution

The gender composition of the survey is balanced, with 52.19% female and 47.81% male respondents, demonstrating a slight female majority and an inclusive approach to data collection. The survey includes respondents with an average age of 51.9 years and a standard deviation of 14.61, indicating moderate variability. Respondents range in age from 18 to 88 years, representing a diverse group across adult age categories. The predominance of middle-aged and older participants may influence agricultural practices and technology adoption rates.

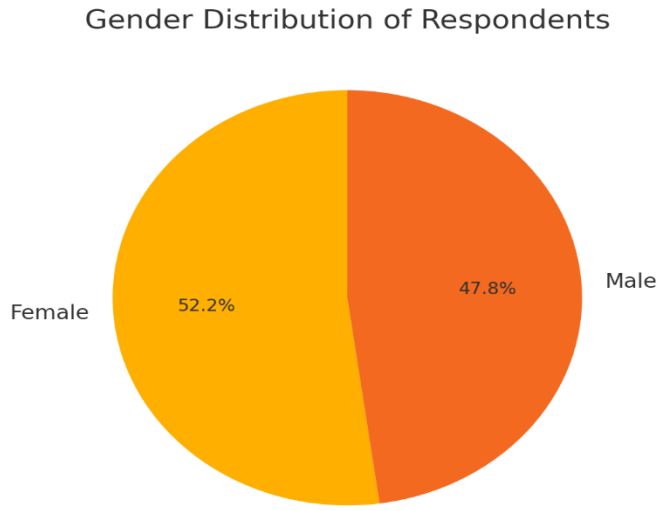

Figure 4.2. Gender distribution of respondents

The chart highlights that 89.47% of male respondents are household heads, compared to 43.24% of female respondents, indicating that household headship is predominantly male. Conversely, 56.76% of female respondents are categorized as other household members, compared to only 10.53% of males. This reflects a gender imbalance in household leadership roles, emphasizing the need for targeted efforts to promote women's participation in decision-making within households.

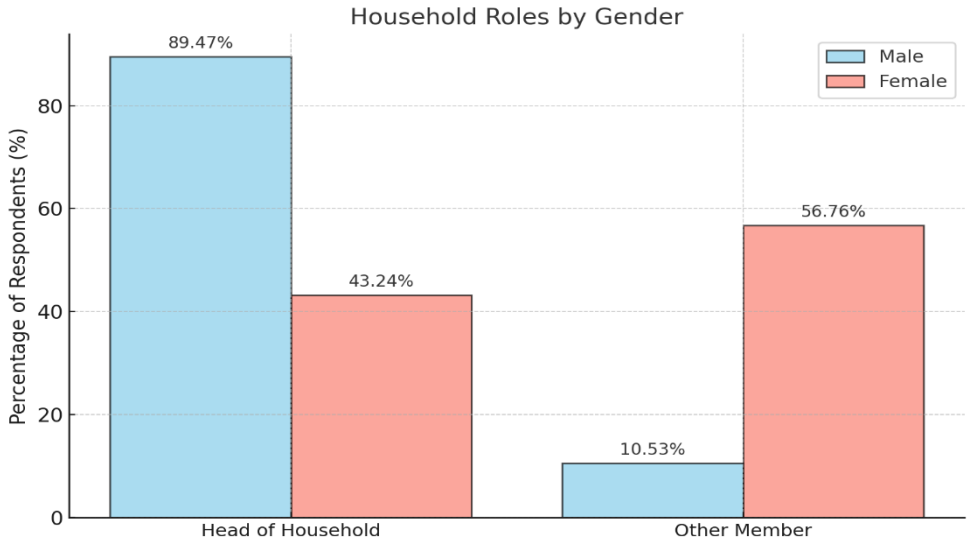

Figure 4. 3. Household roles by gender

The survey predominantly targeted household heads, with 84.06% of respondents (211 individuals) holding this role, emphasizing decision-makers in agricultural contexts. Spouses accounted for 8.76%, while children, siblings, grandchildren, in-laws, other relatives, and unrelated members collectively comprised 7.18%. This distribution highlights the focus on primary decision-makers while also capturing insights into intra-household dynamics. The survey identifies 115 male and 96 female household heads, with both groups representing 100% of the household heads among their respective genders. This distribution highlights inclusivity while reflecting a slight predominance of male household heads, potentially indicative of regional cultural or societal norms. Male household heads (115 individuals) have an average age of 53.63 years with a moderate variability (SD 12.87), ranging from 19 to 83 years. Female household heads (96 individuals) are slightly older on average, with a mean age of 55.54 years and a slightly higher variability (SD 13.83), ranging from 21 to 88 years. This age distribution reflects a broad representation of life stages, with older individuals slightly more prominent among female heads

The gender-age composition of households reveals that female adults aged 15-65 are the largest demographic group, with an average of 2.19 individuals per household, slightly higher than the 1.89 male adults in the same age range. This indicates a balanced but slightly female-dominated adult working-age population, which may reflect the roles women play in both household management and agricultural activities.

Children are another significant demographic, with female children slightly outnumbering male children at 1.37 and 1.17 individuals per household, respectively. This composition highlights the

importance of addressing the needs of younger household members in development projects, particularly in education, nutrition, and healthcare.

Elderly individuals aged 65 and above make up the smallest household demographic, with averages of 0.15 and 0.22 individuals for males and females, respectively. This suggests a younger overall population in the surveyed households, which could influence labor availability and dependency ratios. The variability in demographic groups, as reflected by the error bars, emphasizes the diverse composition of households in the region.

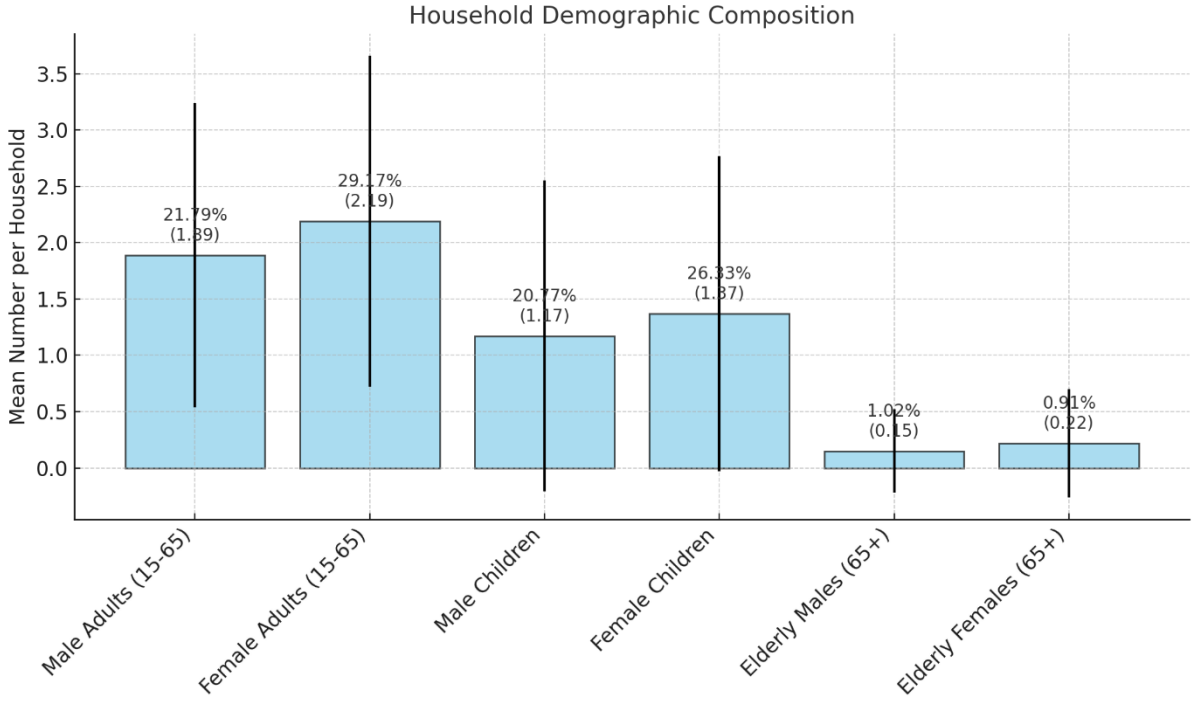

Figure 4.4. Household demographic composition

Among male household heads, the majority (70.54%) are married, highlighting that marital unions are the predominant status for men in leadership roles within households. A significant portion (23.21%) are single, while smaller proportions are widowers (4.46%) or divorced/separated (1.79%), reflecting relatively stable marital conditions among male heads. In contrast, female household heads present a markedly different profile, with nearly half (47.25%) identified as widows, making widowhood the most common marital status for women in this role. While a smaller share (13.19%) of female heads are married, a considerable proportion (31.87%) are single, and 7.69% are divorced or separated. This disparity underscores the unique socio-economic dynamics and challenges faced by female-led households, particularly those headed by widows.

The literacy status of household heads shows a notable disparity between genders. Among male household heads, a significant majority (75.89%) are literate, demonstrating relatively widespread access to basic education among men in this role. In contrast, female household heads have a lower literacy rate, with only 53.85% being literate, while 46.15% are illiterate. This gap suggests that women in leadership roles within households may face greater challenges in accessing educational opportunities, which could influence their ability to access information, manage resources effectively, and participate in decision-making processes. The disparity underscores the importance of promoting education and literacy programs targeted at women to bridge this gap.

