Final Report

"Assessing the Impacts of Agricultural Support Services by the SHOUHARDO III Plus and Successor Program: Opportunities, Challenges, and Way Forward"

Acknowledgments

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Prepared for CARE Bangladesh

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Abbreviation

ADD	Additional Deputy Director
ADG	Additional Director General
ASA	Association for Social Advancement
BRAC	Bangladesh Rural Advancement Committee
BWDB	Bangladesh Water Development Board
CARE	Cooperative for Assistance and Relief Everywhere
CDSP	Char Development and Settlement Project
CLP	Chars Livelihoods Program
DAE	Department of Agricultural Extension
DAM	Department of Agricultural Marketing
DG	Director General
DHRC	Deep Haor and Remote Char
DLS	Department of Livestock Services
DoF	Department of Fisheries
GoB	Government of Bangladesh
GKS	Gaon Kalyan Samiti
HFM&LIP	Haor Flood Management and Livelihood Improvement Project

HYVs	High-Yielding Varieties
IDI	In-depth interview
ISS	Innovation support services
IPTM	Institute of Professionals Training and Management
JICA	Japan International Cooperation Agency
KII	Key Informant Interview
LSP	Local Service Providers
MS Excel	Microsoft Excel
NGO	Non-Governmental Organization
PCSBA	Private Community Skilled Birth Attendant
PEP	Poor and Extreme Poor
PFC	Private Feed Company
PO	Project Official
PPC	Private Pesticide Company
PSC	Private Seed Company
ToR	Terms of Reference
UAO	Upazila Agriculture Officer
UFO	Upazila Fisheries Officer
ULO	Upazila Livestock Officer
USAID	United States Agency for International Development
VSLA	Village Savings and Loans Associations

Executive Summary

Introduction

Bangladesh's Char and Haor regions face significant agricultural challenges due to remoteness, natural disasters, and inadequate infrastructure. This study evaluates the effectiveness of the agricultural support system in these vulnerable areas, focusing on the roles of Local Service Providers (LSPs), government entities, and private sector actors.

Objectives of the Study

The study aims to provide a comprehensive evaluation of the agricultural support system's effectiveness and its role in enhancing livelihoods in vulnerable regions. By examining the intricate dynamics of how these support systems function, the study seeks to address critical areas for improvement and innovation. Specifically, the study aims to:

- Identify the impacts of the support system on people's lives and livelihoods.
- Review the challenges and opportunities persistent within this support system.
- Identify a way forward—how to overcome the challenges and replicate this model.

Study Methodology

A mixed-methods approach was used, combining quantitative data from surveys with 544 households and 166 Local Service Providers (LSPs) and qualitative data from 52 Key Informant Interviews (KIIs), 16 In-Depth Interviews (IDIs), 16 Focus Group Discussions (FGDs), and 4 Case Studies across 8 districts and 21 upazilas in the DHRC regions. Data collection involved surveys, interviews, FGDs, and literature reviews, with stringent quality control measures to ensure reliability.

Key Findings of the Study

Demographic information of the respondents:

- A survey of 544 respondents from Char and Haor regions highlights low educational attainment, with 35.5% only able to sign their names (Char: 36.8%, Haor: 34.2%) and 24.6% completing primary education.
- Farming is the main occupation for 68.6% of respondents, more common in Char (70.1%) than Haor (67.0%). Day laborers make up 11.5%, with a higher percentage in Char, while fishing is more significant in Haor.
- Income disparities are notable, with 6.6% of Char households earning below BDT 10,000, compared to 20.6% in Haor. Most Char households (71.3%) earn between BDT 10,000 and 19,000, while only 43.4% do in Haor.

Actors of the Agricultural Support System in DHRC Areas

- Government Agencies: The DAE, DLS, DoF, and DAM play crucial roles in policy implementation, training, infrastructure development, and market access, supporting crop production, livestock health, and sustainable fishing practices.
- Private Sector: Provides essential agricultural inputs like seeds, fertilizers, and machinery, along with financial services to support land development and agricultural activities.
- Local Service Providers (LSPs): Offer practical training, facilitate market access, and provide financial solutions through Village Savings and Loan Associations (VSLAs), leveraging local resources and knowledge.

Community Awareness of Agricultural Support System Actors

- All beneficiaries (n=272) are aware of agricultural support entities in their areas, while 15.4% of non-beneficiaries lack awareness of these entities.
- Government Departments: Beneficiaries show higher awareness due to program interactions, while non-beneficiaries have lower awareness due to limited exposure. DAE is the most recognized entity, with 92.6% of beneficiaries aware in Char and 81.6% in Haor.
- Private Sector and Banks: Awareness is generally low across both groups, with only around 25% of both beneficiaries and non-beneficiaries recognizing Private Sector Companies. Banks have the lowest recognition, with just 8.1% of beneficiaries and 4.8% of non-beneficiaries in Char, and slightly higher awareness in Haor.

- Local Service Providers (LSPs): LSPs have 100% awareness among beneficiaries, while non-beneficiaries have partial awareness, with 64.0% in Char and 78.1% in Haor, mainly through indirect exposure.

Awareness and Training on Improved Agricultural Practices

- All beneficiaries are aware of improved agricultural practices, while 54.7% of non-beneficiaries remain unaware of these efforts.
- All program beneficiaries (100%) participated in training or workshops on improved agricultural techniques, compared to only 19.1% of non-beneficiaries (Char: 23.5%, Haor: 14.7%).
- In DHRC regions, LSPs trained 100% of beneficiaries, while non-beneficiaries did not report LSP involvement. The DAE provided training to 85.3% of beneficiaries and 81.5% of non-beneficiaries in Char, and 74.3% of beneficiaries and 84.2% of non-beneficiaries in Haor. The DLS trained 41.9% of beneficiaries and 48.1% of non-beneficiaries in Char, and 32.4% of beneficiaries and 56.6% of non-beneficiaries in Haor.
- Homestead gardening participation is high among beneficiaries in Char (92.6%) and Haor (71.3%), but lower among non-beneficiaries (Char: 59.4%, Haor: 55.0%). Training in cultivating high-yielding varieties (HYVs) of crops and rice was widespread. Goat rearing is more common in Char (64.0% of beneficiaries, 59.4% of non-beneficiaries) than in Haor (39.0% of beneficiaries, 40.0% of non-beneficiaries). Training on flood-tolerant rice varieties was more prevalent in Char (62.5% of beneficiaries, 50.0% of non-beneficiaries) compared to Haor (50.7% of beneficiaries, 55.0% of non-beneficiaries).

Changes in Agricultural Practices in DHRC Regions

- The survey shows a significant shift in agricultural practices, with all program beneficiaries adopting improved methods, while only 26.8% of non-beneficiaries (21.8% in Char, 20.5% in Haor) have done the same.
- Homestead gardening was the most common practice, with high participation among beneficiaries (Char: 92.6%, Haor: 71.3%) and lower rates among non-beneficiaries (Char: 59.4%, Haor: 20.0%). Both groups widely practiced cultivating HYVs of crops and rice, with about 80% participation. Goat rearing was more popular in Char (54.4% beneficiaries, 42.1% non-beneficiaries) than Haor (47.1% beneficiaries, 45.0% non-beneficiaries). Adoption of flood-tolerant rice varieties was higher in Char (41.2% beneficiaries, 31.6% non-beneficiaries) than Haor (33.8% beneficiaries, 31.3% non-beneficiaries).

Challenges in Adopting Improved Agricultural Practices

- The study highlights ongoing challenges in adopting improved agricultural practices. In DHRC regions, 98.5% of beneficiaries in Char and 91.2% in Haor face significant

agricultural challenges, compared to 82.4% and 72.1% of non-beneficiaries, respectively.

- Key challenges include access to quality agricultural inputs (63.2% of beneficiaries and 56.3% of non-beneficiaries in Char), pest and disease control (57.9% and 55.1%), high input costs (57.9% and 55.1%), irrigation access (57.9% and 55.4%), land access (50.4% and 67.9%), disaster impacts (49.6% and 41.1%), and limited knowledge of modern technology (39.1% and 50.0%).

Role of Support System in Challenge Mitigation

- Assistance Seeking: Program beneficiaries in both Char and Haor regions seek assistance more than non-beneficiaries. In Char, 93.4% of beneficiaries sought help versus 65.6% of non-beneficiaries. In Haor, 88.2% of beneficiaries sought help compared to 61.7% of non-beneficiaries. Overall, 90.8% of beneficiaries sought assistance compared to 63.8% of non-beneficiaries.

- Government Support: The DAE provides extensive support, engaging 81.9% of Char beneficiaries and 70.0% in Haor. The DLS focuses on livestock, with 64.6% participation in Char and 50.8% in Haor. The DAM engages 38.6% in Char and 27.5% in Haor, while the DoF supports 11.8% in Char and 13.3% in Haor.

- Private Sector and Banks: Private companies and banks have limited engagement. In Char, PSC supports 24.4% of beneficiaries, and PPC supports 21.3%. In Haor, PSC supports 20.0% of beneficiaries, and PPC supports 18.3%. PFCs and banks have minimal engagement, with varying support levels between Char and Haor.

- LSPs: LSPs are essential, with 100% involvement among beneficiaries. Non-beneficiaries also interact significantly with LSPs (57.3% in Char, 53.0% in Haor). LSPs provide extensive training, technical assistance, and input. They conduct more field visits and demonstrations in Char compared to Haor.

Impacts of the Support System on Agricultural Production

- The agricultural support system has significantly improved production in DHRC regions by enhancing crop diversity, productivity, and profitability. In Haor, year-round cropping and elevated animal platforms have replaced single-season rice production, while in Char, improved maize and rice varieties have transformed farming. Livestock benefits have increased with better breeds and vaccinations, alongside support for climate-tolerant seeds and modern techniques. This has led to whole-season farming, greater interest in diverse crops and livestock among youth and women, and reduced flood-related losses.

Impacts of the Support System on People's Lives and Livelihood

- The support system has significantly raised income levels among beneficiaries, with those earning below BDT 10k dropping from 81.6% to 8.1% in five years.

- Beneficiaries in Char and Haor saw major improvements in food security, housing, education, and healthcare compared to non-beneficiaries. In Char, 100% reported better food security, and improvements were noted in housing (97.1% in Char, 91.9% in Haor) and education (90.5% in Char, 87.5% in Haor).
- Women's participation in household decision-making increased among beneficiaries, with 45.6% in Char and 47.8% in Haor involved. Initiatives like Girls' Forums and VSLAs empowered women, with 41.9% in Char and 43.4% in Haor contributing to agricultural decisions.

Loopholes in the Existing Agricultural Support System

- Government Departments: Limited-service reach and frequency, especially in remote areas; insufficient disaster-resilient inputs and financial support; manpower shortages and inconsistent advice reduce effectiveness.
- Private Sector: Primarily focuses on selling inputs with limited training and support; high costs and minimal involvement in marketing or disaster aid leave remote areas underserved.
- LSPs: Provide consistent, community-based training and support; facilitate access to loans and markets, addressing gaps left by government and private sector.

Opportunities Persistent Within the Agricultural Support System

- Referral Activities: LSPs facilitate access to agricultural support by directing farmers to government departments, private companies, and NGOs. This informal network ensures timely service and improved productivity.
- Collaborative Efforts: LSPs regularly engage with government departments and private companies through joint initiatives and information sharing, enhancing service delivery in remote areas.
- Opportunities for Improvement: The referral network mostly directs farmers to government entities. Strengthening links with private companies could enhance the overall support system.

Way Forward

To strengthen the agricultural support system, a coordinated effort from LSPs, government, private sector, and NGOs is needed. Priorities include expanding training, enhancing LSP capacity, integrating modern technologies, and developing infrastructure. Immediate actions should focus on improving existing services, while long-term strategies should address infrastructure development and disaster resilience. Continuous monitoring and evaluation will be essential for adapting and ensuring effectiveness.

Conclusion

A robust and coordinated agricultural support system is crucial for addressing the challenges faced by farmers in Bangladesh's Char and Haor regions. By leveraging the strengths of LSPs, government bodies, and the private sector, and integrating modern practices, the agricultural

sector can achieve greater resilience and productivity. Strengthening public-private partnerships and capacity-building will foster a more effective and equitable support system.

1 Introduction

1.1 Background of the Study

Bangladesh, predominantly an agricultural country, relies heavily on its agricultural sector for economic growth (*Ghimire et al., 2021*). However, this sector faces significant challenges in the Char and Haor areas, collectively known as Deep Haor and Remote Char (DHRC), due to their unique geographical features. These "hard-to-reach" regions suffer from poor infrastructure and limited access to essential services (*LGED, 2023*). Additionally, frequent natural disasters further disrupt local livelihoods, pushing many into extreme poverty as they struggle to recover (*LGD, 2012*).

Compounding these challenges is Bangladesh's high population growth rate, which intensifies the pressure on its limited resources, including land, water, and employment opportunities (*PKSF, 2021*). Climate change, global warming, and land degradation exacerbate the difficulties in agriculture, further strained by limited access to modern farming methods (*Sikder et al., 2014; Seraj, 2022*). The DHRC regions experience unique livelihood challenges due to seasonal flooding, shifting landmasses, and expansive wetlands, contributing to widespread extreme poverty (*Alam et al., 2018; Ahmed, 2023*).

In Char areas, agriculture is central to daily life and economic stability, with cropping patterns shaped by climate, soil, and flooding. Dominant crops include T. Aman rice, maize, and jute, along with other crops such as tobacco and vegetables (*Hoque et al., 2011; Sarker et al., 2021*). Similarly, the Haor regions face distinct challenges due to seasonal water fluctuations. During the monsoon season, these areas become inundated, impacting cropping patterns. Boro rice is the predominant crop during the dry season, alongside other crops like wheat and vegetables (*Alam et al., 2011; Suvra, 2021*). The prevalence of single cropping patterns results in lower cropping intensity in these regions.

To adapt to these conditions, residents in the DHRC regions employ a mix of on-farm and off-farm livelihood strategies. In the Haor regions, fishing, duck and cattle rearing, and day labor are key activities, while Char areas rely on livestock, poultry, fishing, and day labor (*Langford, 2016; Alam et al., 2018*). However, seasonal floods cause significant damage to crops and infrastructure, disrupting transportation and market access. This disruption increases prices and vulnerability, while high labor costs, limited access to loans, and reliance on traditional farming methods further hinder productivity (*Islam et al., 2019; Sarker et al., 2021; Baishakhy et al., 2023*).

