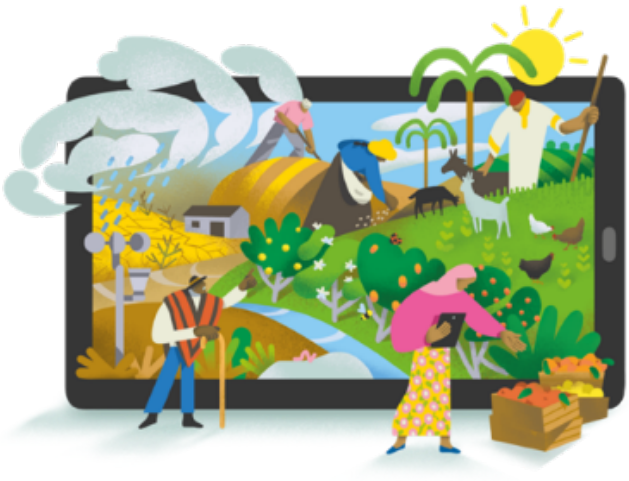
Food and Agriculture Organization of the United Nations



JOWHAR OFF-STREAM STORAGE PROGRAMME (JOSP) BASELINE REPORT

using the SHARP+ methodology

In Somalia, in the Districts of Balcad and Jowhar

Rome, October 2024

Within the framework of the Projects « RESTORE: Restoring the Riverine Eco-Systems for Climate Adaptation» (OSRO/SOM/078/UK) « TRANSFORM: unlocking transformative water solutions for climate resilient livelihoods in southern Somalia » (GCF/SOM/074/USAID) « MAAREYANTA: JOSP Maareynta Isbeddelka Cimilada" JOSP Governance for adaptation to climate change (part of the Jowhar Offstream Storage Programme - JOSP) » (UNJP/SOM/087/UNJP) and « Youth Act PBF: Youth in Action: Empowering Youth to contribute to peaceful transition in Jowhar (YOU-ACT) » (UNJP/SOM (UNJP/SOM /217/PBF)

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Executive summary

This report presents the key findings from the baseline study conducted in Jowhar and Balcad districts as part of the Jowhar Off-stream Storage Program (JOSP). The program is currently supported by four projects namely RESTORE, TRANSFORM, MAAREYANTA, and Youth-Act PBF. The study aimed to produce pre-project or baseline resilience of agroecosystems and identify areas for improvement to enhance smallholder farmers' resilience to climate shocks. Adaptations were made to the questionnaire to capture impact and outcome indicators for all projects under study, providing a baseline for resilience levels across different modules.

The SHARP+ analysis revealed compound resilience scores of 7.4/20 for the households from the RESTORE project zone and 7.2/20 for the ones in the TRANSFORM project zone, both considered medium but close to the lower resilience threshold. The compare group obtain a compound resilience score of 7.0/20, which is considered a low resilience score. Out of twenty modules, eleven and twelve modules with low resilience levels were identified, for RESTORE and TRANSFORM, respectively, indicating the need for significant intervention in these areas. Under MARREYANTA and Youth-Act PBF projects the baseline study covers the aspects of resource-based conflict management, community structure, and management of natural resources.

A major finding is the limited agricultural diversity among smallholder farmers, with 92% of farmers engaged in crop production and only 28.4% involved in livestock farming. Most households practice a single agricultural activity, making them highly vulnerable to shocks. Other challenges include low agro-biodiversity, limited access to quality seeds, poor post-harvest management, and minimal tree cover, all of which negatively affect soil quality, water retention, and overall sustainability.

The study also found that 83.7% of households do not implement land management practices to improve soil quality, and many smallholders are severely affected by climatic shocks, particularly floods and droughts, which have led to significant crop losses. Additionally, 80.2% of households rely on a single income source—mainly crop production—while limited market access and the absence of cooperative structures contribute to unstable and unreliable incomes.

Furthermore, access to essential agricultural information, including weather forecasts and climate adaptation practices, is limited, with only a small percentage of households having access to relevant resources. This lack of information hampers farmers' ability to prepare for and respond to climate-related challenges.

The findings underscore the need for interventions in agricultural diversity, market access, land management, and strengthening community and government structures to strengthen resilience among smallholder farmers in the JOSP program areas.

1. Introduction, methodology and sample

1.1 Projects background

Climate volatility is the new normal for Somalia. Reliance on regular rainfall seasons is no longer viable for agricultural production. Effective and sustainable water management and governance are imperative to reduce the impact of climate hazards, decrease humanitarian caseloads and sustainably boost food security towards enhanced social and economic development and stability. FAO Somalia Water and Land Information Analysis Unit (SWALIM) reports show an emerging pattern of increasing climate volatility in Somalia, with the country experiencing either drought or flood, or often both, in 19 of the last 20 years; with the last 10 years showing a marked rise in the frequency of such events.

While conflict in Somalia is largely the result of the presence of armed groups, when surveying displaced populations, conflict and insecurity in the origin areas of displacement were caused by multiple factors, with 79.3% attributed to conflict over natural resources such as land, water and/or pasture. Humanitarian need in the country is widespread, in 2022, USD 1.5 billion was injected into the country in humanitarian aid from the United States Government alone. In 2023, the humanitarian caseload grew, with the country's Humanitarian Response Plan appealing for USD 2.6 billion to help the 8.25 million people in need to meet their basic survival needs. The 2024 Humanitarian Needs and Response Plan showed a 17% reduction in people in need to 6.9 million due to the end of the drought, yet this number remains well above the five-year average.

Over the following decades, the scale of the irrigation sector grew, and by the end of the 1980s some 60,000 ha were developed for pumped and gravity-fed irrigation—half in the Jowhar District and half in the Balcad District. This early irrigation development was dependent on three main factors: i) a reliable supply of water; ii) protection of the irrigable land from flooding; and iii) coordinated operation and maintenance of the water management system.

The FAO along with other UN partners including IOM, UNEP, UN Habitat and UNIDO, and INGO World Vision International (WVI) are working on the Jowhar Offstream Storage Programme (JOSP). Full rehabilitation of both the JOSP reservoir and canal embankments in Jowhar is expected to substantially reduce the impact of major flood events, such as that seen in May 2024 in Belet Weyne. JOSP is a multi-donor and multi-partner program that works closely with government line departments. The RESTORE, TRANSFORM, MAAREYANTA, and Youth-Act PBF projects are major initiatives that contribute to rehabilitation, capacity building, peacebuilding and governance components of JOSP.

1.1.1. RESTORE

The RESTORE project aims to rehabilitate critical water management infrastructure, increase biodiversity, promote sustainable agricultural and water management practices, and build climate resilience in Somalia's Shabelle region. Initially, the project will directly target the Jowhar and Balcad districts in the Middle Shabelle region, Hirshabelle State. Once the system is fully restored, there will be direct benefits in terms of water availability and irrigation for the Afgoye, Merka and, Qoryoley districts in Lower Shabelle region of Southwest State, which will benefit around 1.5 million individual beneficiaries. The overall objective of the RESTORE project is to create a conducive environment for natural and water resources management to; (i) reduce poverty, (ii) ensure household food security, (iii) make sustainable use of natural and water resources, and (iv) increase the resilience of at-risk communities to the impacts of climate change. The project focuses on four key outcomes:

- Outcome 1: Ecosystem and Conflict-Sensitive Approaches to Natural Resource Management and Infrastructure Rehabilitation.
- Outcome 2: Climate Adaptive Agro-Ecology Practices and Infrastructure.
- Outcome 3: Enhanced Institutional and Community-Level Climate Disaster Risk Profiling and Management.
- Outcome 4: Enhanced Institutional Capacity for Responsible Governance of Water and Land Resources.

1.1.2. TRANSFORM

The TRANSFORM project is expected to directly benefit approximately 7,000 smallholder farmer households and indirectly impact 1.5 million people through restored irrigation and flood control infrastructure. The project aims to reduce reliance on humanitarian aid by enhancing food security, supporting sustainable agriculture, and promoting social stability through equitable water management. It will also enhance climate-resilient livelihoods and food security in Southern Somalia through sustainable water management solutions. USAID's infrastructure investment into the project has potential for much greater reach as part of the Programme Approach when combined with other already committed funds.

The catchment population across the four districts that will benefit from the fully rehabilitated infrastructure (Jowhar, Afgoye, Merka, and Balcad) is estimated at 1.5 million people. To reap the full benefit of this catchment population requires additional resources (full programme implementation), the Programme currently stands at 77% in terms of funding committed as of year 1, with more expected to be mobilised during the project duration. Project has two major outcomes as given under:

- Outcome 1: Sustainable Access to Water for Irrigation Restored.
- Outcome 2: Enhanced Climate Resilient Livelihoods for Vulnerable Populations vulnerable to climate-related shocks (flood and drought).

Under Outcome 1, Rehabilitation of the Sabuun barrage, flood risk reduction in Middle Shabelle (embankments, drainage, and irrigation chambers), rehabilitation of the Supply and Outlet canals, and Jowhar Reservoir rehabilitation.

Under Outcome 2, the project will work closely with the lead ministry (MoAI), forming 20 Farmer Cooperatives supporting some 7,000 HHs with Climate Smart Agriculture (CSA) inputs and providing training to ministry staff on CSA practices. Also under Outcome 2, the project will provide institutional capacity development support to Federal and State level ministry staff and initiate the set-up of project (and programme) governance mechanisms at Federal, State and Local level. Further support to robust, over-arching coordination structures is foreseen under complementary funding from other resource partners.

1.1.3. Youth PBF

The Youth Act PBF project will contribute to realization of inclusive politics and reconciliation as aligned to relevant policies, including the National Reconciliation Framework, National Stabilization Strategy, and the National Durable Solutions Strategy (2020- 2024). The project advances Somali Women's Charter priorities that envision women's full participation in political spaces and full enjoyment of their socio-economic rights as cornerstones for equality and sustainable development.

This project will contribute to multi-stakeholder efforts to advance rural development within Hirshabelle State, and efforts to reclaim agricultural production in Jowhar as one of the sorghum breadbasket zones in the country. This will be done through collaborative efforts by both UN agencies and Civil Society Organizations (CSOs) as planned in the multi-donor funded Jowhar Off-Stream Storage Programme. This project contributes significantly to the social cohesion component

of the JOSP program. The project will be implemented in collaboration with IOM, government, and local partners.

The project proposes to target Jowhar district and more specifically land between the town and water reservoir (South of Jowhar town). This area is government owned and used to be part of a sugar state but has not been cultivated for a long time. Targeting this area would align with the government and other actors' priorities including planned largescale investment in climate proof infrastructure under JOSP program.

The project will target young men and women from both host communities and IDP households. It is estimated that up to 196,000 people (including 76,960 IDPs) will benefit from this project. Through the establishment of the Youth Advisory Council, the project will target a core group of 150 youths through key discussions and engage indirectly with more through schools and community groups.

- Outcome 1: Inter-clan relations improved, and conflicts mitigated through increased youth engagement in conflict management and community planning.
- Outcome 2: Communities, young men and women are better able to respond to resource-based conflicts and climate- related shocks.

1.1.4. MAAREYANTA

The "JOSP Maareynta Isbeddelka Cimilada" (JOSP Governance for Adaptation to Climate Change) project, is a joint project within the broader framework of the Jowhar Offstream Storage Programme (JOSP), led by the Ministry of Agriculture and Irrigation (MoAI) and co-led by the Ministry of Energy and Water Resources (MoEWR) in collaboration with the Ministry of Environment and Climate Change (MoECC) as well as the Durable Solutions Secretariat within the Ministry of Planning (MoPIED). The programme is implemented by a consortium of United Nations agencies with substantial experience and established capacities in Somalia. These agencies include the Food and Agriculture Organization (FAO), the International Organization for Migration (IOM), the United Nations Human Settlements Programme (UN Habitat), the United Nations Environment Programme (UNEP) and the United Nations Industrial Development Organization (UNIDO).

The primary objective of this project is to establish robust, inclusive, and sustainable mechanisms for climate resilient infrastructure and associated water resource governance that can go hand-in-hand with other JOSP projects to support Government ownership and long-term sustainability. When rehabilitating critical infrastructure, restoring irrigation and productive capacity there is a risk of exacerbating existing marginalization and elite capture in relation to resource access and use. Project has following key five outcome level results to achieve.

- Outcome 1: Effective JOSP Water Governance Established and Operationalized in relation to JOSP infrastructure
- Outcome 2: Enhanced capacity of Public-Private partners for managing the irrigation scheme and Agro-Processing Park.
- Outcome 3: Strengthened Community Resilience and Governance through Nature-Based Durable Solutions and Conflict Management
- Outcome 4: Enhanced land governance and urban resilience through strategic planning, displacement solutions, and targeted capital investments.
- Outcome 5: Enhanced Environmental governance and Peacebuilding through integrating climate resilience and environmental peacebuilding strategies and effective community-based conflict resolution mechanisms.

1.2 SHARP+ survey background and objectives

The Self-evaluation and Holistic Assessment of climate Resilience of farmers and Pastoralists (SHARP+) tool was developed in 2014 in a collaborative manner by the Food and Agriculture Organization of the United Nations (FAO) and external partners.

The assessment methodology is based on a series of questions covering aspects on how rural households manage their farm systems, as well as the natural resources. It explores how farmers interact and are linked with their communities, which are the main sources of risks and vulnerabilities, how farmers cope with, adapt to and transform following shocks, among others.

SHARP+ is operationalized through a mobile phone-based application to allow for faster and more accurate data collection and entry processes. The qualitative and quantitative answers are transformed into numerical scores reflecting the resilience of rural-based households as well as the priority areas as considered by farmers. Monitoring changes in the SHARP+ scores at different points in time can be used to indicate whether household's resilience status is declining or improving.

The SHARP+ standard survey consists of four domains (social, economic, environmental and governance), enabling a holistic analysis of resilience. Each domain comprises several modules, being a series of questions covering a specific aspect of the household or farming system under study. The generic version of the SHARP+ survey consists of thirty-three modules, of which seventeen are mandatory for the assessment and sixteen optional. Optional modules are provided to allow users to customize their questionnaire, based on their context and the purpose of the project/programme. The SHARP+ survey was adapted to fit the context and objectives of the project in close collaboration with the project team in Somalia. As such, the core set of question-modules that composes the standard survey were used with three additional modules to capture relevant elements aligned to the project objectives. The Table 1 below details all the modules selected for this data collection and analysis.

Table 1 List of selected modules within the SHARP+ survey

Module
Social
HH characteristics
Agri-production activities
Land access
Access to information
Community cooperation
Group membership
Nutrition
Decision-making (Household)
Environmental
Crop production
Pest management practices
Animal production practices
Water access and management
Soil quality and land degradation
Land management practices
Trees
Shocks
Economic
Access to markets
Income, expenditures and savings
Governance
Government policies and programmes

1.3 Implementation of SHARP+, sample strategy and data collection

1.3.1 Implementation

The SHARP+ questionnaire was utilized as a baseline tool for the projects RESTORE, TRANSFORM, MAAREYANTA, and Youth Act PBF. The qualitative data were also collected using Key Informant Interviews (KIIs) and Focus Group Discussions (FGDs) with communities. To meet the project's needs, address the specific field context and impact and outcome indicators. The standard SHARP+ questionnaire was first adapted. After a thorough review, the most relevant modules were selected, with certain questions modified and others added, aiming to capture a comprehensive understanding of the farming system. Additionally, indicators for monitoring and evaluation (M&E), which could be collected at the household level, were incorporated. The SHARP+ tool is planned to be used two more times during the project: for a midterm assessment and an endline evaluation, both of which will contribute to the overall M&E framework.

To ensure effective field implementation and data quality, a virtual training of trainers (ToT) session was organized. The ToT was aimed at equipping project team in FAO Somalia, partners and an external service provider with the necessary skills to use the tool. These trainers, in turn, trained the enumerators. The enumerators underwent comprehensive in-person training, including both theoretical and practical sessions on the SHARP+ tool. The focus was on understanding the questionnaire, mastering its digital application, and facilitating fieldwork.

The quantitative data collection was conducted using the KoboCollect application on mobile devices, providing several benefits such as real-time data entry, reduced paperwork, and minimizing errors associated with manual data recording. The qualitative data collected using interviews and FGDs guides while document the key points of discussions. Data collection took place in September 2024, during which enumerators carried out field visits across the two projects districts. A structured schedule ensured thorough coverage of each cluster, with daily progress monitored by field supervisors who promptly addressed any challenges.

To maintain data quality, regular checks were performed to identify any outliers or inconsistencies in the data. These findings were then reviewed with the enumerators to discuss issues encountered and provide further guidance. This ongoing quality control helped to ensure the reliability and accuracy of the collected data.

1.3.2 Sampling Strategy

The baseline survey incorporated a multi-stage sampling design to achieve a representative sample and facilitate future attribution analysis. This approach balanced accuracy and logistical feasibility, enabling efficient data collection across the target districts. The multi-stage approach, started with the stratification of the target population by district. This ensured that different districts within the project area are represented in the sample, accounting for potential variations in socio-economic factors and vulnerabilities.

Within each district, the sample size was allocated using Probability Proportional to Size (PPS). This method assigned higher probabilities of selection to districts with larger populations, ensuring that the sample was proportionate to the size of each district. By doing so, the survey captured the diversity and characteristics of different districts in a representative manner.

Next, primary sampling units (PSUs) were selected through random sampling. Accessible villages within each target district were considered as the PSUs, and the random selection ensures that every village has an equal chance of being included in the survey. This approach guarantees unbiased representation across villages, allowing for a comprehensive understanding of the project area.

Within the selected villages, households were chosen as secondary sampling units (SSUs). Random sampling was again employed to select households, ensuring that each household within a chosen village has an equal probability of being included in the survey. This random selection method provided a fair and representative sample of households within the project area.

To facilitate future attribution analysis, the overall sample was divided into the beneficiary and the comparison groups. The beneficiary group consists of households residing in designated intervention villages, directly benefiting from the project interventions. The comparison group comprises households from neighbouring villages with similar socio-economic characteristics but located outside the intervention area. This group serves as a control to account for external factors that may influence outcomes, enabling a more accurate assessment of the project's impact. The baseline survey aimed to collect a total household sample size of 1610. This sample was divided in a proportion of 77.9% for beneficiaries and 22% for the comparison group. The comparison group villages and respondents were selected based on propensity score matching to identify the farmers with identical characteristics.

In cases where a specific project beneficiaries list was not available, the target group or beneficiary households was selected from the JOSP intervention settlement or villages, as indicated in the sample size distribution. These households represent the treatment group, while the remaining households formed the comparison group for the baseline survey.

1.4 Data entry and analysis

The data was collected using KoBo toolbox and downloaded directly from the programme in XLS and CSV format. Before proceeding with data analysis, comprehensive checks and cleaning procedures were performed on the dataset. Established on data collection the mixed methods of data analysis were used. The quantitative data from SHARP+ tool was analysed using tables, and graphs. The qualitative data is narrated with supporting citations relevant to the quantitative data under relevant indicators.

Data analysis was conducted to generate various results, including the calculation of average resilience scores per module, which were automatically computed using KoBo Toolbox. In addition, the respondents were categorized into low, medium, and high resilience levels. Descriptive analysis was also performed to provide context to the findings and identify the key factors contributing to low resilience scores. To ensure accuracy and deliver targeted insights, all findings were disaggregated by groups, allowing for tailored recommendations for each geographic unit. The analysis focused on three distinct groups: 1) households in the targeted landscapes of the Balcad district representing beneficiary households for the RESTORE project, 2) households in the targeted landscapes of the Jowhar district representing beneficiary households for the TRANSFORM and Youth-Act PBF projects, the households from both districts represents to MARREYANTA, and a compare group consisting of households from same river belt but outside the project landscapes.

The quantitative data analysis was conducted using an Excel-based dashboard, which automates the analysis for all questionnaire modules and resilience scores. This dashboard relies on multiple pivot tables linked to the database and enables users to select the desired level of disaggregation (e.g., district, group, gender, type of projects). Additionally, filters can be applied to select specific samples for analysis. The qualitative data were analyzed using simple thematic analysis by citing the exact narrations from KIIs and FGDs to elaborate the quantitative data.

1.5 Limitation of the survey

The SHARP+ tool is a long questionnaire which includes technical questions as well as more subjective questions seeking to capture respondents' perceptions. There is therefore always a risk that the questions will be interpreted by the enumerators in such a way that may cause bias into the data collection and analysis process.

The holistic nature of the SHARP+ questionnaire covers various aspects of both the farming system and household dynamics. Ideally, respondents should have a comprehensive understanding of the farming system and household operations to effectively address all queries. In reality, depending on the context, different people may be responsible for different activities within the household and farming system. As the survey is lengthy, it is often conducted with a single respondent who may have limited knowledge on some of the aspects covered by the survey. This can inadvertently oversimplify the studied household and farming system, potentially affecting the accuracy of the results and influencing resilience levels.

Given that the survey is conducted at the level of farm households, it presents challenges in emphasizing individual or household dynamics distinctly. To mitigate this limitation, various questions aim to encompass the distribution of roles pertaining to different activities within the household. The questions formulated to gather information on perceptions are directly linked to the respondent's individual perspectives. Consequently, they might not necessarily reflect information representative of the household.

Furthermore, key field-level limitations were reported by the enumerators during the data collection process, including:

- **Insecurity during data collection**: The HACOF (third-party monitoring) team worked closely with local leaders and security agencies to coordinate the safe movement of enumerators and supervisors.
- **Inaccessibility of some data collection sites due to flooding**: Flooding from the River Shabelle rendered certain sites unreachable. In response, alternative modes of transport, such as boats, which had not been budgeted for, had to be used. For completely inaccessible sites, HACOF coordinated with the FAO team to identify replacement locations.
- **Poor road infrastructure**: The poor condition of roads made it difficult for enumerators to access certain areas, causing delays in data collection. To meet targets, HACOF extended the data collection period, ensuring that each enumerator could fulfill their quotas.
- **Complexity of the data collection tool**: Given the low literacy levels within the target community, enumerators needed extra time to explain the tool's requirements, ensuring high-quality data collection.
- **Limited network access**: The lack of reliable network access made it difficult to upload data in real-time, which caused delays in reviewing the entries on the data platform.
- **Political interference**: The team faced challenges from local administrative authorities who demanded a temporary halt to the data collection exercise. HACOF engaged in unofficial mediation with these leaders, eventually securing permission to continue the data collection.
- **Community distrust**: Due to fatigue from frequent data collection activities in the community, some members were distrustful of the exercise. HACOF addressed this issue by proactively engaging local elders, who explained the purpose and objectives of the activity, thus gaining the community's cooperation.
- **Cultural sensitivity**: In some areas, interviewing females without a male relative present caused tension. By engaging elders ahead of time, HACOF was able to explain the goals of the data collection process, easing concerns and facilitating smoother interactions.

1.6 Respondent's characteristics and household's composition

In total, 1610 surveys were recorded and used for data analysis within the eight groups covered. Most respondents were women, comprising 53.3% of the participants, while men made up 46.7%. In 48.4% of households, men were identified as the primary decision-makers, while women held this role in 18.6% of cases. Dual decision-making, where both adult men and women jointly led households, accounted for 33.0% of the households surveyed. The respondents and households' main characteristics are presented in Table 2 below, including the share of households per gender of

respondents, per gender of the household's head, per age category of the respondent and the household composition by age.

Table 2 Respondent's characteristics and household's composition

	Balcad RESTORE & MAAREYANTA		Jowhar TRANSFORM Youth Act PBF MAAREYANTA		Compare group		Total	
	N	%	N	%	N	%	N	%
Households interviewed	604	**37.5%**	651	**40.4%**	355	**22%**	1610	
# of villages	18	**36%**	20	**40%**	12	**24%**	50	
Gender of respondent								
Men	294	48,7%	291	44,7%	167	47,0%	752	47%
Women	310	51,3%	360	55,3%	188	53,0%	858	53%
Gender of the decision maker								
Men	311	51,5%	312	47,9%	126	35,5%	749	47%
Women	114	18,9%	126	19,4%	59	16,6%	299	19%
Dual	179	29,6%	213	32,7%	140	39,4%	532	33%
Respondent's age								
18 to 24	35	5,8%	58	8,9%	36	10,1%	129	8%
25 to 29	75	12,4%	106	16,3%	52	14,6%	233	14%
35 to 39	211	34,9%	205	31,5%	108	30,4%	524	33%
45 to 49	170	28,1%	163	25,0%	77	21,7%	410	25%
50 to 60	81	13,4%	87	13,4%	48	13,5%	216	13%
Above 60	32	5,3%	30	4,6%	34	9,6%	96	6%
Household's composition								
Girls below 5	581	11,3%	633	11,6%	364	12,6%	1578	98%
Boys below 5	585	11,4%	602	11,0%	348	12,0%	1535	95%
Girls 5-17	862	16,8%	845	15,5%	431	14,9%	2138	133%
Boys 5-17	871	17,0%	799	14,6%	428	14,8%	2098	130%
Women youth 18-24	420	8,2%	485	8,9%	257	8,9%	1162	72%
Men Yout 18-24	363	7,1%	428	7,8%	210	7,2%	1001	62%
Women adults 25-49	545	10,6%	639	11,7%	314	10,8%	1498	93%
Men adults 25-49	509	9,9%	586	10,7%	304	10,5%	1399	87%
Women adults 50 and over	189	3,7%	252	4,6%	125	4,3%	566	35%
Men adults 50 and over	198	3,9%	197	3,6%	118	4,1%	513	32%
Total	5123		5466		2899		13488	

2. Resilience assessment

2.1 Definition of resilience and methodology

SHARP defines resilience as the ability of a system to recover, reorganize and evolve following external stresses and shocks. This ability will in turn depend on a variety of environmental, social, economic and governance aspects. Under these considerations, SHARP+ assesses resilience using a modular approach, in which each module describes an element of the farm system and household organization. Each module embeds two scoring components measuring resilience as follows:

Technical resilience component: it is a structured component looking into information on the agricultural production unit (farm) or agriculture-based household that can be easily measured or assessed by the respondent. For instance, the number and types of crops planted, the land management techniques used or farmer's access to markets. A score from 0 to 10 is assigned to this component, with 10 being more resilient and 0 less resilient.

Self-assessed adequacy component: It is a self-stated evaluation of perceived satisfaction of a given aspect of the farm or household using a 1 to 5 Likert scale. A score out of 10 is then assigned to this component, with 10 being more resilient and 0 less resilient.

The combination of the first two components provides a general score of resilience, called **Compound Resilience Score** – ranging from 0 to 20 points – in which the lowest scores highlight those aspects of lower resilience. Low scores can be interpreted either by the inadequacy of the resource/status in question, and/or because people consider the number of resources they possess or have access not to be sufficient for the well-functioning of their farm systems.