The educational status of household heads reveals differences in average years of schooling and levels of attainment between male and female heads. Male household heads have an average of 4.55 years of schooling, with a wide variability (standard deviation of 3.63) ranging from no formal education (0 years) to a maximum of 15 years. In comparison, female household heads have an average of 3.12 years of schooling, with less variability (standard deviation of 3.06) and a maximum of 12 years, reflecting a lower overall educational attainment for women in this role.

Regarding educational degrees, a significant proportion of male household heads (57.14%) have completed primary school, followed by 20.54% who have completed secondary school. About 20.54% have no formal education, while a very small fraction (0.89%) hold a high school diploma or other qualifications. Female household heads show a similar proportion (57.14%) having completed primary school, but a higher percentage (28.57%) have no formal education. A smaller share (13.19%) of female heads have completed secondary school, and 1.10% hold a doctoral degree (PhD).

These findings highlight a gender disparity in educational attainment, with male heads generally achieving higher average years of schooling and slightly more diverse qualifications. This gap may have implications for access to opportunities, decision-making, and resource management within households, particularly for female-led households. Addressing these disparities through targeted educational programs could help improve household welfare and economic resilience.

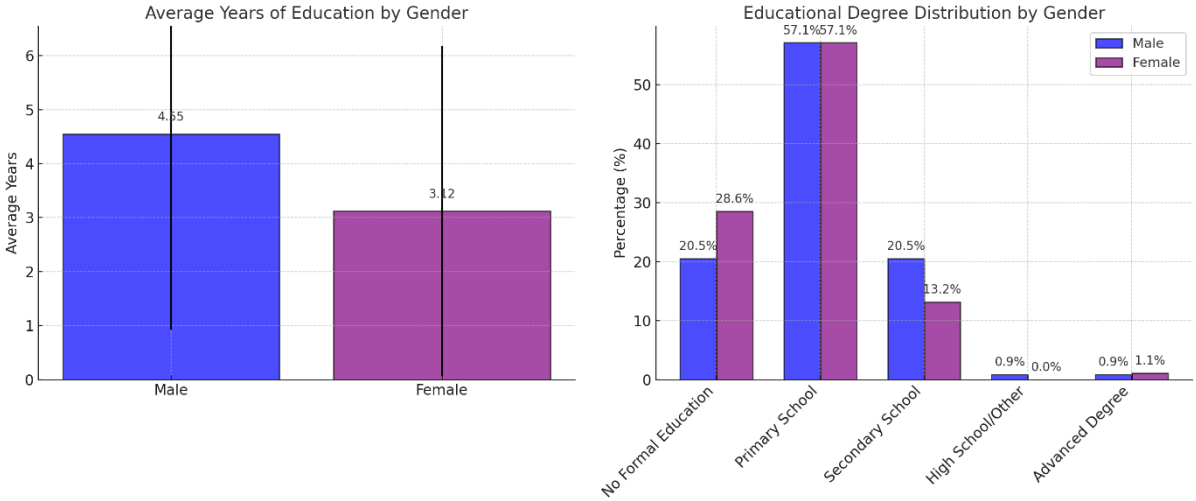

Figure 4.5. Educational degree distribution by gender

Household income sources reveal that farming is the most common source, with 36.87% of households relying on it for their livelihoods. Temporary employment (14.22%) and permanent employment (12.77%) also play significant roles in income generation. Other notable sources include trade (9.16%), aids (8.67%), and livestock (8.19%). Remittances are reported by 3.61% of households, while smaller shares derive income from casual labor and specialized services, highlighting a modest level of diversification in household income sources.

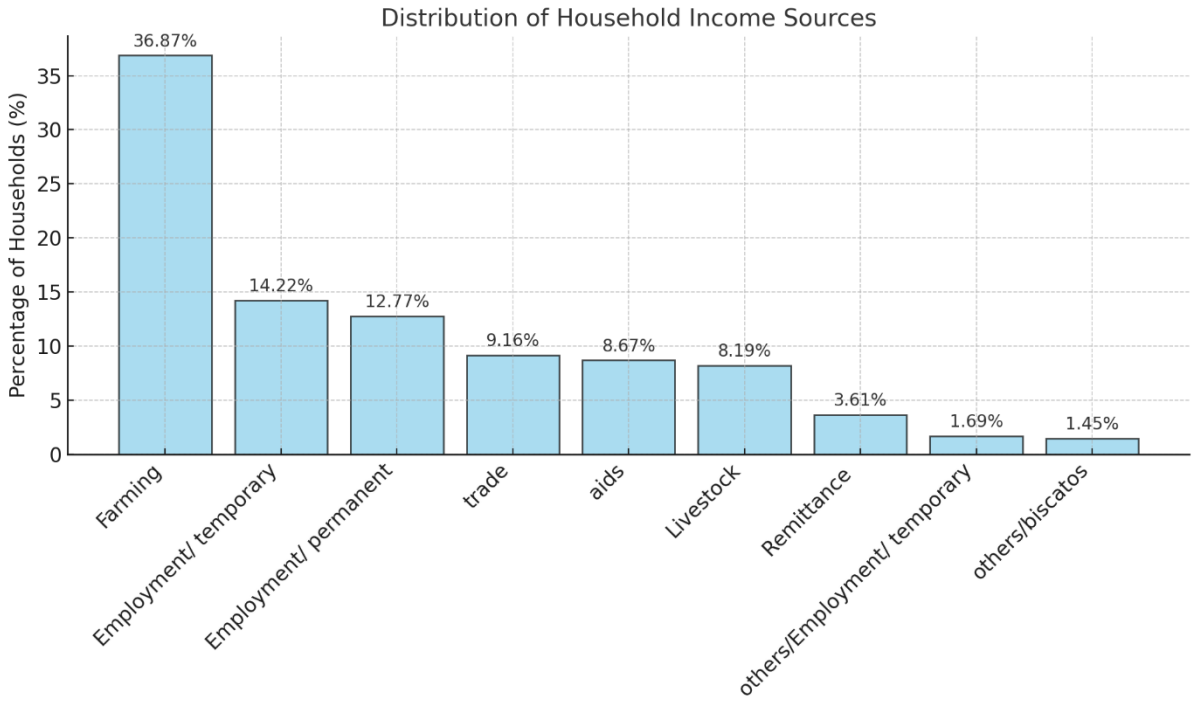

Figure 4. 6. Distribution of household income source

The analysis of average income indicates that the average total income across households is 25,062.48 monetary units. Men contribute the largest share of this income, with an average of 16,374.51 monetary units, while women contribute an average of 8,206.04 monetary units. Joint contributions from both men and women are notably higher, averaging 40,946.79 monetary units, suggesting that combined efforts significantly enhance household income levels. These findings highlight the importance of both individual and collaborative contributions in sustaining household livelihoods.

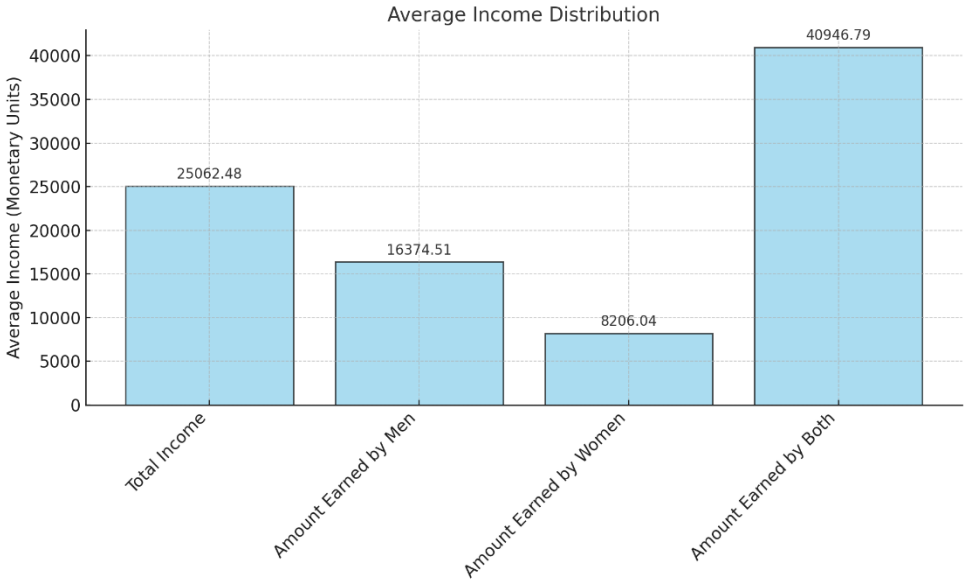

Figure 4.7. Average income distribution

Household expenditure analysis reveals that the average spending on food is 3,123.23 monetary units, with women making decisions in 45.02% of households. Joint decision-making by both men and

women accounts for 35.06%, while men independently decide in 10.36% of households. Non-food expenditure averages 2,898.05 monetary units, with decision-making more evenly distributed. Joint decisions are made in 35.06% of households, followed by women in 28.29% and men in 19.92%. The analysis highlights the pivotal role of women in food expenditure decisions, while non-food expenditure decisions are more collaboratively shared between genders.