Efforts to address these challenges involve a collaborative approach among government bodies, private sector entities, and Local Service Providers (LSPs). Projects like the Char Development and Settlement Project (CDSP) and the BWDB Systems Rehabilitation Project focus on improving water management, infrastructure, and agricultural productivity (*CDSP, 2023; World Bank, n.d.*). Similarly, the Haor Flood Management and Livelihood Improvement Project (HFM&LIP) aims to enhance agricultural and fisheries productivity (JICA, n.d.). Government departments such as DAE, DLS, and DoF contribute through subsidies, infrastructure improvements, and training programs (*Uddin, 2008; Rahman et al., 2014*). Private sector entities provide essential agricultural inputs and veterinary services, complementing these efforts (*Rashid & Qijie, 2016; Kabir & Islam, 2023*).

CARE Bangladesh's SHOUHARDO program, funded by USAID, plays a pivotal role in enhancing food security and livelihoods for over 168,000 poor households in DHRC areas

(*Gillingham, 2016; CARE Bangladesh, 2024*). The SHOUHARDO III Plus Activity further strengthens the role of LSPs in improving food security, market access, and financial services (*CARE Bangladesh, 2024*). With 2,352 active LSPs providing vital services, including seed distribution and veterinary care, they bridge gaps between the private and public sectors (*CARE Bangladesh, 2024*). Despite these comprehensive efforts, there remains a need to strengthen collaborative efforts among stakeholders in the DHRC region (*Rafi et al., 2021; Concern Worldwide, 2021*).

Against this backdrop, the current assessment seeks to delve deeper into the fabric of this transformative program. It aims to illuminate the real impacts of the agricultural support system on the lives it touches, to unearth the intricacies of the challenges faced, and to map out a trajectory that can replicate this model's success across diverse contexts. This study is an exploration, a critical examination, and most importantly, a compass for the way forward.

1.2 Objectives of the Study

LSPs play a pivotal role in bridging the gap between the communities and the various stakeholders involved in the implementation of programs aimed at improving food and nutritional security. These LSPs, mostly rooted in the local context, act as conduits for information, resources, and support. The assessment seeks to explore how these LSPs are actively engaging with the public and private sectors to create a synergistic and comprehensive approach. SHOUHARDO III Plus Program aims to assess how the LSPs and public and private sectors, including the program, are working together in a holistic approach to deliver improved gender-equitable food and nutritional security for the PEP communities in DHRC areas. Under the overall objective, the specific objectives of the assignment include:

- To identify the impacts of the support system on people's lives and livelihoods.
- To review the challenges and opportunities persistent within this support system.
- Identify a way forward- how to overcome the challenges and replicate this model.

2 Study Methodology

2.1 Methodological Approach

The study employed a mixed-methods approach, integrating both qualitative and quantitative data from selected areas and participants. It utilized secondary data sources, including background reports, program log frames, and monitoring reports, alongside primary data collected using specified instruments. The analysis was both exploratory and descriptive, incorporating data triangulation to ensure comprehensive validation.

2.2 Study Area

The study covered 8 districts and 21 upazilas, including Kurigram, Gaibandha, Jamalpur, and Sirajganj in the Char regions, as well as Kishoreganj, Netrokona, Habiganj, and Sunamganj districts in the Haor areas (Figure 1).

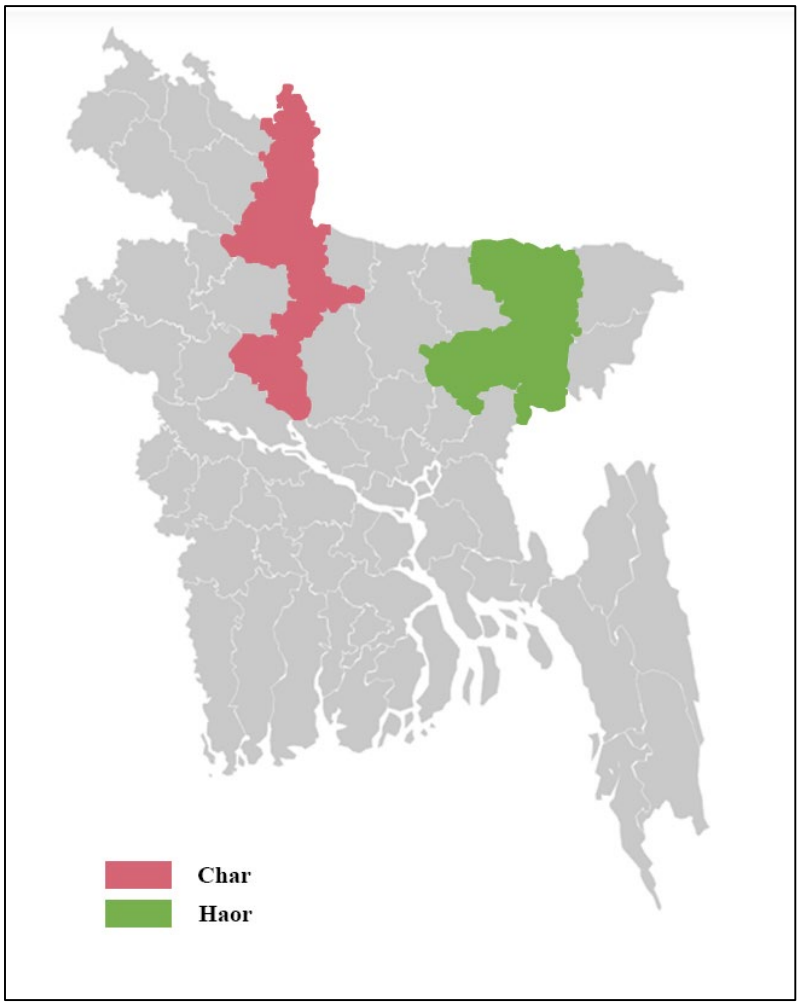

Figure 1: Study Area Map

2.3 Study Sampling

2.3.1 Quantitative Sampling

The primary target groups for the quantitative survey were beneficiary and non-beneficiary households of the SHOUHARDO III Plus program in the DHRC regions. LSPs were also included to assess the program's impacts, challenges, and opportunities. Random sampling ensured representation across all groups, and the data were analyzed separately. The sample size for each target group was calculated using standard statistical formulas, considering a 90% confidence level and a 5% margin of error. For households, with a population of 168,521, the calculation resulted in 272 beneficiary households and 272 non-beneficiary households, totaling 544 households (Annex 1). For LSPs, with a population of 1,581, a sample of 166 LSPs was determined. The sampling covered 8 districts and 21 upazilas (Annex 2).

2.3.2 Qualitative Sampling

The study employed purposive sampling for qualitative data collection, gathering a total of 88 qualitative data samples. This includes 52 Key Informant Interviews (Annex 3), 16 In-Depth Interviews (Annex 4), 16 Focus Group Discussions (Annex 5), and 4 Case Studies. Key stakeholders involved in these interviews and discussions included representatives from the

DAE, the DLS, the DoF, program beneficiaries and non-beneficiaries, program officials, private sector partners, and local leaders.

2.4 Data Collection Method and Tools

2.4.1 Primary Data Collection

The study utilized a comprehensive data collection method, incorporating both quantitative and qualitative methods. Quantitative data were gathered through a survey questionnaire aligned with the study objectives, allowing for structured numerical analysis. To further explore the research objectives, various qualitative methods were employed, including FGDs, KIIs, IDIs, and case studies, providing detailed and in-depth insights.

2.4.2 Secondary Literature Review

The study team conducted a thorough literature review of documents and data from CARE Bangladesh and other sources, following systematic review guidelines. They began with secondary research and developed targeted questions to explore local livelihoods, cropping patterns, and agricultural support mechanisms in the DHRC regions. By analyzing reports and scientific papers, they extracted key insights and organized the findings in a demonstration table for further analysis.

2.5 Data Protection and Management

The study team adhered to strict data quality control protocols to ensure accuracy and reliability. Quantitative data were monitored through checks during collection, with Research Associates overseeing interviews and conducting daily accuracy checks. A portion of this data was back-checked post-collection. For qualitative data, detailed notes and audio recordings (with consent) were used, with recordings destroyed after transcription. Daily debriefing sessions were held to ensure alignment with research objectives.

2.6 Data Analysis

2.6.1 Data Analysis and Triangulation

After completing the cleaning and review of quantitative data, a comprehensive assessment was carried out to confirm its usability, reliability, and validity for subsequent analysis. The data was then transformed into appropriate codes suitable for computer-aided analysis. Using tools such as SPSS or Excel, the data underwent analysis and were stored in both CSV and Excel formats, encompassing both raw and processed quantitative and qualitative data. Quantitative data were analyzed descriptively and presented in tables and figures. Qualitative data extracted from transcripts underwent thematic analysis and were triangulated with quantitative findings and secondary data where applicable.

2.6.2 Conceptual Framework

The study employed the Innovation Support Services (ISS) and SWOT analysis conceptual framework to comprehensively evaluate the agricultural support system in DHRC areas. This methodological approach enabled a thorough assessment of the system's impact, challenges, strengths, and opportunities, providing a robust foundation for understanding and enhancing agricultural support in these regions.

2.6.2.1 Innovation Support Services (ISS)

The Innovation Support Services (ISS) framework served as the guiding framework for evaluating the agricultural support system in this study (*Faure et al., 2019*). It provides a theoretical foundation for understanding how various actors within this support system—namely government entities, the private sector, and LSPs collaborate to enhance the quality of life and livelihoods of the DHRC community through diverse agricultural initiatives. The analysis focuses on assessing the impacts, challenges, and opportunities arising from these collaborative efforts (Figure 2).

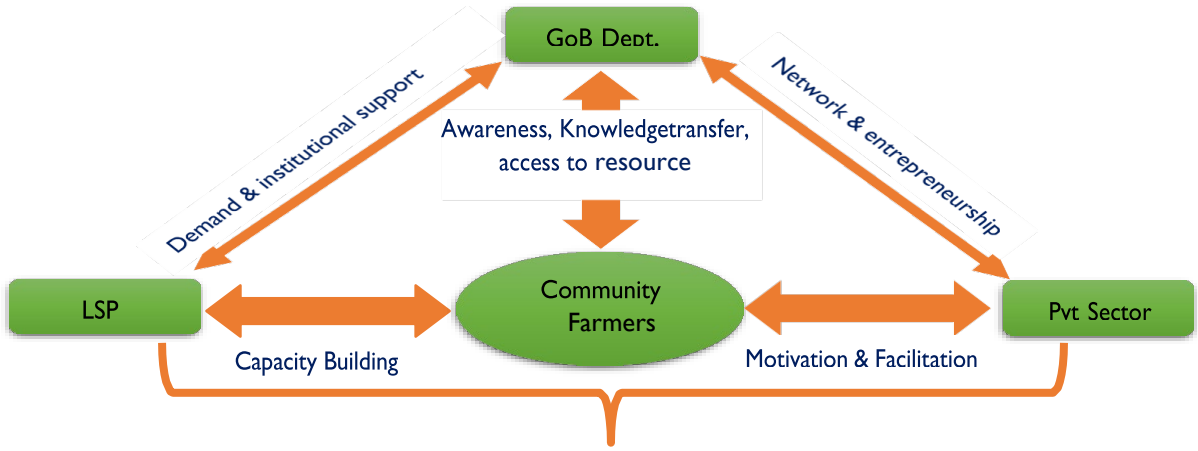

Figure 2: Innovation Support Services (ISS)

2.6.2.2 SWOT Analysis

Moreover, the Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis was utilized to gain a comprehensive understanding of the current agricultural support system (*Gürel, 2017*)

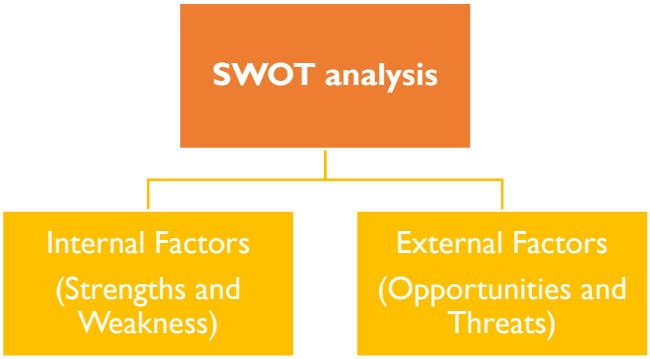

Figure 3: SWOT analysis

The analysis began with collecting data through interviews, surveys, and document reviews to identify elements for each SWOT component. Strengths and weaknesses were evaluated internally, while opportunities and threats were assessed from external factors. The data were categorized and analyzed to determine their impact on the system. Strengths were explored for potential leverage, weaknesses for improvements, opportunities for benefits, and threats

for risks. Findings were validated with stakeholders and experts, and the results were compiled into a report with actionable insights and recommendations.

3 Key Findings

This chapter is structured into several sections, each covering different aspects of the study's findings. The first section provides demographic information about the study participants. The second assesses the agricultural support system in DHRC areas. The third discusses the support system's impacts on agricultural practices and livelihoods. The fourth identifies challenges within the current agricultural support system. The fifth section explores opportunities within the agricultural support system, focusing on public-private partnerships and potential improvements.

3.1 Demographics of the Study Participants

3.1.1 Education

The survey included 544 respondents, with 272 from each region. In the surveyed households, 35.5% of respondents can only sign their names, with a slight difference between the Char (36.8%) and Haor (34.2%) regions. Additionally, 24.6% have completed primary education, while 10.3% did not finish it, reflecting lower educational attainment in these areas (Annex 6).

3.1.2 Household Occupation

In the surveyed households (n=544) from DHRC regions, a majority of participants (68.6%) are engaged in farming, making it the most common occupation. Notably, farming is slightly more prevalent in the Char region (70.1%, n=272) compared to the Haor region (67.0%, n=272). Day laborers represent the second-largest occupational group at 11.5%, with a higher prevalence in the Char area (13.3%) compared to Haor (9.7%). Transport services, including bike and auto drivers, account for 6.4% of the total, with a higher proportion in Haor (7.1%) compared to Char (5.6%). Fishing is more significant in the Haor region (4.8%) than in Char (1.5%), making up 3.2% of the total (Annex 7).