The resilience thresholds are defined as follows:

Table 3 Resilience levels threshold

Resilience threshold	Compound resilience score (Scale: 0 to 20 points)
Low resilience levels	0 to 7 points
Medium resilience levels	7,01 to 12 points
High resilience levels	12,01 to 20 points

Finally, the ***Self-assessed importance component*** present at the end of the survey gives farmers the opportunity to rank those aspects they consider as priority to improve their livelihoods.

2.2 Resilience levels for the RESTORE project

2.2.1 Average resilience scores per domain

The average resilience score[1] across all domains and modules for the households sampled across the households in the RESTORE project landscape located in the district of Balcad is 7.4 out of 20.

[1] The average compound resilience score is obtained by summing the summing technical assessment of responses (technical resilience score) and the auto-evaluation of the adequacy of given aspect by the respondent (adequacy score).

When classified per domain, the lowest score was obtained in the governance domain with an overall compound resilience score of 4.2 followed by the economic domain (5.3), the environmental domain (7.0), and finally the social domain (8.0).

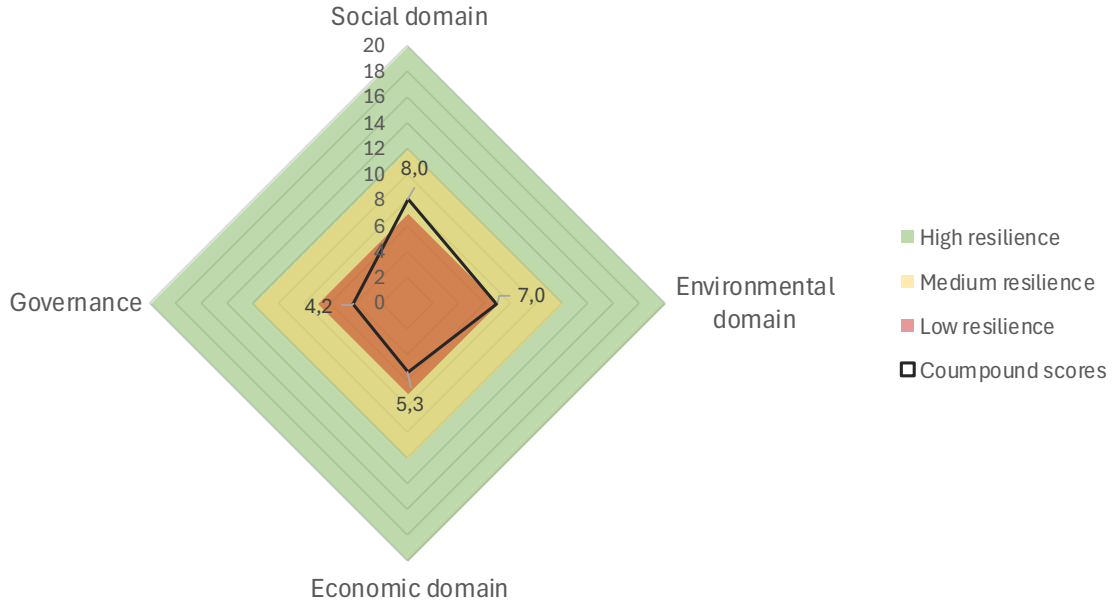


Figure 1 Compound resilience score per domain for RESTORE project (N=604)

2.2.2 Average resilience scores per module

Figure 2 illustrates the compound resilience scores for all evaluated modules across all households in the RESTORE project landscape located in the district of Balcad [2]. Modules depicted in red indicate those with scores classified as low, with a score ranging below 7. Those in orange represent modules with medium resilience scores ranging from 7.01 to 12, while modules in green indicate high resilience, with scores exceeding 12. Additionally, the Figure 2 below illustrates the proportion of the compound resilience score allocated to the technical component (dark) and the adequacy component (light), along with the label of the compound resilience score, which represents the sum of the two components. The adequacy score, which determines the respondent's satisfaction with a particular service or practice, is determined solely based on the proportion of households with access to or practicing this specific service or activity. As a result, in certain modules, it does not accurately represent the entire sample.

Within the entire sample, low resilience performance is observed across eleven modules, indicating vulnerabilities in various aspects of farming households and systems when confronted with shocks. Strengthening these modules is crucial for enhancing overall system resilience. Detailed information on modules with the lowest resilience scores can be found in Section 3. Profiling of Livelihood[3]. Conversely, no modules exhibit high resilience scores, while all others fall within the medium resilience threshold.

[2] Table with full resilience scores by modules can be found in Annex 1.

[3] For quick access to most of the modules with low resilience levels, please click on the resilience bar directly in *Figure 2*, which will take you directly to the corresponding section.

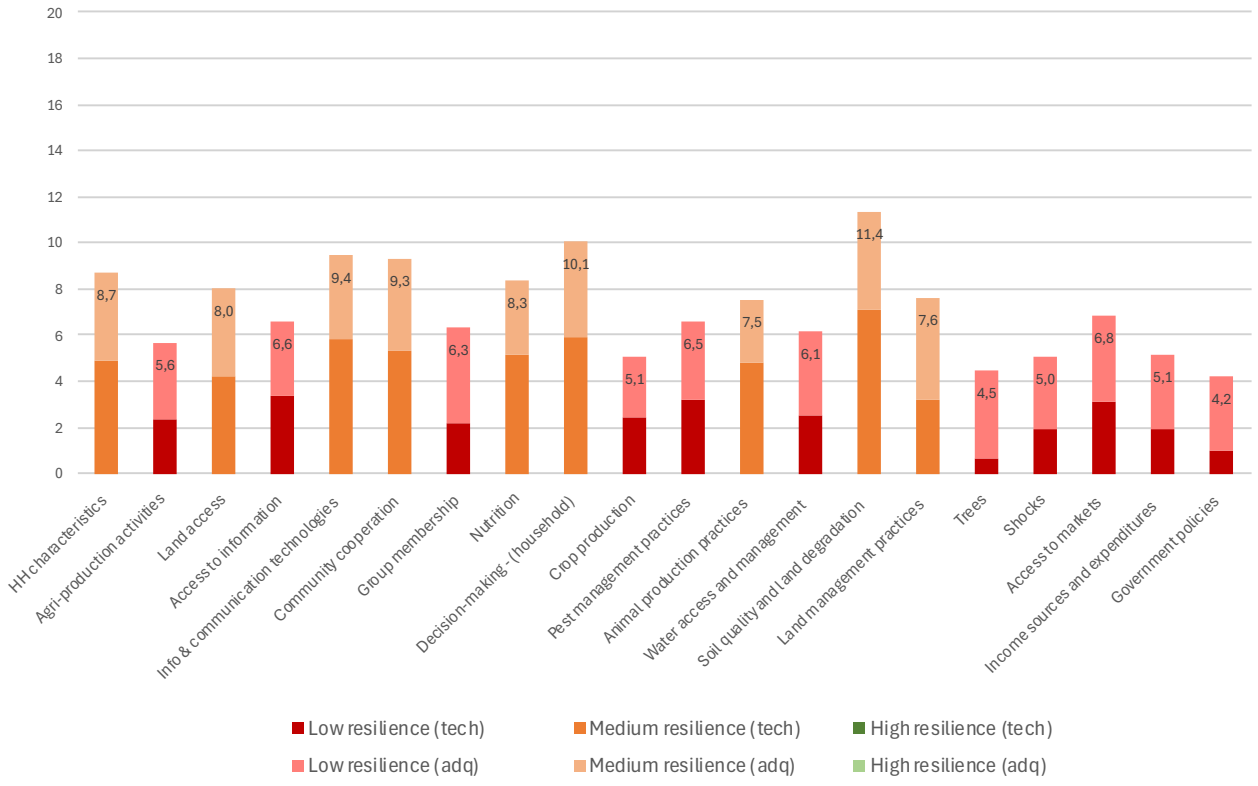


Figure 2 Compound resilience score across all respondents for RESTORE project (N=604)

2.2.3 Share of households per resilience levels

Figure 3 below illustrates the share of respondents per resilience level and per module across all households in the RESTORE project landscape located in the district of Balcad. The share of households having a low resilience score for a specific module are visible in red, a medium resilience score in yellow and a high resilience score in green. Grey bars represent households for whom the compound resilience score could not be calculated, since the respondent did not answer the adequacy component because they were not part certain resilience activities. Adequacy score is mandatory to calculate the compound resilience score. This happens when the households do not have access to an input, service or do not practice a certain activity. For example, when looking at the module on access to markets, within all respondents, 40.4% stated not producing with the aim of selling. The SHARP+ approach is therefore unable to evaluate the resilience level of respondents' market access because they are not actively seeking to sell any products. It's crucial to examine this result to highlight the specific practices or services that are not being utilized or accessed. Understanding why these practices haven't been implemented is essential for devising actions aimed at enhancing the resilience of farm households. Integrating this information into strategies can help address the underlying reasons and bridge the gaps in resilience-building initiatives.

It is furthermore important to consider the number of households by resilience level so as not to miss vulnerability, where resilience scores vary significantly between respondents, and are therefore smoothed out by the overall averages.

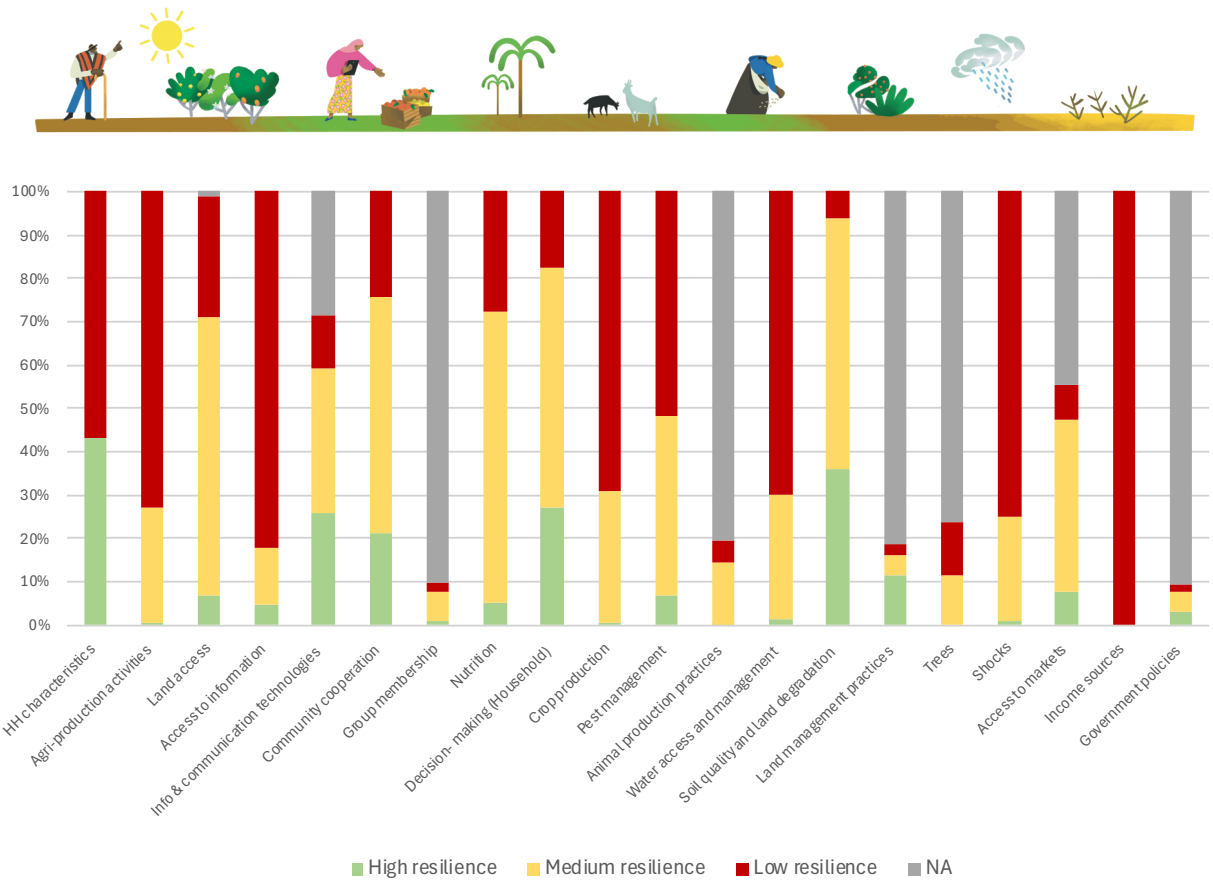


Figure 3 Share of households per compound resilience scores level for RESTORE project (N=604)

The breakdown of respondents by resilience level generates the following insights:

- 0.9% of household do not have access to any type of land for agricultural production.
- 28.6% of households do not use any information and communication technologies.
- 90.2% of farmers are not part of any kind of groups.
- 80.6% of farmers do not practice animal production on their farmland.
- 81.3% of farmers do not implement any land management practices to try to improve the quality of their soil or land.
- 76.2% of farmers do not own any tree species on farmland.
- 44.7% of households are not market oriented not producing with the aim of selling part of their production or did not sell any farm products, mainly due to insufficient production
- 84.6% of households did not participate in any governmental policies or programmes on climate change and sustainable agriculture during the last three years.

Moreover, for modules on household characteristics, agricultural production activities, access to information, crop production, pest management practices, water access and management, shocks/disturbances, and income sources and expenditure; more than half of the population obtained low compound resilience scores, indicating limited potential in seek of intervention. These results partially corroborate the low average compound resilience scores for these modules, elaborated in sections 3.1.1 Agricultural production activities, 3.4.2 Access to Information, 3.1.3 Crop production, 3.2.1 Disturbance, climate change and coping strategies, 3.2.2 Water access and management and 3.1.2 Income sources and expenditures respectively.

2.3 Resilience levels for the TRANSFORM project

2.3.1 Average resilience scores per domain

The average resilience score[4] across all domains and modules for the households sampled across the households in the TRANSFORM project landscape located in the district of Jowhar is 7.2 out of 20.

When classified per domain, the lowest score was obtained in the governance domain with an overall compound resilience score of 3.9, followed by the economic domain (4.9), the environmental domain (6.6), and finally the social domain (7.9).

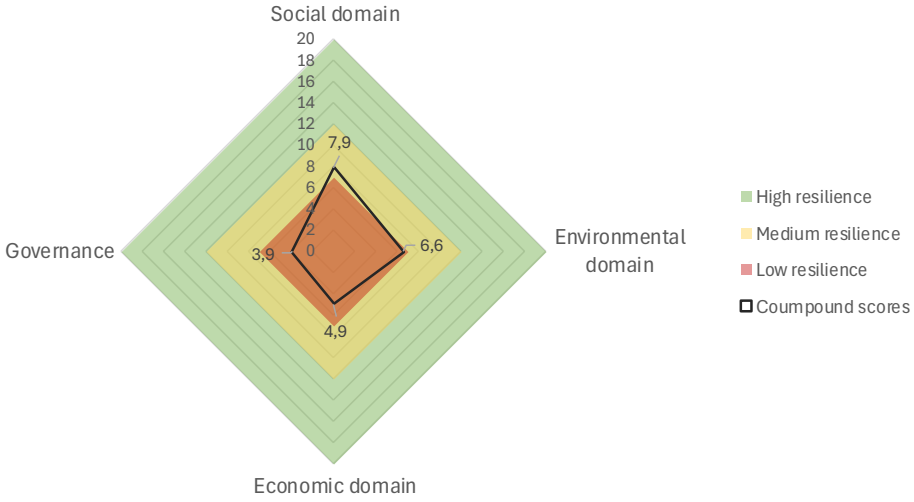


Figure 4 Compound resilience score per domain for TRANSFORM project (N=651)

2.3.2 Average resilience scores per module

Figure 5 illustrates the compound resilience scores for all evaluated modules across all households in the TRANSFORM project landscape located in the district of Jowhar [5].

Within the entire sample, low resilience performance is observed across twelve out of twenty modules, indicating vulnerabilities in various aspects of farming households and systems when confronted with shocks. Strengthening these modules is crucial for enhancing overall system resilience. Detailed information on modules with the lowest resilience scores can be found in Section 3. Profiling of Livelihood[6]. Conversely, no modules exhibit high resilience scores, while all others fall within the medium resilience threshold.

[4] The average compound resilience score is obtained by summing the summing technical assessment of responses (technical resilience score) and the auto-evaluation of the adequacy of given aspect by the respondent (adequacy score).

[5] Table with full resilience scores by modules can be found in Annex 1.

[6] For quick access to most of the modules with low resilience levels, please click on the resilience bar directly in *Figure 5*, which will take you directly to the corresponding section.

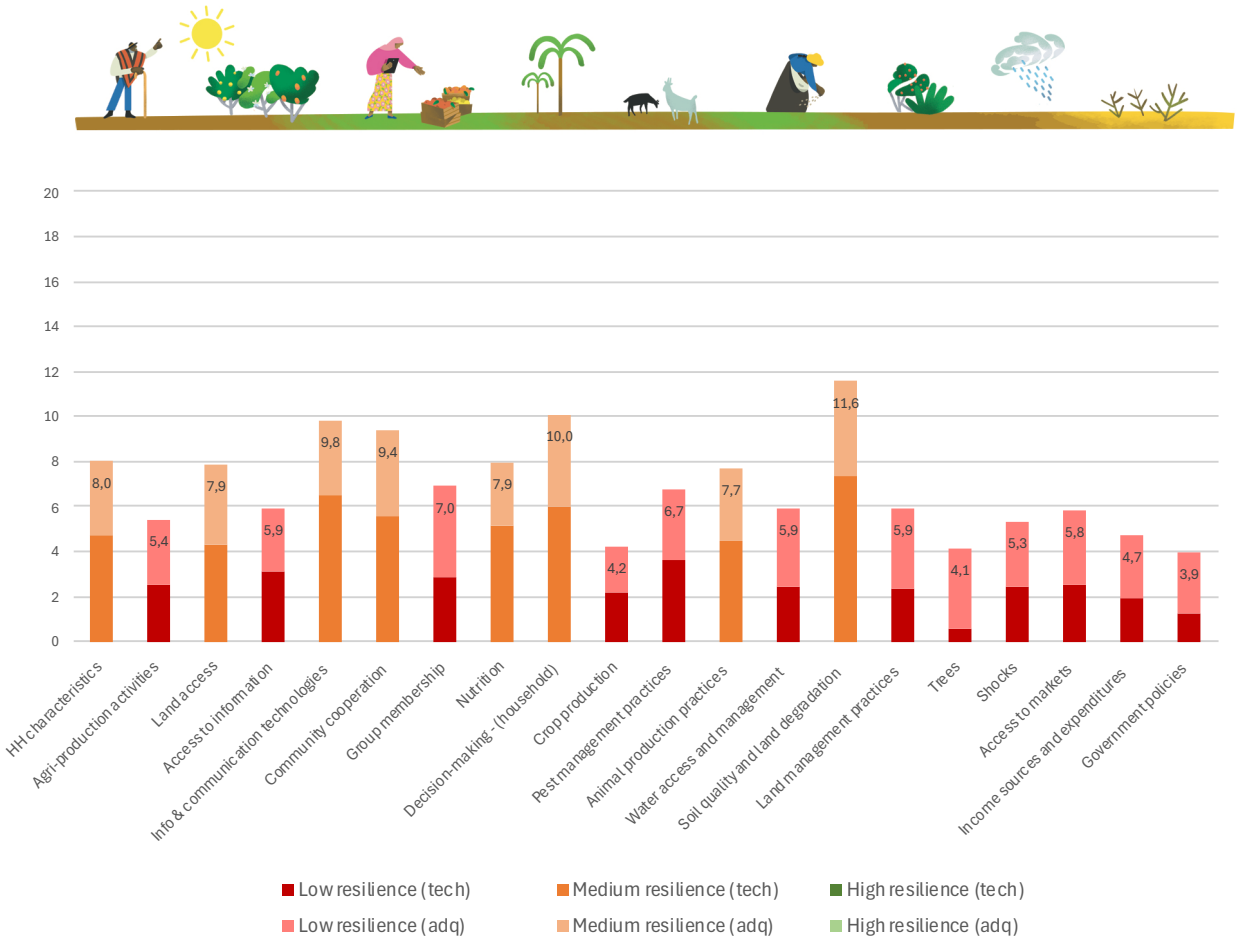


Figure 5 Compound resilience score across all respondents for TRANSFORM project (N=651)

2.3.3 Share of households per resilience levels

Figure 6 below illustrates the share of respondents per resilience level and per module for all across all households in the TRANSFORM project landscape located in the district of Jowhar. The share of households having a low resilience score for a specific module are visible in red, a medium resilience score in yellow and a high resilience score in green. Grey bars represent households for whom the compound resilience score could not be calculated, since the respondent did not answer the adequacy component, which is mandatory to calculate the compound resilience score. This happens when the households do not have access to an input, service or do not practice a certain activity. For example, when looking at the module on access to markets, within all respondents, 40.4% stated not producing with the aim of selling. The SHARP+ approach is therefore unable to evaluate the resilience level of respondents' market access because they are not actively seeking to sell any products. It's crucial to examine this result to highlight the specific practices or services that are not being utilized or accessed. Understanding why these practices haven't been implemented is essential for devising actions aimed at enhancing the resilience of farm households. Integrating this information into strategies can help address the underlying reasons and bridge the gaps in resilience-building initiatives.

It is furthermore important to consider the number of households by resilience level so as not to miss vulnerability, where resilience scores vary significantly between respondents, and are therefore smoothed out by the overall averages.

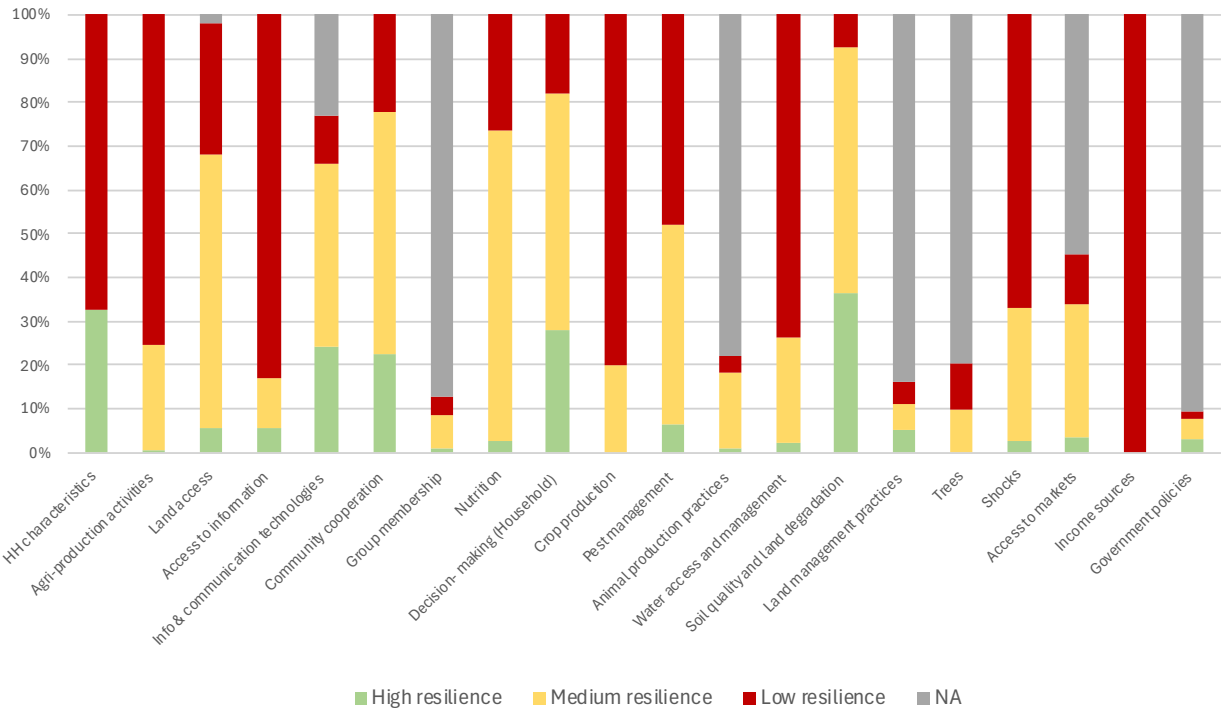


Figure 6 Share of respondents per resilience level for TRANSFORM project (N=651)

The breakdown of respondents by resilience level generates the following insights:

- 2.0% of household do not have access to any type of land for agricultural production.
- 21.2% of households do not use any information and communication technologies.
- 87.4% of farmers are not part of any kind of groups.
- 78.2% of farmers do not practice animal production on their farmland.
- 83.9% of farmers do not implement any land management practices to try to improve the quality of their soil or land.
- 79.7% of farmers do not own any tree species on farmland.
- 54.7% of households are not market oriented, not producing with the aim of selling part of their production or did not sell any farm products, mainly due to insufficient production.
- 81.6% of households did not participate in any governmental policies or programmes on climate change and sustainable agriculture during the last three years.

Moreover, for modules on household characteristics, agricultural production activities, access to information, crop production, water access and management, shocks/disturbances, and income sources and expenditure, more than half of the population obtained low compound resilience scores, indicating limited potential in seek of intervention. These results partially corroborate the low average compound resilience scores for these modules, elaborated in sections 3.1.1 Agricultural production activities, 3.4.2 Access to Information, 3.1.3 Crop production, 3.2.1 Disturbance, climate change and coping strategies, 3.2.2 Water access and management and 3.1.2 Income sources and expenditures respectively.

2.4 Resilience levels for the compare group

2.4.1 Average resilience scores per domain

The average resilience score[7] across all domains and modules for the households sampled across the households in the compare group located in the districts of Jowhar and Balcad is 7.0 out of 20.

When classified per domain, the lowest score was obtained in the governance domain with an overall compound resilience score of 3.6, followed by the economic domain (4.8), the environmental domain (6.3), and finally the social domain (7.8).