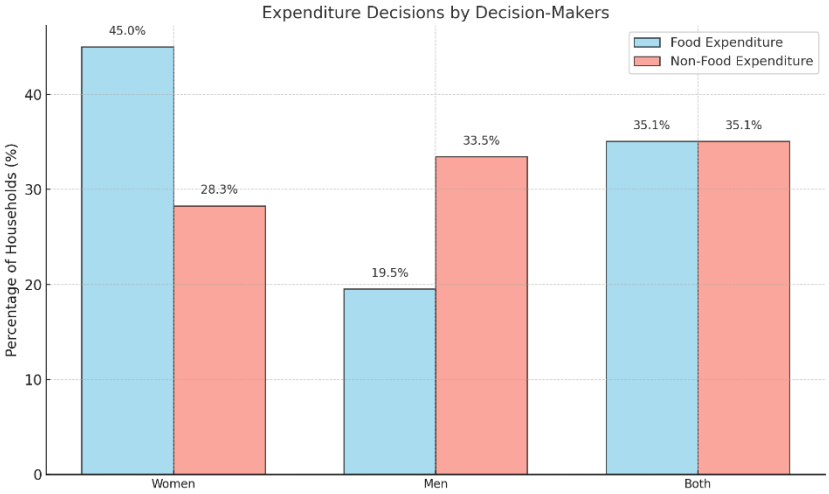

Figure 4. 8. Food and non-food expenditure decision-making by gender

Household asset ownership shows that essential items such as houses, kitchen utensils, and mobile phones are widely owned, with ownership rates exceeding 90%, reflecting their necessity in daily living. Agricultural tools are also prominent, with 74.1% of households owning farming tools, underscoring the sector's importance. In contrast, advanced or luxury assets like cars, tractors, and washing machines are owned by less than 10% of households, highlighting limited access to high-cost equipment.

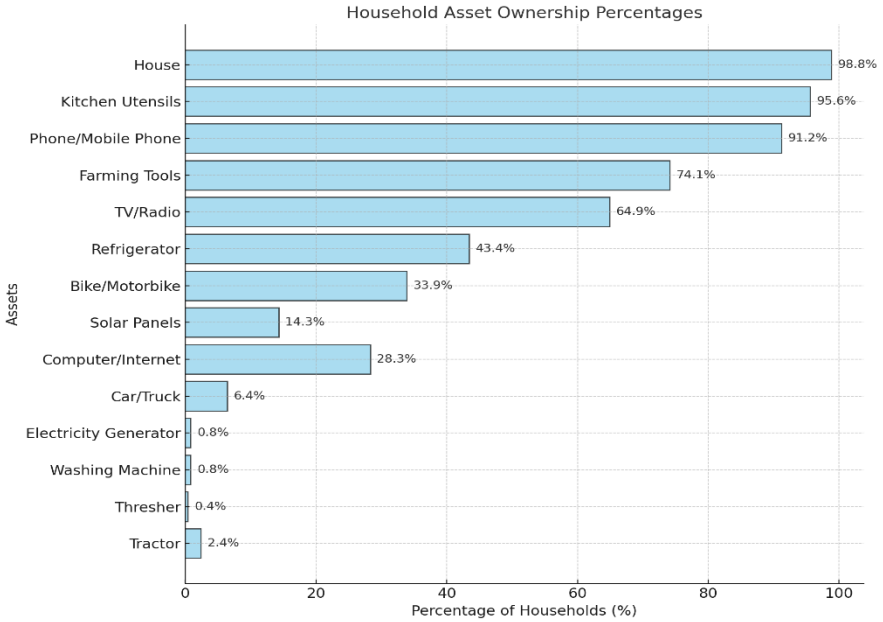

Figure 4.9. Household asset ownership

Men's ownership of household assets shows that houses (17.13%), TVs/radios (12.75%), and phones (11.55%) are the most commonly owned items, reflecting their prominence in men's contributions to household resources. However, ownership of essential assets like farming tools (4.38%) and high-value items such as cars (1.59%) and tractors (0.80%) is limited, suggesting shared or alternative ownership patterns within households.

Women's ownership of household assets is predominantly focused on essential items, with kitchen utensils (29.08%), phones (15.14%), and houses (13.15%) being the most commonly owned. Moderate ownership is observed for farming tools (7.17%) and TVs/radios (5.58%), reflecting women's involvement in both household and productive activities. However, ownership of high-value assets such as bikes, refrigerators, and cars remains minimal, while no ownership is reported for electricity generators, tractors, or washing machines, highlighting significant gender disparities in access to and control over expensive or specialized assets.

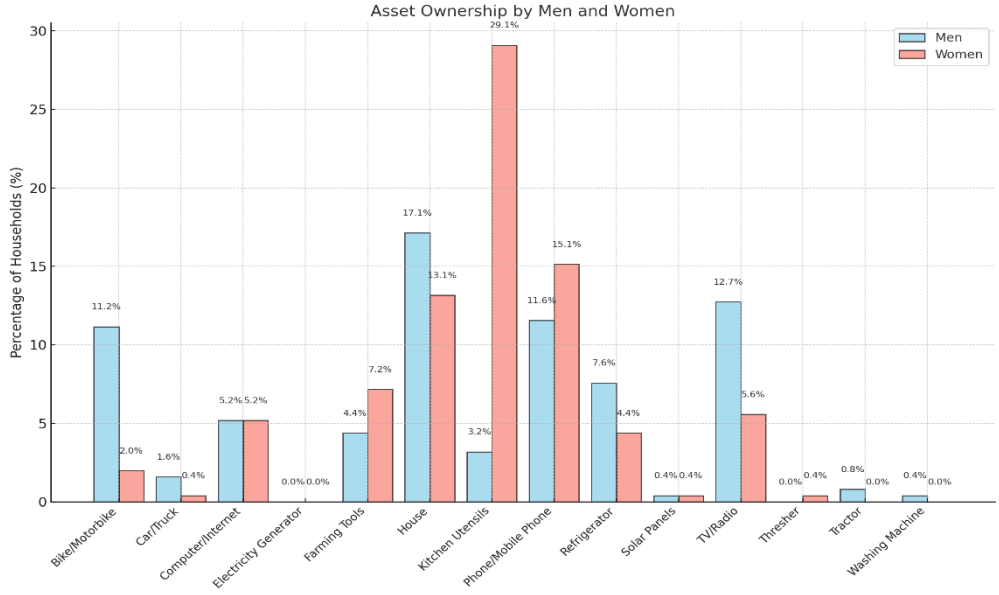

Figure 4.10. Asset ownership by gender

4.3. Landholding and Agriculture Production Portfolio

The analysis reveals that the majority of households (89.52%) rely on irrigated land for farming, while a smaller proportion (7.26%) use both irrigated and rainfed land, and only 2.42% depend solely on rainfed land. Most households (76.71%) have access to irrigation, which plays a critical role in agricultural productivity, while 22.89% lack such access, potentially facing limitations in farming output. Surface irrigation is overwhelmingly the most common method, used by 97.21% of households, with advanced techniques like drip or localized irrigation barely adopted, indicating significant opportunities to introduce more efficient and sustainable irrigation practices.

The analysis of soil types reveals that **clay soils** are the most common, present in 54.4% of households' farmland, followed by **loam soils** at 37.6%. **Sandy soils** account for 8% of the farmland. This distribution highlights the predominance of clay and loam soils, which are generally more fertile and

suitable for agriculture, while sandy soils, being less common, may require additional management practices to enhance productivity.

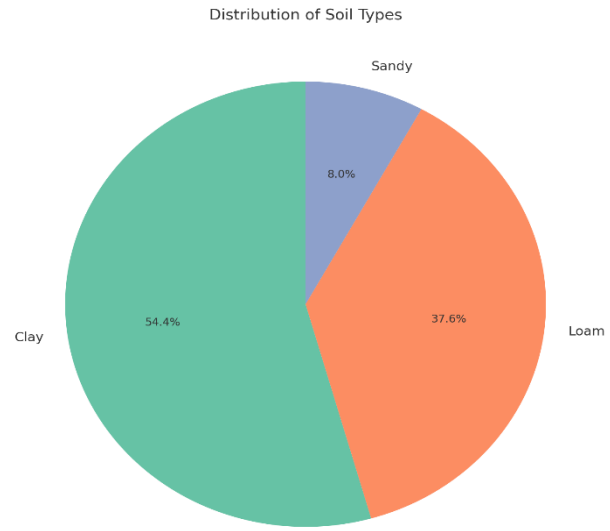

Figure 4. 11. Soil type distribution

The reported soil fertility levels indicate that most households perceive their soils as favorable for agriculture, with 39.04% rating their soil as good and 38.65% as average. A smaller but significant proportion (12.75%) report very good fertility, reflecting highly productive agricultural land in some areas. However, 8.76% of households consider their soil poor, and a minimal 0.80% classify it as very poor, suggesting localized challenges in soil quality. These results emphasize the need for targeted soil management practices to support households with less fertile land.