3.1.3 Economic Status

Among the study participants, income levels varied significantly between the Char and Haor regions. In Char, 6.6% of households have an average monthly income below BDT 10,000 ($91), while in Haor, this percentage is substantially higher at 20.6%. A majority of households in Char (71.3%) earn between BDT 10,000-19,000 ($91-$173), compared to 43.4% in Haor. Households with an income of BDT 20,000-29,000 ($173-$264) make up 16.5% in Char and 19.1% in Haor (Annex 8).

3.2 Agricultural Support System in DHRC Areas

3.2.1 Existing Agricultural Support System in DHRC Areas

The agricultural support system in DHRC regions relies on a coordinated effort from government agencies, the private sector, and Local Service Providers (LSPs). Key government bodies like the Department of Agricultural Extension (DAE), Department of Livestock Services (DLS), Department of Fisheries (DoF), and Department of Agricultural Marketing (DAM) provide policy implementation, training, market access, input quality, and technical support. Along with government services, the private sector supplies high-yielding seeds,

fertilizers, pesticides, and financial services. CARE Bangladesh as part of development services, also contributes to the support system. SHOUHARDO III Plus program, through LSPs, offers community-based support, including training, market linkages, and financial solutions via Village Savings and Loan Associations (VSLAs). The table below outlines the roles and contributions of these entities to the agricultural support system in the DHRC region (Table 1)

Table 1: Roles and Responsibilities of the Existing Agricultural Support System Actors

Relevant Bodies	Major Services	Specific Services	Sources
Government Departments			
DAE	Policy Implementation and Regulation	✓ DAE oversees policies on crop production, food security, and rural development. ✓ Ensures compliance with agricultural laws and standards among farmers and stakeholders.	✓ KIIs with Upazila Agriculture Officers ✓ KII with Deputy Director of DAE ✓ Department of Agricultural Extension. (n. d.) Crop Production. Department of Agricultural Extension. https://dae.gov.bd/site/page/6907fb65-cca9-4df9-89ac-a4a6b0ba9cb9/- ✓ Department of Agricultural Extension. (2016). Agricultural Extension Manual: Chapter 3: Citizen's Charter and Others: Information on Receiving Citizen Services. https://dae.portal.gov.bd/sites/default/files/files/dae.portal.gov.bd/page/07f14b9d_9ca7_43c2_bf11_d946bede2da2/Chapter%203.pdf ✓ Uddin, M. N. (2008). Agricultural extension services in Bangladesh: A review study. *Bulletin of the Institute of Vocational and Technical Education.* https://www.researchgate.net/publication/37504963_Agricultural_Extension_Services_In_Bangladesh_A_Review_Study
	Extension Services and Farmer Education	✓ Provides training, workshops, and demonstrations on crop, soil, pest, disease, and water management. ✓ Facilitates field sessions for practical learning and knowledge sharing among farmers. ✓ Offers early forecasting to assist farmers with timely harvesting and effective planning. ✓ Supports input provision for cropping systems, ensuring farmers have access to essential resources. ✓ Assists with seed sowing, harvesting, and marketing strategies to enhance agricultural productivity and market access.	
	Input Support and Subsidies	✓ Manages distribution centers for subsidized seeds, fertilizers, pesticides, and quality control of agricultural inputs. ✓ Coordinates seed production programs to ensure availability of certified seeds suited to local agro-climatic conditions.	
	Infrastructure Development	✓ Establishes and maintains storage facilities, cold chains, and market yards to reduce post-harvest losses and ensure better market access for farmers. ✓ Partners with other agencies to improve rural road networks for efficient transport of agricultural produce and inputs.	
DLS	Policy Implementation and Regulation	✓ Formulates policies to promote sustainable livestock production, improve animal health, and enhance livestock welfare.	✓ KII with Deputy Director of DLS ✓ KIIs with Upazila Livestock Officers ✓ Rahman, S., Begum, I. A., & Alam, M. J. (2014). Livestock in Bangladesh: Distribution, growth, performance, and potential Livestock Research for Rural Development. 26(10), 173. http://www.lrrd.org/lrrd26/10/rahm26173.html
	Extension Services and Farmer Education	✓ Conducts training programs and workshops for livestock farmers on animal nutrition, disease prevention, and management practices. ✓ Supplies essential vaccines to support animal health and prevent disease outbreaks.	
	Input Support and Subsidies	✓ Builds shelters, sheds, and grazing lands to improve animal welfare and enhance productivity.	

Relevant Bodies	Major Services	Specific Services	Sources
	Infrastructure Development	✓ Introduces and promotes innovative technologies such as artificial insemination, fodder cultivation, and biotechnological applications in livestock farming.	✓ Islam, M. R. (2022). Transition of the Department of Livestock Services in the context of One Health. *ResearchGate*. https://www.researchgate.net/publication/366790423_Transition_of_the_Department_of_Livestock_Services_in_the_Context_of_One_Health
DoF	Policy Implementation and Regulation	✓ Formulates policies to promote sustainable fisheries practices, conservation of aquatic resources, and enhancement of fishery livelihoods.	✓ KII with Assistant Director of DoF ✓ KIIs with Upazila Fisheries Officers ✓ Department of Fisheries. (2023). Annual Report 2023. *https://fisheries.portal.gov.bd/sites/default/files/files/fisheries.portal.gov.bd/annual_reports/aca05177_c9cd_4c3b_9b98_88d36bb6d26d/2023-10-03-08-04-3135f50a843082dae35078276062898l.pdf* ✓ Molla, M. H. R. (2018). Fisheries management and governance in Bangladesh. MOJ Ecology & Environmental Sciences, 3 (6), 381-385. https://doi.org/10.15406/mojes.2018.03.00117
	Extension Services and Farmer Education	✓ Conducts training programs and workshops for fishers and aqua culturists on improved fishing techniques, fish farming practices, and pond management.	
	Input Support and Subsidies	✓ Builds and maintains landing centers, fish sanctuaries, and fish markets to facilitate fish landing, storage, and marketing.	
	Infrastructure Development	✓ Introduces and promotes innovative technologies such as fish breeding techniques, fish feed formulations, and water quality management in aquaculture.	
DAM	Policy Implementation and Regulation	✓ Formulates policies to enhance market efficiency, transparency, and competitiveness.	✓ KII with Deputy Director of DAM ✓ Department of Agricultural Extension. (2016). Agricultural Extension Manual: Chapter 3: Citizen's Charter and Others: Information on Receiving Citizen Services. *https://dae.portal.gov.bd/sites/default/files/files/dae.portal.gov.bd/page/07f14b9d_9ca7_43c2_bf11_d946bede2da2/Chapter%203.pdf*
	Extension Services and Farmer Education	✓ Conducts training sessions and workshops on market-oriented production, quality control, and post-harvest management.	
	Input Support and Subsidies	✓ Establishes and maintains wholesale markets, rural markets and cold storage facilities to ensure proper handling and storage of agricultural produce.	
	Infrastructure Development	✓ Conducts studies on market trends, consumer preferences, and supply chain dynamics to inform policy and strategic decisions.	
Private Sectors			

Relevant Bodies	Major Services	Specific Services	Sources
	Input Supply	✓ Provide high-yielding, disease-resistant seeds and planting materials adapted to local agro-climatic conditions, including hybrid seeds, genetically modified seeds, and tissue-cultured plants. ✓ Distribute various types of fertilizers, such as chemical, organic, and bio-fertilizers, as well as soil conditioners to improve soil fertility and enhance crop productivity. ✓ Offer a range of pesticides, herbicides, and fungicides to protect crops from pests, diseases, and weeds, along with integrated pest management (IPM) solutions. ✓ Supply farm machinery and tools to support efficient agricultural practices.	✓ KIIs with Private Sector Representatives ✓ Kabir, M., & Islam, M. (2023). Effectiveness of public and private extension services in building capacity of the farmers: A case of Bangladesh. *Sarhad Journal of Agriculture*. https://doi.org/10.17582/journal.sja/2023/39.1.101.110 ✓ Husain, S., & Amin, M. (2018). Public-private partnership in the livestock sector of Bangladesh. Bangladesh *Journal of Animal Science*, 46, 172. https://doi.org/10.3329/bjas.v46i3.36311 ✓ Rashid, M. M. U., & Qijie, G. (2016). An assessment of public and private crop extension services in Bangladesh. *IOSR Journal of Agriculture and Veterinary Science*, 9 (1), 7-16. *https://doi.org/10.9790/2380-09120716*
	Financial Services	✓ Offer short-term and long-term loans for various agricultural purposes such as purchasing inputs, machinery, land development, and post-harvest processing.	
Local Service Providers (LSP)			
	Community Support	✓ Collaborate with PEP participants to diversify income sources by promoting improved agricultural practices. ✓ Utilizing local resources and traditional knowledge to promote sustainable agricultural practices and community development initiatives. ✓ LSPs collaborate with government departments and private sectors to provide services at the grassroots level.	✓ KIIs with Program Officials ✓ IDIs with LSPs ✓ Care Bangladesh. (2024). SHOUHARDO III Plus. https://shouhardo3plus.carebangladesh.org/ ✓ Afroze, Z. A. (2022). Local Service Providers now have sustained motivation to serve the community. CARE Bangladesh. 2022 CLA Case Competition. https://usaidlearninglab.org/system/files/2022-08/22_zinat_-_zinat_ara_afroze_1.pdf
	Training	✓ Conducting practical training sessions for PEP households on crop management, pest control, soil health, livestock, fish farming, and climate-smart agriculture.	
	Market Linkages	✓ Disseminating market intelligence, price trends, and demand forecasts to farmers through local channels and community meetings.	
	Financial Services	✓ Providing financial solutions through VSLAs to improve livelihoods and agricultural activities.	
	Input supply	✓ Assist with access to technical and input resources by ensuring LSPs provide quality inputs as company agents. ✓ LSP makes quality input available as a company agent.	

However, the service delivery mechanism of the actors in the agricultural support system is structured across different levels for government, private sectors, and Local Service Providers (LSPs). Government services are organized from the national to the community level, while private sector services span from head offices to community levels through agents, retailers, and dealers. And LSPs, introduced to address service gaps and meet community demand, work with public (e.g., DAE, DLS) and private providers (e.g., seed companies). They receive support from both the Dhaka and regional/district offices through CARE and partner NGOs staffs, ensuring effective service delivery at the community level (Figure 4).

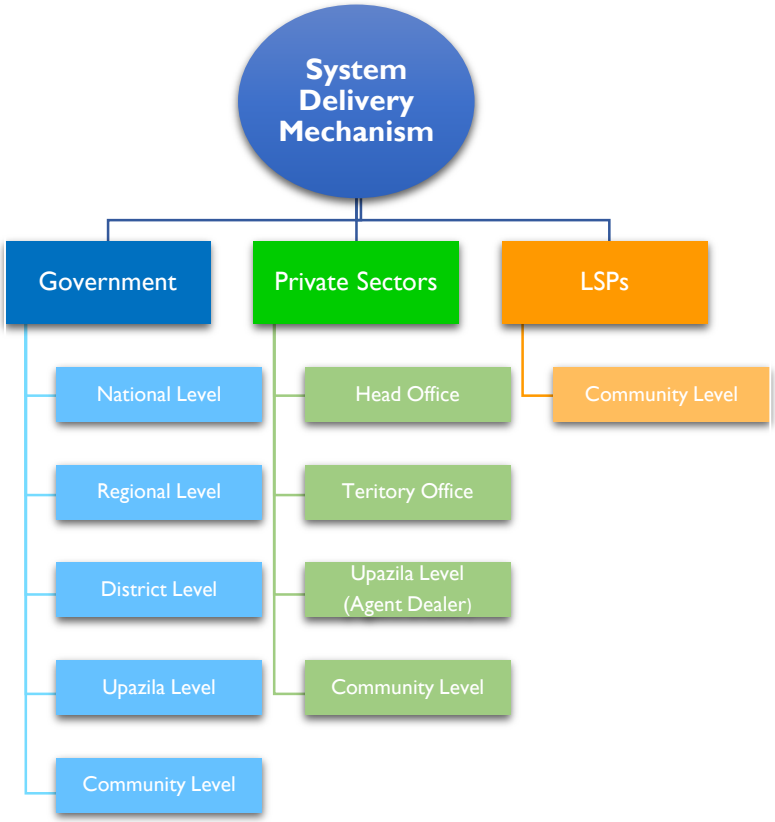

Figure 4: Service Delivery Mechanism

Notably, LSPs have evolved from the community and are trained by the SHOUHARDO III Plus program. They collaborate with implementing partners, government departments, and private companies to deliver technical guidance, inputs, and services, effectively addressing local needs and enhancing productivity.

3.2.1.1 Community Awareness of the Agricultural Support System Actors

The survey findings indicate that all program beneficiaries (n=272) are aware of the entities providing agricultural support in their respective areas, while a considerable portion (15.4%, n=272) of non-beneficiaries lack this awareness. Overall, beneficiaries consistently demonstrate higher levels of awareness across most entities compared to non-beneficiaries. LSPs and the DAE had widespread recognition in both regions, underscoring effective outreach efforts, followed by DLS and DAM. However, awareness levels for entities like the

DoF and private financial institutions from which farmers can avail loans, such as banks, private money lenders, NGO, and so on, remain lower (Figure 5).