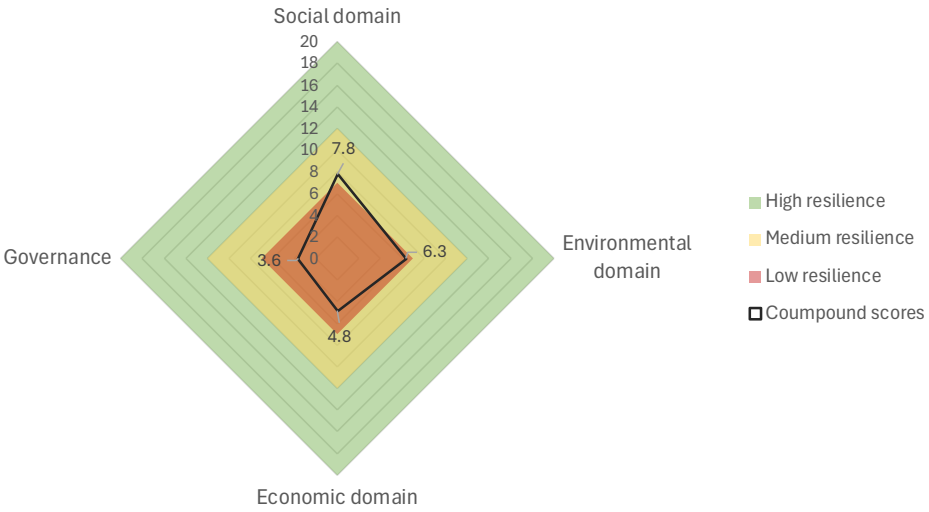


Figure 7: Compound resilience score per domain for the compare group (N=355)

2.4.2 Average resilience scores per module

Figure 8 illustrates the compound resilience scores for all evaluated modules across all households in the compare group located in the districts of Jowhar and Balcad. Within the entire sample, low resilience performance is observed across twelve out of twenty modules, indicating vulnerabilities in various aspects of farming households and systems when confronted with shocks. Strengthening these modules is crucial for enhancing overall system resilience. Conversely, no modules exhibit high resilience scores, while all others fall within the medium resilience threshold.

[7] The average compound resilience score is obtained by summing the summing technical assessment of responses(technical resilience score) and the auto-evaluation of the adequacy of given aspect by the respondent (adequacy score).

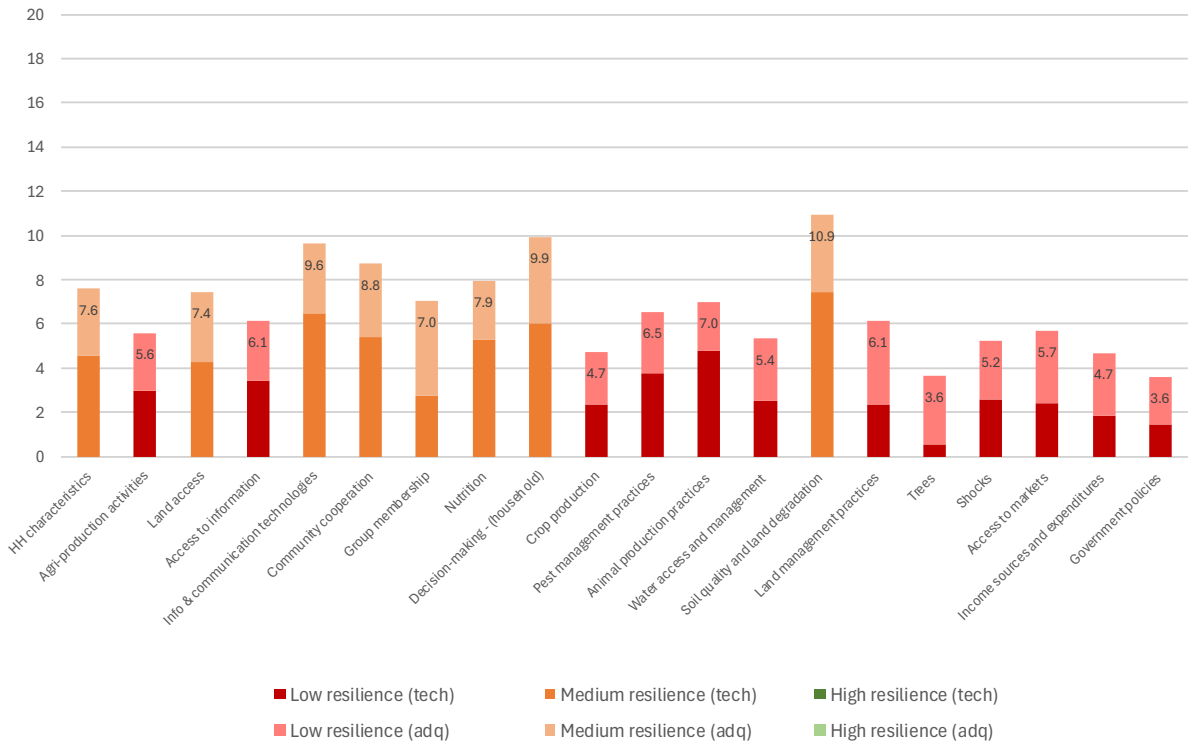


Figure 8: Compound resilience score across all respondents for compare group (N=355)

2.4.3 Share of households per resilience levels

Figure 9 below illustrates the share of respondents per resilience level and per module across all households in the compare group.

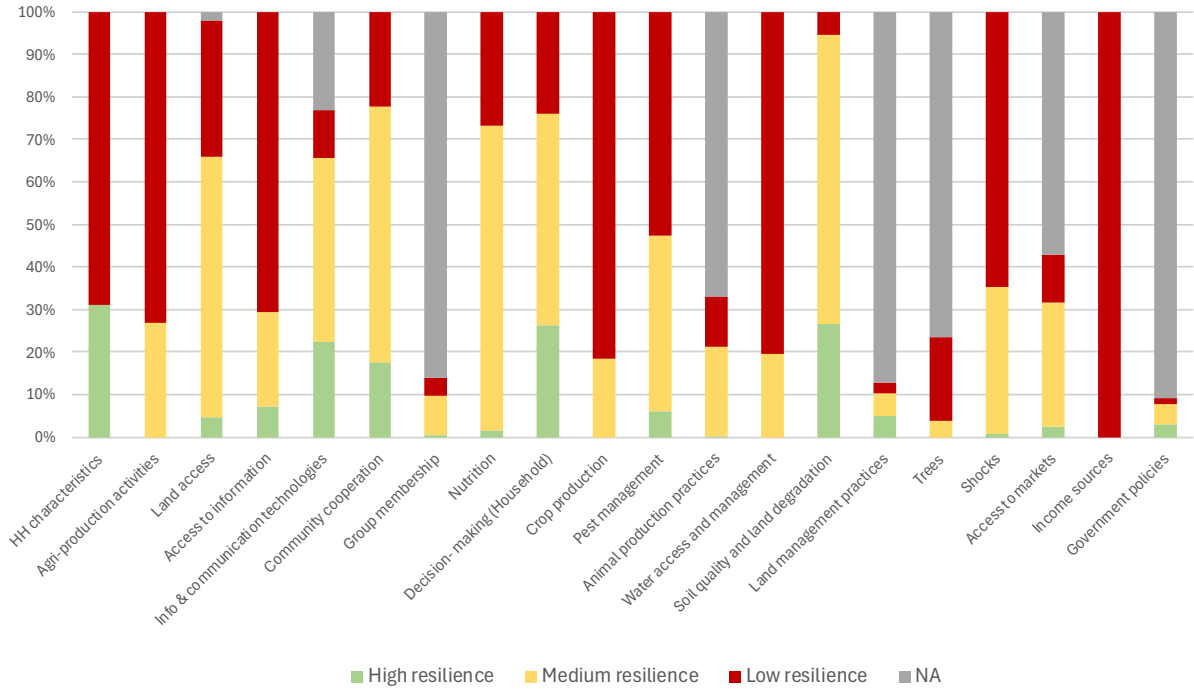


Figure 9: Share of respondents per resilience level for the compare group (N=355)

3. Profiling of livelihoods

This section undertakes a descriptive statistical analysis of responses and findings from selected modules to enhance comprehension of household operations and farming systems in the targeted groups. The objective is to explore the local context, shedding light on factors influencing resilience levels. Modules with lower resilience scores, first presented in section 2.3. Average resilience score per module, are prioritized, along with key data detailing farming systems and household functioning.

The analysis covers sources of agricultural production activities and main income, expenditures, providing insights into household strategies for subsistence and livelihood. Subsequent sections address various shocks, disturbances, and land degradation phenomena, followed by discussions on access to economic resources and services. The qualitative evidence collected through KIIs and FGDs are narrated to elaborate the quantitative analysis.

Each section includes:

- The technical and adequacy resilience scores by group.
- A concise overview of the module's purpose, its contribution to system resilience, and the underlying calculation methodology.
- Descriptive statistical analyses outlining the specific situational context.

Results are presented for the entire dataset and disaggregated by district, representing each one project and control group to provide nuanced insights into regional variations and trends. In the following section, households in the district of Balcad, represent the RESTORE project while farmers in the district of Jowhar represent the TRANSFORME and Youth Act PBF projects. Whereas the beneficiaries for MAAREYANTA project are spread over both districts.

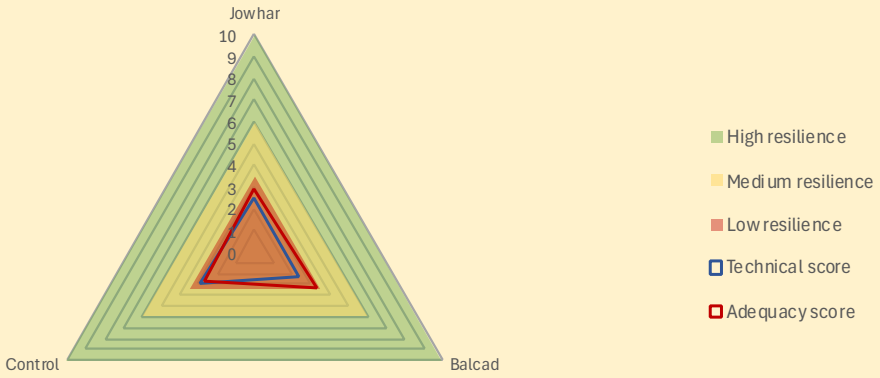
3.1 Sources of income and production activities

3.1.1 Agricultural production activities

BOX 1

Technical and adequacy resilience scores

This module aims to evaluate the diversity of agricultural activities, directly impacting households' resilience. A diverse system with various activities ensures agricultural production for both subsistence and income generation, even in the face of shocks or disturbances. Additionally, the assessment examines production and commercialization levels to gauge the household's independence from global market forces. Finally, subsistence farming is viewed as lowering the technical score, primarily because it limits the capacity to generate surplus agriculture and income.



On average, across all groups, farmers achieve a low compound resilience score of 5.5/20 for their agricultural activities. The above Figure highlights that, both the technical and adequacy scores consistently fall below the lower threshold, indicating farmers' low satisfaction with fulfilling their food and nutritional requirements through their own production and sales, coupled with a limited current capability to do so. This is explained, by a low diversity of agricultural activities as well as because most farmers are subsistence farmers, consuming their entire production for personal consumption rather than for sale, contributing to the low technical score.

Crop production is the primary agricultural activity practiced by farmers, with approximately 92.0% of households involved in it. Additionally, 28.4% of these households engage in livestock production, 3.0% in agroforestry, and 1.4% in fishing. Figure 10 below provides a breakdown of the different agricultural activities disaggregated by group. Crop production is the most common activity across all groups. The control group shows greater involvement in livestock production, with 38.6% of farmers participating, compared to 28.3% in Jowhar and 22.7% in Balcad. All other agricultural activities remain very limited and show little variation between groups.

Among all households, 89.6% have identified crop production as their primary activity and main source of livelihood. On the other hand, 7.1% stated it was livestock production, and 2.7% agroforestry. Typically, farming households manage between one and two activities on their farmland, with an overall average of 1.3 activities per household. This does not vary between groups.

"Our primary livelihood activities are agricultural activities such as crops and fodder production, livestock production and fishing activities for the few who can afford to get the tools" - KII Community leader BULA-BISHAARO

"Agricultural activities such as crops, and fodder production is a major contributing source of income and livelihood for people living in Jameeco Misro village. Livestock production also makes up part of

the livelihood. Fishing activities although not every household can afford to practice in flood zones" - KII Community leader Jameeco

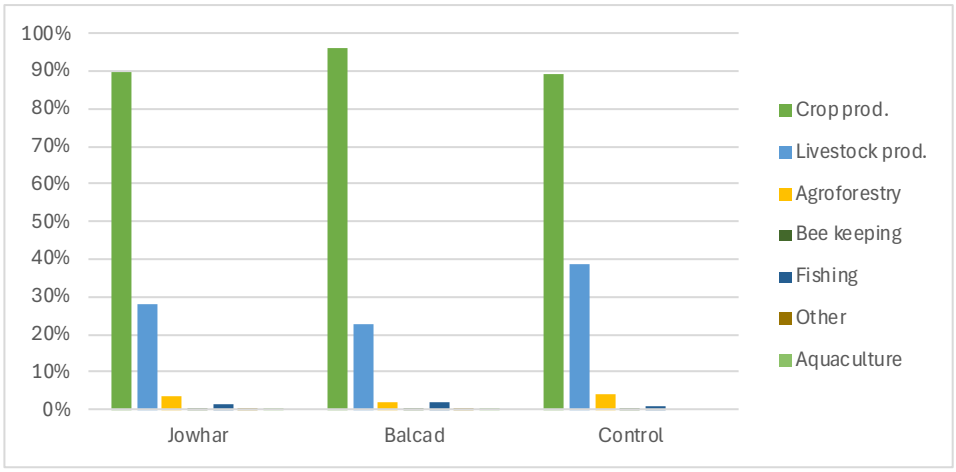


Figure 10 Agricultural activities (N=1610)

Most farming households (68.8%) primarily identify as subsistence farmers, focusing on meeting their household's food needs. A smaller proportion (20.3%) also produce on a small scale, selling some surplus to local consumers. Lastly, 10.6% of households primarily sell their production in local markets while consuming only a small portion themselves. Figure 11 below illustrates production and commercialization levels per group, showing that most farmers, across all groups, focus on subsistence farming, with minimal variation between the groups.

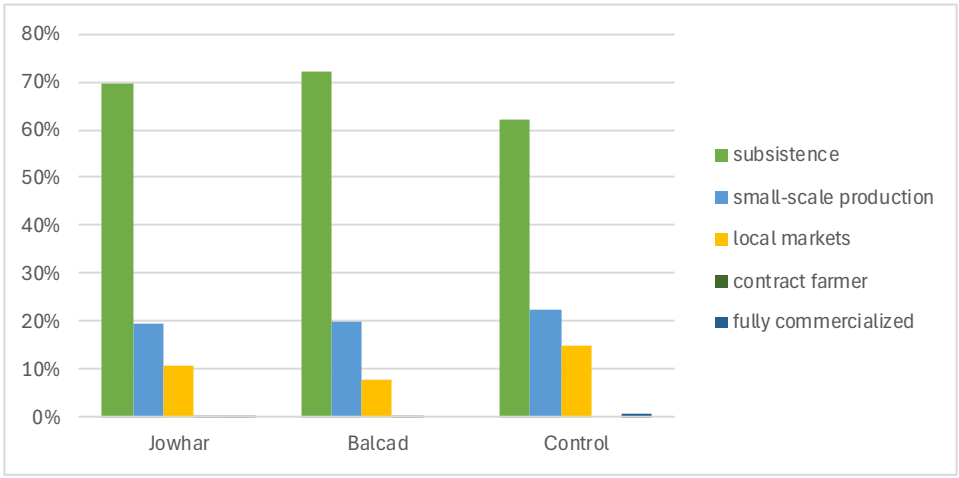


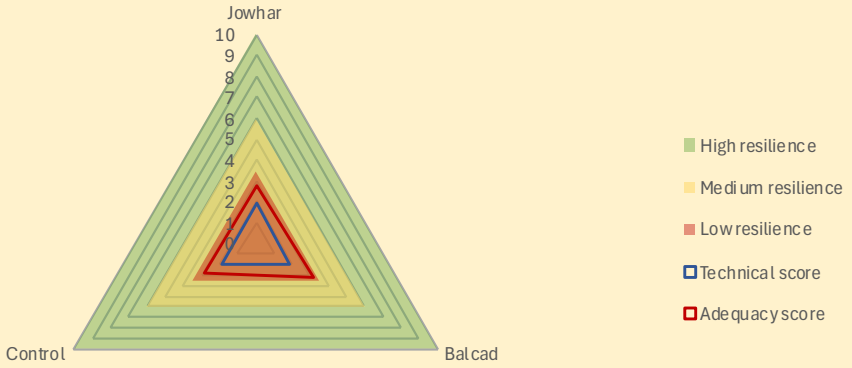
Figure 11 Level of production and commercialization (N=1610)

3.1.2 Income sources and expenditures

BOX 2

Technical and adequacy resilience scores

This module aims to evaluate income security by examining the quantity, diversity, and profitability of income sources. For an agroecosystem to be resilient, it must be reasonably profitable so that the agricultural population can make a livelihood from their work without relying solely on other employment or subsidies. It also assesses the primary expenses incurred, including the household's ability to finance education for its members and invest in farming operations as needed. A reasonably profitable system should have the capacity to invest in future agricultural activities as well as education to increase human capital.



Overall, households achieved low resilience scores, with an average compound resilience score of 4.9/20. The Figure above shows that the technical and adequacy scores fall under the low resilience threshold. These low adequacy scores indicate that respondents perceive the income generated by farm and non-farm activities as insufficient to cover food and other basic expenses. The low technical score is influenced by the limited diversity of income sources, lack of involvement in non-farming activities for income, inability to save money and inability to afford children's education.

Most households (80.2%) rely on one single source of income to sustain their household, and this trend is consistent across all groups, as depicted in Figure 12 below.

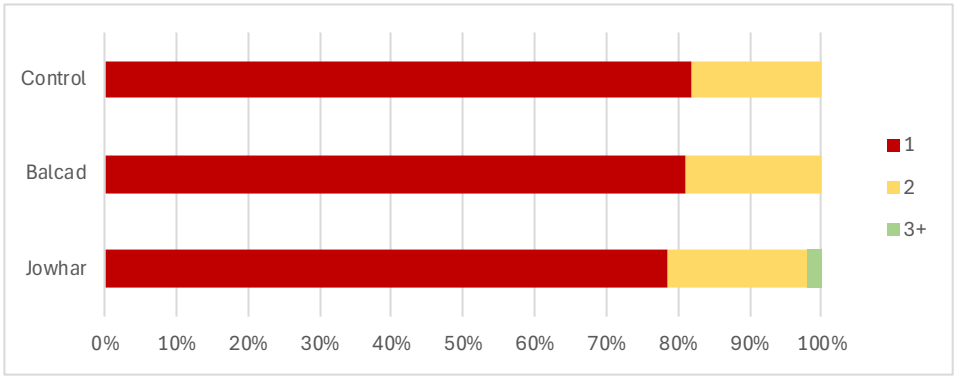


Figure 12 Number of different sources of income (N=1610)

Examining the primary sources of income, crop production emerges as the predominant source, utilized by 97.4% of the surveyed households and serving as the primary income source for 88.7% of them. This is followed by livestock production, employment outside of agriculture and employment in another farm. Figure 13 below provides a breakdown of these findings by groups, with an aggregation of the two main sources of income per household. The results therefore underscore the vital role of agricultural activities, especially crop production, in both income generation and subsistence (refer to section 3.1.1 Agricultural production activities).

Furthermore, households were specifically asked about their income sources from non-farm activities. Responses showed little variability across groups, with between 20.6% and 27.6% of surveyed households receiving income from an off-farm activity, depending on the group. Employment outside of agriculture emerged again as the primary off-farm source of income, along with the sale of firewood or handcrafts, though these remain extremely marginal.

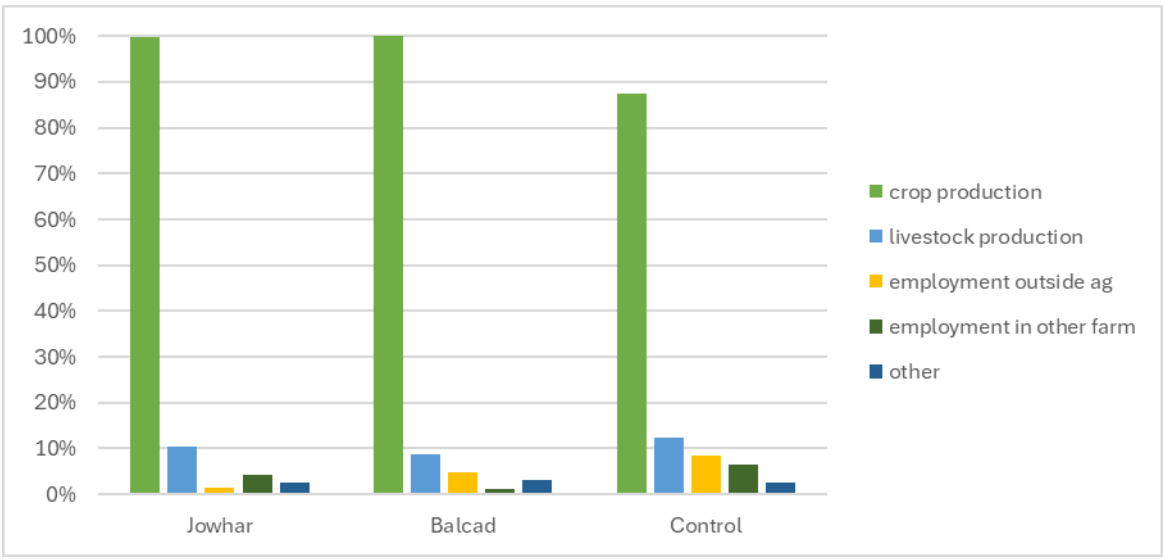


Figure 13 Aggregation of the two main income sources (N=1610)

Regarding primary expenditures, which represent the aggregation of households' top three expenses, seed purchases ranked highest, mentioned on average by 78.8% of surveyed households. This is followed by the purchase of food and beverages (53.2%), farm equipment (43.0%), healthcare (33.2%), and costs related to costs related to livestock (29.1%). These results show little variation across groups, as illustrated in Figure 14 below. Such high spending on food and beverages suggests an insufficient production to meet household's needs, given that on average, 68.8% of farmers are subsistence farmers, and 20.3% sell surplus to local consumers but consume most of their own production.

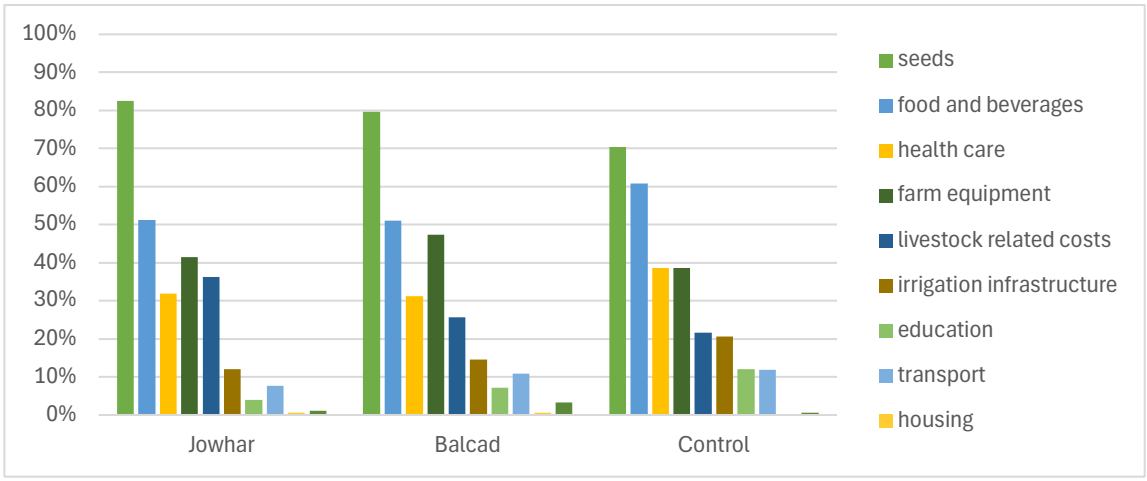


Figure 14 Aggregation of the three main expenditures (N=1610)

Following these primary expenditures, most respondents, 99.0%, reported that they were unable to save money. This result is consistent across all groups.

Household farming activities, while being the predominant income source, are not consistently profitable. On average, only 6.8% of farmers reported that their activities are consistently profitable, 64.8% sometime profitable and 28.4% not profitable. This finding is similar across the various groups, as depicted in Figure 15 below. This suggests a need for efforts to enhance the profitability of farming activities, which could involve adding value to products, raising prices, diversifying production, among other strategies.

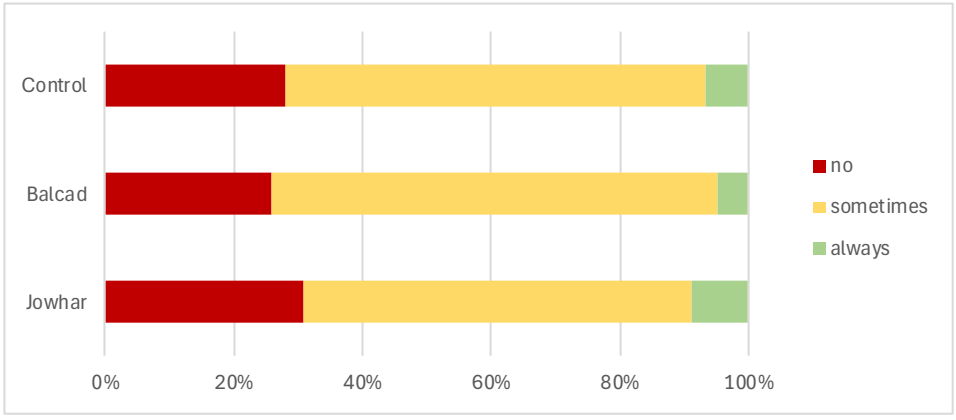


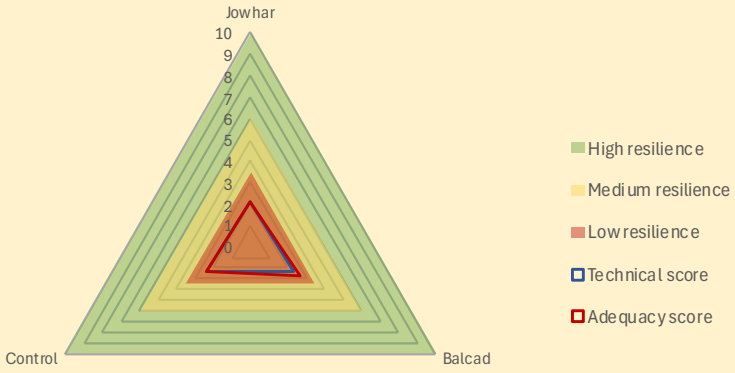
Figure 15 Profitability of agricultural production activities (N=1610)

3.1.3 Crop production

BOX 3

Technical and adequacy resilience scores

This module aims to assess the resilience of crop production by examining whether the system is ecologically self-regulated, for instance, through the presence of perennial plants or the management of crop residues for feedback mechanisms within the system, reducing the need for external inputs. The diversity of species and varieties is also observed, as it creates a buffer against disturbances, just like the spatial heterogeneity brought by intercropping or pairing crop and livestock for improved fertilization. Additionally, sources of young plants, adaptability to climate, yields, and pre- and post-harvest production losses are examined.