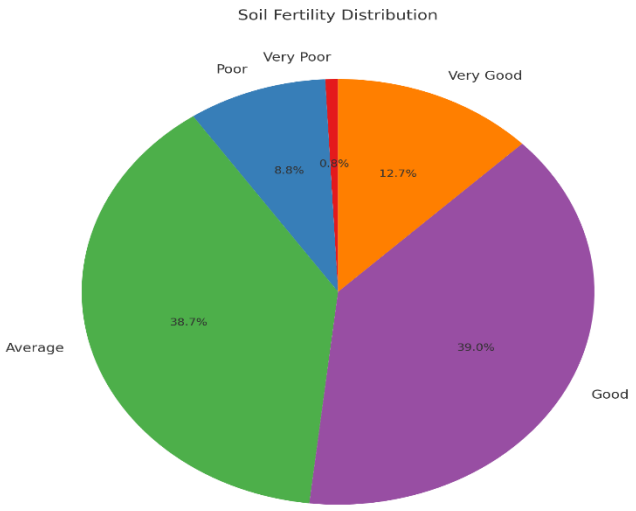

Figure 4.12. Soil fertility distribution

The analysis of crop data reveals diverse patterns in production, consumption, and sales across crop types. Garlic stands out with the largest irrigated area (1.0 ha) and the highest total production (3,020 kg), of which 1,220 kg is consumed and 10,780 kg sold at an average price of 17.5 per kg. Quiabo (Okra) follows with significant production (4,160 kg) on 1.5 ha, selling 3,690 kg at an average price of 38.33

per kg, while 310 kg is consumed. Beans and green beans show moderate production, with most of it consumed locally, reflecting their role in household food security. Crops like "Folha de abóbora" are grown on smaller scales (0.025 ha) and are primarily consumed, indicating limited commercial orientation. These results highlight variations in the use of crops for consumption versus income generation, with garlic and okra emerging as key cash crops. Irrigated Land covers a total of 370.69 hectares, with a total production of 753,190 kg, demonstrating its high productivity. Rainfed Land Spans 10,038.08 hectares but produces only 36,385 kg, indicating much lower productivity compared to irrigated land.

The analysis of average crop yields shows significant variability in productivity among different types. Pumpkin leaves (Folha de Abóbora) exhibit the highest yield at 8,000 kg per hectare, making them a highly efficient crop. Garlic follows with a yield of 3,020 kg per hectare, underscoring its importance as a key cash crop. Okra (Quiabo) also demonstrates strong productivity at 2,773 kg per hectare, balancing its role in both consumption and sales. Green beans yield a moderate 2,000 kg per hectare, while regular beans have the lowest productivity at 733 kg per hectare, suggesting room for improvement through better inputs or practices. These findings highlight opportunities to optimize crop selection and management for enhanced agricultural efficiency.

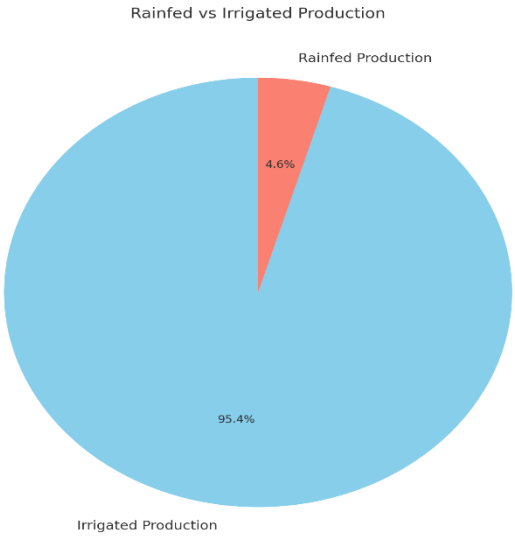

Figure 4. 13. Rainfed and irrigated production

The livestock ownership distribution, presented in descending order, highlights that chickens account for the largest share at around 44% of total ownership, reflecting their prominence in household farming systems. Cows follow with a significant share, emphasizing their dual role in milk production and as a financial asset. Ducks and goats make up smaller but meaningful portions, supporting diversified farming and food security. The lower ownership percentages of other livestock types suggest their supplementary roles in household economies. This pattern underscores the reliance on poultry and cattle for primary agricultural activities, with other livestock playing secondary roles.

The analysis of the average number of livestock owned by respondents indicates variability across different types. Other unspecified types of livestock have the highest average ownership at 30.5 per respondent, possibly reflecting collective or group management practices. Ducks in the "Others"

category show an average ownership of 5.5 per respondent, indicating moderate reliance on this type. Pigs (Others/Pork) are owned at an average of 5 per respondent, suggesting their role in subsistence and occasional commercial activities. Bulls have a lower average ownership of 1.6, emphasizing their specialized use, likely for plowing or breeding purposes. These results highlight the diverse roles of livestock in household economies and the differing scales of their management.

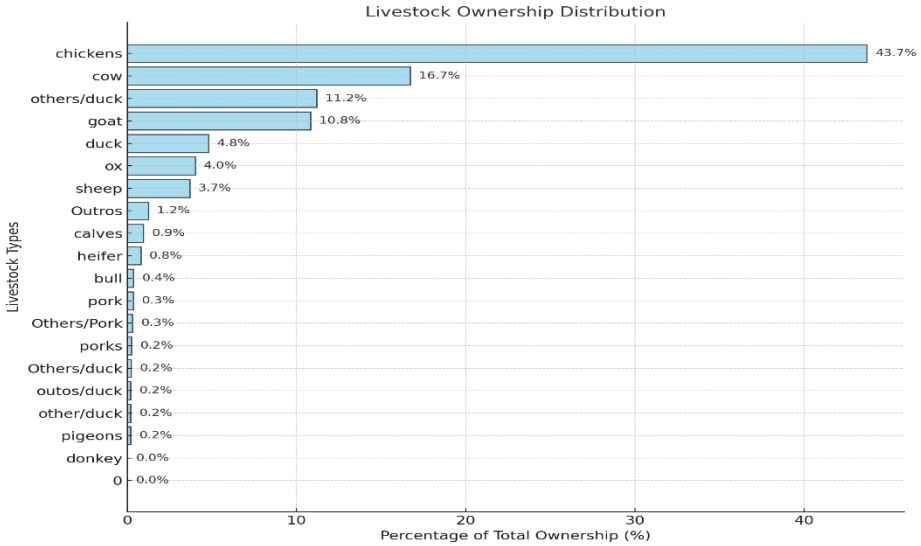

Figure 4.14. Livestock ownership distribution

4.4. Cooperative Membership and Access to Extension Services

The analysis shows that 43.22% of respondents are members of an organization or cooperative, while the majority (56.78%) do not participate in such groups. Among members, grower organizations or associations are the most popular, involving 31.12% of respondents, indicating their critical role in supporting agricultural activities and market access. Agricultural cooperatives account for 7.91% of membership, reflecting their importance in collective farming and resource sharing. Other organizations, including suppliers and traders associations, represent smaller shares of membership, pointing to their specialized roles in the value chain. These findings highlight the potential for expanding cooperative and organizational participation to enhance agricultural support and collaboration.

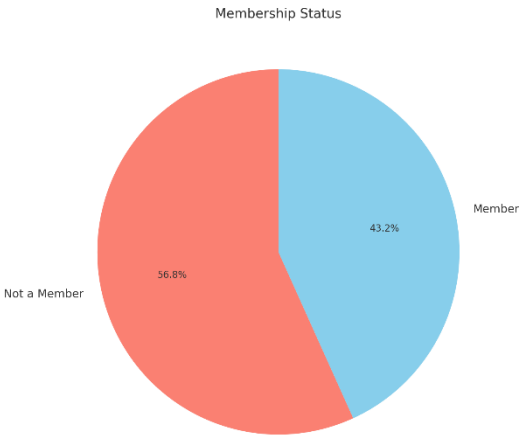

Figure 4. 15. Cooperatives membership status

The analysis reveals that 57.14% of respondents have access to extension services, while 42.86% lack such access, highlighting a considerable gap in agricultural support outreach. Among those who interact with extension service agents, 44.64% report never receiving a visit, while 20.41% experience rare visits (once every three months), and 27.04% receive occasional visits (once or twice a month). Only 7.91% of respondents benefit from regular weekly visits, indicating limited frequency of interaction for most households. These findings underscore the need to improve both the coverage and intensity of extension services to better support farmers.

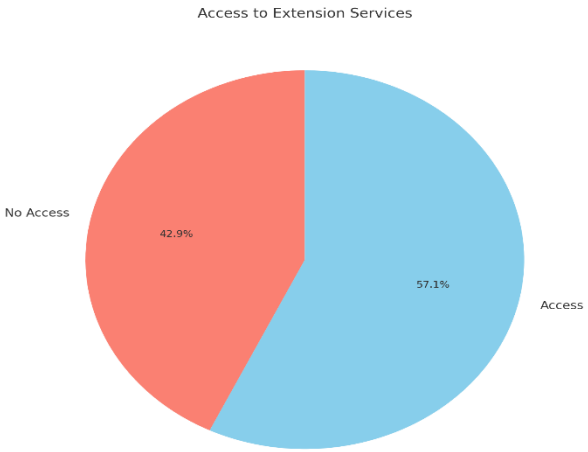

Figure 4.16. Extension services access status

The analysis indicates that technical support for production is the most frequently provided service, benefiting 34.95% of respondents, while other critical areas like pest and disease management (5.36%) and climate change adaptation (6.12%) are significantly underrepresented. Services for adopting new technologies (8.16%) and crop diversification (7.91%) are also limited, pointing to gaps in promoting innovation and sustainable practices. Market-related support, such as price information (2.55%) and input supply (1.02%), is rare, and nearly all respondents lack advice on farm credit or loans (99.49%). These findings highlight the narrow focus of extension services, emphasizing the need for more diverse and inclusive support to address the broader challenges faced by farmers.