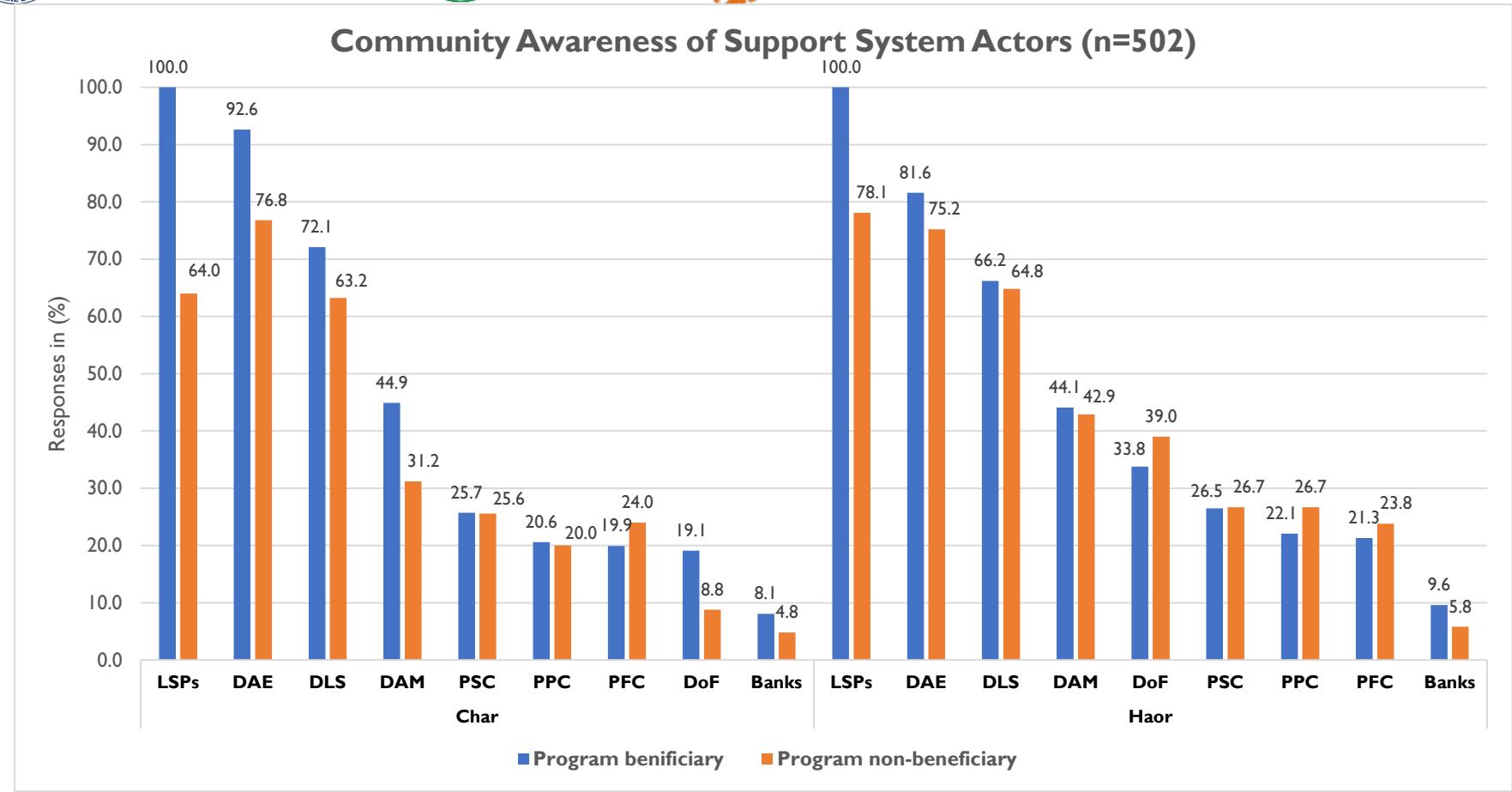

Figure 5: Community Awareness of Support System Actors

[1]

[1] *Local Service Providers (LSPs), Department of Agricultural Extension (DAE), Department of Livestock Services (DLS), Department of Fisheries (DoF), Department of Agricultural Marketing (DAM), Private Seed Company (PSC), Private Pesticides Company (PPC), Private Feed Company (PFC).*

Three key sectors of the support system recognized in the DHRC communities—namely the public sector, private sector, and LSPs—are discussed in detail below.

3.2.1.1.1 Awareness of Government Departments Activities

In DHRC regions, program beneficiaries had strong awareness of key government entities: 92.6% recognized the DAE in Char and 81.6% in Haor, compared to 76.8% and 75.2% of non-beneficiaries, respectively. The DLS was known by 72.1% of beneficiaries in Char and 66.2% in Haor, with non-beneficiary awareness at 63.2% and 64.8%. Awareness of the DAM varied, with 44.9% of beneficiaries and 31.2% of non-beneficiaries in Char, and 44.1% of beneficiaries and 42.9% of non-beneficiaries in Haor. DoF had the lowest recognition, with 19.1% of beneficiaries and 8.8% of non-beneficiaries in Char, and 33.8% of beneficiaries and 39.0% of non-beneficiaries in Haor.

Qualitative findings from IDIs with program beneficiaries also indicate strong awareness of key government entities involved in agricultural support. This heightened awareness is attributed to LSP interactions, regular training sessions, and access to resources. Conversely, FGDs with community members show that non-beneficiaries have lower awareness of these entities due to their exclusion from training programs and limited exposure to government initiatives.

3.2.1.1.2 Awareness of Private Sectors and Banks Activities

Private companies and banks contribute to agricultural activities with varying degrees of recognition. Private Seed Companies (PSCs) are identified by approximately 25% of both beneficiaries and non-beneficiaries in the DHRC regions. Private Poultry Companies (PPCs) are acknowledged by about 20% of individuals in Char and slightly more in Haor. Private Feed Companies (PFCs) have a lower recognition rate, with 19.9% of beneficiaries and 24.0% of non-beneficiaries in Char, and 21.3% and 23.8% in Haor, respectively. Banks exhibit the lowest recognition, with only 8.1% of beneficiaries and 4.8% of non-beneficiaries in Char, and 9.6% and 5.8% in Haor.

Qualitative findings indicate that limited community awareness of private sector services stems from their often individual-focused approach rather than community-wide outreach. Additionally, the presence of private sector entities is minimal in some remote areas. However, certain companies, such as Bengal Meat, ACI Ltd., BRAC Seed, and Lal Teer, are recognized within the community. FGDs further highlight that beneficiaries have greater awareness of banking services due to program collaborations aimed at promoting bank use for agricultural financing. This initiative seeks to replace private lenders by providing easier access, reduced documentation, and lower interest rates, thereby enhancing community financial inclusion.

3.2.1.1.3 Awareness of Local Service Providers (LSPs) Activities

In both the DHRC regions, LSPs are widely recognized among beneficiaries, with a 100% awareness rate reported across this group. Among non-beneficiaries, the recognition of LSPs remains also strong, though slightly lower, with 64.0% awareness in the Char region and 78.1% in the Haor region. Consistent with the quantitative data, FGDs with community members show that non-beneficiaries frequently attend and observe LSP activities, such as community-led vaccination campaigns. This indirect exposure contributes to their partial awareness of LSPs. This suggests that while non-beneficiaries have less direct interaction with LSPs, they

still gain some knowledge through indirect exposure, as highlighted by an LSP during an IDI in Islampur, Jamalpur.

3.2.2 Community Awareness of Improved Agricultural Practices

Quantitative findings revealed that all program beneficiaries were aware of improved agricultural practices, while 54.7% of non-beneficiaries were not. Non-beneficiaries largely used traditional methods (78.7%), struggling with challenges like growing flood-tolerant rice. FGDs revealed that many non-beneficiaries struggled with cultivating flood-tolerant rice and developing sustainable livelihoods because they depended on traditional methods. Despite lacking formal training, some non-beneficiaries gained knowledge about improved practices through community interactions and guidance from LSPs, government representatives, and private sector actors. In contrast, beneficiaries gained from structured training and workshops offered by LSPs and government entities.

KIIs with UAOs highlighted that low literacy levels among rural residents slowed the adoption of modern practices. The Upazila Livestock Officer of Madan noted gradual progress in awareness of livestock improvements, while the Upazila Fisheries Officer of Dowarabazar reported limited awareness of advanced fish farming, leading to suboptimal production. Both the UFO of Mithamoin, Kishoreganj, and the Deputy Director (DD) of the DAE emphasized the need to enhance community awareness and address implementation gaps. The DD also mentioned that,

> *" Good Agricultural Practices (GAP) began with improved practices using modern principles. Small marginal farmers receive ongoing training on the latest crop varieties, modern seeds, and safe crop production. Other NGOs, such as CARE Bangladesh, are also collaborating to accelerate these efforts."*

3.2.2.1 Improved Agricultural Training Received from the Support System

Training programs, workshops, and field sessions are essential for equipping farmers and fishermen with modern practices to enhance productivity and sustainability. Government bodies and LSPs provide these sessions, which lead to higher yields, better livestock health, and efficient resource use, while addressing information and financial constraints. In contrast, private companies primarily focus on commercial inputs rather than community capacity-building.

All program beneficiaries participated in either training programs, workshops, or field sessions. In contrast, only 19.1% of non-beneficiaries had similar access, with slightly higher participation in Char (23.5%) compared to Haor (14.7%). Non-beneficiaries' limited participation was due to unawareness (61.4%), uncertainty about engaging with programs (59.1%), and financial constraints in Haor (19.5%). Beneficiaries across both DHRC regions noted that LSPs primarily facilitated these sessions. The DAE significantly contributed, providing training to 85.3% of beneficiaries and 81.5% of non-beneficiaries in Char, and 74.3% of beneficiaries and 84.2% of non-beneficiaries in Haor. The DLS also played a notable role, with 41.9% of beneficiaries and 48.1% of non-beneficiaries in Char, and 32.4% of beneficiaries and 56.6% of non-beneficiaries in Haor (Figure 6).

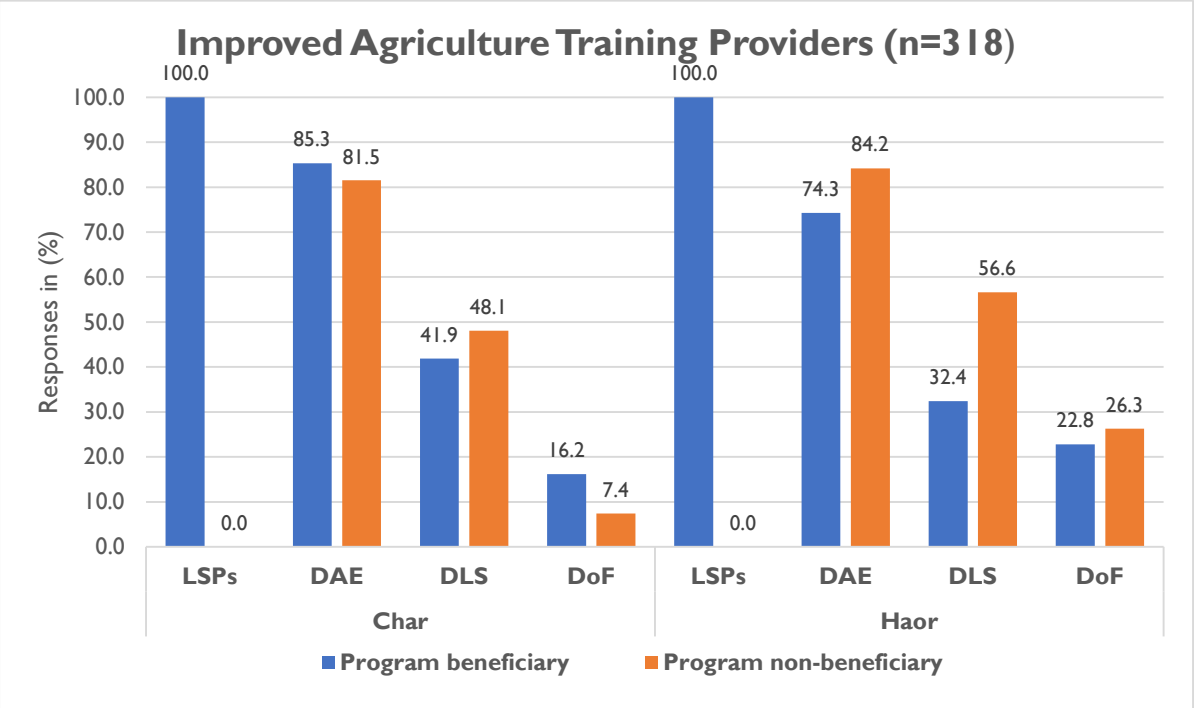

Figure 6: Improved Agriculture Training Providers

FGDs and IDIs revealed that program beneficiaries have developed a stronger understanding of the support system, including government departments, through LSP-led initiatives. This increased awareness has led to higher participation in government training, workshops, and field sessions compared to non-beneficiaries. However, non-beneficiaries face significant challenges due to a lack of awareness about these opportunities. For instance, participants from Dowarabazar, Sunamganj, expressed a strong interest in training but were unaware of available workshops. Additionally, limited awareness of DoF activities has led to lower participation in DoF-facilitated sessions. Women face additional barriers, including family and societal discouragement. KIIs with government stakeholders confirmed these issues, noting that despite efforts, training sessions often lack broad outreach due to staffing limitations and constraints related to the predominantly river-based nature of the area, which affects individual fish farming.

3.2.2.1.1 Types of Improved Agricultural Training Received by Community Members

In the DHRC regions, homestead gardening was widely practiced, with high participation among beneficiaries in Char (92.6%) and Haor (71.3%), compared to lower rates for non-beneficiaries (59.4% in Char and 55.0% in Haor). Training in High-Yielding Varieties (HYVs) of crops such as rice, wheat, and maize also showed high engagement, with 83.8% of Char beneficiaries and 80.1% of Haor beneficiaries participating, versus 75.0% and 65.0% for Char and Haor non-beneficiaries, respectively. Goat loft rearing was notably popular in Char (64.0% beneficiaries, 59.4% non-beneficiaries) compared to Haor (39.0% beneficiaries, 40.0% non-beneficiaries). Participation in flood-tolerant rice varieties was higher in Char (62.5% beneficiaries, 50.0% non-beneficiaries) than in Haor (50.7% beneficiaries, 55.0% non-beneficiaries (Table 2).

Table 2: Types of Improved Agricultural Practices in which Community Members are Trained

Responses (%)	Char			Haor			Total
	Program beneficiary	Program non-beneficiary	Total Char	Program beneficiary	Program non-beneficiary	Total Haor	
n	136	32	168	136	20	156	324
Homestead gardening (e.g., vegetables, tomatoes, potatoes, and carrots, etc.)	92.6	59.4	76.0	71.3	55.0	63.2	69.6
High-Yielding Varieties (HYV) (rice, wheat, maize, potato, etc.)	83.8	75.0	79.4	80.1	65.0	72.6	76.0
Loft rearing (goat)	64.0	59.4	61.7	39.0	40.0	39.5	50.6
Meat rearing (cow and buffalo)	63.7	40.6	52.2	52.2	35.0	43.6	47.9
Flood-tolerant rice varieties	62.5	50.0	56.3	50.7	55.0	52.9	54.6
Poultry rearing (chicken)	50.7	37.5	44.1	36.0	25.0	30.5	37.3
Hand pollination	41.2	28.1	34.7	28.7	20.0	24.4	29.5
Fodder crops	33.1	21.9	27.5	10.3	35.0	22.7	25.1
Hatching basket	23.5	3.1	13.3	21.3	25.0	23.2	18.2
Fish farming	14.0	15.6	14.8	23.5	40.0	31.8	23.3
Haylage/silage production	10.3	3.1	6.7	5.9	15.0	10.5	8.6
Tower Garden	8.8	12.5	10.7	3.7	15.0	9.4	10.0

Government departments such as DAE, DLS, and DoF conduct comprehensive training programs for the community. The KII with UAO Austagram, Kishoreganj, highlighted their regular sessions for small and marginal farmers, covering a wide range of topics including modern crop varieties, seed selection, and safe crop production practices. Additionally, DLS and DoF offer training workshops on livestock rearing, including silage and haylage production[2], as well as fish farming. LSPs also organize training and workshops for their beneficiaries, focusing on improved agricultural practices. These efforts complement the broader support provided by government departments.