Most respondents reported an average compound resilience score of 4.7/20, considered low. The Figure above shows that both adequacy and technical scores are nearly identical, highlighting dissatisfaction with the quantity and diversity of crops available to meet household needs, as well as a lack of technical capacity to address these challenges. The technical score is mainly affected by low agrobiodiversity, including limited species and varieties of both seasonal and perennial crops, restricted access to seeds (with most farmers relying on only one or two sources), limited capacity to manage post-harvest products to reduce losses or increase value, and declining yields.

On average, almost all surveyed households (92.0%) stated being involved in crop production in the last twelve months. When looking at the type of cultivation, 68.2% stated participating in seasonal crop cultivation, and only 10.1% involved in perennial crops.

A disaggregation of the results by groups reveals slight variations, with farming households in the district of Balcad and the control group being more involved in seasonal crop production, with 73.3% and 74.6% respectively, compared to 59.9% of farmers in Jowhar. On the other hand, perennial crops are less commonly cultivated in the control group, where only 10.1% of farmers are involved in perennial farming, compared to 12.6% in Jowhar and 10.6% in Balcad. These findings are illustrated in Figure 16 below.

"Our main seasonal crops include Maize, Beans, Millet and Sesame. Among the pests and diseases are insect manifestation and diseases such as corn pests, locusts and other insects that commonly affect the seasonal farmers. - KII Community leader Jameeco

"Our main seasonal crops include Maize, Beans and Sesame. Among the pests and diseases are insect manifestation and diseases such as "cuncun" that commonly affects the seasonal farmers."- KII Community leader Bula-Bishaaro

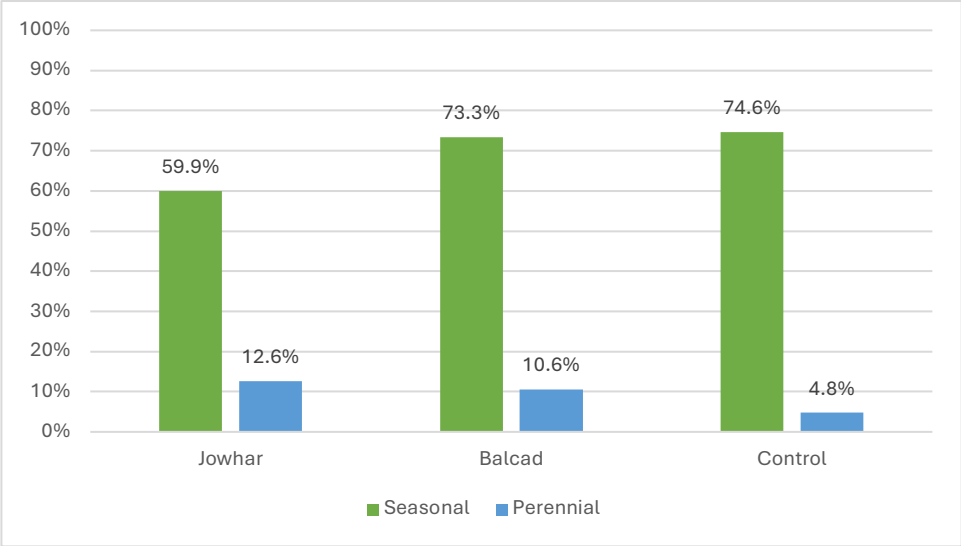


Figure 16 Households involved in seasonal and perennial crop production (N=1610)

Regarding production systems, a predominant pattern observed is mono-cropping, where production primarily centres on a single crop, practiced by an average 83.2% of crop producers. Conversely, 12.0% reported adopting a mixed system, where various crops occupy similar shares of land. Additionally, an average of 7.1% mentioned having access to a small private vegetable garden, as well as 0.2% to a communal small vegetable garden. Finally, the growing of tree species in an orchard, specified on one major specie, or diversified with several species, is also observed in a smaller share of 0.5% of crop producers. Figure 17 below illustrates these production systems by group, showcasing the variations among them.

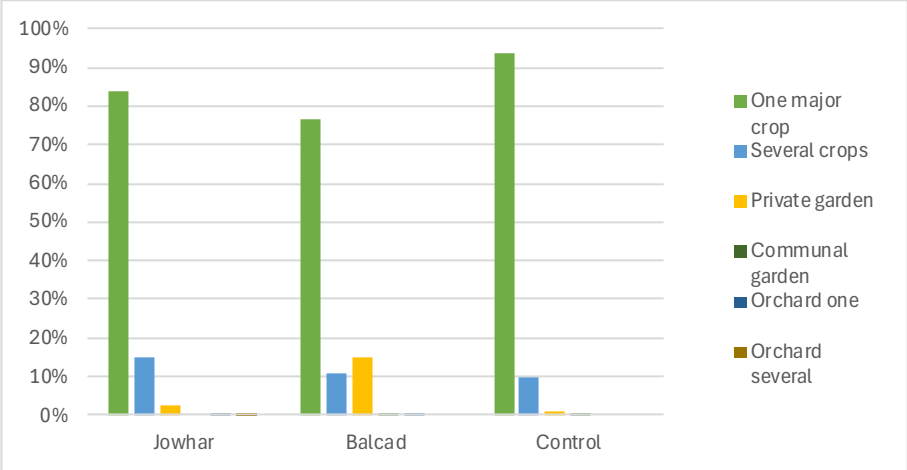


Figure 17 Crop production systems (N=1098)

Seasonal crops

The most cultivated crop across the pilot area is maize, grown by an average of 50.1% of farmers engaged in crop production, followed by beans (13.9%) and sesame (9.5%). Table 4 below presents the main seasonal crops cultivated in each group. The cultivation patterns for seasonal crops are consistent across groups, apart from millet. The "other" category includes crops grown by less than 0.5% of the population and comprises groundnut, Irish potato, lettuce, mung bean, watermelon, costa green, chili, sorghum, onion, and cowpea.

Farmers engaged in crop production cultivate an average of 0.8 seasonal crop species (0.7 in Jowhar and 0.9 in Balcad and Control group) and 0.1 perennial crop specie within their farming system. Having a diversified system with several species and varieties cultivated makes it possible to secure production in the face of a shock, whether climatic or related to pest outbreaks, and also contributes to the diversification of food supplies.

Table 4 Main seasonal crops planted during the last season (N=1098)

Seasonal species	Jowhar	Balcad	Control	Grand Total
Maize	45,8%	51,3%	55,8%	50,1%
Beans	12,4%	14,9%	14,9%	13,9%
Sesame	8,1%	8,9%	13,0%	9,5%
Millet	0,5%	5,5%	2,8%	2,9%
Rice	2,9%	1,5%	0,6%	1,9%
Tomato	0,9%	2,8%	1,1%	1,7%
Other	2,8%	2,3%	0,6%	2,1%
N=	390	443	265	1098

Perennial crops

The most cultivated perennial crop is mango, grown by an average of only 6.8% of households involved in crop production. Other perennial crops such as acid lime, banana, guava, orange, tamarind, papaya, and grapefruit have also been reported, but they are much rarer. The disaggregated results by group are presented in Table 5 below.

"Our cultivation practices are mainly traditional e.g; the mixed cropping, crop rotation and burn cultivation. Our main management is the use of insecticides and pesticides to eradicate insects and pests and reduce their impacts for those who can afford"- KII Community leader Jameeco

"We usually manage these diseases and pests through application of insecticides and pesticides to eradicate or reduce their impacts. We also sprinkle water to improve resistance to some crop's conditions and diseases."- KII Community leader Bula-Bishaaro

Table 5 Main seasonal crops planted during the last season (N=158)

Perennial species	Jowhar	Balcad	Control	Grand Total
Mango	9,2%	6,1%	3,7%	6,8%
Acid lime	0,6%	2,5%	0,8%	1,4%
Banana	0,5%	0,7%	0,0%	0,4%
Guava	0,5%	0,0%	0,0%	0,2%
Orange	1,2%	0,8%	0,0%	0,8%
Tamarind	0,2%	0,0%	0,0%	0,1%
Papaya	0,0%	0,2%	0,0%	0,1%
Grapefruit	0,0%	0,0%	0,6%	0,1%
Other	0,0%	0,2%	0,0%	0,1%
N=	82	64	12	158

Access to seed

Planting material is acquired through various channels, mainly through own production (79.8%) and purchase in shops (37.6%). Accessing seeds through family and friend, the United Nations, NGOs and cooperatives were also mentioned but less common. The specific findings are illustrated in Figure 18 below and show little variations amongst groups. Most surveyed farmers demonstrate the ability to produce and propagate their planting material, rendering them less reliant on external markets for obtaining seeds. This capacity can also serve as an advantage for diversifying crops.

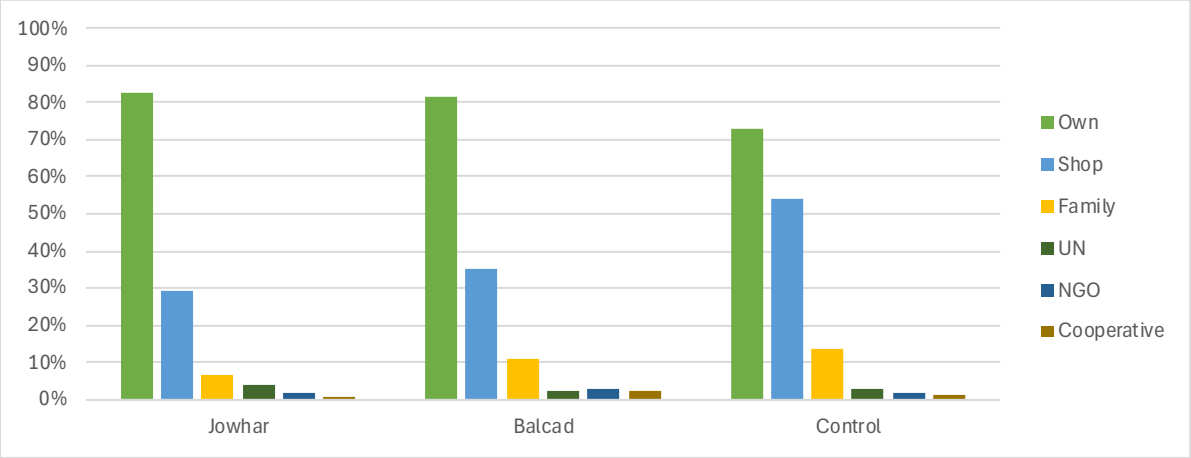


Figure 18 Different sources of seed (N=1122)

Little share of farmers indicated always or often having the financial capacity to purchase seeds for each production season, as depicted in Figure 19 below. This financial capability, coupled with the high rate of self-production mentioned in the previous results, suggests that seed supply may be a barrier to crop production.

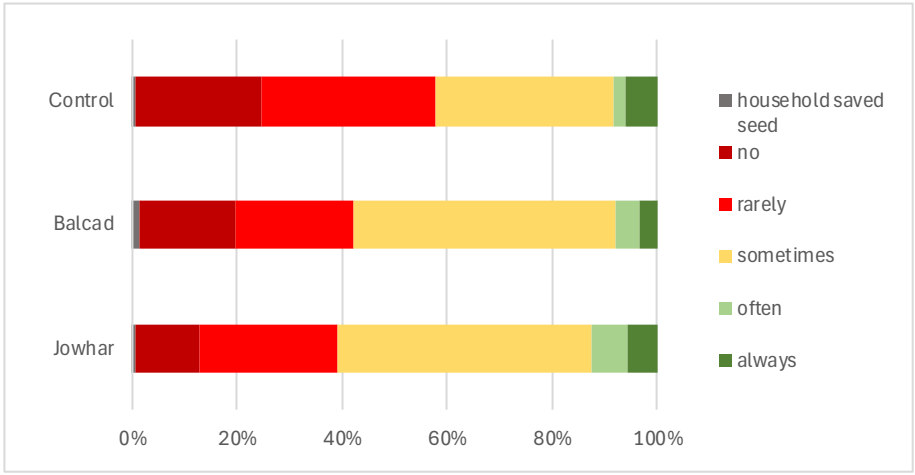


Figure 19 Ability to afford seed in each growing season (N=1122)

Crop losses and post harvesting practices

On average more than 70.4% of households reported at least some pre-harvest loss. For 14.8% of the households surveyed, the losses faced exceeded 60% of the production. This data shows their vulnerability to external factors causing those pre-havest losses, such as extreme weather events, pest and disease infestations, limited access to inputs, and inadequate agricultural practices.

Additionally, 34.8% of households experienced no post-harvest losses, while 30.8% reported minor losses ranging from 10% to 30% of their total harvest, indicating the presence of effective post-harvest practices and reliable storage facilities. Figure 20 below illustrates the total pre- and post-harvest losses per group, revealing variations among them. Notably, pre- and post-harvest losses appear to be more significant within the control group compared to the districts of Jowhar and Balcad.

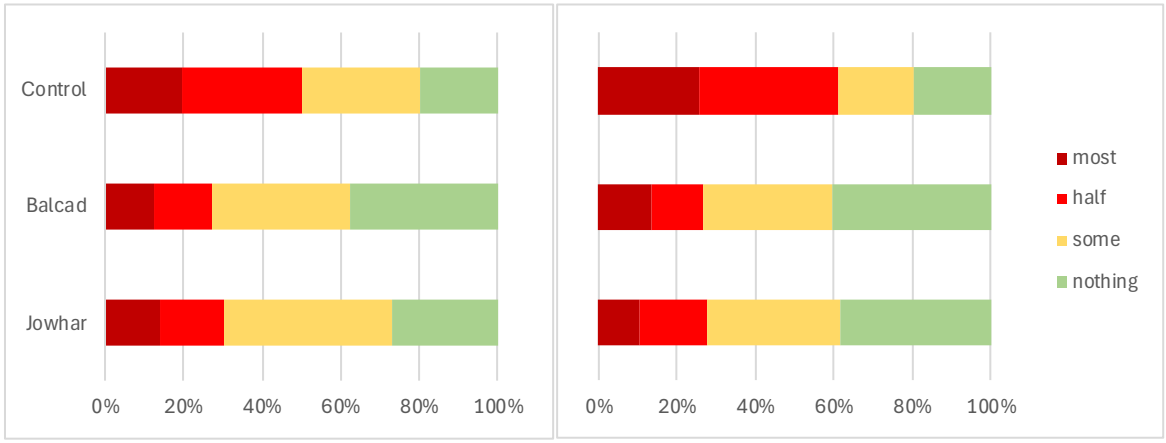


Figure 20 Pre-harvest (left) and Post-harvest (right) losses, during the last growing season (N=1122)

Over the past twelve months, most farmers (62.2%) reported not utilizing any post-harvest practices. Among those who implemented at least one practice, sorting, drying, packaging, improved cleaning, and basic storage were the most employed methods. The prevalence of these primary post-harvest practices is illustrated in Figure 21 below, with little variation observed among the different groups.

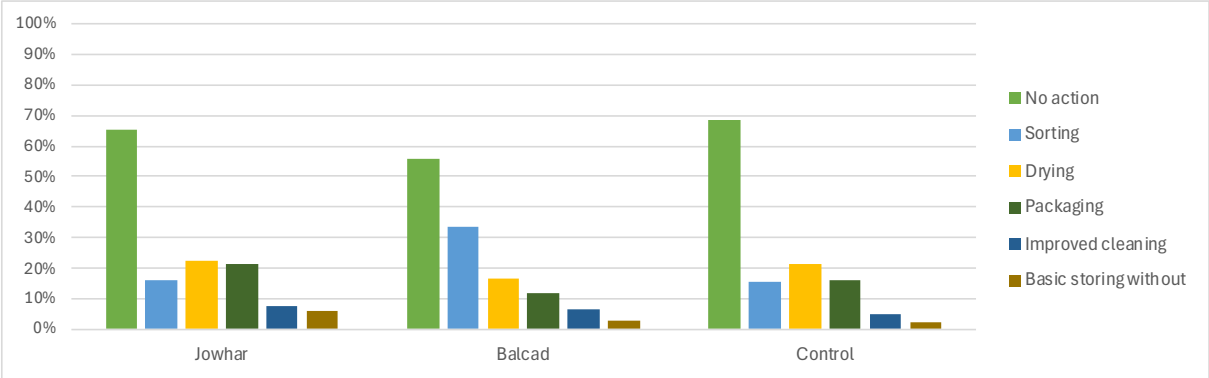


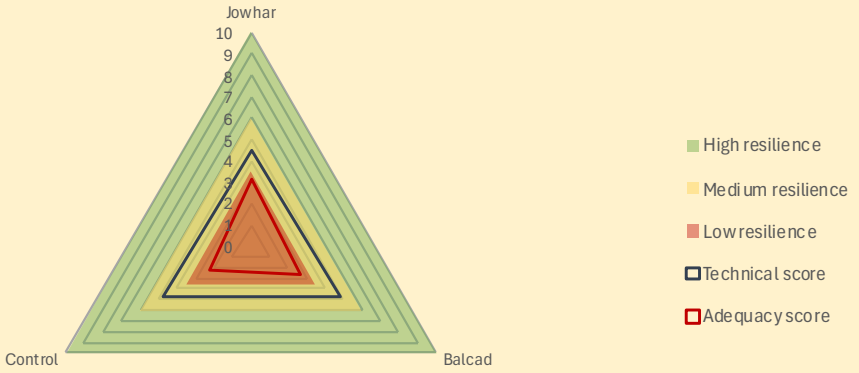
Figure 21 Main post-harvest practices (N=1122)

3.1.4 Animal production

BOX 4

Technical and adequacy resilience scores

This module aims to assess the resilience of animal production by evaluating the diversity of species and breeds raised, as well as the type of production system, the adaptation of raised species and breeds to local conditions, and manure management. The objective is to determine if a certain level of diversity is present to act as a buffer in case of disruptions and to examine whether the system is integrated with local capital, meaning it is linked to local resources and ecosystem services, including manure management, which reduces the need for external inputs for fertilization.



Across all groups, farmers achieve an average resilience score of 7.4 out of 20, reflecting a moderate level of resilience, albeit close to the lower threshold. It is important to note that this score is derived solely from the 23.4% of farmers who engage in animal husbandry. The Figure above illustrates that the adequacy score consistently lowers the technical score, suggesting dissatisfaction among farmers regarding the number and diversity of animal species raised. In contrast, the technical score is relatively higher across all groups. This disparity can be attributed to the limited diversity of animal species and ineffective manure management systems, which primarily involve direct use or open-air discharge, preventing the full utilization of this resource for fertilization.

On average, 23.4% of households reported keeping animals on their farms at the time of the survey. However, this result exhibits slight variation across groups, with 33% of the control group engaging in livestock rearing, compared to 21.8% of farmers in Jowhar and 19.4% in Balcad. Figure 22 below illustrates these results, with yellow indicating households that reported having animals in their agricultural system now of the survey. In blue, are represented the households that had animals within the past twelve months but no longer do so, suggesting either a loss of these animals or a cessation of the activity. In green, households that have not kept animals in the past twelve months are displayed.

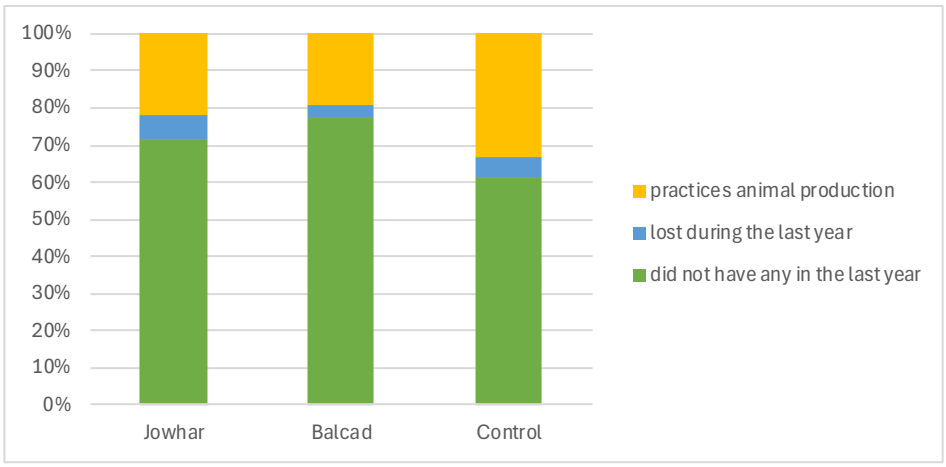


Figure 22 Animal production (N=1610)

Among farmers who lost some of their livestock over the past twelve months, drought was the primary cause mentioned by 43.9% of them, followed by flooding, cited by 26.8%. When disaggregating the results by group, as illustrated in Figure 23 below, the findings show significant variation between groups. In Balcad, livestock production appears to have been most impacted by drought, with 70% of farmers who lost animals citing this as the main reason. In contrast, in Jowhar, losses seem to have been almost equally caused by floods (42.9%) and droughts (38.1%). Meanwhile, in the control group, the primary reason given was a lack of interest, mentioned by 40.0% of respondents.

"During floods, the livestock owners are forced to move to areas where they are not used to. This results in reduced resistance to diseases. This usually in loses of livestock."- KII Community leader Bula-Bishaaro

"Animal diseases such as widespread skin infections and worm manifestations are some of the shocks that mostly affect livestock production"- KII Community leader Jameeco

"Shocks such as drought has a serious negative impact on the livestock production as it may kill a good number of livestock."- KII Community leader Bula-Bishaaro

"Unexpected resource-based conflicts e.g; tensions resulting from pastures can reduce access to the pastures as well as death of caretakers and livestock too."- KII Community leader Bula-Bishaaro

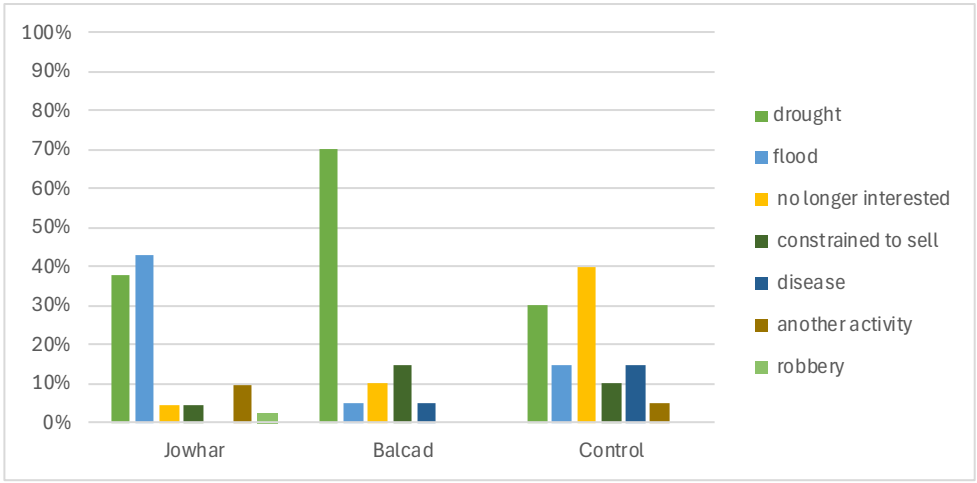


Figure 23 Reasons for stopping animal production within the last 12 months (N= 82)

Approximately half of the households raising on-farm animals described their production system as semi-nomadic, with livestock migrating for less than six months each year. Additionally, 21.4% identified as fully nomadic, where animals migrate for six months or more annually. Meanwhile, 12.8% reported operating small-scale livestock farms, 8.6% practiced extensive livestock production on communal land, and 2.9% engaged in transhumant systems. These results are further illustrated in Figure 24 below.

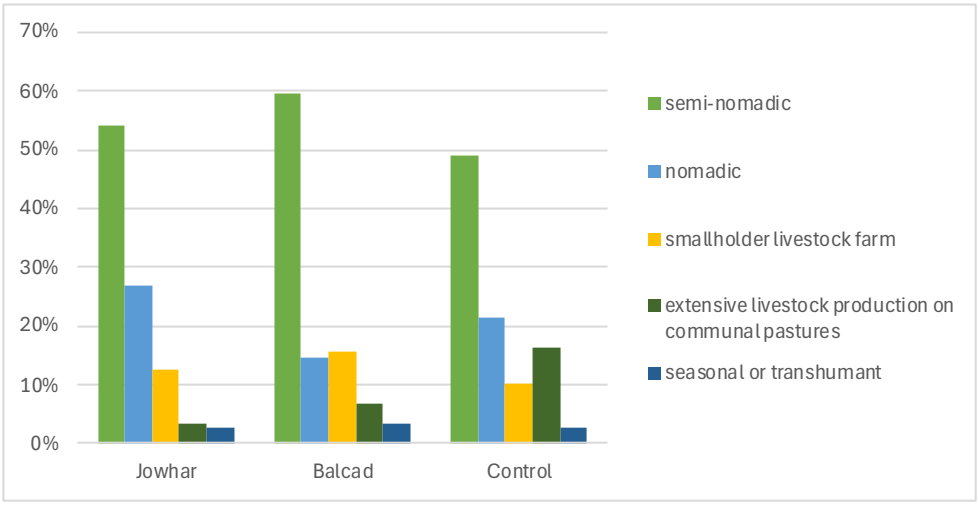


Figure 24 Livestock production system (N=374)

In terms of animal species owned, cattle are the most common specie among farmers engaged in animal production, hold by 10.8% of all interviewed households, followed by poultry, goats and sheep and equines. These results are detailed and disaggregated by group in Table 6 below, revealing significant differences between groups.

"The predominant livestock species our community are Cattle, Sheep and Goats. For cattle we practice system like penning, Tethering and others are allowed to freely feed from the pasturelands." - KII Community leader Jameeco

"The predominant livestock species our community are Cattle, Sheep and Goats. For cattle we practice system like penning, Tethering and others are allowed to freely feed from the pasturelands although they are taken care of by the owner."- KII Community leader Bula-Bishaaro

Table 6 Animal species (N=1610)

Animal species	Jowhar	Balcad	Control	Grand Total
Cattle	11,8%	6,6%	16,1%	10,8%
Goats	7,4%	6,8%	6,8%	7,0%
Sheep	5,5%	5,8%	9,3%	6,5%
Other	0,2%	0,2%	0,3%	0,2%
Camels	0,2%	0,2%	0,0%	0,1%
Poultry	1,2%	4,3%	4,5%	3,1%
N=	651	604	355	1610

Farmers predominantly employ direct application of manure onto the soil (54.1%), while a smaller proportion (2.1%) opt for composting before application. Conversely, 54.1% resort to discharging manure into open-air lagoons. Figure 25 below provides a breakdown of these findings by group, highlighting no differences amongst them. **There is potential to enhance fertilization practices by promoting greater adoption of composting techniques before application**, which is still relatively uncommon. This approach offers a more sustainable and advantageous method for enhancing soil fertility and supporting crop growth compared to direct manure application.