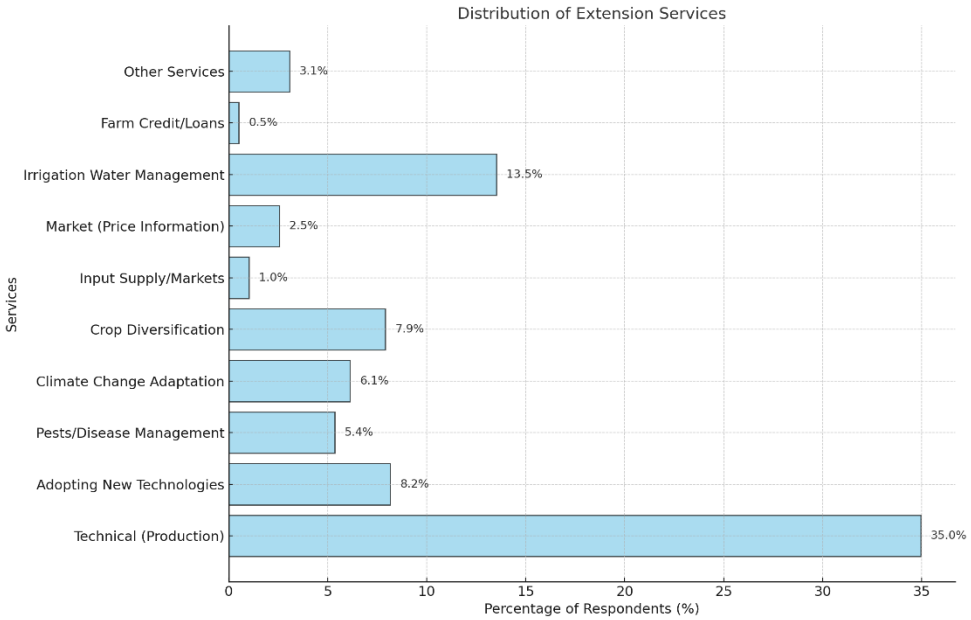

Figure 4.17. Distribution of extension services

4.5. Labor Involved in Farming Activities

The analysis shows that 67.33% of households involve their own members as hired labor on their farms, reflecting the critical role of household labor in farming activities. On average, 2.95 household members are hired per farm, contributing 13.74 days and 4.98 hours per day, with significant variability reflecting differences in farm size and labor intensity. Household members earn an average wage of 95.80 units, with wages ranging up to 1,200, indicating variations in compensation practices within families. These findings emphasize the importance of internal labor dynamics in supporting household farming operations.

The analysis shows that 47.01% of households have members engaged in off-farm work, highlighting its role as a supplementary livelihood strategy, while 52.99% rely solely on farm-based activities. On average, households have 0.39 members working full-time off-farm, with a maximum of 4, and 0.32 members in part-time off-farm work, with a maximum of 2. These findings suggest that while off-farm employment contributes to household income diversification, its extent is limited for most households, reflecting continued reliance on agricultural activities.

The analysis shows that households hire both male and female laborers from the market, with an average of 0.84 male laborers and 1.17 female laborers per household. Female laborers work slightly longer, averaging 9.99 days compared to 7.41 days for males, but wages are similar, with males earning an average of 22.26 units and females 21.74 units. The maximum wages for both genders reach 5,000, highlighting significant variability in payment practices. These findings suggest a balanced reliance on male and female labor, with women contributing more workdays but earning comparable wages, reflecting some degree of equity in labor practices.

Figure 4.18. Labor hired from the market distribution

4.6. Natural Disasters, Soil Salinity and Coping Strategies

The data highlights that the most frequently experienced shocks include crop pests and diseases (203 respondents), increased disease levels (182 respondents), and floods (111 respondents), posing significant risks to livelihoods. Moderate impacts were observed from extreme weather conditions (76 respondents) and unusual increases in food prices (139 respondents). Less common shocks included natural disasters like earthquakes (2 respondents) and other unspecified events (1 respondent). High-severity events such as loss of house or assets (100 respondents) and insecurity or violence (60 respondents) also affected a notable portion of households, emphasizing the vulnerability of respondents to diverse shocks.

The data reveals that the majority of disasters experienced by households are classified as low severity, comprising 90.3% of all incidents. Common low-severity events include crop pests and diseases, extreme weather conditions, and floods. Medium-severity incidents represent 16.8% of the total, with crop pests and diseases, unusual increases in food prices, and loss of houses or assets being the most frequently reported. High-severity shocks, though less common at 13%, highlight significant vulnerabilities, particularly to floods, crop pests, and diseases, and unusual decreases in food availability. This distribution underscores that while most disasters have a manageable impact, certain high-severity shocks pose critical challenges to household resilience and food security.

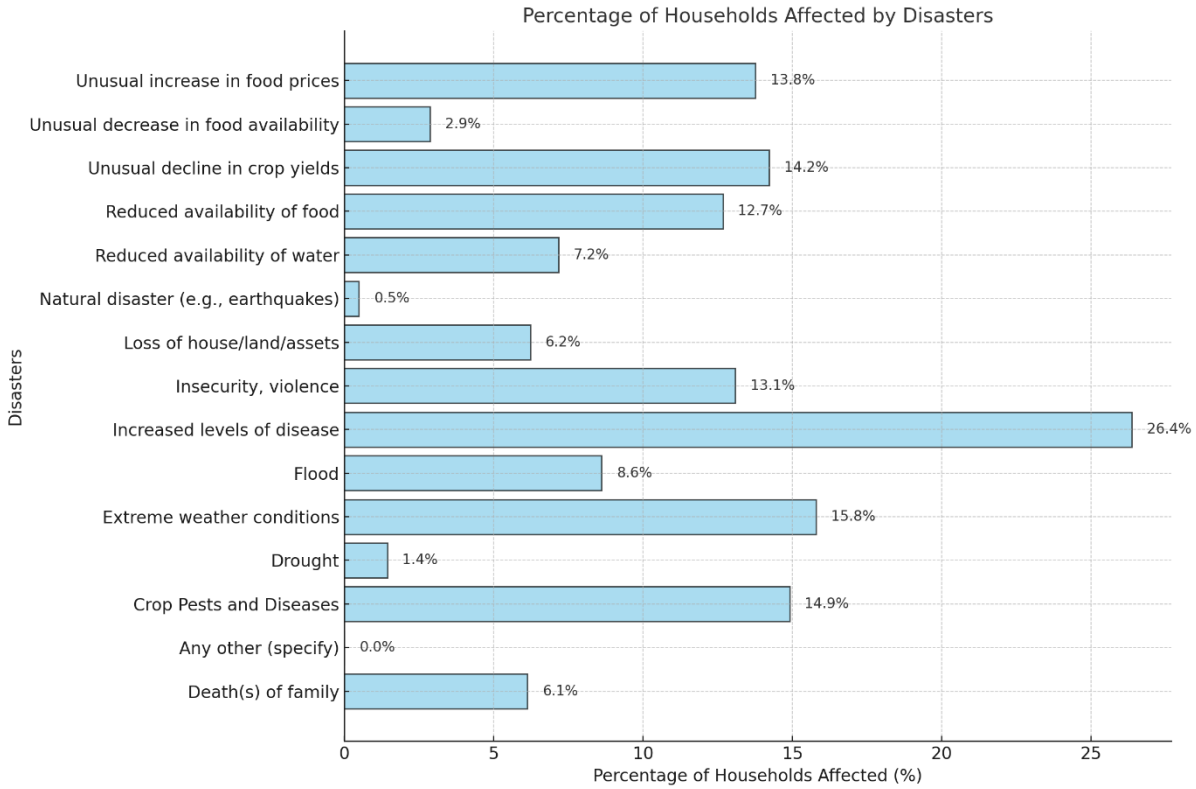

Figure 4. 19. Household rates affected by disasters

The data reveals that salinity is perceived as a common problem in the surveyed areas, with 97.21% of respondents reporting it as an issue in their village or district. Additionally, 82.07% of respondents believe their land is directly affected by salinity, indicating a widespread impact on agricultural land and potential challenges for farming practices in the region.

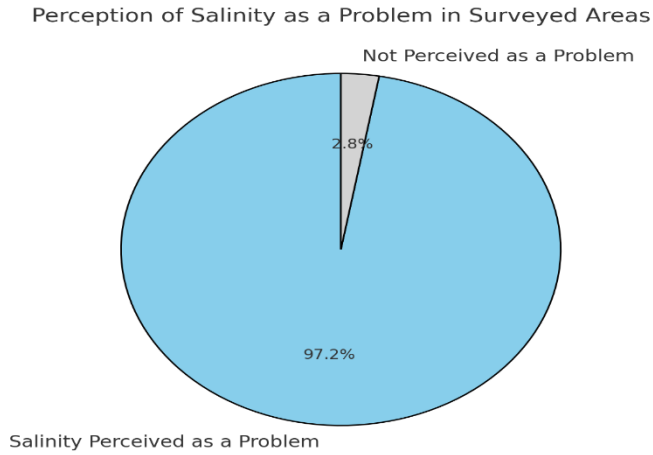

Figure 4.20. Salinity is perceived as a problem

The results indicate that training in salinity management is virtually non-existent among respondents, with only 1.59% having received such training. None of the respondents reported receiving training from research centers, while a mere 0.40% received training from either government or NGOs, and no one reported training from other sources. This highlights a critical gap in knowledge dissemination

and support for managing salinity, underscoring the need for greater investment in training programs and outreach by relevant institutions.