3.3 Impacts of the Support System in DHRC Regions

3.3.1 Changes in Agricultural Practices

The survey findings underscore a notable shift in agricultural practices due to training and workshops. All program beneficiaries have transitioned to improved agricultural practices, whereas 26.8% of non-beneficiaries—21.8% in Char and 20.5% in Haor—have adopted similar methods. Homestead gardening was the most common practice across both regions, with high participation among beneficiaries (Char 92.6%, Haor 71.3%) and lower rates among non-beneficiaries (Char 59.4%, Haor 20.0%). The cultivation of HYVs of crops and rice was widely practiced by both beneficiaries and non-beneficiaries, with participation rates around 80% in both regions. Goat rearing was particularly popular in Char (54.4% beneficiaries, 42.1% non-beneficiaries) compared to Haor (47.1% beneficiaries, 45.0% non-beneficiaries). Flood-tolerant rice varieties were more widely adopted in Char (41.2% beneficiaries, 31.6% non-beneficiaries) than in Haor (33.8% beneficiaries, 31.3% non-beneficiaries) (Table 3).

[2] Silage is made from fermented green crops stored in airtight conditions, while haylage is made from partially dried forage with higher moisture content than hay.

Table 3: Types of Improved Agricultural Practices Being Implemented by Community Members

Responses (%)	Char			Haor			Total
	Program beneficiary	Program non-beneficiary	Total Char	Program beneficiary	Program non-beneficiary	Total Haor	
n	136	38	174	136	35	171	345
Homestead gardening (e.g., vegetables, tomatoes, potatoes, and carrots, etc.)	92.6	81.6	87.1	71.3	65.0	68.2	77.6
High-Yielding Varieties (rice, wheat, maize, potato, etc.)	85.3	68.4	76.9	73.5	60.0	66.8	71.8
Hand pollination	58.8	44.7	51.8	55.9	30.0	43.0	47.4
Loft rearing (goat)	54.4	42.1	48.3	47.1	45.0	46.1	47.2
Meat rearing (cow and buffalo)	41.2	34.2	37.7	44.9	31.3	38.1	37.9
Flood tolerant rice varieties	41.2	31.6	36.4	33.8	31.3	32.6	34.5
Poultry rearing (chicken)	36.8	26.3	31.6	27.2	35.3	31.3	31.4
Fodder crops	30.1	28.9	29.5	17.6	30.0	23.8	26.7
Hatching basket	28.7	3.4	16.1	27.2	20.0	23.6	19.8
Saline tolerant rice varieties	11.0	10.5	10.8	20.6	12.5	16.6	13.7
Tower garden	8.1	2.6	5.4	14.0	6.3	10.2	7.8
Haylage/silage production	6.6	0.0	3.3	9.6	6.3	8.0	5.6
Fish farming	5.9	15.8	10.9	18.4	25.0	21.7	16.3

FGDs findings highlight key agricultural practices in Bangladesh. Homestead gardens featuring vegetables like puishak, brinjal, pumpkin, sweet pumpkin, gourds, and bitter gourds, along with fruit trees such as guava and banana, strengthen food security. Farmers commonly use high-yielding varieties like BRRI Dhan 28, BRRI Dhan 29, and maize hybrid Pioneer 30V92 for increased productivity. In flood-prone areas, flood-tolerant rice varieties, including BRRI Dhan 51 and BRRI Dhan 52, ensure stable yields. Hand pollination in crops like tomatoes, cucumbers, gourds, and pumpkins further enhances yields, while fodder crops such as Napier grass and cowpea support livestock health and milk production. Bamboo hatching baskets assist in poultry farming to boost production.

During FGDs with program beneficiaries and community members revealed that homestead gardening, particularly among women, is the most popular agricultural activity due to its feasibility within home surroundings. In contrast, men favored high-yield crop varieties and flood-tolerant rice for field cultivation. Beneficiaries have also adopted high-yield maize production methods, as noted in Islampur, Jamalpur. Informal learning has played a role in skill acquisition, with untrained individuals learning from program beneficiaries who received formal training. For instance, in Kalmakanda, Netrokona, homestead gardening involving vegetables like brinjal and gourds was highlighted.

Significant changes in agricultural practices were observed. In Char Rajibpur, the introduction of high-yield crops such as maize, wheat, and potatoes has led to increased income and improved living standards. Participants who previously struggled with these crops are now successfully engaging in poultry, cow fattening, and home gardening. Similarly, in Sundarganj, the shift from local to improved cow breeds has resulted in greater profitability. In Shahjadpur, Sirajganj, an LSP mentioned the positive impact of these changes,

"Field days were held to demonstrate the introduction of HYV crops and rice varieties. SHOUHARDO III Plus members participated, gained knowledge, and applied it within their communities. As a result, others have adopted these HYVs, shifting from traditional varieties to boost production."

3.3.1.1 Challenges in Agricultural Practices

Farmers in DHRC regions face significant challenges. In Char, 98.5% of beneficiaries and 82.4% of non-beneficiaries struggle, while in Haor, 91.2% of beneficiaries and 72.1% of non-beneficiaries do. Major issues include high input costs (56.7% in Char vs. 55.5% in Haor), pest and disease management (56.5% in Char vs. 46.6% in Haor), and access to quality inputs (59.8% in Char vs. 56.5% in Haor). Knowledge gaps in modern techniques are slightly higher in Char (44.6%) compared to Haor (43.8%). Difficulty accessing loans impacts 43.3% in Char and 41.0% in Haor, while fair product values are challenging for 30.9% in Char and 24.0% in Haor. Limited market access affects 20.3% in Char and 18.5% in Haor, with access to reliable information difficult for 18.9% in Char and 17.4% in Haor (Figure 7).

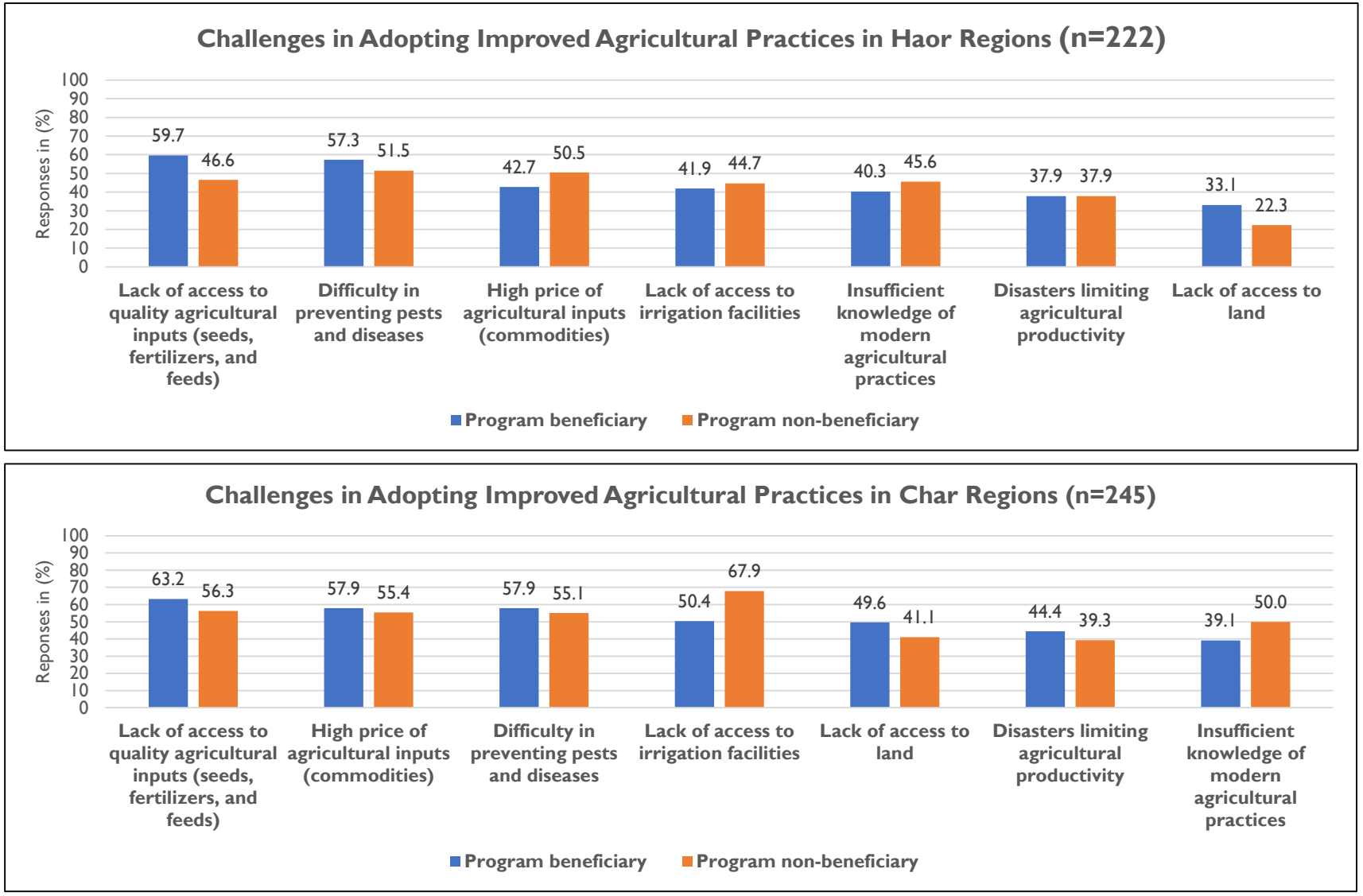

Figure 7: Challenges in Adopting Improved Agricultural Practices in DHRC Regions

During the FGDs, it was highlighted that the accessibility of agricultural inputs, such as quality seeds and pesticides, presents a significant challenge. A participant from Dowarabazar, Sunamganj, highlighted,

"One of the major challenges we encounter in agriculture revolves around the availability of high-quality seeds and the persistent threat of pest attacks, which significantly impact our crop yields and overall productivity."

In Islampur, Jamalpur, during an FGD, community members reported challenges including insect infestations, stunted plant growth, reduced yields, and livestock diseases. They also highlighted difficulties in marketing their agricultural products, citing issues like distant markets and inadequate transportation. In another FGD in Char Rajibpur, Kurigram, a woman said,

"I grow some vegetables and keep ducks, chickens, and eggs at home. However, since the amounts are small, selling the surplus isn't worthwhile because of the transportation costs and the time required."

In Kalmakanda, Netrokona, an FGD participant mentioned that distant markets and unreliable transportation hinder product sales, often lowering profits due to high costs. The study also highlighted that woman face extra challenges in agricultural marketing. One woman noted she struggles to sell surplus vegetables like gourd and lemon due to market access issues. Similar concerns were shared by other community members, especially those not benefiting from the program. Financial constraints were a significant issue, as illustrated by an FGD participant from Itna, Kishoreganj, who said,

"If I want to start agricultural activities, I need financial resources that I don't currently have. Our financial situation makes it hard to arrange the necessary funds since banks require collateral for loans."

FGDs participants also highlighted several agricultural challenges. Issues with loan documentation and financial management were noted, particularly due to literacy and gender barriers. Many rely on high-interest local loans due to insufficient support. In Sundarganj, Gaibandha, extreme poverty hampers livestock investments. Ajmiriganj, Habiganj residents face financial and land constraints in starting poultry farming. In Char Rajibpur, Kurigram, floods and river erosion significantly impact agriculture and marketing.

A program official from Chuhali, Sirajganj, acknowledged that challenges like inadequate quality seeds, fertilizers, pesticides, and limited access to bank loans are major barriers to agricultural activities. In this regard, the UFO of Islampur, Jamalpur, stated,

"Most farmers are not interested in fish farming due to year-round water scarcity and poverty. Money is also a significant obstacle in fish farming. Small and medium-scale farmers purchase fish fry but struggle to afford necessary feed, leading to stunted growth. This discourages them from continuing in fish farming despite its potential."

In another KII, the UAO of Char Rajibpur, Kurigram, echoed these concerns, noting that both constraints and natural disasters severely limit local farmers' productivity. Similarly, the UAO of Madan, Netrokona, highlighted the significant adverse effects of disasters on agriculture and overall livelihoods in the region.

3.3.2 Role of the Support System in Agricultural Support and Challenge Mitigation

Quantitative findings show that in both Char and Haor regions, a higher percentage of program beneficiaries sought assistance from agricultural support system actors compared to non-beneficiaries. In Char, 93.4% (n=127) of beneficiaries sought help, while 65.6% (n=82) of non-beneficiaries did. In Haor, 88.2% (n=120) of beneficiaries sought assistance compared to 61.7% (n=66) of non-beneficiaries (Figure 8).