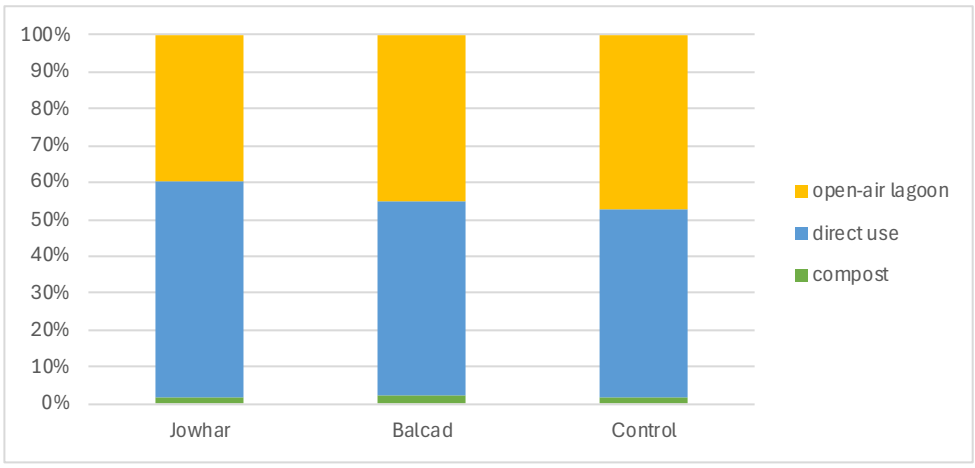


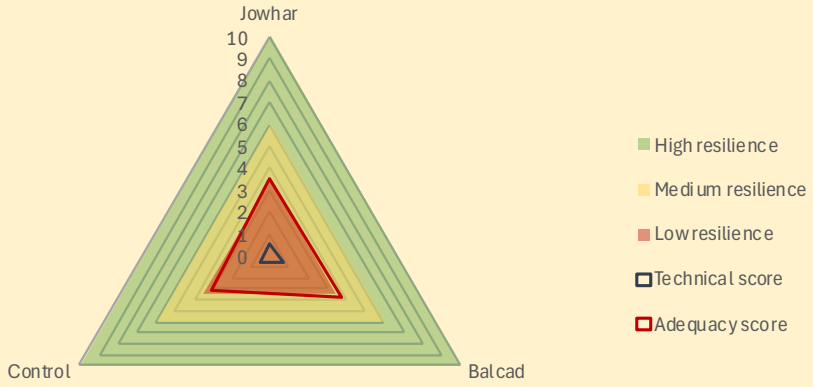
Figure 25 Manure management (N=375)

3.1.5 Tree production and use of timber and non-timber products

BOX 6

Technical and adequacy resilience scores

This module aims to evaluate the presence and diversity of trees on farmland and in surrounding forests (if they exist), as well as their sustainable use, contributing to the resilience of the agricultural system and households. The presence of trees on farmland enhances ecological self-regulation, reduces reliance on external inputs, and fosters the creation of an agroecosystem that recycles waste, conserves water, and increases agricultural activity diversity. This contributes to buffering against shocks and yields numerous benefits such as improving soil health by reducing erosion and increasing organic matter, enhancing biodiversity, sequestering carbon, aiding water management by increasing infiltration and reducing runoff, providing shade and shelter, creating a favourable microclimate, and enhancing overall resilience of farming systems and households. Additionally, trees offer additional income opportunities through non-timber forest products.



When looking at the overall average, farmers across all groups receive low compound resilience scores, with an average of 4.1/20. The above Figure shows that the technical score is particularly low, averaging only 0.6/10, which significantly drags down the overall compound resilience score. This is largely due to the limited presence of trees on farmland, with only 20.3% of households reporting having trees, including perennials. Among those who do, the low technical score is further influenced by the decrease in tree cover over the past three years, low tree density, limited diversity of tree species, and minimal use of non-forest tree products. Additionally, all households have limited access to forests and forest products, further reducing their resilience.

Trees on farmland

On average, only 20.3% of households reported growing trees on their agricultural land, including perennial plants. This result varies does not vary at all amongst groups, as illustrated in Figure 26 below.

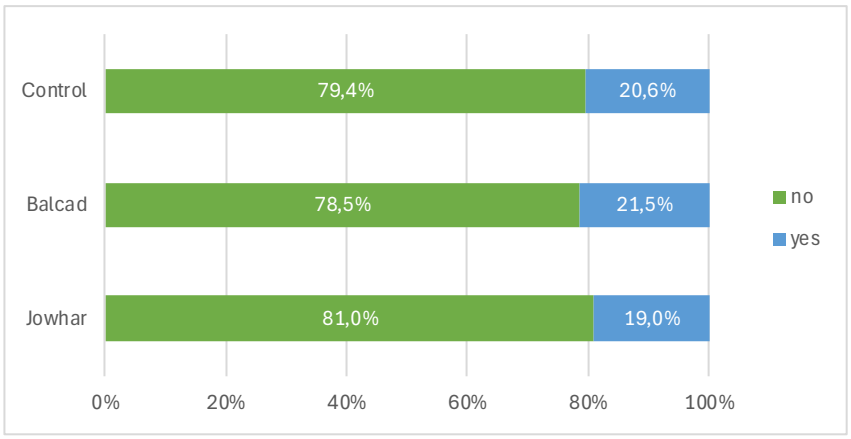


Figure 26 Tree presence on farmland (N=1610)

The distribution of trees on farmland shows that most households describe their trees as "few and scattered," with 81.1% reporting this across all groups. This pattern is consistent across Jowhar (81.5%), Balcad (77.3%), and the control group (87.3%). A smaller percentage of households' report having trees as "many and scattered evenly," with 8.4% in total. There is some variation between groups, with Balcad showing a slightly higher proportion (10.9%) compared to Jowhar (8.1%) and the control group (4.2%). Very few households reported trees as "bordering the land" (9.6% overall), and an even smaller number described their land as "forested area" (0.3%) or "other" (0.6%), with slight variations between groups. This suggests that, across all areas, trees are typically sparse and unevenly distributed, with limited land dedicated to dense tree coverage.

The data reveals that changes in tree species diversity and quantity over the last three years have been mostly negative, with most farmers reporting a decrease. In terms of species diversity, 53.2% of households across all groups reported a decline, while 45.0% saw no change, and only 1.8% noticed an increase. The control group experienced the most significant decline (64.4%) in species diversity compared to Jowhar (58.9%) and Balcad (41.5%), where more households noted stability (56.9% in Balcad and 40.3% in Jowhar).

Regarding tree quantity, a similar trend is observed, with 57.2% of households reporting a decrease in the number of trees, 41.3% noticing no change, and only 1.5% experiencing an increase. The control group again recorded the largest drop (75.3%), followed by Jowhar (58.1%) and Balcad (46.2%), where a significant proportion of households in Balcad (53.8%) reported no change. These figures suggest a general decline in both tree diversity and quantity across the surveyed areas, with the control group particularly affected.

Among farmers holding trees on farmland, the majority (63.2%) have only one specie and 28.5% between two and five different species. The detailed tree species are shown in Table 7 below.

Table 7 Tree species on farmland (N=327)

Tree species	Jowhar	Balcad	Control	Grand Total
perennials[8]	25,8%	53,1%	11,0%	33,3%
acacia	47,6%	16,9%	31,5%	31,8%
toothbrush tree	10,5%	10,8%	16,4%	11,9%
mesquite	8,1%	6,9%	11,0%	8,3%
acalliandra	8,9%	5,4%	2,7%	6,1%
neem tree	9,7%	5,4%	1,4%	6,1%
river shea	5,6%	6,9%	5,5%	6,1%
bead bean	3,2%	4,6%	8,2%	4,9%
prosopis	4,8%	5,4%	1,4%	4,3%
common holly	4,0%	3,1%	2,7%	3,4%
other	21,8%	10,8%	34,2%	20,2%
N=	124	130	73	327

Among farmers who reported having trees on their land, nearly half (49.8%) indicated that they did not utilize any timber or non-timber products from these trees. The use of tree products varies across groups, with some, like Jowhar, showing higher reliance on wood for charcoal, reported by 26.6% of farmers holding trees. The control group shows moderate use of trees for both charcoal and firewood, but a significantly higher proportion of farmers use trees for natural remedies compared to Jowhar and Balcad. The main use of on-farm tree products is illustrated in Figure 27 below. Despite these variations, the overall trend shows that most farmers reporting trees on farmland do not harvest tree products, though there are notable differences in how trees are utilized for specific purposes across groups.

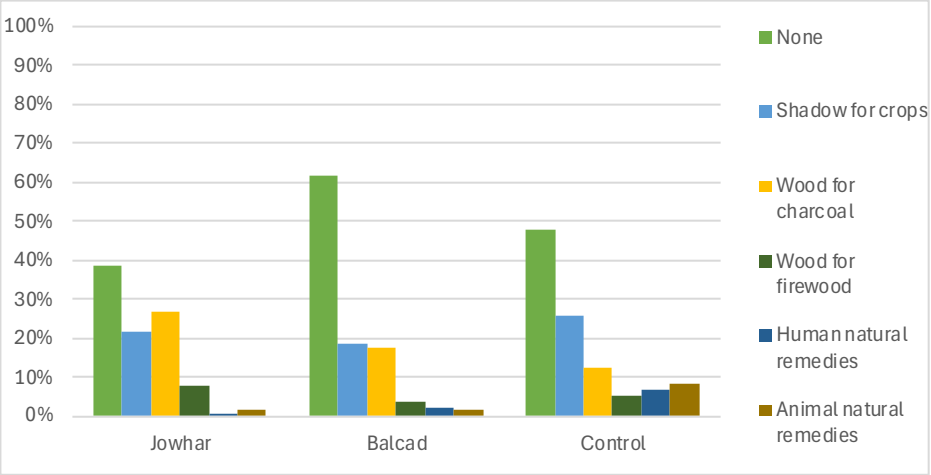


Figure 27 On farm main tree products used (N=327)

Forest outside farmland

On average, only 5.2% of farmers have access to forests outside their agricultural land, with minimal variation between groups: 6.6% for farmers in Jowhar, 4.7% in Balcad, and 3.4% in the control group.

[8] List of perennials in Table 5 above.

Among those with forest access, the vast majority (75.9%) reported a degradation in forest conditions over the past three years. This degradation was most pronounced among Jowhar farmers, with 90.7% observing it, compared to 57.1% in Balcad and 66.7% in the control group. Farmers largely attributed this decline to the expansion of agricultural activities.

Figure 28 below details the main forest tree products used by the small proportion of the population (only 5.18%) with access to forests. Forest usage differs significantly between groups. Farmers in Jowhar focus more on wood for firewood, while those in Balcad and the control group primarily harvest wood for charcoal. Additionally, Jowhar farmers tend to have a more diversified use of forest products, also utilizing non-timber resources like natural remedies for humans and animals. These findings reflect only a small subset of the total population.

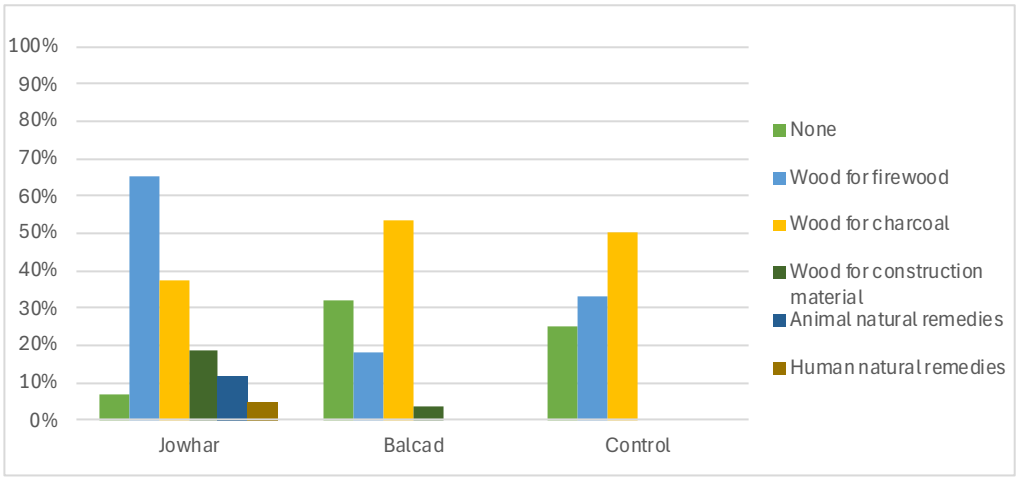


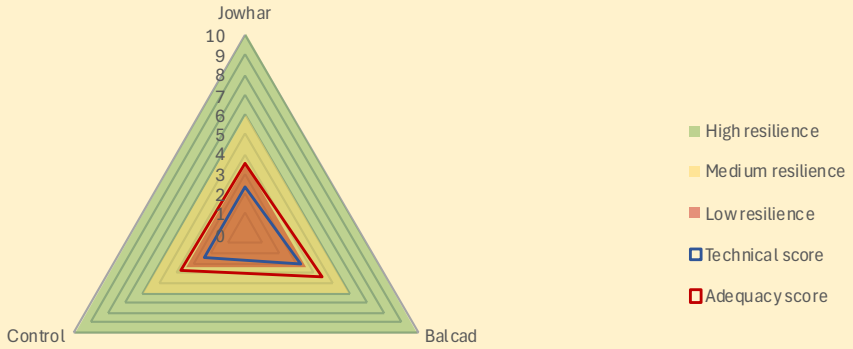
Figure 28 Forest main tree products used (N=83)

3.1.6 Land management practices

BOX 7

Technical and adequacy resilience scores

This module aims to assess land management practices employed to enhance soil quality and productivity, including soil fertilization methods. The objective is to examine whether the agroecological system maximizes the use of available natural resources and ecosystem services, and whether the system is ecologically self-regulated. Practices aligned with agroecological principles such as crop rotation, intercropping, and minimal tillage, which promote soil health and sustainability, are therefore considered more resilient and require fewer external inputs to the system.



This module obtains an average compound resilience score of 6.6/20, which is considered low. When disaggregating the data by groups, this low score is observed in Jowhar and the control group, but not in Balcad. This low score can be explained by a consistently low technical score across all groups, as shown in the Figure above. The technical score is low primarily due to a large proportion of farmers–83.7% on average–who have not taken any measures to improve soil quality. Furthermore, among those who have, very few employ agroecological practices. In Jowhar and the control group, the adequacy score is also low, indicating that even those farmers who have implemented any type of practices are dissatisfied with their capacity in improving soil quality.

Land quality improvement practices have been employed by an average of 16.3% of farmers in the past year. Breakdown by group reveals little variation with respectively 16.1%% of farmers adopting such practices in Jowhar, 18.7% on Balcad and 12.7% in the control group.

There is variation in the types of soil management practices used across the sample. The most adopted practice is manuring or composting, utilized by 8.4% of farming households overall, though this figure is higher in Balcad (13.1%) compared to Jowhar (4.9%) and the control group (6.8%). Liming, which averages 3.5%, is slightly more prevalent in Jowhar (5.4%) than in Balcad (2.5%) and the control group (1.7%). Windbreak hedges and intercropping are less frequently used, with intercropping being more prominent in the control group (3.4%) compared to Jowhar (1.1%) and Balcad (0.7%). Zero/minimum tillage and animal urea are also adopted by a small percentage of farmers, with the control group showing slightly higher usage of animal urea (2.3%) compared to Jowhar (0.5%) and Balcad (1.7%). Practices like planting cover crops, rotational grazing, and crop residues are scarcely used across all groups, with averages around 0.5% to 1.1%. Crop rotation is the least adopted practice overall, with only 0.5% of farmers using it. These findings, detailed in Table 8 below highlight the limited adoption of sustainable soil management practices across the sample.

"Soil degradation can happen when a repeated deep ploughing is done to turn over the ground and then a heavy rain comes, and the quality soil is washed away leaving the ground unfit for cultivation." - KII Community leader Jameeco

"It also happens when the soil dries and cracks because of little rainfall or drought. This reduces soil productivity and quality. It also happens when the soil is cultivated while wet, this therefore hardens the soil to an extent it becomes unfavorable for crop production and growth." - KII Community leader Jameeco

"Floods- excessive floods, especially during heavy rains the farms are filled with water that becomes stagnant for a very long period. This makes the soil salty. This condition depletes soil nutrients and does not support the growth of any crop."- KII Community leader Bula-Bishaaro

Soil degradation also happens when the soil dries and cracks because of little rainfall or drought. This reduces soil productivity and quality. It also happens when the soil is cultivated while wet, this therefore hardens the soil to an extent it becomes unfavorable for crop production and growth."- KII Community leader Bula-Bishaaro

"Excessive floods especially during heavy rains our farms are always submerged in water that becomes stagnant for a very long period. This makes the soil salty. This condition depletes soil nutrients and does not support the growth of any crop." - KII Community leader Jameeco

Table 8 Main land management practices used (N=1610)

Types of actions taken to improve or preserve soil quality	Jowhar	Balcad	Control	Grand Total
none	83,9%	81,3%	87,3%	83,7%
manuring composting	4,9%	13,1%	6,8%	8,4%
liming	5,4%	2,5%	1,7%	3,5%
wind break hedge	1,4%	0,5%	0,6%	0,9%
intercropping	1,1%	0,7%	3,4%	1,4%
zero minimum tillage	0,9%	0,8%	0,3%	0,7%
animal urea	0,5%	1,7%	2,3%	1,3%
planting cover crops	1,8%	0,5%	0,6%	1,1%
rotational grazing	0,6%	0,5%	0,6%	0,6%
crop residues	0,5%	0,7%	0,3%	0,5%
crop rotation	0,2%	0,8%	0,6%	0,5%
other	2,2%	1,2%	1,1%	1,6%
N=	651	604	355	1610

When asked about their perception of the effectiveness of the implemented practices in enhancing soil quality, most farmers regarded them as moderately or little beneficial. The breakdown of results for each group is depicted in Figure 29 below. Notably, farmers in Jowhar exhibited the lowest proportion of satisfied individuals, influencing directly the overall compound resilience score.

"Crop rotation is among the key farming practices in our village to reduce soil degradation. The time difference between the harvest for one crop and planting the next crop gives the land enough time to regain nutrients and quality."- KII Community leader Jameeco

"The land is ploughed months before the rainy season and irrigated well before crops are grown to reduce and prevent soil degradation." - KII Community leader Jameeco

"Afforestation also reduces soil degradation because the more the trees the less the soil erosion." - KII Community leader Jameeco

"Leaving the farm residues in the farm can also reduce soil degradation because this will allow the land to rest and regain its value as well as getting shield from winds erosions." - KII Community leader Jameeco

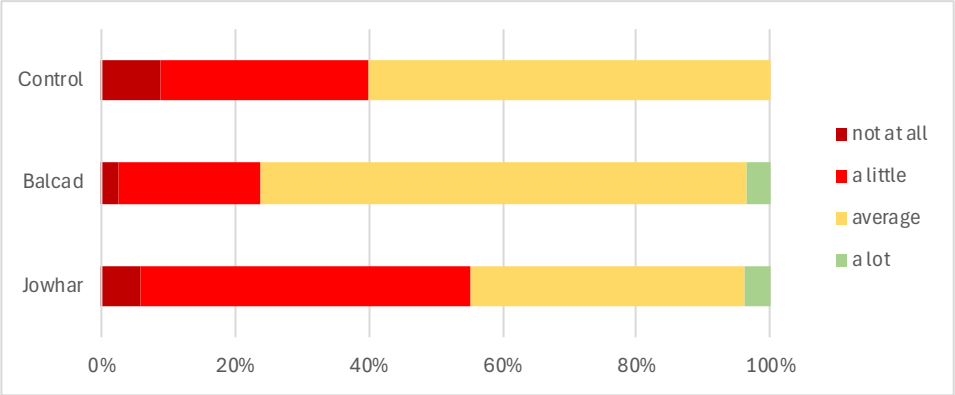


Figure 29 Usefulness of the land management practices (N=263)

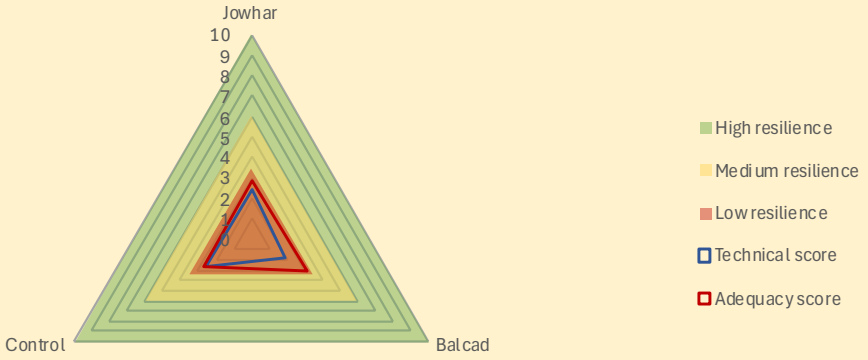
3.2 Natural resources utilization and management

3.2.1 Disturbance, climate change and coping strategies

BOX 8

Technical and adequacy resilience scores

This module explores the exposure and vulnerability to shocks by looking at the type and frequency of climate and non-climate shocks as well as the level of damage, the impact on the household and its adaptive capacities. For an agroecosystem to demonstrate resilience and adaptability to shocks and disturbances, it needs to be regularly exposed to various disturbances to develop effective adaptation strategies. The agroecosystem should therefore encounter repeated small shocks over time, as long as these shocks do not push the system beyond a critical threshold. This principle also applies to the frequency of each shock.



The overall compound resilience for this module is classified as low, with a score of 5.2/20. As illustrated in the Figure above, both adequacy and technical scores are consistently low. This is largely due to the limited number of climate and non-climate shocks reported per household, which is considered insufficient exposure to shocks for households to fully develop their adaptive capacity. Furthermore, the shocks that were reported are described as highly damaging, with significant negative impacts. The technical score is also influenced by households' perceptions of their recovery time from future shocks, as most estimate they would be able to recover quickly and expect to access external support for recovery. Finally, adequacy scores reveal that the majority of households are dissatisfied with the effectiveness of their current responses in addressing shocks and mitigating their impacts.

On average, 42.7% of households reported experiencing at least one climate-related shock in the past three years. However, this varies between groups, as shown in Figure 30 below, with farmers in Balcad reporting a slightly lower incidence of climatic shocks (37.6%). In contrast, non-climatic shocks were reported far less frequently, with an average of only 12.5% of households affected. These non-climatic shocks were somewhat more common among farmers in the control group, where 19.7% reported experiencing such events in the last three years.

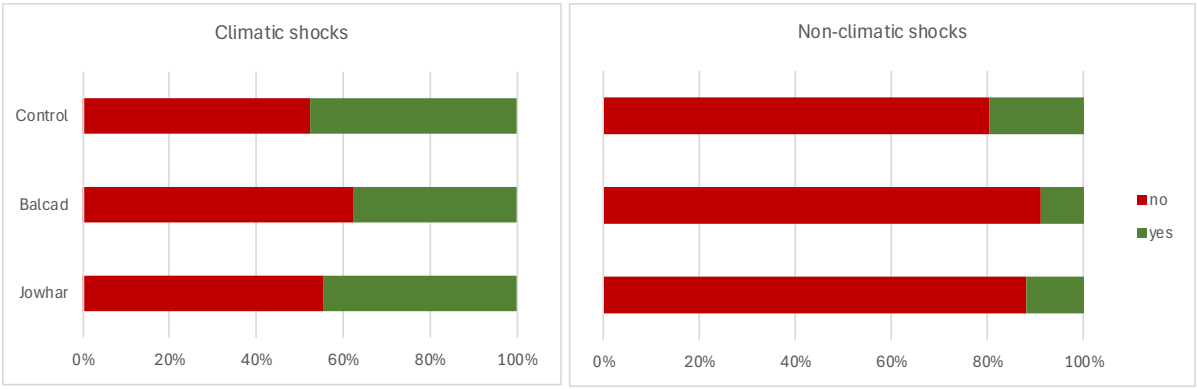


Figure 30 Share of household affected by climatic and non-climatic shocks in the last 3 years (N=1610)

Floods are the most reported climatic shock, affecting 32.1% of households overall. As per google buildings data analysis done by FAO SWALIM, 3.3% houses/buildings were affected during Gu seasons floods and 60.4% in Deyr season during 2023 in Jowhar districts. Whereas 0.7% buildings in Gu season and 36.7% in Deyr season were affected in Balcad district during 2023. This trend is consistent across all groups, with the highest proportion of affected households in the control group (37.5%), followed by Jowhar (35.8%) and Balcad (25.0%). In terms of frequency, floods are particularly notable, with households experiencing an average of 3.42 flood events over the past three years. The frequency is especially high in the control group (3.72) and Jowhar (3.53), while Balcad records a slightly lower frequency of 3.04. As per SWALIM data, two types of floods hit all areas, one is known as Gu and the other Deyr. The high prevalence and frequency of floods indicate that they are a significant challenge for households, posing more frequent risks than other climatic shocks.

Droughts, on the other hand, are reported far less frequently, affecting only 3.1% of households on average. As per google buildings data analysis done by FAO SWALIM, 79,863 buildings in Jowhar and 70,085 in Balcad districts were affected by drought in 2023. Balcad experiences the highest proportion of drought-affected households (5.1%), while other groups report even lower figures. In terms of occurrence, droughts happen an average of 0.46 times across all groups, with Balcad again experiencing the highest frequency at 0.89. Other climatic shocks, such as the late onset of rain and extreme heat, are reported by fewer than 1.0% of households across all groups, with both events occurring less than 0.1 times on average. While droughts are less frequent and affect fewer households, they still pose a risk, particularly in certain areas like Balcad.

Table 9 Main climatic and non-shocks affecting households in the last three years (N=1610)

Type of climatic shock	Jowhar	Balcad	Control	Grand Total
Flood	35,8%	25,0%	37,5%	32,1%
Drought	1,1%	5,1%	3,4%	3,1%
Late onset of rain	0,9%	1,2%	0,8%	1,0%
Extreme heat	0,0%	0,2%	0,6%	0,2%
N=	651	604	355	1610

Figure 31 highlights the damage caused by the various climatic shocks, revealing significant disparities in their impact across different categories. Floods emerge as the most damaging shock, with 72.53% of affected households reporting high to major damage, while a substantial 22.44% noted medium to moderate damage. This suggests that floods are not only frequent but also highly destructive, necessitating effective mitigation strategies. Droughts also pose a severe risk, as 80% of households experiencing drought reported high to major damage, indicating a critical vulnerability to this climatic event. Conversely, the impact of late onset of rain appears to be less severe, with an

equal distribution of 43.75% of households reporting both high and medium damage, while only 12.5% indicated low damage. Extreme heat is noteworthy, as 100% of affected households reported high damage, underscoring its potential to severely disrupt agricultural productivity.