The analysis reveals a severe lack of training content on critical salinity management topics. Only 0.40% of respondents (1 individual) reported receiving information on reclamation methods, alternative crops for salt-affected soils, or improved irrigation methods, while 99.60% (250 individuals) did not receive such training. Additionally, no respondents reported receiving any other relevant information. These results underscore significant gaps in the dissemination of essential knowledge, emphasizing the need for more comprehensive and inclusive training programs to address salinity management effectively. The results reveal that none of the respondents have used the information obtained from training to reduce salinization on their farmland. Barriers to application were minimal, with only 0.40% citing the inaccessibility or irrelevance of the methods, and another 0.40% reporting lack of interest. A slightly higher percentage (4.78%) mentioned other unspecified reasons for not applying the techniques. These findings highlight a critical disconnect between training programs and their practical application, suggesting the need for more accessible, relevant, and engaging training to encourage the adoption of salinity management practices.

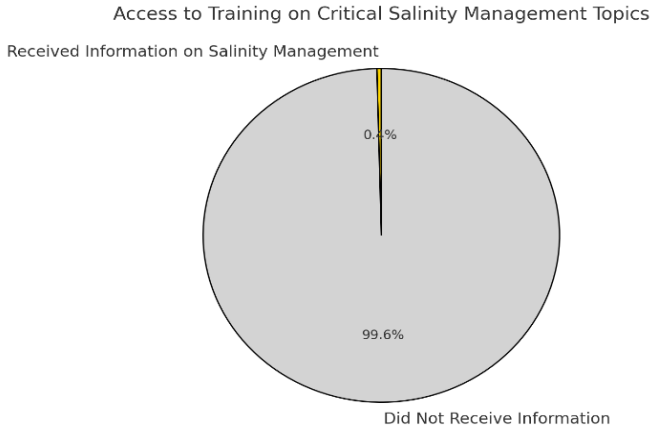

Figure 4.21. Training received on soil salinity

The results show that the most commonly recognized indicator of salinity problems is the presence of a white crust, identified by 68.53% of respondents. Other indicators are less commonly recognized, with 19.92% associating salinity with dark brown soil coloration, 17.53% citing low water infiltration, and only 9.16% identifying soil compactness as a sign. These findings highlight a strong reliance on visible indicators like white crust while underscoring the need for greater awareness of less obvious signs of salinity, such as compactness and water infiltration issues.

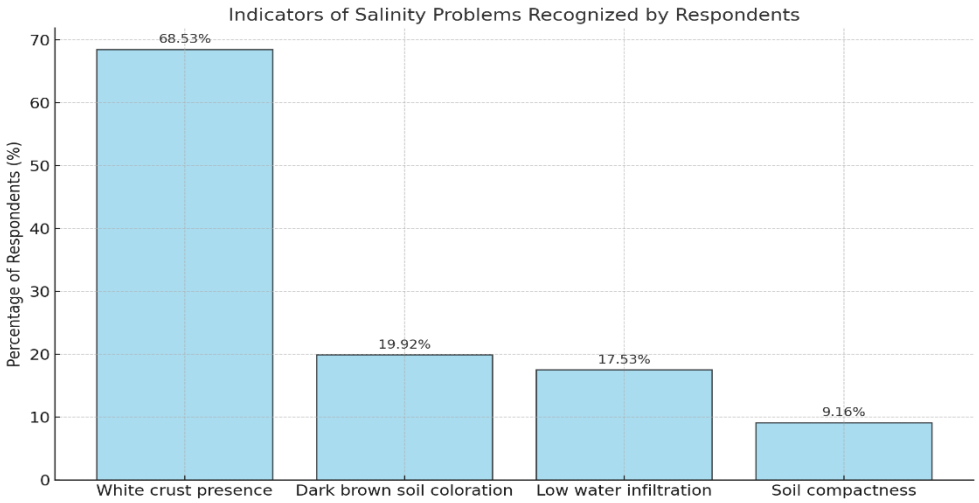

Figure 4. 22. Indicators of problems recognized by respondents

The analysis reveals that salinity is predominantly associated with irrigated land, as identified by 84.86% of respondents. In contrast, only 14.74% of respondents attribute salinity to rainfed land, and a negligible 0.40% report salinity as equally common in both land types. These results suggest that salinity issues are significantly more prevalent in irrigated areas, likely due to practices such as over-irrigation or poor drainage. Most respondents (72.11%) acknowledge the medium to high severity of salinity's impact on crop yields, reflecting significant but varied challenges. These findings highlight the importance of targeted interventions to mitigate salinity's effects, particularly for those experiencing severe impacts.

The data reveals that most respondents (57.77%) experience moderate to high yield losses due to salinity, with 33.33% reporting low or negligible impacts. These findings underscore the varied severity of salinity's effects and the need for tailored interventions to minimize productivity losses. While rice is overwhelmingly recognized for its salinity tolerance, a smaller proportion of respondents consider other crops like maize, onion, and garlic viable options. Notably, 41.43% of respondents did not identify any crop, and 3.59% indicated uncertainty, suggesting gaps in knowledge or experience regarding salinity-resistant crops.

The analysis indicates that the most commonly cited cause of salinity is the lack of drainage systems, identified by 33.85% (88 respondents), highlighting poor water management as a critical issue. Improper irrigation practices were the second most frequent cause, mentioned by 10% (26 respondents), followed by parent material or natural soil conditions, cited by 31.25% (80 respondents). Climatic conditions (4.62%, 12 respondents) and irrigation methods (5.38%, 14 respondents) were less frequently reported, while issues like land leveling problems (2.72%, 7 respondents) and irrigation water quality (0.39%, 1 respondent) were minimally recognized. These findings underscore the predominance of water management challenges as key contributors to salinity, alongside natural and climatic factors, emphasizing the need for targeted interventions to mitigate these causes.

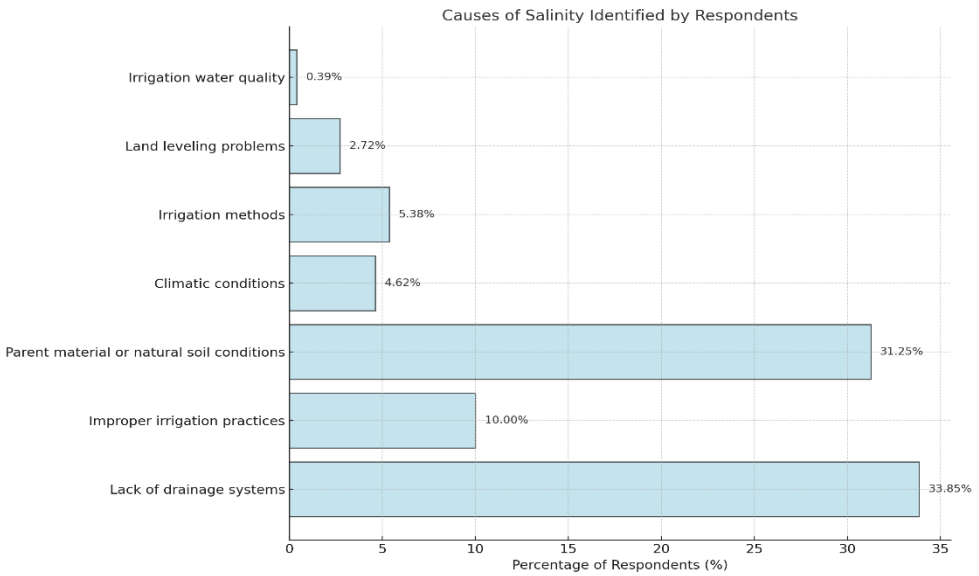

Figure 4.23. Causes of salinity identified by respondents

The analysis shows that the most proposed interventions to combat salinity include drainage or leaching (4.98%), the use of green manure, compost, or biochar (2.42%), and crop rotation (2.27%). Less common strategies include better irrigation methods (0.77%) and crop diversification (0.34%). Only 7.06% of respondents found these interventions effective, while 92.12% did not implement or achieve success with these methods. These findings highlight respondents' limited adoption and effectiveness of salinity management strategies.

4.7. Gender and Women's Involvement in Agricultural Activities

The analysis of gender roles in decision-making shows that women play a significant role in both household and farming activities. Women are involved in 96.41% of household decisions, while only 3.59% of respondents reported their non-participation. Similarly, 96.02% of respondents indicated women’s involvement in farming decisions, with just 3.98% reporting otherwise. These findings underscore the pivotal role women play in both domestic and agricultural decision-making, highlighting the need to integrate gender-sensitive approaches into policy and program interventions to support and enhance their contributions.

The analysis highlights the significant participation of women in key household and farm-related decision-making areas. Women play a leading role in selecting crops to grow (41.43%), hiring labor (39.04%), and purchasing agricultural tools and production inputs (35.46% and 39.04%, respectively). Joint decision-making is also common, particularly in spending income from farming (39.44%) and selling products (30.68%). Men are more involved in buying or renting land (37.85%) and share responsibilities in purchasing tools and machinery (35.06%). These findings emphasize the pivotal role of women in managing both agricultural and financial decisions, often surpassing or equaling the contributions of men in these domains.