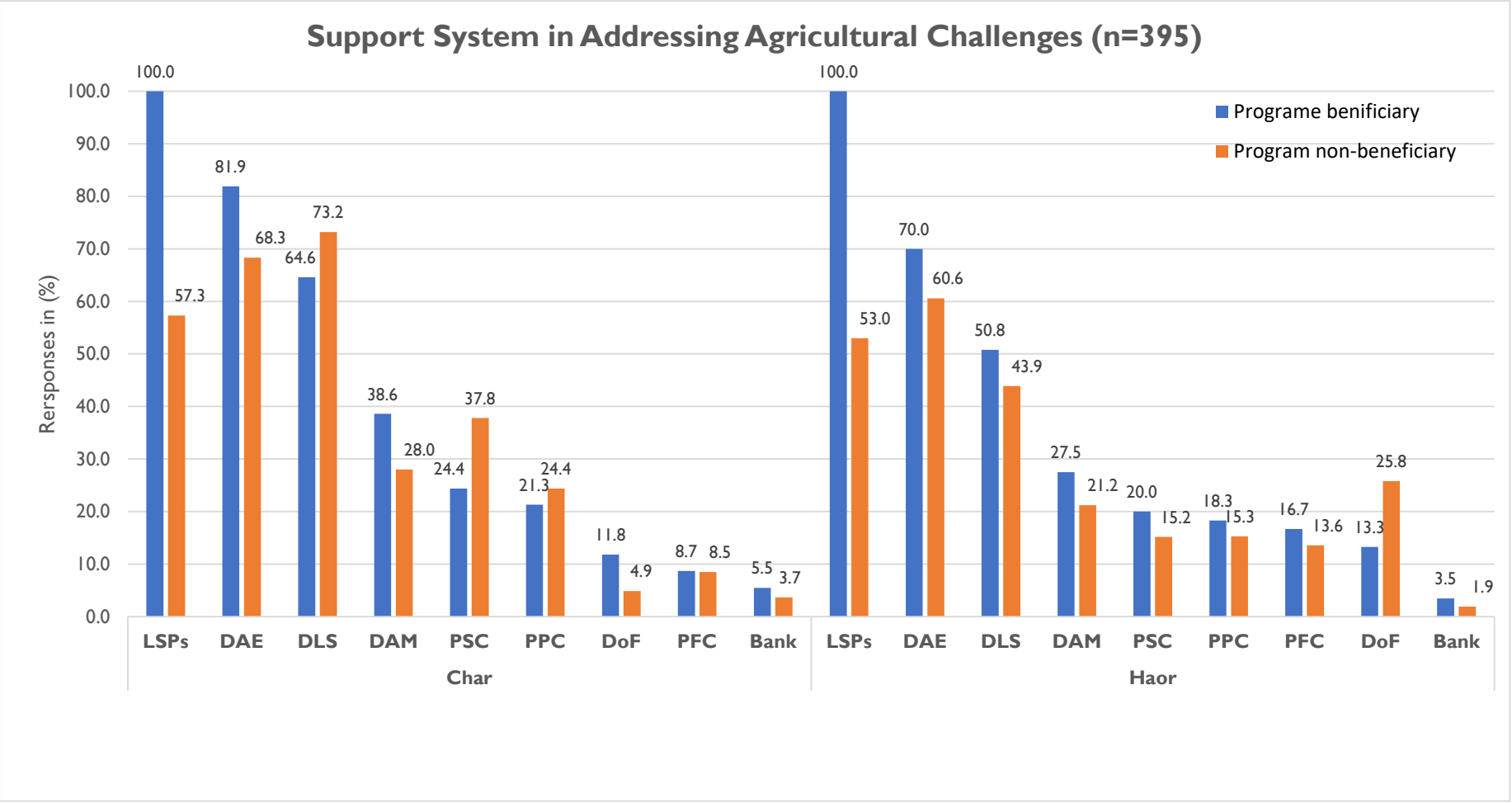

Figure 8: Support System in Addressing Agricultural Challenges

The DHRC communities' benefit from three key sectors of the support system—namely the public sector, private sector, and LSPs—which are instrumental in providing agricultural support and addressing challenges. These sectors' roles in addressing agricultural challenges in DHRC regions are discussed in the following.

3.3.2.1 Role of Government Departments

Government entities play a vital role in supporting agriculture in the Char and Haor regions. The DAE leads with 81.9% engagement in Char and 70.0% in Haor, while the DLS focuses on livestock activities, with 64.6% and 50.8% participation, respectively. DAM supports local initiatives with 38.6% involvement in Char and 27.5% in Haor, and the DoF provides specialized support to 11.8% in Char and 13.3% in Haor. FGDs also revealed that farmers heavily rely on the DAE for crop cultivation, pest management, and modern techniques, especially in agriculture-dependent DHRC areas. Many participants noted that before the SHOUHARDO III Plus Program, they were unaware of DAE office locations and available services, highlighting the program's role in increasing awareness and access to agricultural support.

The FGDs revealed that people frequently seek advice on crop cultivation and farming, including pest and disease control, from government departments. While some participants found the services useful, others felt the advice was not always adequate, especially for addressing emerging diseases in crops and livestock. For instance, participants in Kalmakanda, Netrokona, shared that the support provided was insufficient. In response, program beneficiaries turned to LSPs for additional help, while non-beneficiaries sought guidance from experienced farmers for more practical solutions.

Additionally, some FGD participants noted that they frequently need assistance with pest and disease control, treatment, and agricultural inputs. However, accessing these services is difficult due to the departments being located in distant Upazilas, which requires considerable time, effort, and transportation costs. This challenge is exacerbated during natural disasters and droughts, when boats are the primary means of transport. As an FGD participant in Char Rajibpur, Kurigram, highlighted, reaching these departments for treatment of domesticated chickens, ducks, and goats becomes especially difficult during such times.

Some participants highlighted prolonged waiting times and inadequate attention from government officials. Government representatives attributed these issues, in some cases, to a shortage of manpower despite their best efforts. As expressed by the UFO of Mithamoin, Kishoreganj, during a KII session,

"The Department of Fisheries faces its biggest challenge in manpower shortages. Two instead of five personnel make implementing activities difficult."

He further emphasized that even with five personnel, serving such a vast area with a large community remains challenging. Similar sentiments were echoed by other government officials in separate KIIs.

Community farmers also sought assistance with agricultural inputs such as seeds, feeds, fertilizers, pesticides, and livestock medicine. However, FGD participants claimed that these supports were inadequate. An FGD participant in Belkuchi, Sirajganj, noted,

"I once went to the DAE for quality seeds at a low price but didn't get any even after traveling a long distance."

Another participant had a similar complaint about the DLS. Regarding financial assistance, community members often receive referrals to government banks or NGOs rather than direct help from government departments, as revealed in an FGD in Madan, Netrokona. Additionally, FGD participants seldom received assistance with marketing their agricultural products from government departments.

In response to these challenges, government representatives in KIIs reaffirmed their commitment to supporting community farmers both in the office and in the field. The UAO of Islampur, Jamalpur, mentioned that they provide field-level advice tailored to local needs but face limitations due to manpower shortages and the high volume of service seekers. Similarly, the ULO of Dowarabajar, Sunamganj, highlighted that, beyond staffing issues, distance and transportation problems further hinder beneficiaries from accessing office services directly.

The UAO of Phulchari, Gaibandha, noted the DAE's difficulty in serving around 70 chars due to limited manpower. Despite this, the department offers training on improved rice varieties and crop production. However, the provision of quality seeds, fertilizers, and other inputs often falls short of local needs. Consequently, farmers are referred to LSPs or private dealers for inputs and to agricultural banks or NGOs for loans, as mentioned by the ULO of Belkuchi, Sirajganj.

Regarding market arrangements, the study found that government departments, including the DAM, lacked effectiveness in this area. The UAO of Phulchari, Gaibandha, added,

> *"Farmers cannot easily market their produce because there is no facility to transport the produce to distant markets. As a result, they have to sell to local traders at unfair prices."*

The DLS of Islampur, Jamalpur, highlighted that distant markets are often unreachable during natural disasters. To address this, the department established a wet market for livestock sales. However, despite these efforts, they are insufficient and such solutions are not commonly available in many areas.

3.3.2.2 Role of Private Sectors and Banks

Private companies and banks have limited involvement in the Char and Haor regions. In Char, PSCs support 24.4% of beneficiaries and 37.8% of non-beneficiaries, while PPCs assist 21.3% and 24.4%, respectively. In Haor, PSCs engage 20.0% of beneficiaries and 15.2% of non-beneficiaries, and PPCs support 18.3% and 15.3%. PFCs interact with 8.7% of beneficiaries and 8.5% of non-beneficiaries in Char, compared to 16.7% and 13.6% in Haor.

FGD participants shared those interactions with these entities are primarily transactional, focusing on the purchase of seeds, pesticides, and fertilizers. Although some dealers provide agricultural advice, they offer little support for marketing or loans. Private sector representatives noted a lack of training and collaboration with programs like SHOUHARDO III. In Char Rajibpur, Kurigram, participants highlighted a shortage of agricultural services, which is exacerbated by staffing issues. Non-beneficiaries often resort to high-interest loans from private lenders and NGOs due to barriers like literacy and collateral requirements. Furthermore, government banks such as Bangladesh Krishi Bank impose land requirements for loan eligibility, as noted by the UAO of Madan, Netrokona.

3.3.2.3 Role of the LSPs

In both DHRC regions, LSPs are vital in supporting agricultural practices among farmers, with complete involvement (100%) among program beneficiaries. Non-beneficiaries also interact significantly with LSPs, at rates of 57.3% in Char and 53.0% in Haor. LSPs' major activities include providing training sessions (89.1%) and conducting courtyard meetings (63.6%). Field visits are conducted by 77.6% of LSPs. Technical assistance and support are provided by 55.2%, while 55.4% supply quality inputs such as seeds, fertilizers, and fish fry. Additionally, 44.6% of LSPs facilitate market access, and 38% conduct plot demonstrations (Annex 9).

In FGDs, program beneficiaries noted that they gained knowledge about modern agricultural practices from LSPs, which they lacked before the SHOUHARDO III program. They now primarily rely on LSPs for assistance, reducing the need to visit Upazila offices. As a program beneficiary in Itna, Kishoreganj, stated,

"Before, I had to go to DAE offices, which are located far from my area. But now, there are LSPs in my area. I can reach them anytime I want and get quality services at affordable fees."

In an FGD, participants from Sundarganj, Gaibandha, noted that remote areas often lack service provider visits, leading them to rely on LSPs. They appreciated that LSPs offer quality seeds, fertilizers, and pesticides at lower prices than private dealers. Similarly, in Islampur, Jamalpur, participants highlighted LSPs' timely support for production, pest control, and inputs, in contrast to the slower response from government departments. The availability of LSPs for field visits was also valued, as such visits are rare from government bodies. A participant added,

"When I encounter issues such as pests or poor growth in my crops and livestock, I contact LSPs. The they visit, diagnoses the issue, and takes necessary steps."

Program beneficiaries reported using an app from the SHOUHARDO III Plus program for information on seeds, pesticides, and disease control. FGDs indicated that non-beneficiaries also learned about improved practices through interactions with beneficiaries and LSPs. In Ajmiriganj, Habiganj, some non-beneficiaries turned to LSPs for assistance because of their accessibility, familiarity, and comfort. An LSP said in a KII,

"Farmers frankly tell me about any problem in agriculture. If there is any problem, they call me anytime, even at night, and I have to come to solve it."

FGD findings also revealed that LSPs have been playing a role in establishing market linkages. According to participants, the introduction of LSPs has helped them sell products, which was complicated before due to distance and transportation issues. Moreover, women often can't go to nearby markets. An FGD participant from Kalmakanda, Netrokona, shared,

"We primarily sell our products—such as rice, maize, vegetables, and eggs—to local collectors who offer fair prices. This arrangement reduces our travel costs and saves us time."

FGD participants observed that government and private sector services are limited in their areas. An LSP from Islampur, Jamalpur, described a system where local buyers or wholesalers collect and sell farmers' produce to LSPs, ensuring payment to farmers. The Program Manager of Kuza Biashara, an international partner of SHOUHARDO III, emphasized their role in

enhancing LSP skills and creating market linkages with government and private partners. Kuza Biashara has established connections with buyers, particularly benefiting women by improving market access for farmers in remote areas.

To address financial challenges, the SHOUHARDO III program introduced Village Savings and Loans Associations (VSLAs), known locally as "Baksho Samiti." These VSLAs provide members with the ability to save money and access funds for agricultural activities, offering financial support not typically available through other systems. An FGD participant in Madan, Netrokona, shared,

"I previously had to rely on high-interest private lenders, which hindered my ability to expand my poultry farm. Since joining the VSLA, I can now access loans easily without documentation, delays, or interest."

In FGDs, participants noted that women often use their own savings to provide immediate loans for their husbands' agricultural work. An IDI participant from Phulbari, Kurigram, mentioned that the VSLA helped her secure a bank loan for purchasing a cow. LSPs also assist farmers with loan applications and documentation. The SHOUHARDO III program's collective homestead gardening approach notably supports landless individuals, setting it apart from government and private sector efforts.

A program official also highlighted LSPs' essential role in improving agricultural productivity by providing services like seed supply, vaccination, and collection. The UAO of Islampur, Jamalpur, emphasized the successful collaboration between LSPs and farmers. He mentioned,

"The LSPs work closely door to door with the farmers, which sets them apart from others."

3.3.3 Impacts of the Support System on Agricultural Production

FGDs revealed that the agricultural support system has significantly improved crop production, increasing diversity, productivity, and profitability. For example, a participant from Char Rajibpur noted that high-yield maize and rice cultivation has made farming more profitable, and the adoption of improved cow breeds has enhanced animal husbandry benefits. Another participant added,

"Previously, I didn't grow rice during the flooding season. But after participating in the improved agriculture training program, I learned about flood-tolerant rice varieties and can now cultivate even during floods."."

In Nageshwari, Kurigram, a program beneficiary noted that training on HYVs and pest management has boosted crop production, while vaccinations have reduced animal mortality. In Belkuchi, Sirajganj, participants observed that LSPs and support system initiatives have altered local cropping patterns. A participant shared,

"Earlier, there was only one crop per land. Now, due to improved agricultural practices, the same land produces three crops a year. Crops are produced throughout the year."

In Austagram, Kishoreganj, participants reported a shift from annual rice production to year-round cultivation, poultry raising, and vegetable gardening, with elevated platforms mitigating flooding concerns. In Char Rajibpur, Kurigram, maize cultivation and improved cattle breeds have significantly increased profitability. An IDI participant from Phulbari, Kurigram, noted

that adopting climate-tolerant crops like improved maize, vegetables, and new rice varieties has boosted production.

LSPs have played a crucial role in transforming crop production in DHRC regions. An LSP from Islampur noted that people previously lacked a solid understanding of effective crop production techniques. He stated,

> *"Previously, only non-HYV rice and jute were grown. Now, farmers cultivate a variety of HYVs, including rice, pepper, mustard, garlic, and more, transforming the land into a three-crop system. Rice yields have increased from 10-15 maunds per Ekabigha (33 decimals) to 35 maunds."*

A private sector representative from Bakshiganj, Jamalpur, noted that improved flood-resistant seeds have transformed Aus rice cultivation, reducing losses from flooding. The SHOUHARDO III program also distributes Mashkalai seeds and introduces practices like silage production, loft rearing, and tower gardens to protect crops and livestock during disasters. These initiatives have heightened local interest in farming, enabling year-round cultivation and livestock rearing. Women are increasingly involved in vegetable farming and livestock rearing, boosting overall production, according to a program official from Phulchari, Gaibandha.