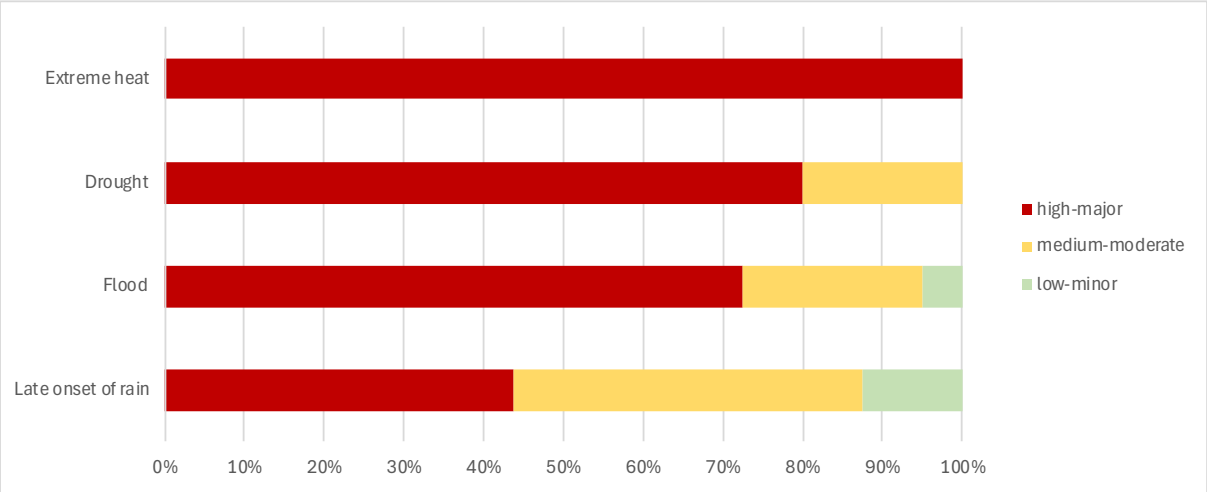


Figure 31 Level of damage of climatic shocks (N=587 reported shocks)

Table 10 below details the impact of the reported climatic shocks on affected households across different regions–Jowhar, Balcad, and a control group–providing insight into how these shocks manifest in terms of productivity, food security, and property loss. A significant 83.8% of households report experiencing loss of productivity, with Balcad (87.4%) showing the highest prevalence, indicating that climatic shocks severely hinder agricultural output across all groups. Crop failure is also a major concern, affecting 63.7% of households overall, with the control group reporting the highest rate at 69.3%. This suggests that even those not directly involved in the targeted projects are vulnerable to crop failures due to climatic shocks.

In terms of food security, the data reveals that 13.0% of experienced shocks led to a food shortage for the household facing the shocks, with Balcad reporting the highest rate at 17.4%. Although this percentage is lower than other impacts, it still highlights a significant concern, as food security is crucial for household resilience. The spread of pests affects was stated for 11.8% of reported climatic shocks, with relatively similar reporting across all groups, indicating that climatic shocks may also create conditions conducive to pest proliferation. Lastly, loss of property was reported for 11.1% of shocks overall, with the control group experiencing the highest impact at 17.3%. This suggests that while property loss is less common than productivity loss or crop failure, it remains a noteworthy concern. Overall, the data underscores the profound and multifaceted impact of climatic shocks on agricultural livelihoods, emphasizing the need for targeted interventions to enhance resilience among affected households.

Table 10 Main impacts of climatic shocks that affected household in the last three years (N=587reported shocks)

Impact of climatic shocks for affected households	Jowhar	Balcad	Control	Grand Total
loss of productivity	80,9%	87,4%	84,0%	83,8%
crop failure	59,3%	64,7%	69,3%	63,7%
reduced food security	7,7%	17,4%	16,0%	13,0%
spread of pests	13,0%	8,9%	13,3%	11,8%
loss of property	6,5%	12,1%	17,3%	11,1%
landslides	12,6%	11,1%	4,0%	9,9%
decrease in income	5,7%	9,5%	5,3%	6,8%

need for greater inputs	5,7%	5,3%	7,3%	6,0%
rising poverty levels	3,3%	8,4%	4,0%	5,1%
health risks including death	6,5%	4,7%	2,0%	4,8%
land erosion	1,6%	6,8%	3,3%	3,8%
crop damage	4,1%	2,6%	4,0%	3,6%
loss of animals	5,7%	1,1%	1,3%	3,1%
Other	7,3%	3,2%	6,0%	5,6%

Various strategies were employed by households in response to climatic shocks over the past three years, showing that in most cases, affected farmers attempted to mitigate the impacts. A significant 15.2% of shocks resulted in no action taken by the affected households, with Balcad (22.1%) showing the highest rate of inaction. However, this also means that for most shocks, households sought out solutions to cope with the consequences. One of the most common responses is off-farm employment, utilized in 25.8% of shocks, especially among control group households, where 36.0% of shocks led to this strategy. This indicates that many households seek alternative income sources outside of agriculture when confronted with climatic challenges. Borrowing from the community was another frequently used strategy, with 19.5% of shocks resulting in households seeking financial support from their local networks. This response was most prevalent in Jowhar (23.2%), illustrating the importance of social safety nets in times of crisis. Shifting to animal production was a less common response, employed in 13.0% of cases, while changing crop or animal varieties was utilized in 11.9% of shocks, indicating a strategic adaptation to reduce vulnerability to climatic changes. Seasonal migration was used less frequently, accounting for 8.7% of shocks, with the control group reporting the highest rate at 12.0%. The most common adaptation strategies are detailed and disaggregated per group in Table 11 below.

"During floods, we suffer from crop failures and loss of farm produce, food insecurity and little or poor accessibility to and from the village." - KII Community leader Jameeco.

"*There are several climate-related shocks in our locality. For example, drought is a major climate-related shock. During drought season, we usually store enough water in reservoirs to ensure water availability for irrigation and household use is maintained in case the river dries." - KII Community leader Jameeco*

"*Drought is a major climate-related shock. During drought season, we usually fill enough water with reservoirs to ensure water availability for irrigation and household use in case the river dries." – Mixed FGD Jowhar*

"Animal diseases is also a major shock that mostly affects livestock production. Shocks such as drought has a serious negative impact on the livestock production as it may kill a good number of livestock and brings about food insecurity." - KII Community leader Jameeco

Overall, the data shows that most farmers made efforts to adapt and cope with climatic shocks, utilizing a range of strategies to safeguard their livelihoods. However, the varying levels of response across regions also suggest that some households may need further support to strengthen their adaptive capacity.

Table 11 Main copping strategies used in the last three years (N=587 reported shocks)

Coping strategies for climatic shocks	Jowhar	Balcad	Control	Grand Total
did not do anything	12,2%	22,1%	11,3%	15,2%
off farm employment	17,5%	28,4%	36,0%	25,8%
borrowed from community	23,2%	13,7%	20,7%	19,5%
shift to animal production	14,6%	12,1%	11,3%	13,0%
change the crop or animal varieties	17,5%	8,9%	6,7%	11,9%
seasonal migration	8,9%	5,8%	12,0%	8,7%
relied on aid	2,8%	6,8%	1,3%	3,8%
sold agricultural assets	7,7%	0,5%	1,3%	3,8%
diff water management practices	2,8%	3,7%	1,3%	2,7%
diff land management practices	5,3%	0,5%	1,3%	2,7%
reduced healthcare spending	4,5%	0,5%	0,0%	2,0%

The surveyed households also experienced non-climatic shocks, though these affected only an average of 12.5% of households, as shown in Figure 30 above. When examining the types of non-climatic shocks in more detail, conflicts and pest and disease outbreaks emerged as the most reported, affecting 3.3% and 3.6% of the population, respectively. A breakdown of these results by group, illustrated in Figure 32 below, reveals further insights into the distribution of these shocks across different areas.

"Causes of resource-based conflict are failure to solve tensions that may lead to conflicts, poor farmers-livestock owners' co-existence, land demarcations and border row, the urge to grab people's land and lack of transparency in resource distribution and conflict resolution. Discrimination based on gender, ethnicity or capacity could also cause conflicts."- KII Community leader Bula-Bishaaro

"Inter-clan conflicts e.g., tensions resulting from pastures and other resources can reduce access to the pastures and agricultural lands as well as death of human and livestock." - KII Community leader Jameeco

"Resource-based conflicts can also occur when some members of the society are discriminated and are restricted from accessing resources and their rights."- Mixed FGD Balcad

"Poor or unstable bond among communities that are neighbors including poor conflict resolution strategies and agreements."- Mixed FGD Jowhar

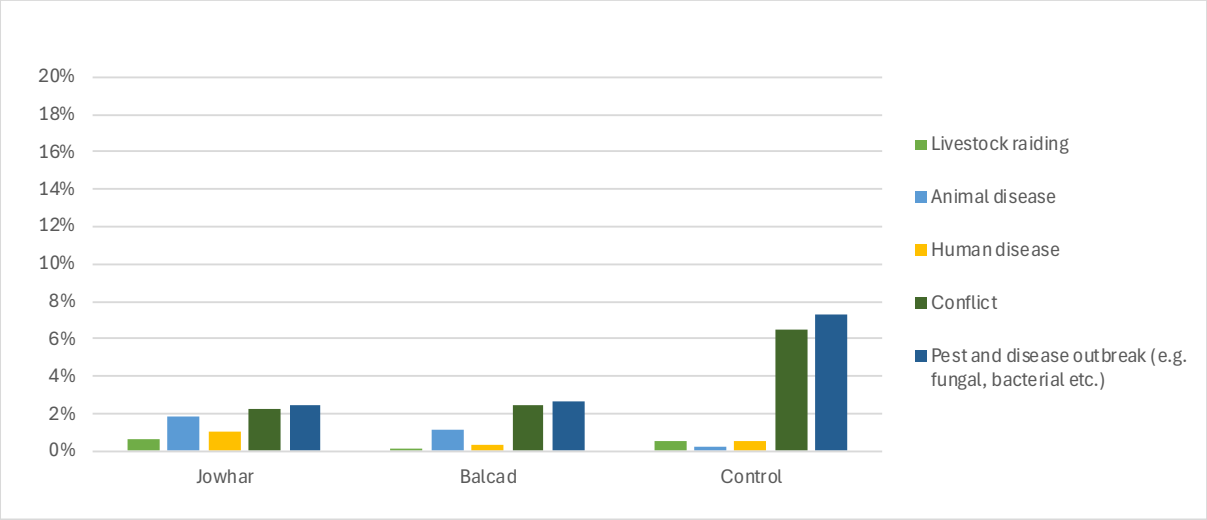


Figure 32 Main non-climatic and non-shocks affecting households in the last three years (N=1610)

The most significant impacts of non-climatic shocks, primarily conflicts and pest and disease outbreaks, include loss of production (83% of affected households), loss of property and productive assets (30%), and rising poverty levels (30%). These shocks severely disrupt agricultural activities, deplete household resources, and deepen poverty.

In terms of coping strategies, households largely turned to off-farm employment (38.9%), seasonal migration (29.5%), and changing crop or animal varieties (18.1%) to mitigate the effects of non-climatic shocks. These adaptive measures reflect households' efforts to diversify income sources and reduce reliance on affected agricultural systems.

"We don't have plans that are enough to address risks but once warning trigger is heard there are procedures for addressing these risks." - KII Community leader Jameeco

"*We usually receive warning system through local radios, Hormuud telecommunication voice warning, from friend and relatives as well as community elders and NGOs**.** These triggers are well understood and are used to address gaps and prepare for shocks."- KII Community leader Bula-Bishaaro*

"Some NGOs also provide early warning to climate changes and likely impacts so that people in the community are prepared for the shocks and enhance their adaptability in the future." – Mixed FGD Jowhar

"During warning signs for drought, people tend to store enough food for consumption and enough fodder for the livestock so as to adapt to the anticipated little rain."– Mixed FGD Balcad

"When early warning about little rain is received, the community is advised to store more food to avoid risks of food shortages and malnutrition that may result from drought." – Mixed FGD Balcad

"During warning signs for drought, people are advised to store enough food for consumption and enough fodder for the livestock so that they can adapt to the anticipated impacts of drought." – Mixed FGD Jowhar

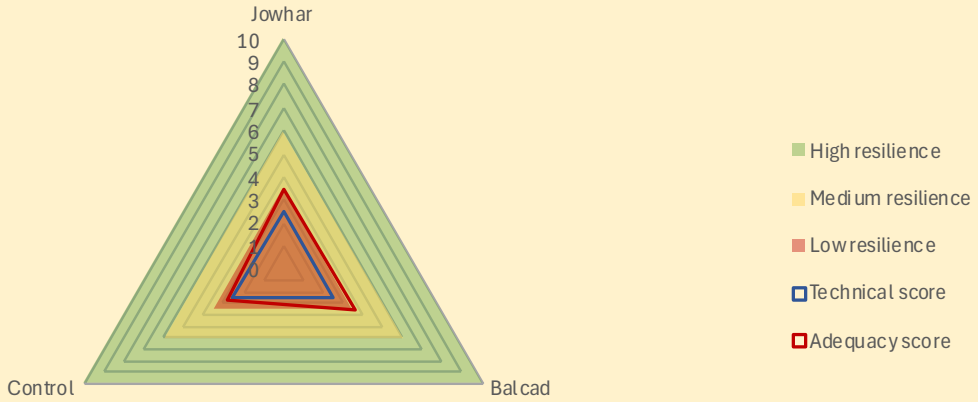
"When the community receives early warning signs of climate changes such as heavy rains, those in lowlands are advised to move to raised places where impacts of flood are relatively low." – Mixed FGD Jowhar

3.2.2 Water access and management

BOX 9

Technical and adequacy resilience scores

This module aims to assess the access to and management of water resources for various purposes including household consumption, agricultural field irrigation, and livestock within the households. It focuses on identifying the sources of water, the time required to access these sources, changes in water availability, and the effectiveness of water conservation measures. Additionally, the module examines household practices related to water treatment and the affordability of water-related expenses, ensuring that all water needs are consistently met for human, agricultural, and livestock purposes.



This module achieves a compound resilience score of 5.9/20, classified as low. This result is driven by low technical and adequacy scores across all studied groups, with the exception of Balcad, as shown in the Figure above. The low scores are largely attributed to a lack of diversity in water sources, limited capacity to pay for water for agricultural use, and the absence of water conservation practices. Additionally, the vast majority of respondents reported being unsatisfied with their access to consistent, sufficient, and adequate water for household use. These factors collectively contribute to the low resilience score in water access and management.

For household consumption, 83.2% of surveyed households have access to only one water source on average. This source varies depending on the household. Across the three groups studied, the main sources of water are rivers/ponds or lakes (28.8%), boreholes (24.8%), and communal wells (19.7%). For agricultural use, households appear to have access to a slightly broader range of sources, with 75.4% reporting access to only one source and 24.6% to two sources. The results are similar across groups. Regarding the main source for agriculture, rivers, streams, or lakes were reported by 81.6% of respondents, making it the principal source, followed by boreholes at 10.6%. For livestock consumption, water sources are even less diversified, with 94.2% of households relying on only one source, predominantly rivers, streams, or lakes (55.8%), followed by boreholes (36.1%). Only a few water sources are available across all groups, with similar sources being used for household, agricultural, and livestock needs.

Farmers were also asked if financial constraints limit their access to water for agricultural activities by inquiring whether they could afford the fees associated with accessing water for farming. On average, only 12.4% reported not needing to pay for water, while 44.2% indicated they could not afford to pay at all, and 18.1% stated they rarely have the means to pay. These findings are consistent across all groups, as illustrated in Figure 33 below and highlight the insufficient access to water for agricultural purposes due to financial barriers.

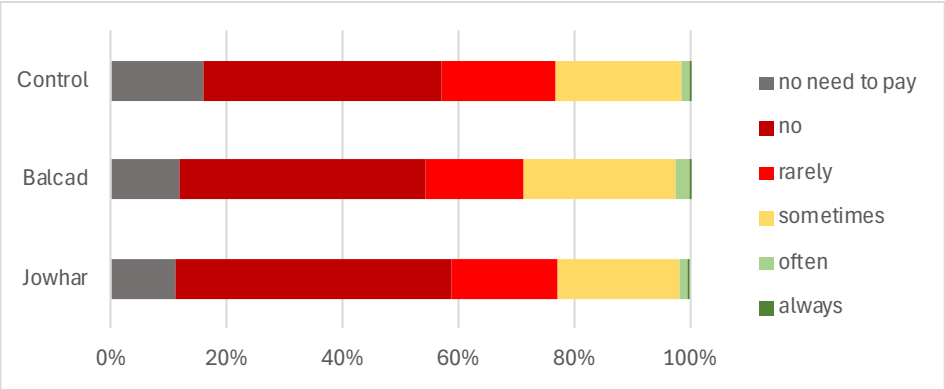


Figure 33 Ability to afford to pay the fees for using water for agriculture (N=1610)

For the water sources mentioned above, about a quarter of farmers reported a decrease in water availability. Additionally, farmers were asked if they implemented actions to improve water conservation. A significant portion of households across all groups take no action to improve water conservation, with 74.4% on average reporting no measures in place. The most common action taken is the use of planting pits, with 16.3% of farmers employing this method. This is consistent across Jowhar (15.8%), Balcad (15.5%), and the control group (18.4%). Water retention ditches are the second most frequently used practice, adopted by 10.3% overall, with higher usage in the control group (14.1%) compared to Jowhar (9.4%) and Balcad (9.2%). Localized irrigation systems are implemented by only 3.1% of respondents, with minimal variation across groups. Lastly, other water conservation practices are reported by 5.2% of the sample, referring to mulching, water early in the morning or late at night when temperature is low, cover crops, terracing or other water harvesting techniques. These findings indicate limited efforts in water conservation, with the majority of farmers not implementing measures to improve water management. The main water conservation practices used are detailed in Table 12 below.

"The canals and the borehole are managed by individual who maintain and ensure their security, but they are used freely by everybody." – Mixed FGD Jowhar

"Our main sources of water are the river through the irrigation canals managed by the committee and a private borehole, which is usually managed by the locals and is accessible to everybody in this locality."- Mixed FGD Balcad

"Yes, we share water, and all other resources based on the signed agreements. These agreements are designed by representative from the different communities and are implemented by an elected committee." - KII Community leader Bula-Bishaaro

Table 12 Water conservation practices used (N=1610)

Actions to improve water conservation	Jowhar	Balcad	Control	Grand Total
nothing	76,6%	72,9%	72,9%	74,4%
planting pits	15,8%	15,5%	18,4%	16,3%
water retention ditches	9,4%	9,2%	14,1%	10,3%
localized irrigation	2,3%	3,7%	3,7%	3,1%
other	4,5%	6,5%	4,2%	5,2%
N=	651	604	355	1610

Overall, the techniques used to increase water availability do not appear to be very effective. The majority of respondents across all groups report that the actions taken have had little to no impact, with 48.3% stating that the measures have helped "a little" and 5.6% indicating they were "not effective at all." Only a small percentage, 2.7%, found the techniques to be highly effective. These results are similar across groups, as illustrated in Figure 34 below, with slight variations in effectiveness levels. This suggests that the current water conservation practices are insufficient to significantly improve water availability.

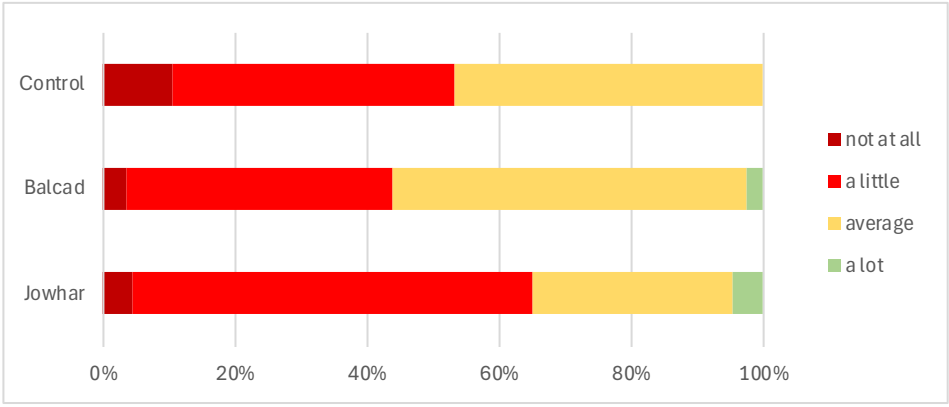


Figure 34 Effectiveness of actions taken to increase water availability (N=410)

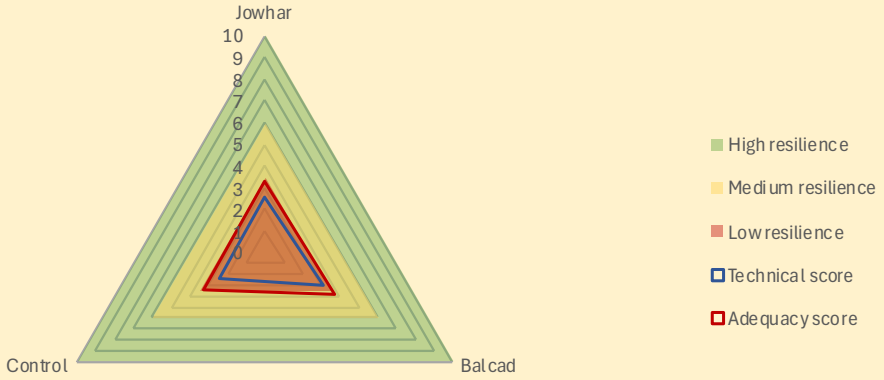
3.3 Access to economic resources and information

3.3.1 Access to markets

BOX 10

Technical and adequacy resilience scores

This module assesses farmers' capacity to market their products effectively, taking into account various factors such as physical access, organization for favourable sales conditions and pricing, access to diverse sales channels, and progress towards obtaining certification. Farmers organized within grassroots systems are considered more resilient due to their collective bargaining power, pooling of resources and knowledge, and risk-sharing capabilities. The objective is also to be well-connected, meaning to have multiple sales channels to avoid dependence on a single external force. Ultimately, as agricultural households rely on farming as their primary source of income, these activities must be reasonably profitable so that farmers do not solely depend on subsidies or assistance.



This module achieves a compound resilience score of 6.2/20, classified as low. The compound resilience scores are only calculated for market-oriented farmers, therefore representing 56.1% of the total households interviewed. These low levels can be attributed particularly to the technical component, which consistently remains low, as evident in the Figure above. This technical aspect is primarily affected by farmers' limited capacity to sell desired products, their lack of organization in marketing their produce—leading them to sell independently—and the pricing mechanisms they employ, which are often too low or unstable to secure a reliable income. Additionally, there is a total absence of certification to add value and ensure stable earnings. The adequacy component is also relatively low, indicating that farmers are not very satisfied with the conditions under which they sell their products to generate sufficient income.

The data shows that across all groups, the majority of farmers produce with the intent to sell at least part of their production to generate income. This trend is consistent, with 55.8% of farming households in Jowhar, 59.6% in Balcad, and 51.0% in the control group being market-oriented. The remaining households who do not sell primarily cited inconvenience or lack of interest as their reasons.

Among those aiming to sell, over half (51.5%) faced challenges in selling their farm products over the past twelve months. Across all groups, none of the interviewed farmers were able to sell all the desired products, and only 11.7% managed to sell a portion of what they had intended, as shown in Figure 35. Nearly 87.0% of farmers attributed their inability to sell to insufficient production, while 6.5% said they didn’t know where to sell their products, a challenge more frequently mentioned in

Balcad (15.4%). Additionally, 5.9% of farmers in Jowhar and 3.8% in Balcad reported that the market was too far away.

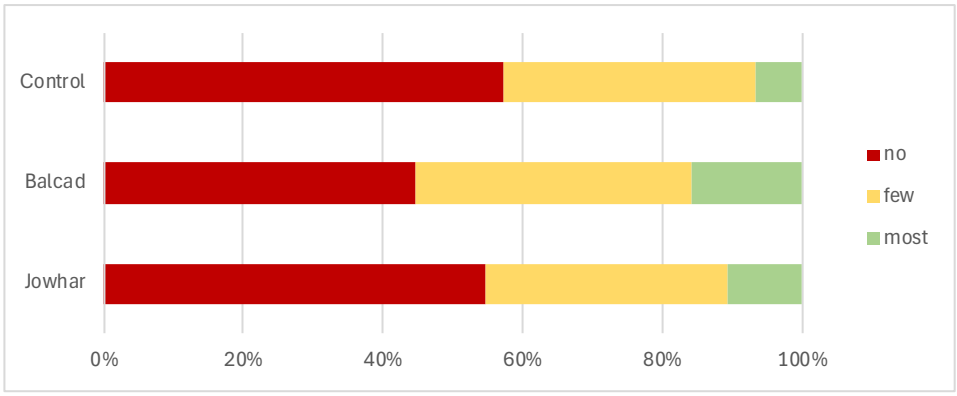


Figure 35 Ability to sell production (N=904)

Most households (61.3%) sell their products independently, indicating a lack of organization into formal or informal groups that could enhance their market access and selling capabilities.

The primary sales channel across all groups is the local market, with 73.1% of farmers utilizing this option, indicating its importance in generating income. This practice is particularly prevalent in Balcad, where 79.9% of farmers sell their products locally, followed by Jowhar at 72.2%. In contrast, the control group has a slightly lower reliance on local markets, with 59.9% using this channel. Regional markets are also significant, particularly in Jowhar and the control group, with 35.3% and 34.9% of farmers respectively opting for this channel. However, selling to traders is more common in the control group, with 25.7% of farmers utilizing this option, compared to only 4.4% in Jowhar and 12.0% in Balcad. Other channels such as street sales and kiosk shops are used less frequently, highlighting the strong preference for local markets. These findings illustrate the varied sales strategies employed by farmers across different groups.