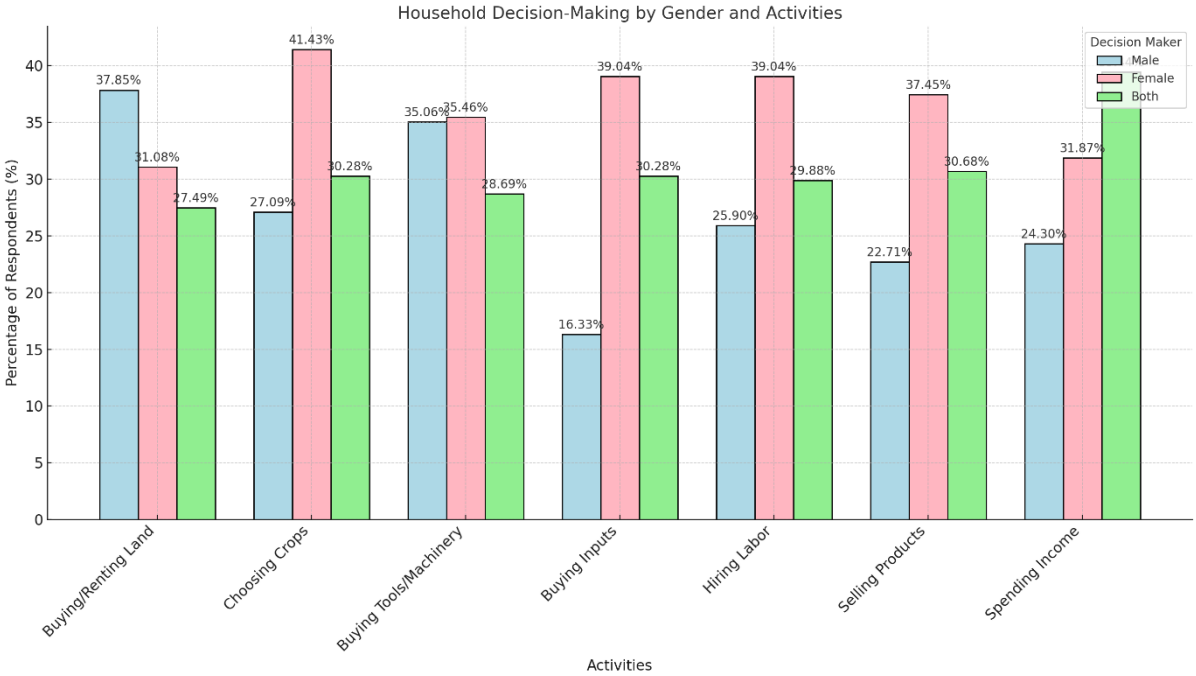

Figure 4.24. Household decision-making by gender and activities

The analysis reveals that women are heavily involved in agricultural activities, with weeding (36.61%), sowing (17.92%), and harvesting (15.22%) being the most common tasks. These activities primarily occur in the crop farming sector (88.25%), with limited engagement in livestock (4.24%) and non-farm activities (5.97%). Regarding their level of involvement, 52.99% of activities are exclusively performed by women, while 40.46% are shared between men and women, and only 5.20% are rarely done by women, predominantly involving men. These findings highlight women's significant contribution to crop farming and the shared responsibilities in some activities.

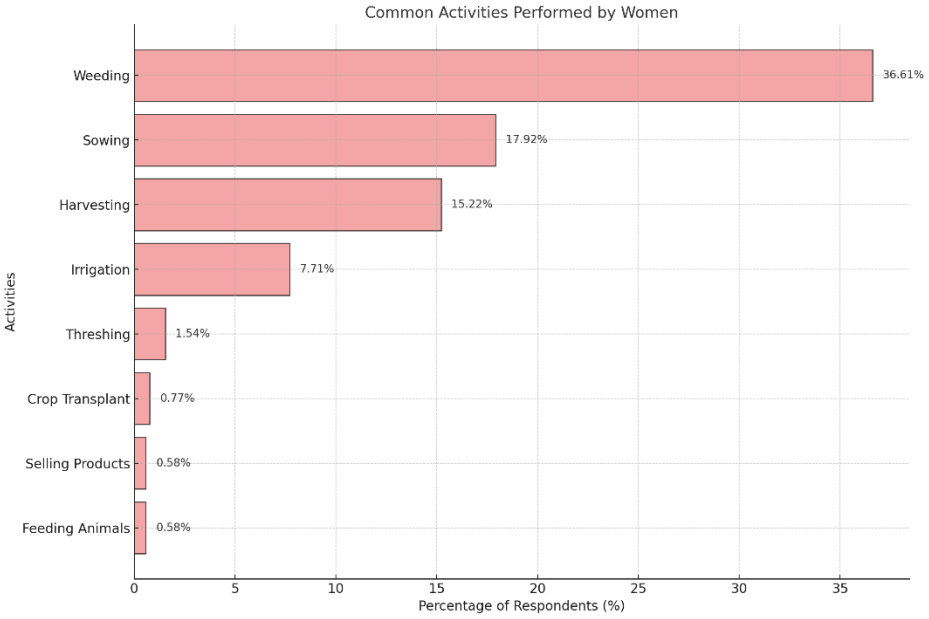

Figure 4.25. Commun activities performed by women

4.8. Food Security and Nutrition

The household food security status analysis reveals that a majority of households (67.33%) experienced occasional food shortages over the past year, indicating periodic challenges in meeting their food needs. Additionally, 27.09% of households reported having enough food to meet their needs without any surplus, reflecting a stable but limited food situation. A smaller proportion (2.39%) faced food shortages throughout the year, highlighting severe food insecurity for these households. Only 0.40% of respondents reported a surplus of food, suggesting that surplus production is rare in the surveyed population. These results emphasize the need for interventions to address periodic food shortages and improve food security resilience.

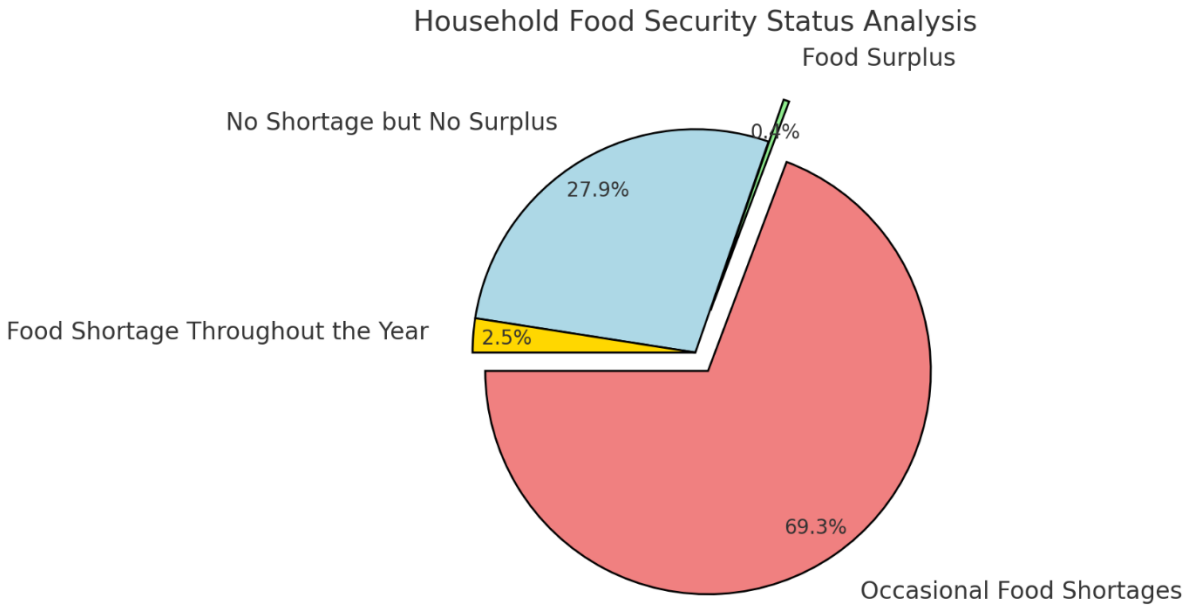

Figure 4.26. Household food security status

The analysis reveals that households primarily consume staple foods such as maize, vegetables, and beans, with limited diversity in other food groups like dairy and grains. Food is sourced predominantly through own production (50.44%) and market purchases (32.43%), reflecting a reliance on both subsistence farming and market access. Gifts, charity (1.04%), and food aid (0.03%) contribute minimally to the food supply. The average frequency of food consumption is low, at 1.62 days per week, with significant variation, suggesting potential food insecurity and inconsistent access to diverse food items. These findings highlight the need for interventions to enhance dietary diversity, improve food production systems, and ensure consistent food availability.