LSPs are pivotal in enhancing production, as also highlighted in a KII with a Program Manager of Kuza Biashara. According to him,

> *"Kuza Biashara partners with quality seed producers, creating a chain where seed agents distribute superior seeds locally. LSPs then sell these high-quality seeds in markets, boosting productivity and benefiting both farmers and buyers."*

However, the introduction of improved flood-resistant seeds, crops, and livestock has reduced production losses during floods, as noted by the ULO of Saghata, Gaibandha. The UAO of Austagram, Kishoreganj, also mentioned,

> *"Growing profitability in agriculture has attracted educated young entrepreneurs to cultivate high-yield crops and rear improved livestock, including loft rearing, on previously unused land, enhancing resilience to natural and climate shocks."*

He noted that government-led irrigation facilities have eased drought-related challenges, positively impacting agricultural production. This was supported by government representatives. Additionally, a DoF official highlighted that both government and NGO programs, including improved technology and climate-tolerant varieties, have addressed natural calamities and enhanced production and livelihoods.

3.3.4 Impacts of the Support System on People's Lives and Livelihood

3.3.4.1 Employment Opportunities and Poverty Reduction

According to the quantitative findings, PEP households who are program beneficiaries have made significant progress in adopting improved agricultural practices, leading to increased household income alongside their primary occupations. Five years ago, 81.6% (n=222) of program beneficiaries earned below 10,000 BDT ($85[3]), whereas now only 8.1% (n=22) fall into this category. Currently, 62.5% (n=170) of beneficiaries earn between 10,000-19,000

[3] 1 USD = 117.56 BDT (as per the rate of the calculation day)

BDT ($85-$161), a notable increase from the previous 12.5% (n=34). Furthermore, the percentage of beneficiaries earning between 20,000-29,000 BDT ($170-$247) has risen to

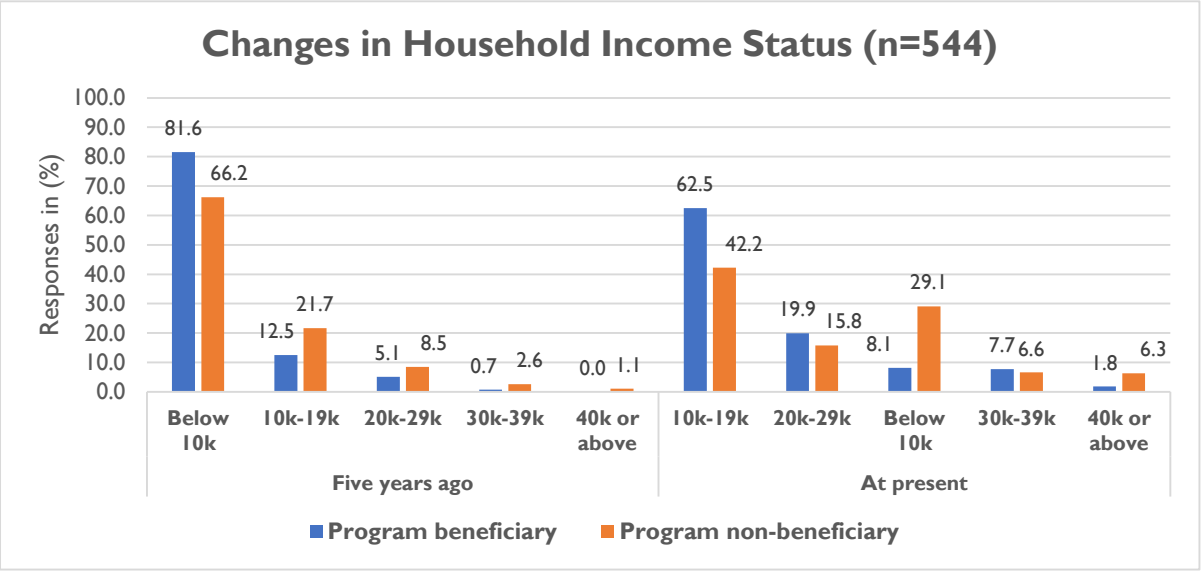

Figure 9: Changes in Household Income Status

19.9% (n=54), up from 5.1% (n=14) five years ago. Higher income levels have also seen increases, with 7.7% (n=21) of beneficiaries now earning between 30,000-39,000 BDT ($255-$332) (Figure 9).

The quantitative findings also highlight significant improvements in additional income due to adopting improved agricultural practices among program beneficiaries. Five years ago, 44.1% of beneficiaries and 43.0% of non-beneficiaries reported no additional income from agriculture. Today, all beneficiaries earn some extra income, with 56.3% earning between 1,000-5,000 BDT ($8-$43), compared to 37.5% of non-beneficiaries. Additionally, 27.2% of beneficiaries now earn 6,000-10,000 BDT ($51-$85), while 23.2% of non-beneficiaries still report no additional income, showing the positive impact of the program (Figure 10).

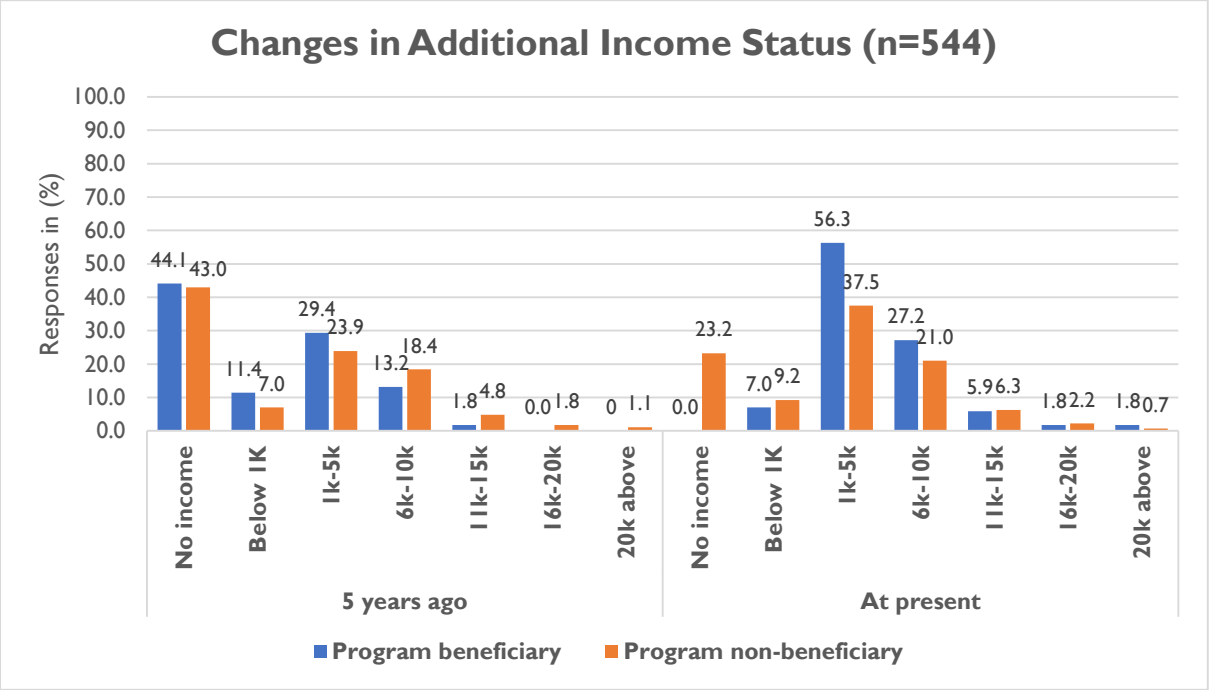

Figure 10: Changes in Additional Income Status

The agricultural support system, particularly through LSPs, has significantly increased employment in DHRC regions, especially among women. FGDs reveal that LSPs provide regular training in modern agriculture, livestock, and poultry farming, empowering women to start their own ventures. In Phulchari, Gaibandha, women are actively involved in farming, boosting household income. In Austagram, Kishoreganj, beneficiaries highlighted LSPs' role in facilitating market access and ensuring fair prices. VSLAs supported by LSPs also offer financial resources for women to expand businesses. Beneficiaries emphasized their economic progress from improved agricultural practices, monitored regularly by LSPs, a support absent among non-beneficiaries. A beneficiary from Itna, Kishoreganj, shared,

"My husband used to be the sole earner as a van puller, and our income was very low. After joining the program, I started homestead gardening and bought poultry with a VSLA loan. Now, I contribute significantly to our household income."

Furthermore, a case study exemplifies how activities by LSPs have positively influenced agricultural practices and household income levels, as depicted below.

Kawsar Ali (pseudonym), a 44-year-old from a Char in Kurigram, struggled to provide for his family after river erosion destroyed their home, forcing them to rebuild on someone else's land. As the sole earner with three children and his mother to support, Kawsar faced a bleak future. His situation changed when he became a beneficiary of the SHOUHARDO III program, which introduced him to livestock rearing and sustainable agricultural practices. With training, resources, and a loan facilitated by a Local Service Provider (LSP), Kawsar purchased his first cow and goat, avoiding high-interest loans from private money lenders. He also adopted efficient poultry-raising techniques using hatching baskets. This support enabled Kawsar to provide his family with consistent meals, improve their living conditions, and achieve financial stability. The transformation of Kawsar's household underscores the significant impact of the SHOUHARDO III program in empowering vulnerable communities.

A beneficiary shared how raising livestock and cultivating crops significantly boosted her income, enabling her to save in VSLAs for financial security. An LSP from Dowarabazar, Sunamganj, reported similar income gains, with some households now earning at least 5,000 BDT ($42) monthly. The UAO of Madan, Netrokona, noted that increased agricultural production has improved living standards and food security in the area.

3.3.4.2 Improvement in Living Standards of the Community People

The quantitative findings show notable differences in the program's impact on living standards between beneficiaries (n=272) and non-beneficiaries (n=272) in the Char and Haor regions. All beneficiaries reported improvements in food and nutrition security, while non-beneficiaries in the Char region noted higher education advancements (90.5%) compared to Haor (85.5%). Beneficiaries in Char experienced significant improvement in housing (97.1%), education (90.5%), and health care (90.4%), whereas non-beneficiaries saw more modest improvements in these areas. Similarly, beneficiaries in Haor reported significant enhancements in housing (91.9%), education (87.5%), and health care (87.5%) (Figure 11).

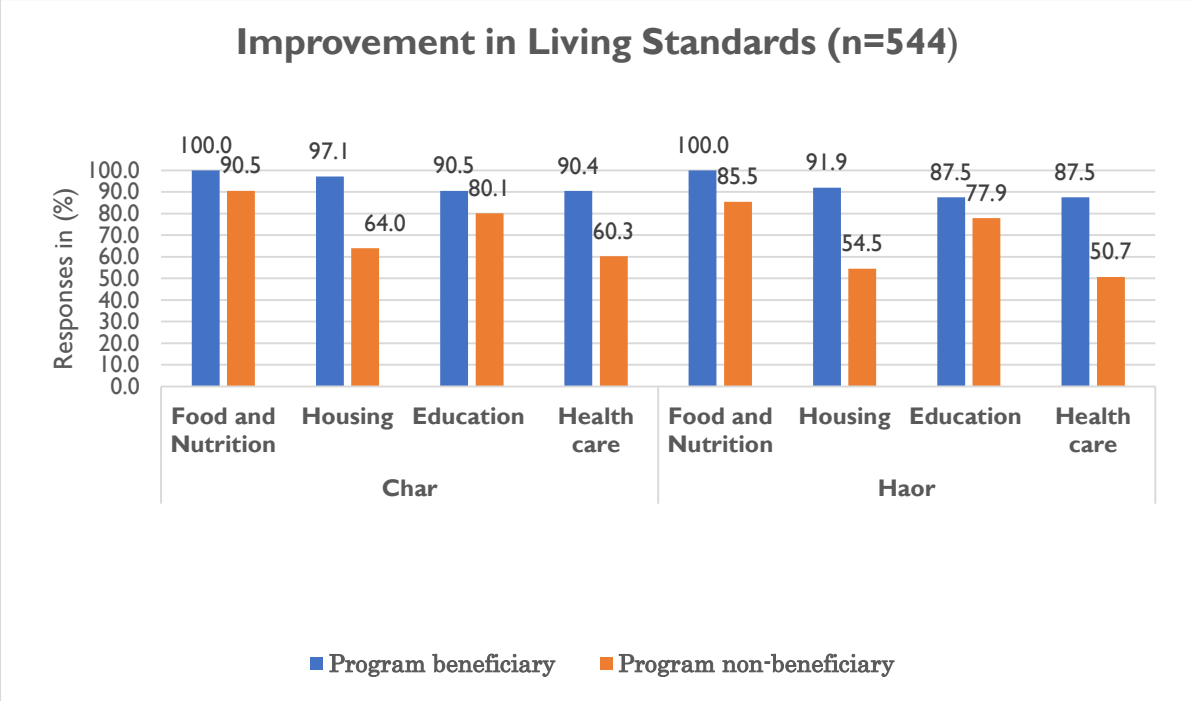

Figure 11: Improvement in Living Standards

The qualitative findings found that program beneficiaries experienced significant improvements in living standards. FGDs revealed that adopting new agricultural practices greatly enhanced their financial situation and food security. A participant from Bakshiganj, Jamalpur, noted,,

> *"With the training provided, I have initiated vegetable cultivation and the raising of poultry, cows, and goats. This shift has allowed us to rely on our own eggs and meat, thereby reducing our dependence on market purchases."*

Another case study vividly illustrated the profound impact of improved agricultural practices on program beneficiaries, as depicted below.

Rina Begum (pseudonym), a 38-year-old resident of a Haor area in Sunamganj district, faced significant challenges as a single mother of three children, exacerbated by the uncertainties of flood and other natural disasters. Struggling to provide three meals a day and ensure consistent education for her children, Rina's situation markedly improved when she joined the SHOUHARDO III program as a beneficiary. This initiative, aimed at supporting vulnerable communities, provided Rina with training and resources to start poultry farming, including raising chickens, ducks, and livestock, while cultivating vegetables around her home. This diversification of her income sources significantly enhanced household nutrition. With a reliable supply of eggs, chicken and duck meat, and fresh vegetables from her garden, Rina could now regularly provide nutritious meals for her children, improving their overall health and well-being. Furthermore, the additional income enabled her to enroll her children in school consistently, overcoming previous financial barriers. Beyond empowering Rina with sustainable livelihood skills, SHOUHARDO III also fostered community support and resilience against economic shocks.