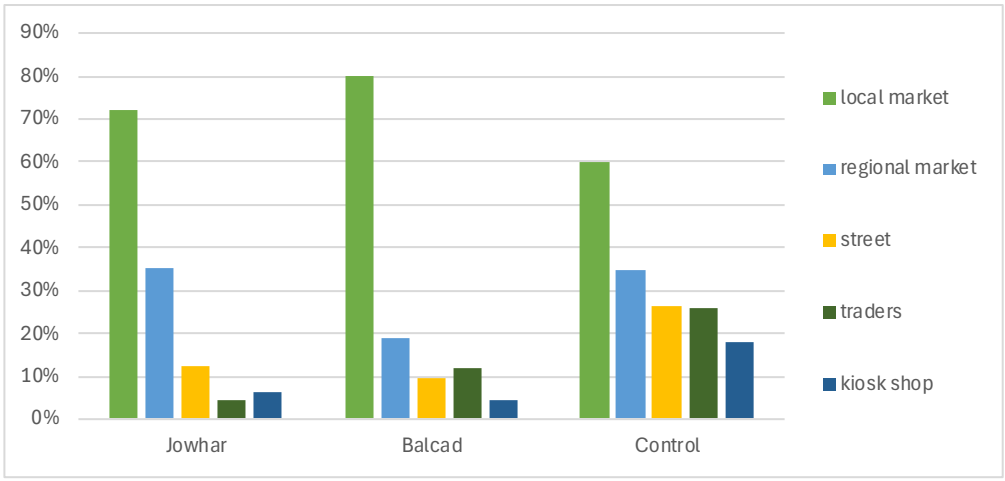


Figure 36 Main sales channel (N=781)

Prices are determined by prevailing market rates and the information available to farmers. Many farmers perceive these prices as volatile and not consistently profitable. As illustrated in Figure 37 below, farmers across all groups largely view prices as fluctuating, which hinders their ability to generate stable profits. Additionally, 29.6% of respondents indicated that prices are always low, while only 10.2% believe that prices are consistently profitable. Given that 97.4% of respondents identified crop production as their primary source of income, the profitability of agricultural activities is crucial for securing household livelihoods.

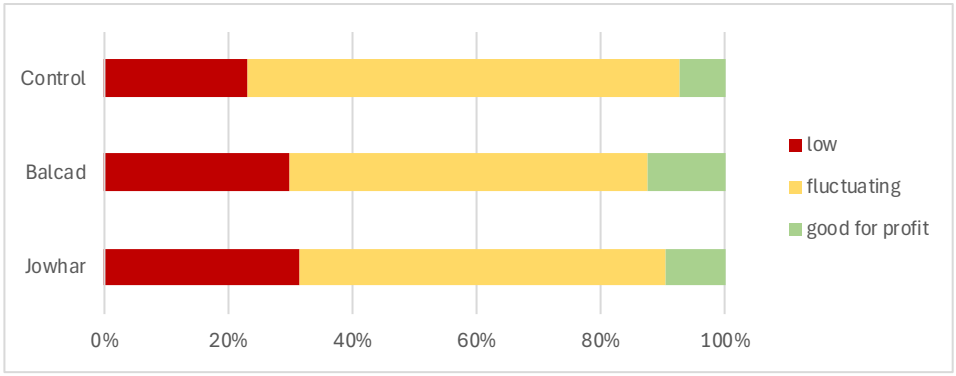


Figure 37 Perception of the selling price of agricultural products (N=781)

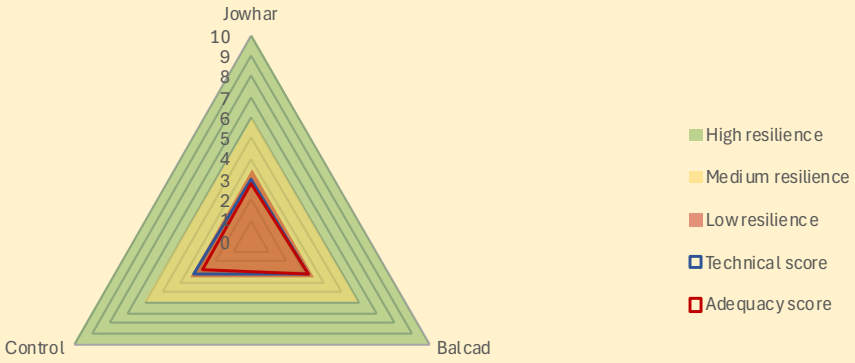
Participation in certification schemes is relatively uncommon, with only 35.6% of surveyed households engaged in such programs. The control group shows a higher representation, with 48.2% of its members participating in certifications. Among those involved in certification schemes across all groups, all are affiliated with Fairtrade. For the majority of those not participating in certification, the primary reason cited is that such schemes do not exist in their area.

1.1.5. Access to information

BOX 13

Technical and adequacy resilience scores

This module aims to assess farm households' access to various types of information, including weather, climate, and non-climate hazards, as well as cropping and livestock practices and sustainable natural resource management. Access to such information is crucial for preparedness and resilience-building against climatic shocks and disturbances. Additionally, the diversity and usefulness of the information received are evaluated to gauge overall resilience.



Farmers have achieved a compound resilience score of 6.2/20, which is classified as low. Both the adequacy and technical scores are nearly identical, as shown in the Figure above. The low technical score is primarily due to the perceived quality of weather forecast information, which most farming households consider only slightly or moderately useful. Moreover, only a small proportion of households (20.8%) have access to information on cropping or livestock adaptation practices, and even fewer (15.3%) have access to sustainable resource management information. This underscores a significant gap in the dissemination of crucial agricultural data, potentially undermining resilience-building efforts. Additionally, the majority of farmers are dissatisfied with the sufficiency of available information to help households predict and cope with weather events and climate changes, which negatively impacts both the adequacy score and the overall compound resilience score.

Access to information is critical for improving resilience and adaptation in farming communities. According to the data, a significant portion of households across all groups reported having access to information, particularly on future weather and natural events, with 61.0% of respondents indicating that they receive such information. This is slightly higher in the control group, where 67.0% have access, compared to 59.8% in Jowhar and 58.8% in Balcad. However, access to information on cropping or livestock adaptation practices and sustainable resource management remains relatively low, with only 20.8% and 15.3% of households, respectively, reporting access. This trend is consistent across groups, as seen is Figure 38 below, showing that while weather-related information is widely available, knowledge on practical adaptation and resource management is more limited. These findings underscore the need for improved access to diverse types of information that could enhance farming practices and sustainability.

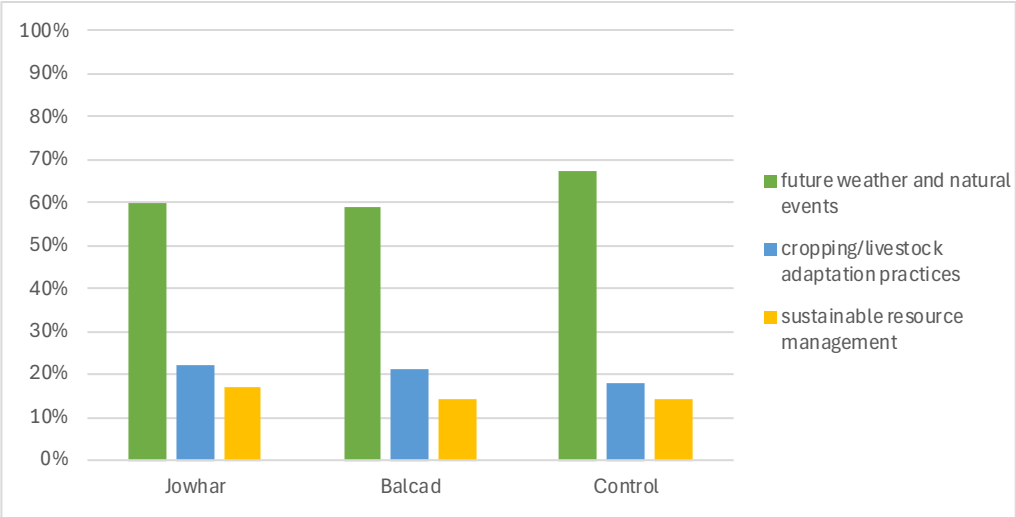


Figure 38 Access to different type of information (N=1610)

The most accessed type of weather information is extreme events forecast, with an average of 75.6% of respondents, highlighting the importance of anticipating weather-related risks. Seasonal weather forecasts follow closely, with nearly half of all respondents (46.7%) relying on this information. Less commonly accessed types of information include forecasts for the start of the rains, pest and disease outbreaks, both accessed by approximately 10-12% of respondents. Interestingly, very few respondents (0.4%) indicated reliance on other types of weather information. This trend is consistent across Jowhar, Balcad, and the control group, with minimal variations, as seen in Figure 39 below.

The data shows that the most accessed type of information is related to crop production and management, with 81.5% of respondents across all groups indicating they seek this information. Post-production handling information follows at a much lower 23%, highlighting a gap in knowledge that could affect value addition and income generation. Information on livestock production and management is accessed by only 7.8% of respondents, indicating that this topic is less prioritized across the study groups. These trends are consistent across Jowhar, Balcad, and the control group, with only slight variations in the levels of access to different types of information.

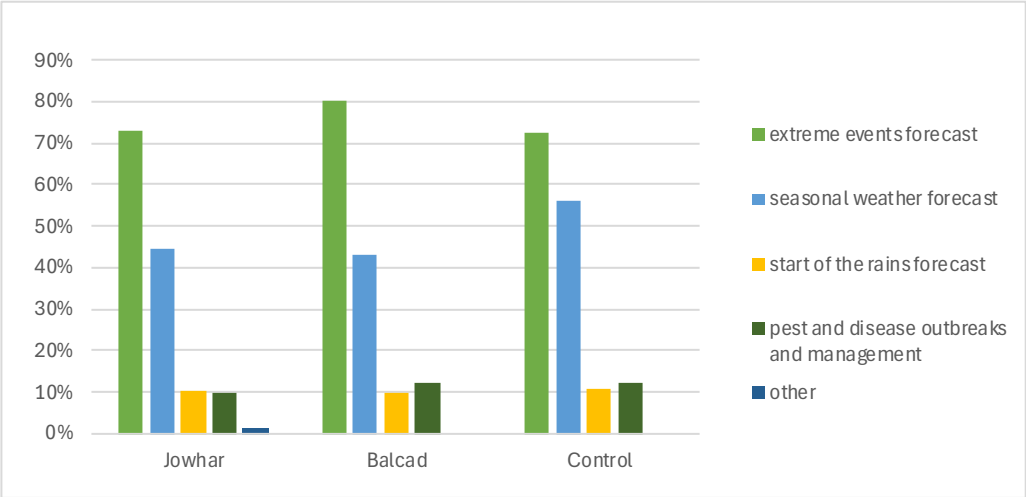


Figure 39 Type of information for weather forecast and natural events (N=982)

The primary source of information for accessing weather forecasts, future natural events, and cropping/livestock adaptation practices is through cell phones across all groups. This is followed by the radio. However, beyond these sources, the results vary depending on the type of information accessed or the specific group being disaggregated. These findings are detailed in Tables 13 and 14 below.

"The local authority through the department of disaster management and the village elder provide early warnings to both major and minor shocks." – Mixed FGD Jowhar

"Through Hormud telecommunication as call-to-call awareness voices for all calls which is reliable and sufficient so that the community is warned against any worrying signs of climate-related shocks." – Mixed FGD Jowhar

"Through a local radio station, that airs early warning signs of different shocks in its programs to alert the community of the danger ahead and the ideal practices to adapt with those shocks. This alert is always reliable and sufficient." – Mixed FGD Jowhar

"There are NGOs who also provide early warning to climate changes and likely impacts so that people in the community is prepared for the shocks and enhance their adaptability in the future." – Mixed FGD Balcad

Table 13 Sources of information for weather forecast and natural events (N=982)

Sources of information	Jowhar	Balcad	Control	Grand Total
cell phone	63,5%	68,7%	75,2%	68,2%
radio	57,6%	46,2%	53,4%	52,4%
neighbors	16,2%	18,6%	25,2%	19,2%
community based organizations	8,2%	18,3%	8,0%	11,8%
traditional forecasters	8,7%	9,0%	11,8%	9,6%
farmer organizations	2,3%	20,6%	4,2%	9,4%
family members	8,7%	6,8%	11,3%	8,7%
cooperatives	1,3%	16,6%	6,7%	8,1%
UN	10,8%	6,5%	2,9%	7,3%
NGOs	9,0%	5,9%	5,0%	6,9%
government extension workers	4,9%	2,0%	2,9%	3,4%
community meetings	2,8%	2,8%	2,9%	2,9%
television	2,1%	3,7%	1,7%	2,5%

Table 14 Sources of information for cropping/livestock adaptation practices (N=335)

Sources of information	Jowhar	Balcad	Control	Grand Total
cell phone	41,4%	55,9%	57,1%	49,9%
radio	40,0%	42,5%	38,1%	40,6%
traditional forecasters	15,9%	15,7%	28,6%	18,2%
UN	24,1%	8,7%	6,3%	14,9%
cooperatives	2,8%	19,7%	31,7%	14,6%
neighbors	17,9%	7,9%	9,5%	12,5%
farmer organizations	6,2%	21,3%	4,8%	11,6%
family members	9,7%	5,5%	20,6%	10,1%
community based organizations	7,6%	13,4%	9,5%	10,1%
NGOs	17,2%	3,9%	3,2%	9,6%
community meetings	9,0%	7,9%	12,7%	9,3%
government extension workers	4,8%	3,1%	6,3%	4,5%
religious groups	4,1%	2,4%	4,8%	3,6%
agri. service providers	3,4%	3,1%	3,2%	3,3%

Figure 40 below highlights the perceived usefulness of information on weather and natural events, as well as cropping/livestock adaptation practices, across the surveyed groups. For weather and natural events, most respondents in all groups rated the information as "somewhat" helpful, with similar distributions across Jowhar, Balcad, and the control group. Only a small proportion of respondents across all groups found the information "not very helpful." For adaptation practices, the information was generally rated more positively, with a higher percentage of respondents considering it "very helpful," particularly in the control group. These results show that while most respondents find the information somewhat helpful, there is a marked improvement in satisfaction when it comes to adaptation practices, especially among the control group. Overall, satisfaction with the usefulness of both types of information remains consistently moderate.

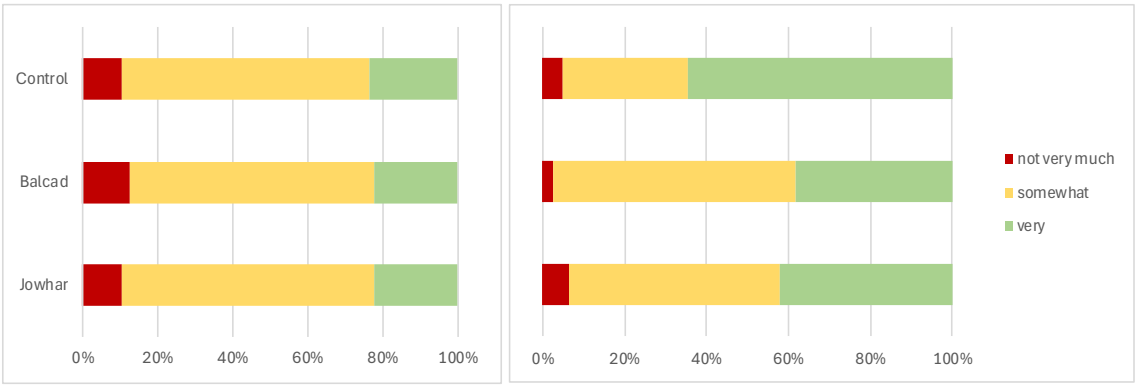


Figure 40 Usefulness of the information on weather forecast and natural events and on cropping/livestock adaptation practices (N=982 and 335)

4. Baseline Indicators

The SHARP+ questionnaire, used as a baseline tool for the RESTORE, TRANSFORM, PBF and MAAREYANTA projects, also served as a foundation for gathering household-level data, used to calculate key indicators for assessing the impact and outcomes, of four projects part of JOSP. The aim is to track the evolution of these indicators for project Monitoring and Evaluation (M&E). This baseline study will support in project impact evaluation when compare with midline and end line studies lateron. This section presents selected indicators for each project, with the complete list of indicators available in Annex 2.

4.1 RESTORE project

4.1.1 Impact

The impact of the RESTORE project is to contribute significantly to reducing the effects of climate hazards (floods and droughts) on vulnerable populations, while also supporting the environmental peacebuilding agenda in Somalia.

To develop the baseline status of this, following four impact indicators were measured:

1. **Increase in overall resilience**: This indicator reflects the average compound resilience score of all beneficiary households across all assessed modules[9].
2. **Trust between target populations and government institutions rebuilt through sustainable natural resource management and climate-adaptive public-private partnerships**: This indicator was measured by asking respondents to rate their level of trust in government institutions regarding natural resource management and climate-adaptive public-private partnerships. Only respondents who indicated a "high" or "very high" level of trust were included in the calculation, while those indicating "moderate," "low," or "very low" levels of trust were excluded.
3. Increase crop production or yield per ha.
4. Area protected from flood was measured through SWALIM data.

Impact indicators are detailed in Table 15 below.

Table 15 Impact indicators for RESTORE project

	Indicator	Baseline value
1	Number of people whose resilience has been improved because of the project (ICF KPI 4) (To be computed using SHARP).	Average compound resilience score 7.4/20 – With 42.7% of HH having a Low Res, 56.8% a Medium Res and 0.2% with High Res. (SHARP data).
2	Percentage change in reported trust among households in government.	52.9% of respondents with at least a moderate level of trust. (SHARP data).
3	Percentage change in crop production at household level against (irrigation) (Maize, Sesame, Beans).	Maize with 100% of land irrigated 683.5 kg/ha.

[9] Detailed scores by domain and module can be found in section 2.2.1. Average resilience score per domain and section 2.2.2. Average resilience score per module.

		Sesame with 100% of land irrigated 430.6 kg/ha. Beans with 100% of land irrigated 597.3 kg/ha. (SHARP data).
4	Area protected from flood (ha).	Gu season: 30,730.78 ha. Deyr season: 13,191.12 ha. (SWALIM data).

4.1.2 Outcome

The outcomes of the RESTORE project are focused on ensuring that ecosystem- and conflict-sensitive approaches to natural resource management, infrastructure rehabilitation, and governance are thoroughly assessed and applied. In addition, the project aims to promote climate-adaptive agro-ecology practices and infrastructure that enhance food production and support environmental health in a sustainable manner. Finally, the project seeks to strengthen both institutional and community capacities for climate disaster risk profiling and management, enabling better preparedness and response to climate-related hazards.

To develop the baseline status of these, seven outcome indicators were measured:

1. Percentage of land in the project target area affected by surface erosion
2. Percentage change in land under irrigation
3. Percentage change in crop yield (Maize, Sesame, Beans, and Sorghum)
4. Percentage of community members reporting inclusive management of the environment and inclusive decision making around natural resource governance
5. Percentage change in crop yield at household level
6. Number of households who have improved knowledge and practice of agro-ecology practices on their land
7. Percentage of households affected by flooding
8. Percentage of households affected by drought

Outcome indicators and sub-indicators are detailed in Table 16 below.

Table 16 Outcome indicators for RESTORE project

	Indicator	Baseline value
1	Percentage of land in the project target area affected by surface erosion.	Slight soil loss: 19%. Moderate soil loss: 61.5%. High soil loss: 12.55. Very high soil loss: 3.4%. Severe soil loss: 3.5%. (CHIRPS, Sentinel 2, MODIS, Open Land Map data).
1.1	Percentage of households affected by erosion	46.1 ha of land affected by erosion, affecting 13.1% of households. (SHARP data).
1.2	Percentage of agricultural land affected by erosion	0.1 ha of land under erosion per household, 5.6% of total agricultural land affected by erosion. (SHARP data).
2	Percentage change in land under irrigation.	

2.1	Percentage of households irrigating crops.	56% of households irrigate seasonal and/or perennial crops. (SHARP data).
2.2	Percentage of cultivated land under irrigation.	3.57% of total land. (GFSAD Landsat-Derived Global Rainfed and Irrigated-Cropland Product data). 0.6 ha of irrigated land per household, 50,8% of total lands are irrigated. (SHARP data).
2.3	Total land irrigated (ha)	Total irrigated land: 346.2 ha. (SHARP data).
2.4	Percentage change in crop yield (t/ha) at household level.	Maize: 0.58 t/ha Sesame: 0.36 t/ha Beans: 0.52 t/ha Sorghum: 0.08 t/ha. (SHARP data). Yield per specific crop in Annex 3
3	Percentage of community members reporting inclusive management of the environment and inclusive decision making around natural resource governance.	
3.1	Percentage of households reporting that others in the community have a restricted access and utilization of resources because of their ethnic group, gender	21.9% of household reported that at least a few members of the community have a restricted access and utilization of resources. (SHARP data).
3.2	Percentage of households feeling some members of the community do not have an equal say in decision elated to natural resource management	52.5% of households feel some members of the community do not have an equal say in decision related to natural resource management. (SHARP data).
3.3	Percentage of community members involved in decisions related to Natural Resource Management	6.70% of households feel that at least 90% of the community are fully involved in decision related to NRM. (SHARP data).
3.4	Percentage of households reporting exclusions of groups or individuals from decision-making processes on Natural Resource Management	38.1% of households reported exclusions. (SHARP data).
5	Percentage of riverine farmers in Jowhar & Balcad districts who have improved knowledge and practice of agro-ecology practices at project end.	
5.1	Average number of agroecological practices used per household	0.22 of agroecological practices per household. (SHARP data).
5.2	Percentage of households using improved agroecological practices	18.7% of households use agroecological practices. (SHARP data).
5.3	Percentage of households having access to information on climate adaptation practices	21% of households have access to information on climate adaptation practices. (SHARP data).
5.4	Percentage of households having access to information on Natural Resource Management	14.1% have access to information on NRM. (SHARP data).
6	Percentage of households affected by flooding.	25.0% of household affected by flooding. (SHARP data). No. of flooded buildings in Gu Season: 4,97 (0.7%). (Google buildings data). No. of flooded buildings in Deyr Season: 25,715 (36.7%). (Google buildings data).
7	Percentage of households affected by drought.	5.1% of household affected by droughts. (SHARP data). Homes affected by droughts 70,085 (100%) (Google buildings data).

4.2 TRANSFORM project

4.2.1 Impact

The impact of the TRANSFORM project is to contribute significantly to mitigating the effects of climate hazards (floods and droughts) on vulnerable populations, while also supporting the stabilization agenda in Somalia. The project's overall objective is to enhance climate-resilient livelihoods and improve food security in southern Somalia.

To establish the baseline status of this, four impact indicators were measured:

1. **Increase in overall resilience**: This indicator reflects the average compound resilience score of all beneficiary households across all assessed modules.
2. **Percentage increase in cereal crop yield**: This indicator measures the improvement in agricultural productivity among beneficiary households.
3. **Reduced Coping Strategy Index (rCSI) among the beneficiaries' households**: The rCSI measures the frequency and severity of coping strategies households use when faced with food shortages. A lower rCSI indicates improved food security.
4. **Proportion of targeted households with acceptable food consumption score (FCS)**: The FCS measures dietary diversity and food frequency, with an acceptable score indicating adequate food consumption and nutrition.

Impact indicators are detailed in Table 17 below.

Table 17 Impact indicators for TRANSFORM project

	Indicator	Baseline value
1	Percentage change in Resilience Score (using SHARP+ tool) .	Average compound resilience score 7.2/20 – With 47.6% of HH having a Low Res, 52.2% with Medium Res and 0.5% with High Res. (SHARP data).
2	Percentage change in cereal crop yield (Maize, Sasame, Sorgum).	Maize: 0.45 t/ha Sesame: 0.53 t/ha Beans: 0.25 t/ha Sorghum: 0.26 t/ha. (SHARP data). Yield per specific crop in Annex 3
3	FS02: Mean and median Reduced Coping Strategy Index (rCSI) score.	Average CSI index 5.83 28% of households with a low CSI score and 72% with a moderate CSI score. (SHARP data).
4	FS01: Percent of households with poor, borderline, and acceptable Food Consumption Score (FCS).	73.7% of households have obtained acceptable FCS, 20% borderline, and 6.3% poor. (SHARP data).

4.2.2 Outcome

The outcomes of the TRANSFORM project focus on restoring sustainable access to water for irrigation, ensuring that agricultural production can continue in the face of climate challenges. Additionally, the project aims to enhance climate-resilient livelihoods for populations vulnerable to climate-related shocks, such as floods and droughts, equipping communities with the tools and strategies needed to adapt and thrive in changing environmental conditions.

To establish the baseline status of these, six outcome indicators were measured:

1. Percentage increase in land under irrigation (hectares)
2. Percentage increase in income for crop producer beneficiary households
3. Percentage increase in ha under irrigation per household
4. Percentage increase in household crop production on land under irrigation
5. Percentage land area under irrigation (ha) comes from SWALIM data
6. Percentage area protected from floods (ha) comes from SWALIM data

Outcome indicators are detailed in Table 18 below.

Table 18 Outcome indicators for TRANSFORM project

	Indicator	Baseline value
1	A07: Number of hectares under irrigation resulting from irrigation interventions.	3.83% of total land (GFSAD Landsat-Derived Global Rainfed and Irrigated-Cropland Product data).
2	% change in income for crop producer beneficiary households.	293.9 USD Income per specific agricultural production activity and non-farm. (SHARP data). activities in Annex 4
3	% change in ha under irrigation per household.	0.5 ha of irrigated land per household, 36.1% of total lands are irrigated. (SHARP data).
4	% change in HH crop production in land under irrigation.	Maize with 100% of land irrigated 496.2 kg/ha. Sesame with 100% of land irrigated 699.4 kg/ha. Sorghum with 100% of land irrigated 173.5 kg/ha. Seasonal crop yield for farm with irrigation in Annex 5 (SHARP data).
6	Percentage change in Area protected from flood (ha).	Gu season: 41,176.54 ha. Deyr season: 4,957.50 ha. (SWALIM data).

4.3 PBF project

4.3.1 Outcome

For the PBF project, no impact indicators that could be assessed through a household-level survey were identified in the proposal. Instead, only outcome indicators were outlined, specifically: "Improved inter-clan relations and conflicts mitigated through increased youth engagement in conflict management and community planning," and "Communities, including young women and men, are better able to respond to resource-based conflicts and climate-related shocks."

To establish the baseline values of these, four outcome indicators were measured:

1. Percentage of project beneficiaries who report increased participation in community planning activities because of their involvement in the project.
2. Percentage of project beneficiaries who adopt and use developed technology to improve community collaboration through digital platforms.
3. Percentage of project beneficiaries who report reduced conflict because of conflict resolution activities undertaken by the project.

4. Percentage of project beneficiaries who report an increased participation in decision making processes because of their participation in project activities.

Outcome indicators are detailed in Table 19 below.