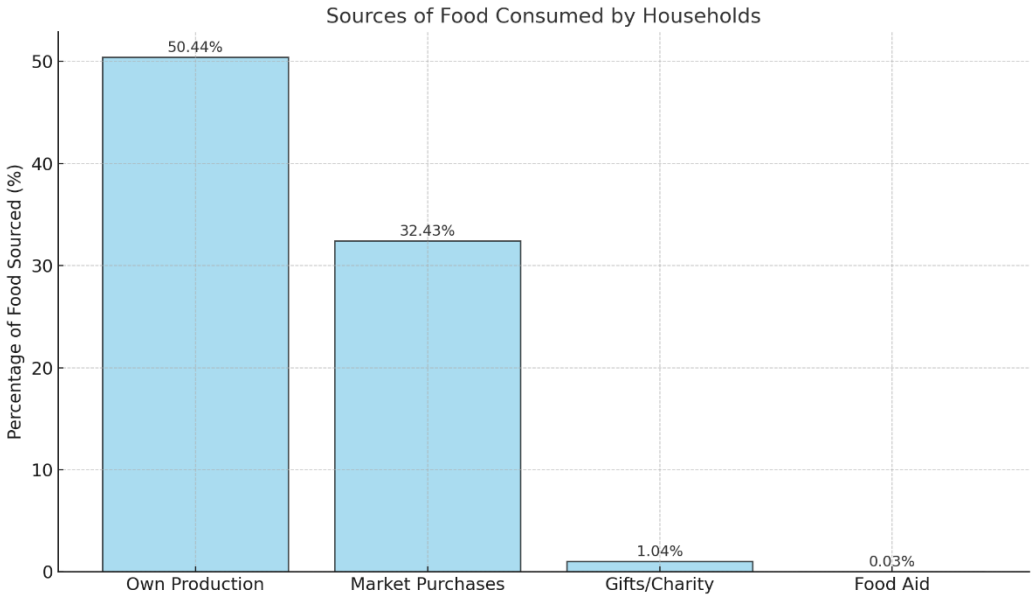

Figure 4.27. Sources of food consumed by the respondents

4.9. Access to infrastructure and facilities services

The analysis shows that hospitals (28.65%, 210 accesses), schools (25.78%, 189 accesses), and markets (18.69%, 137 accesses) are the most frequently accessed infrastructure types, underscoring their essential role in the community. Secondary schools (3.68%, 27 accesses), stores (4.91%, 36 accesses), and water fountains (2.05%, 15 accesses) are moderately utilized. In contrast, infrastructure like fish farms (1.64%, 12 accesses), mills (1.09%, 8 accesses), and police stations (0.68%, 5 accesses) are accessed less frequently, indicating potential gaps in availability or lower demand. Most infrastructure is community-owned, with hospitals (208 owned by the community) and schools (188 owned) being notable examples. These findings highlight the need to enhance access to and utilization of underused infrastructure to meet diverse community needs.

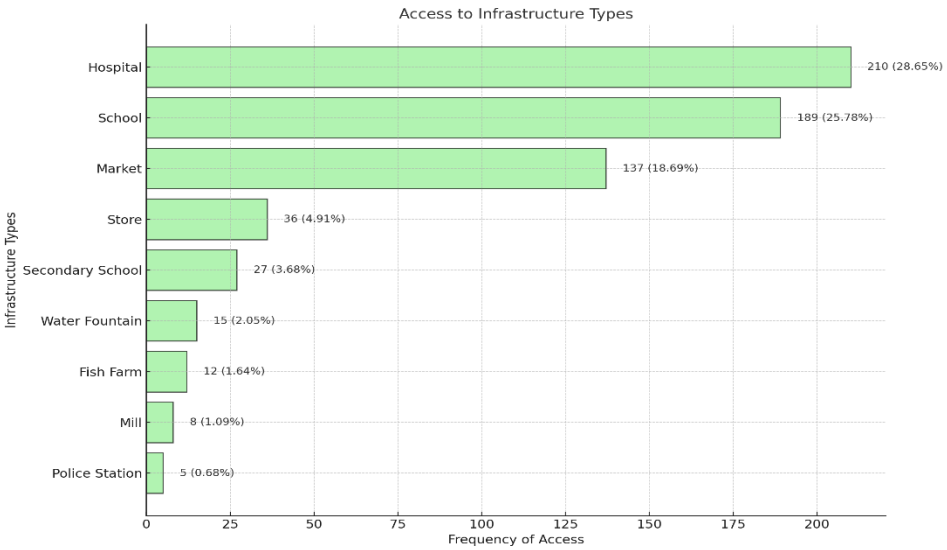

Figure 4.28. Access to infrastructure types

Concerning access to facilities, the analysis reveals that health facilities (78.40%), schools/colleges (79.09%), and transport services (78.74%) are the most accessed facilities, primarily through public sources. Electricity access is moderate at 68.29%, while clean drinking water is accessed by 59.93%, indicating the need for improvement. Micro-finance and credit facilities are severely limited, with only 5.57% of respondents having access. Private sources contribute minimally to most facilities, except for transport services (31% privately accessed). These findings highlight a strong reliance on public infrastructure for essential services and the need to enhance private-sector involvement, particularly in areas like clean drinking water and micro-finance.

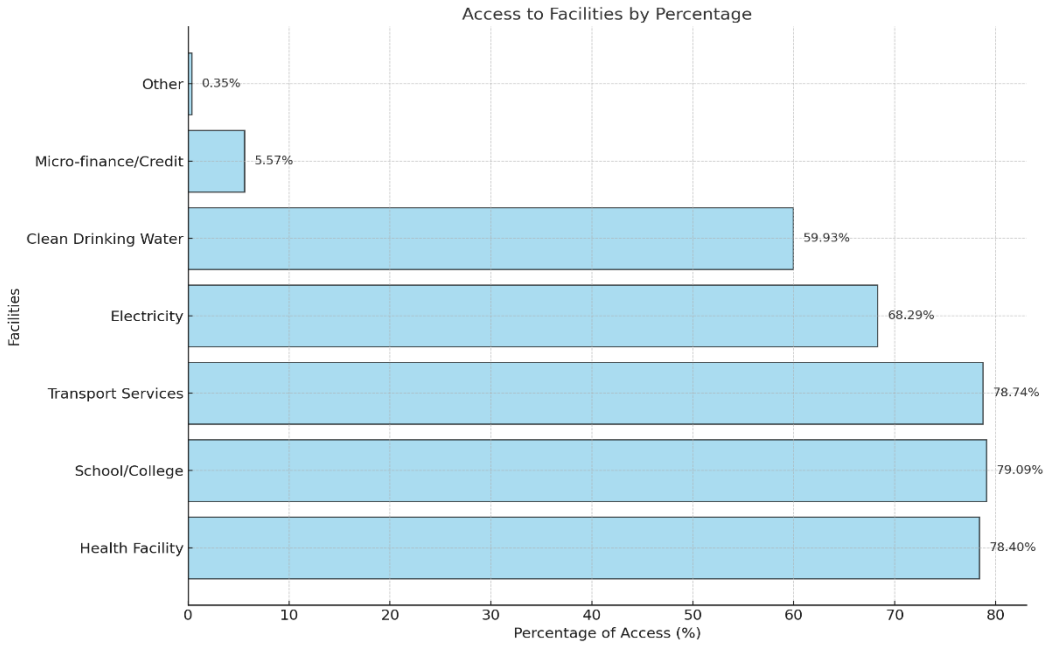

Figure 4. 29. Access to facilities

The majority of respondents (89.24%) have access to markets, primarily relying on local markets (81.27%), with minimal engagement in big or commercial markets. While 74.50% have access to market information, 25.50% remain uninformed, indicating a need for better communication and resource distribution.

The analysis shows that nearly all respondents (99.60%) have access to roads, with unpaved roads being universally accessible. However, access to paved roads is limited to 14.34% of respondents. Households are, on average, 6.03 km away from unpaved roads and much closer to paved roads (0.02 km), highways (0.19 km), and tertiary roads (0.40 km), though distances vary significantly. Similarly, communities are closer to paved roads (1.53 km on average) and tertiary roads (0.37 km). These findings highlight strong access to unpaved roads but limited and uneven access to paved roads, indicating a need for targeted infrastructure development to improve connectivity.

Conclusion for Mozambique: The baseline survey conducted in Mozambique engaged 251 respondents from the southern region, specifically the Gaza Province, with data collected from four villages: Conhane (27.89%), Kotwane (23.90%), Massavasse (22.31%), and Nwachicoluane (25.90%). The sample comprised 52.19% female and 47.81% male respondents, with an average age of 51.9

years, ranging from 18 to 88 years. These demographics provide a comprehensive foundation for understanding the socio-economic and agricultural conditions in the region.

The findings reveal critical areas of strength and opportunities for improvement as we prepare to introduce agricultural development initiatives aimed at addressing food security, and soil salinity, and improving productivity, resilience, and livelihoods. Farming is the primary livelihood for the majority of households, with 89.52% relying on irrigated land. However, productivity disparities between rainfed and irrigated lands and limited adoption of advanced irrigation techniques highlight areas for intervention. Crops like garlic and okra demonstrate strong commercial potential, while others show opportunities for yield improvement through targeted support.

Infrastructure access shows mixed outcomes. While access to roads, markets, schools, and health facilities is relatively high, significant gaps remain in clean drinking water and microfinance services. Limited access to paved roads and underdeveloped irrigation infrastructure underlines the need for investment in rural connectivity and sustainable water management systems.

Social dynamics highlight gender inclusivity in decision-making, with women playing critical roles in household and farming decisions. However, disparities in education, asset ownership, and access to resources emphasize the need for targeted gender-sensitive interventions to ensure equitable participation and empowerment. Cooperative membership and access to extension services remain limited, with only 57.14% of respondents having interacted with extension agents, reflecting opportunities for capacity building and improved outreach.

Food security remains a pressing concern, with 67.33% of households experiencing occasional food shortages and 2.39% facing chronic shortages. Limited dietary diversity and reliance on staple foods underscore the need for interventions to enhance nutrition, improve food availability, and build resilience against food insecurity.

This baseline analysis underscores the importance of targeted, inclusive interventions to address identified gaps and build on existing strengths. By introducing climate-smart technologies, strengthening infrastructure, and promoting gender equity, the project aims to enhance agricultural productivity, mitigate the impacts of climate change, and improve food security and livelihoods for farmers in Mozambique.