Table 19 Outcome indicators for PBF project

	Indicator	Baseline value
1	% of project beneficiaries who report an increased participation in community planning activities.	
1.1	Percentage of households in which at least one member is part of any kind of groups/organization/association	12.6% of households have at least one member being part of a group/organization/association. (SHARP data).
3	% of project beneficiaries who report an increased participation in decision making processes as a result of their participation in project activities.	91.0% of group members are part of the decision structure. (SHARP data).
2	% of project beneficiaries who adopt use of developed technology to improve community collaboration.	
2.1	Percentage of households having access to at least one electronic device to access information	76.8% of households having access to at least one electronic device. (SHARP data). Type of electronic devices in Annex 10
2.2	Percentage of respondents perceiving that the devices and information accessed is little useful to improve agricultural activities and revenues	7.6% of respondents perceive it as useful (7.4% a lot and 0.2% completely). (SHARP data).
4	% of project beneficiaries who report reduced conflict as a result of conflict resolution activities undertaken by the project.	
4.1	Percentage of households joining members of the community to address conflicts	67.9% of households joined members of the community to address the problem (out of 21.0% reporting conflict at community level). (SHARP data).
4.2	Percentage of households reporting customary mechanisms to deal with problems across/within the community	28.3% of households reporting customary mechanisms. (SHARP data). Type of customary mechanisms in Annex 7

4.4 MAAREYANTA project

4.4.1 Outcome

For the MAAREYANTA project, no impact indicators that could be assessed through a household-level survey were identified in the proposal. Instead, three key outcome indicators were outlined: the establishment and functioning of Effective JOSP Water Governance (for FAO), the enhancement of Land Governance and Urban Resilience through strategic planning, displacement solutions, and targeted capital investments (for UN-Habitat), and the enhancement of Environmental Governance and Peacebuilding by integrating climate resilience, environmental peacebuilding strategies, and effective local-based conflict resolution mechanisms (for UNEP).

To establish the baseline values of these, three outcome indicators were measured:

1. Establishment of management structures.
2. Improved land administration capability.
3. Operational conflict resolution platforms.

Outcome indicators are detailed in Table 20 below.

Table 20 Outcome indicators for MAAREYANTA project

	Indicator	Baseline value
1	% change in beneficiaries' participation in community organizations or groups.	
1.1	Percentage of households in which at least one member is part of any kind of groups/organization/association.	11.2% of households have at least one member being part of a group/organization/association. (SHARP data). Types of groups in Annex 8
1.2	Percentage of groups being initiated by the community	85.1% of groups initiated by the community. (SHARP data).
2	Improved land administration capability	
2.1	Percentage of households converting natural land intro agricultural land in the last five years	28.2% of households converted land. (SHARP data).
3	Operational conflict resolution platforms	
3.1	Percentage of households reporting customary mechanisms to deal with problems across/within the community	30.0% of households reporting customary mechanisms. (SHARP data). Type of customary mechanisms in Annex 7
3.2	Percentage of respondents being confident in the capabilities of the existing community resolution structures in addressing resource-based conflicts	12.9% of respondent stating “a lot+ or “completely” confident. (SHARP data).

5. Gender dynamics

This section aims to provide insights into gender dynamics within households in the study area, analysing the distribution of roles and tasks as well as access to goods and services. The data for this analysis comes from a total of 1610 surveys conducted across all districts and groups, therefore aggregating both projects and the control group.

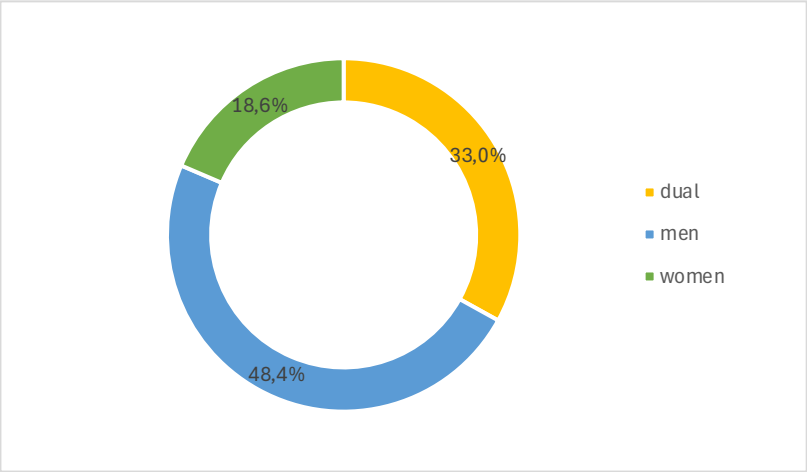


Figure 41 Sex of the main decision maker(s) across all sample (N=1610)

Out of the total respondents, 53.3% were men, and 46.7% were women. Regarding household decision-making, 48.4% identified their household as male-headed, 18.6% as female-headed, and 33.0% as dual-headed, indicating joint decision-making by both men and women.

To classify the gender of the primary decision-maker in male leaded households, female leaded households and dual-headed households, respondents were questioned at the survey's outset regarding who holds this role, with the following response options "me, my spouse, both, or someone else in the household". This approach facilitated the identification of the main decision-makers gender, by coupling it with the gender of the respondent.

5.1 Gender roles

Figure 42 illustrates the repartition of labour in farm and non-farm activities based on gender. In most activities, both men and women contribute, with a significant majority of tasks being managed by both genders collectively. Raising and breeding animals as well as crop cultivation show a majority of shared responsibility, with 62.2% and 62.9% of these tasks handled by both men and women, respectively. Men take a lead in water management (49.5%) and also play a substantial role in non-farm activities (38.3%) and crop cultivation (34.3%). Women's roles are less prominent in all categories, with the highest participation in water management (9.3%). Figure 42 shows a clear gender disparity, with women's involvement being considerably lower compared to men, except in tasks where both genders are involved.

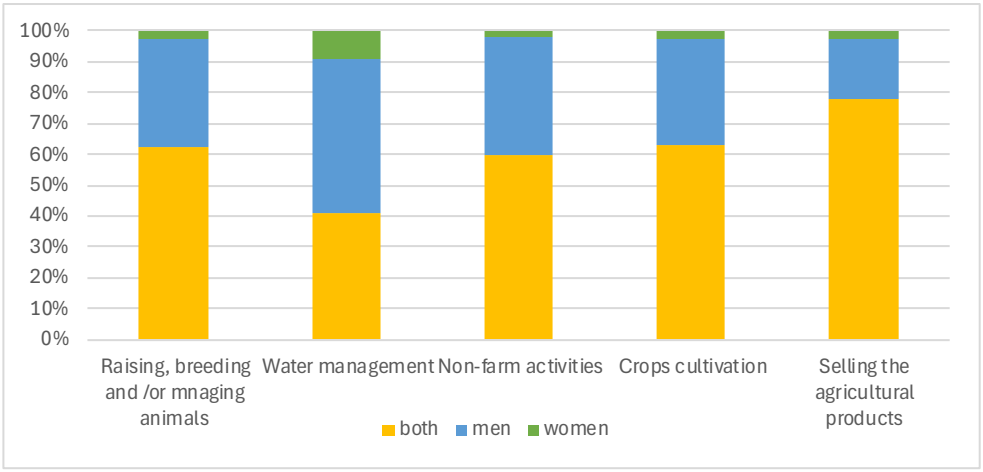


Figure 42 Person in charge of farm and non-farm activities (N=1610)

5.2 Access to goods and services

The analysis of education access within households reveals notable disparities in educational opportunities across gender and age groups. For children, both boys and girls show limited access to education, with 68.7% of girls and 68.4% of boys not attending school. However, only 1.1% of girls and 2.0% of boys are fully enrolled, indicating a slightly better but still limited access for boys.

Among youth, a similar pattern persists, with 74.1% of young women and 71.0% of young men lacking access to education. However, more young men (4.3%) have full access compared to young women (3.3%), suggesting a gender gap in educational opportunities as youth transition to adulthood.

For adults in the household, both men and women show the highest levels of exclusion from education, with 83.4% of both groups not having completed any education. This indicates that the disparity in access is more generational rather than strictly gender-based, with some marginal differences favouring men in youth and adulthood.

Overall, access to education remains limited for all groups, with a slight but consistent gender disparity favouring men, particularly among youth and adults.

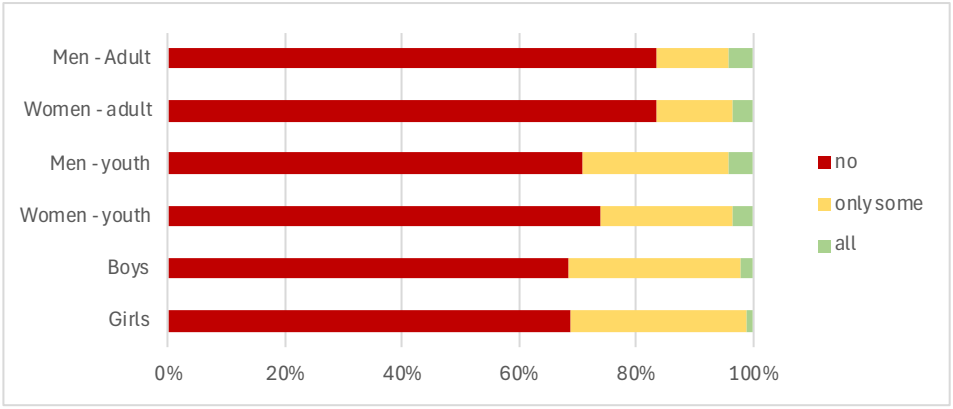


Figure 43 Access to education, per gender (N=1610)

The distribution of private agricultural land ownership by gender reveals that most of the private agricultural land is owned by men, accounting for 45.6% of the ownership. Shared ownership between men and women stands at 38.5%, reflecting a significant portion of joint landholding.

Women, however, own only 15.8% of private agricultural land, indicating a notable gender imbalance in land ownership. This distribution emphasizes the dominant role of men in private land ownership compared to women.

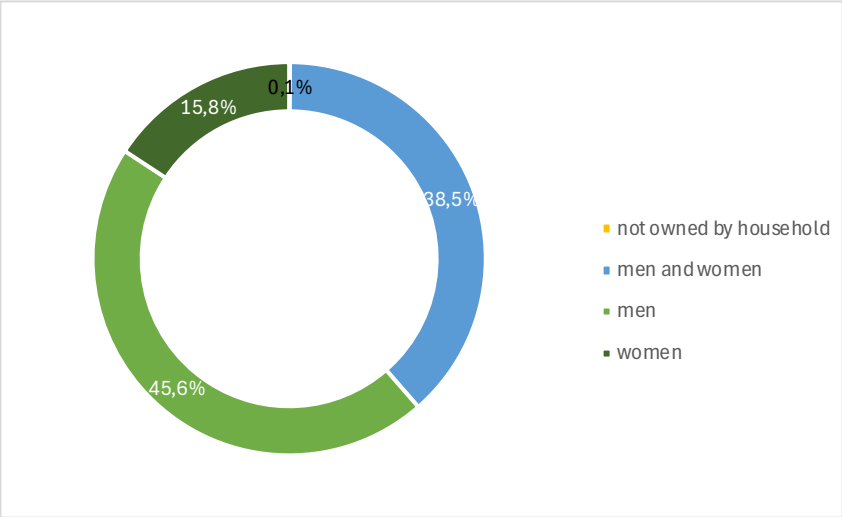


Figure 44 Private agricultural land ownership (N=1610)

Figure 45 outlines the distribution of rights to use different types of land based on gender. In most cases, men dominate land usage rights. For rented agricultural land, men hold 46.8% of the rights, while women have 22.3%, and 30.9% is shared between men and women. Similarly, for communal agricultural land, men have the formal right to use the land in 48.4% of households, women in 19.3%, and in 32.3%, the right is shared. Communal land refers to the land owned by community or state only 1.9% of total respondents expressed about communal land. In the case of communal forest land and pastureland, the rights are evenly divided between men and women for communal forest land (50% each), whereas for pastureland, men hold 50%, with only 16.7% held by women, and 33.3% shared. This indicates a strong gender disparity, with men consistently having a larger share of land usage rights compared to women.

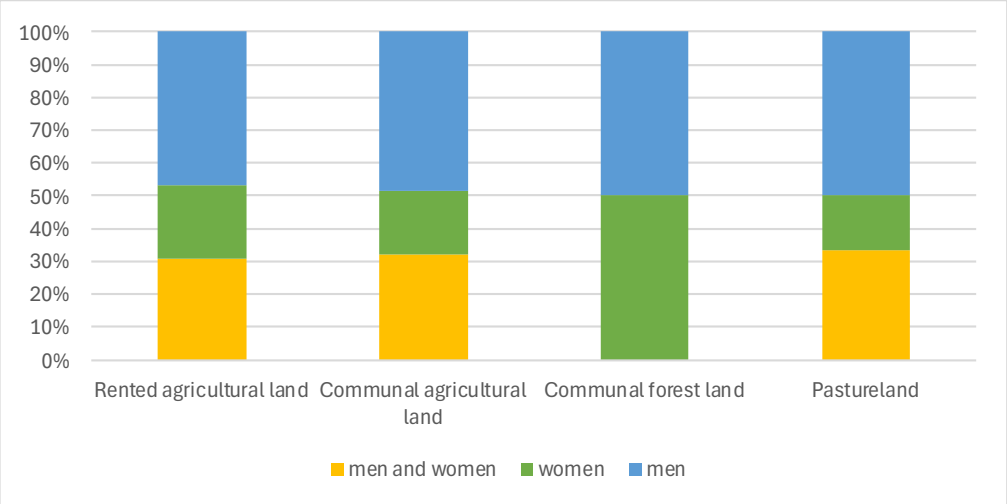


Figure 45 Right to use lands by gender (N=1610)

To address these disparities, interventions should aim to promote gender-inclusive land tenure policies and practices that recognize and protect women's land rights.

5.3 Decision making

The data on intra-household decision-making reveals that men predominantly make decisions in several key areas, particularly in household budgeting and major farm investments, where men are the sole decision-makers in 61.2% and 60.4% of households, respectively. However, decisions regarding food purchases are more equally shared, with 37.6% of households making decisions jointly between men and women, and 30.7% where women make decisions alone. Similarly, women take the lead in domestic work, where they are the main decision-makers in 48.8% of households. For non-food expenditures and employment outside the farm, decisions are primarily made by men, but a significant portion of households (47.1% and 34.7%, respectively) report joint decision-making.

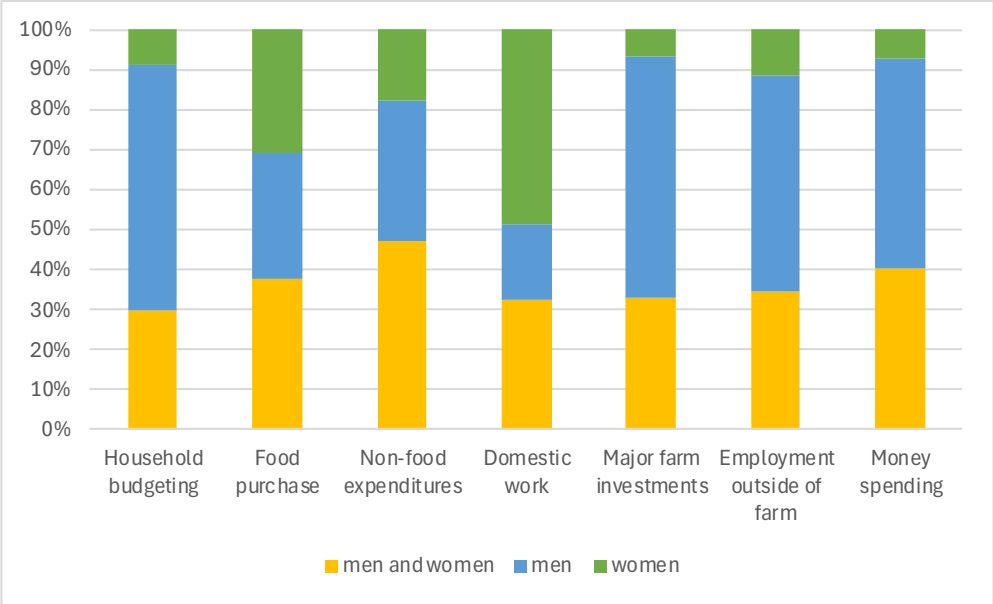


Figure 46 Gender of primary decision-maker for household matter (N=1610)

The findings on household decision-making underscore the prevailing gender disparities in decision-making power within households. With men predominantly making decisions related to household and farm management, there exists a significant imbalance in decision-making authority between genders. While women are more involved in decisions concerning domestic work, their participation in other aspects of decision-making, particularly in farm management, remains limited. To address these disparities, it is crucial to promote gender equality and empower women in decision-making processes within households. Implementing gender-sensitive policies and programs that promote women's participation and leadership in decision-making roles can contribute to more equitable and resilient agricultural systems.

6. Remarks and recommendations

The SHARP+ assessment has identified significant vulnerabilities within the agricultural systems of Somalia's smallholder farmers, stemming from various factors that highlight an urgent need for targeted interventions to enhance resilience.

One of the primary challenges is the limited **diversity in agricultural activities**. Most farmers are subsistence-based, with 92% engaged in crop production and only 28.4% involved in livestock farming. Furthermore, 75.6% of households practice only one agricultural activity, with an average of 1.3 activities per household, and 83.2% of crop producers focus solely on monocropping. This lack of diversification increase vulnerability in case of shocks affecting the only production, with no buffer to absorb their impacts, and with no alternative income. There is also widespread dissatisfaction with the ability to meet food and nutritional needs. Promoting diversified agricultural practices, including crop and livestock integration, would help enhance food security, improve nutrition, and strengthen household resilience.

Additionally, the assessment revealed weaknesses **in crop production** due to low agro-biodiversity, limited access to quality seeds, poor post-harvest management, and declining yields. Increasing access to diverse seeds and improving post-harvest practices could help farmers maintain yields and reduce losses. **Tree cover** is also minimal, with only 20.3% of households having trees on their farmland. Promoting tree planting and agroforestry could enhance soil stabilization, water retention, and provide additional income from tree products, ultimately improving the sustainability of the agroecosystem.

Farmers also struggle with land management practices. A striking 83.7% of households have not implemented any **measures to improve soil quality**, and those who have expressed low satisfaction with the results. Encouraging agroecological land management practices through training and incentives could significantly enhance soil health and agricultural productivity.

Smallholder farmers are frequently affected by **extreme climate events**. Floods were identified as the most damaging climatic shock, affecting 32.1% of households, with an average of 3.4 flood events in three years. Over 72.5% of those affected reported major crop losses. Droughts, though affecting fewer households (3.1%), were similarly destructive, with 80% of households reporting significant damage. To mitigate these impacts, capacity-building programs and improved resource allocation are needed to help farmers cope with and recover from these events. Increasing tree cover and diversifying agricultural activities could also reduce the negative impacts of such shocks.

Water access remains a critical issue, with many households reporting inadequate access for both agricultural and household needs. Limited water sources, inability to pay for water, and a lack of water conservation practices exacerbate the problem. Improving water management systems and access to affordable water resources is essential for strengthening resilience.

The assessment also highlights a **lack of income diversity**, with 80.2% of households relying on a single income source, primarily crop production. Limited involvement in non-farming activities, combined with non-diversified farming systems, restricts opportunities for additional income. This leaves many farmers unable to save or afford basic needs such as education. Respondents also perceive their income as insufficient to cover essential expenses. This issue is further compounded by **limited market access**. Many farmers sell independently due to a lack of organizational structures like cooperatives, which results in challenges securing fair prices and unstable incomes. Among market-oriented farmers, 51.5% struggle to sell their products due to low production. Over half of the households are not market-oriented, despite crop production being their main source of income, revealing a disconnect between potential and actual earnings. To improve income generation and livelihood security, it is crucial to promote market orientation through organizing farmers into cooperatives, offering marketing training, and stabilizing pricing mechanisms.

A significant gap was also found in **access to essential agricultural information**, particularly related to weather forecasts and climate adaptation practices. Only 20.8% of households have access to information on crop and livestock adaptation, and even fewer (15.3%) have information on sustainable resource management. This lack of information undermines farmers' ability to prepare for and respond to weather events. Strengthening information dissemination channels and improving the quality of available information would significantly support resilience-building efforts.

Moreover, very few households are part of **farmer groups or cooperatives**, limiting their access to collective knowledge, resources, and market opportunities. Encouraging group membership could facilitate knowledge exchange and improve access to resources. **Community cooperation** appears strong, with the vast majority of households (80.5%) reporting no issues that required collective action. Among those that did encounter such issues, most participated alongside other community members to address them. Additionally, most households indicated that no community members face restricted access to or use of resources based on ethnicity or gender. Only a small proportion of households reported the existence of customary mechanisms within the community for resolving collective issues. Regarding trust, nearly all respondents indicated they "sometimes" or "mostly" trust other community members, reflecting an environment that is neither characterized by perfect trust nor by mistrust.

Additionally, almost all farmers reported being unaffected by **governmental policies or programs related to climate change and sustainable agriculture**. Those who did participate in such initiatives expressed dissatisfaction. Efforts should be made to increase farmer participation in government programs through awareness campaigns and improved support services.

Addressing these key areas through targeted interventions could significantly improve the resilience of agroecosystems and livelihoods across Somalia, contributing to sustainable development and food security

ANNEXES

Annex 1. Compound resilience score per module and per group

Module	RESTORE			TRANSFORM			Control		
	Tech.	Adq.	Com. Res.	Tech.	Adq.	Com. Res.	Tech.	Adq.	Com. Res.
Household characteristics	4,9	3,8	8,7	4,7	3,3	8,0	4,6	3,0	7,6
Agri-production activities	2,4	3,2	5,6	2,5	2,9	5,4	3,0	2,6	5,6
Land access	4,2	3,8	8,0	4,3	3,6	7,9	4,3	3,1	7,4
Access to information	3,4	3,2	6,6	3,1	2,8	5,9	3,4	2,7	6,1
ICT	5,8	3,6	9,4	6,5	3,4	9,8	6,5	3,2	9,6
Community cooperation	5,3	4,0	9,4	5,5	3,9	9,8	5,4	3,4	9,6
Group membership	2,2	4,1	9,3	2,8	4,1	9,4	2,8	4,3	8,8
Nutrition	5,1	3,2	6,3	5,2	2,8	7,0	5,3	2,6	7,0
Decision-making - household	5,9	4,2	8,3	6,0	4,1	7,9	6,1	3,9	7,9
Crop production	2,4	2,7	10,1	2,1	2,1	10,0	2,4	2,3	9,9
Pest management practices	3,2	3,4	5,1	3,6	3,2	4,2	3,8	2,7	4,7
Animal production practices	4,8	2,7	6,5	4,5	3,3	6,7	4,8	2,2	6,5
Water access and management	2,5	3,6	7,5	2,4	3,5	7,8	2,5	2,8	7,0
Soil quality and land degradation	7,1	4,3	6,1	7,4	4,2	5,9	7,4	3,5	5,4
Land management practices	3,2	4,4	11,4	2,3	3,6	11,6	2,4	3,8	10,9
Trees	0,7	3,8	7,6	0,6	3,5	5,9	0,6	3,1	6,1
Shocks	1,9	3,2	4,5	2,4	2,9	4,1	2,6	2,6	3,6
Access to markets	3,1	3,7	5,0	2,5	3,3	5,3	2,4	3,3	5,2
Income sources and expenditures	1,9	3,2	6,8	1,9	2,8	5,8	1,9	2,8	5,7
Government policies	1,0	3,2	5,1	1,2	2,7	4,7	1,5	2,1	4,7
Average	3,6	3,6	7,4	3,6	3,3	7,2	3,7	3,0	7,0

Annex 2. Irrigation system used by crop producers in RESTORE project

Irrigation system	N=	%
center pivot	6	1,8%
drip	33	9,9%
sprinkler	142	42,4%
flood	223	66,6%
sub-surface	32	9,6%
other	5	1,5%
Total	335	100,0%

Annex 3. Yields

	RESTORE	TRANSFORM
Seasonal crops (in Kg/ha)		
Beans	521,3	252,2
Chilies	3200	
Costa Green	1200	
Cowpea		48
Groundnut	800	1680
Irish Potato		1066,7
Lettuce	5120	680
Maize	581,2	453,1
Millet	807,6	625,7
Mungbean	210	
Onion	12	
Rice	693,2	486,3
Sesame	361,4	533,4
Sorghum	80	266,8
Tomato	488,5	496
Other	481,8	451,2
Perennial crops (in Kg/tree)		
Acid Lime	61,1	
Banana	30,3	
Liinta dhannan	5,6	
Oranges	15,2	
Other	30	

Annex 4. Total income in Somali Shilling per type of activity for TRANSFORM project

Type of activity	Somali Shilling/year
Crop production	293,9 SOS
Livestock production	17,8 SOS
Employment outside ag	4,1 SOS
Receive remittances	0,4 SOS
Selling handcrafts	1,2 SOS
Aquaculture	0,4 SOS
Employment in other farm	10,4 SOS
Fishing	2,0 SOS
Firewood	0,3 SOS
Market selling of ag products	0,3 SOS
Beekeeping	0,4 SOS

Charcoal	0,3 SOS
Agroforestry	0,6 SOS
Other	7,1 SOS
Total	339,1 SOS

Annex 5. Seasonal crops' yields in Kg/ha depending on level of irrigation for TRANSFORM project

	Seasonal crops' yields in kg/ha for farms with more than 75% of irrigation (N = 214)	N =	Seasonal crops' yields in kg/ha for farms with 100% irrigation (N = 183)	N =	Seasonal crops' yields in kg/ha for farms with 0% irrigation (N = 374)	N =
Maize	461,0	170	496,2	143	476,2	90
Sesame	654,1	44	,4	38	344,6	33
Beans	333,5	34	320,8	31	151,3	15
Chilies		1		1		2
Costa Green		4		4		0
Cowpea		4		4	48,0	1
Groundnut	1680,0	1	1680,0	1		0
Irish Potato		0		0		0
Lettuce		0		0		0
Millet	1000,0	9	1000,0	8	438,6	8
Mungbean	680,0	2	680,0	2	23,3	3
Onion		0		0		1
Rice	440,7	0	471,9	0	512,2	0
Sorghum	173,5	0	173,5	0	453,3	0
Tomato	564,0	2	564,0	2		1
Watermelon		0		0		0
Other	155,0	0	155,0	0	1043,5	1
N =	214,0		183,0		374,0	

Annex 6. Electronic devices accessed per household for PBF project

Type of electronic device	N	%
Mobile phone	438	67.3%
Radio	55	8.4%
Television	6	0.9%
Internet connection	4	0.6%
Total	651	

Annex 7. Customary mechanisms reported for PBF project and MAAREYANRA project

Type of customary mechanisms	PBF		MAAREYANRA	
	N	%	N=	%
elder committees or councils	161	87,5%	335	88,9%
dispute resolution committee	51	27,7%	109	28,9%
land committees	31	16,8%	71	18,8%
water resource management committees	9	4,9%	29	7,7%
Total	184		377	

Annex 8. Types of groups in which at least one member of the household is part of for the MAAREYANRA project

Group type	N	%
FFS	46	3,7%
Agricultural producers' group	51	4,1%
Livestock producers' group	4	0,3%
Water users' group	6	0,5%
Watershed management group	1	0,1%
Religious group	6	0,5%
Merry go round group	1	0,1%
Total	1255	