Participants in various FGDs expressed similar views, acknowledging the SHOUHARDO III program's impact on enhancing their housing, children's education, and family healthcare, alongside a notable increase in household incomes. A beneficiary from Saghata, Gaibandha, commented during an IDI,

> *"We farm our land, grow maize and veggies, and raise cows, goats, and poultry, which has really improved our lives. We used to live in a thatched house, and floods were tough. Now, we have a brick and tin shed that's much more comfortable, and it helps us cover our children's education expenses."*

3.3.4.3 Community Development: Social Equity and Inclusion

The actors in the agricultural support system, particularly LSPs, have a significant impact on agriculture and community development. Beneficiaries in the DHRC regions are more active in decision-making and community activities than non-beneficiaries. In Char, 45.6% of beneficiaries participate in household decisions and 41.9% in agricultural decisions, compared to 24.3% and 19.2% of non-beneficiaries. In Haor, 47.8% of beneficiaries engage in household decisions and 43.4% in agricultural decisions, versus 21.7% and 18.4% of non-beneficiaries. Beneficiaries also show higher community activity participation, with 16.2% in Char and 23.9% in Haor, compared to 2.2% and 3.3% of non-beneficiaries (Figure 12).

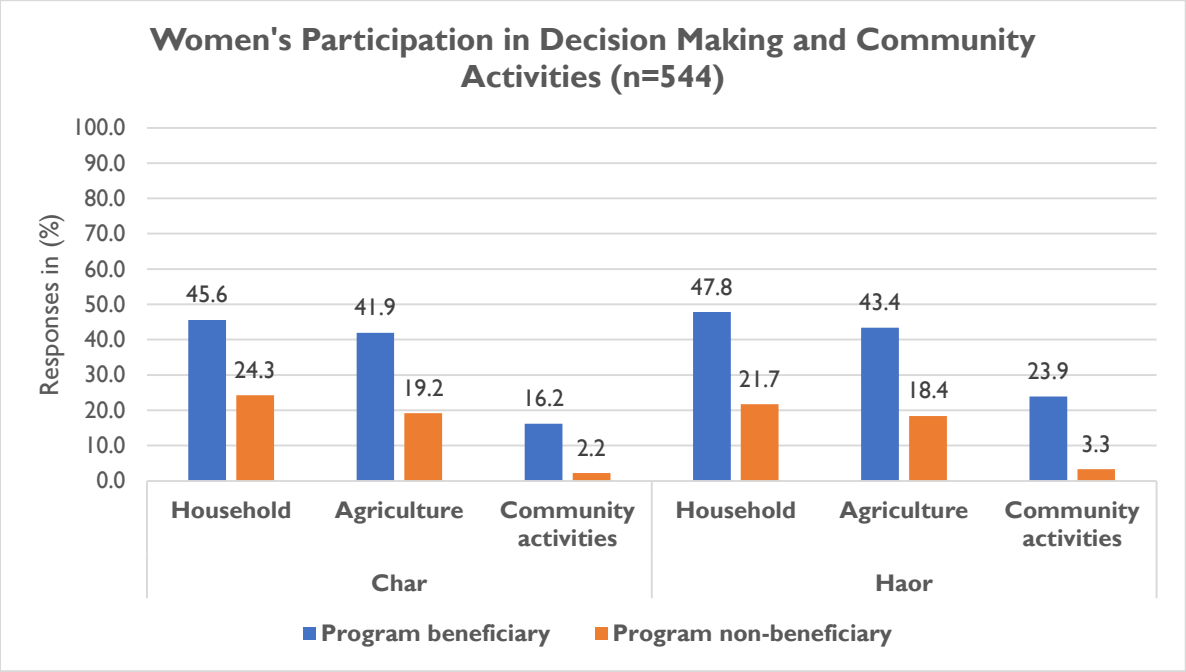

Figure 12: Women's Participation in Decision Making and Community Activities

Both LSPs and government departments are actively working to include women in agricultural improvements in DHRC regions. The SHOUHARDO III program has set up Girls' Forums and VSLAs to empower women, which has led to increased income and autonomy. In an FGD in Baniachang, Habiganj, a participant shared,

"In the Haor region, sustainable livelihoods were a big issue. It's not just about men anymore; we're now deeply involved in agriculture and making decisions ourselves."

The qualitative study also revealed that women, who once only participated marginally, are now actively involved in agriculture as a livelihood. One participant from Khaliajhuri, Netrokona, noted,

"I'm now earning a steady income from raising ducks and chickens, and selling their eggs. Even with a monthly income of 500, my husband listens to my decisions."

The SHOUHARDO III program's Girls' Forums and VSLAs, which are run by the community, help women engage more in local markets and LSP meetings. Additionally, the ICT Champion of SHOUHARDO III supports communities with an app offering advice on seeds, pesticides, and disease control. Government departments are also pushing for greater female participation, aiming for 30% involvement in DAE and DLS activities. Officers from Phulchari, Gaibandha, and Doarabajar, Sunamganj, have mentioned the appointment of lead female farmers and efforts to support women in decision-making and plot sharing, which helps boost their participation and income.

3.4 Challenges of the Agricultural Support System

3.4.1 Challenges with Livelihoods and Agricultural Practices in DHRC Areas

The DHRC regions face severe challenges from seasonal flooding and shifting landmasses, impacting agriculture and livelihoods (Karim et al., 2017; Rana et al., 2010). FGDs in Itna,

Kishoreganj, and Sundarganj highlight these issues and align with previous research (Alam et al., 2018; Ahmed, 2023). Problems such as poor communication networks, limited market infrastructure, and high input costs exacerbate these vulnerabilities and contribute to poverty (Alam et al., 2018; Islam et al., 2014).

DHRC communities rely on diverse livelihoods—crop cultivation, livestock rearing, and day labor—to cope with environmental unpredictability (Alam et al., 2018; Hoq et al., 2022; Barau et al., 2023). Seasonal flooding disrupts agriculture and market access (Islam et al., 2019; Sarker et al., 2021), while high labor costs, limited loans, and fluctuating crop prices are worsened by natural disasters (Alam et al., 2018; Quddus et al., 2019).

Access to agricultural inputs is also a major issue, affecting productivity and management (Hoq et al., 2022; Mazumdar et al., 2022). Livestock farmers face difficulties during floods, and fishermen struggle with declining water bodies and market inefficiencies (Alam et al., 2018; Mitra et al., 2020; Shill et al., 2016).

FGD findings reinforce existing literature and offer specific insights into these challenges. The table below ranks these issues based on secondary data and qualitative findings(Table 4).

Table 4: Ranked Challenges in DHRC Regions Based on Qualitative Findings

Challenge	Char Region	Haor Region
Seasonal Flooding	Severe	Severe
Shifting Landmasses	Significant	Significant
Inadequate Communication Networks	Significant	Significant
Limited Market Infrastructure	Significant	Moderate
High Input Costs	Significant	Moderate
Declining Water Bodies	Significant	Significant
Access to Agricultural Inputs	Moderate	Significant
Access to Veterinary Services	Moderate	Moderate
Environmental Pollution	Moderate	Moderate
Market Inefficiencies	Moderate	Moderate

The study emphasizes the need for integrated interventions to bridge infrastructure gaps, improve access to modern agricultural technologies, enhance market linkages, and bolster resilience against climate uncertainties. The remote location and limited resources of the DHRC area restrict effective climate adaptation and timely agricultural support, as confirmed by key informant interviews with DAE, DLS, and DoF officials.

3.4.2 Loopholes in the Existing Agricultural Support System: Contribution of LSPs Within the Support System

3.4.2.1 Loopholes in the Government Department's Agricultural Support

The findings from discussions with local government officials and community members reveal several challenges in the delivery and effectiveness of agricultural support services provided by government departments such as the DAE, DLS, and DoF. These challenges can be categorized and ranked based on their impact on farmers, particularly those in remote areas and during natural disasters. Below is a table summarizing the key issues identified (Table 5).

Table 5: Identified Loopholes in Government Agricultural Support Services and Their Impact

Challenge	Description	Impact
Insufficient Reach and Frequency of Training	Government training sessions and demonstrations are not widely accessible, particularly to farmers in remote areas.	Many farmers lack adequate training on improved agricultural practices, exacerbating their vulnerabilities.
Manpower Shortages in Government Offices	Significant shortages in manpower limit the ability of government departments to provide on-field services and timely assistance.	Reduced efficiency and limited support during critical times, especially during natural disasters.
Inconsistent Quality of Agricultural Advice	Farmers report inconsistencies in the quality of advice provided by government departments, particularly in managing emerging pests and diseases.	Farmers often receive inadequate or outdated advice, leading to poor crop and livestock management.
Insufficient Distribution of Agricultural Inputs	The distribution of quality seeds, fertilizers, and pesticides by government programs is often insufficient to meet demand.	Farmers struggle to access essential inputs, resulting in lower agricultural productivity and resilience.
Limited Access to Loans and Financial Support	Government departments offer minimal financial incentives, and farmers often face bureaucratic hurdles in accessing government loans.	Many farmers rely on private lenders and NGOs for loans, often at high interest rates, limiting their financial stability.
Challenges in Market Access	Farmers have difficulty transporting their produce to larger markets due to inadequate infrastructure and transportation options.	Farmers are forced to sell at lower prices to local traders, leading to economic losses and reduced profitability.
Lack of Coordination Among Government Departments	Fragmented efforts among government departments lead to inefficiencies and gaps in service delivery.	Farmers experience inconsistent support, and their needs are not fully addressed in program planning and implementation.

However, addressing these issues will require a coordinated effort among government departments, improved training and support services, and better access to financial and market resources for farmers.

3.4.2.2 Loopholes in the Private Sector's Agricultural Support

In contrast to government services, which struggle with accessibility issues, the private sector also faces challenges. Private companies provide some product training, but it is often limited and not widely available. Farmers require more extensive training on best practices and modern inputs. While there are occasional collaborations with government and NGOs for training, such as in Phulbari, Kurigram, these do not fully meet the extensive training needs. Additionally, private companies usually focus on accessible areas, leaving remote regions underserved. The following table summarizes the key challenges identified (Table 6).

Table 6: Identified Loopholes in Private Agricultural Support Services and Their Impact

Challenge	Description	Impact
Limited Training Programs	Private companies offer training that is often not widespread or comprehensive.	Farmers lack extensive training on best practices and modern inputs, reducing effectiveness in agricultural activities.

Regional Limitations	Private sector operations are often limited to more accessible regions.	Remote areas, like Char Rajibpur, Kurigram, are underserved, leading to difficulties in accessing quality inputs and advice.
Reliance on Local Dealers	Inputs are distributed through local dealers.	Accessibility is limited to areas where dealers operate, and effectiveness can vary based on dealer support.
Variable Product Effectiveness	Quality of seeds, fertilizers, and pesticides varies.	Without proper training, the effectiveness of products can be compromised, impacting crop and livestock management.
Minimal Technical Assistance	Limited hands-on support and general advice provided.	Farmers receive general rather than tailored support, affecting their ability to address specific field issues effectively.
Limited Disaster Support	Focus on maintaining supply chains rather than providing disaster-specific aid.	Lack of support during emergencies and natural disasters exacerbates farmers' challenges in affected areas.
High Costs of Inputs	Inputs are sold at higher prices.	Small and marginal farmers face significant financial barriers, impacting their ability to afford necessary agricultural inputs.
Minimal Financial Assistance	Little involvement in providing financial support.	Farmers continue to rely on high-interest private lenders and NGOs, with underutilization of the banking system due to complex procedures and collateral requirements.
Lack of Market Support	Limited assistance in marketing produce.	Farmers struggle to find fair markets for their products, leading to economic losses and reduced profitability.

Overall, private sector entities are primarily driven by profit motives and may not fully address the community needs of smallholder farmers. There is a pressing need for more community-focused initiatives that align with the socio-economic realities of these farmers.

3.4.2.3 Contribution of LSPs Within the Support System

LSPs are crucial in filling gaps left by government and private sector agricultural support. Unlike government departments, which often have limited reach and frequency, especially in remote areas, LSPs provide consistent, community-based training. This approach has notably improved agricultural productivity and resource management, as seen in Itna and Kishoreganj. LSPs offer immediate support within communities, eliminating the need for farmers to travel to distant offices, and provide timely disaster-specific aid, such as flood-resistant seeds.

While government advice can be inconsistent and private sector support focuses on sales, LSPs deliver hands-on, tailored technical support for issues like insect infestations and livestock diseases, as demonstrated in Islampur, Jamalpur. They also enhance input availability by offering quality seeds, fertilizers, and pesticides at competitive prices and facilitate access to agricultural loans through VSLAs, particularly benefiting women in Madan, Netrokona. LSPs address market access challenges by establishing local market linkages, reducing transportation costs, and ensuring fair prices, especially for women with limited mobility in Kalmakanda, Netrokona. Overall, LSPs bridge gaps between government and private sector services, integrating various support mechanisms and providing community-focused assistance.

3.5 Opportunities Persistent Within the Agricultural Support System

3.5.1 Status of Public-Private Partnerships

3.5.1.1 Status of Existing Referral Activities

FGDs with program beneficiaries and community members emphasize the critical role of LSPs in facilitating access to agricultural support through informal referral networks. LSPs act as key intermediaries, connecting beneficiaries with a range of services from government departments, private companies, and NGOs.

Government departments are the primary entities to which LSPs refer beneficiaries. In regions like Bakshiganj, Jamalpur, and Char Rajibpur, Kurigram, beneficiaries have reported significant improvements in accessing government services through LSP referrals. For example, in Nageshwari, Kurigram, a beneficiary, initially hesitant about approaching the DAE, found it easier to receive help after an LSP had requested assistance on their behalf. Similarly, in Ajmiriganj, Habiganj, and Chuhali, Sirajganj, LSPs routinely direct beneficiaries to government departments for services, with some also facilitating access to government training programs. In Phulbari, Kurigram, LSP referrals even helped beneficiaries secure non-agricultural support, such as sewing training through the Directorate of Women Affairs.

Government bodies acknowledged the importance of these referral networks during KIIs. In Phulchari, Kurigram, the UAO noted that LSPs occasionally refer farmers to government services, with referrals flowing in both directions. Similarly, in Islampur, Jamalpur, the UAO frequently advises farmers to obtain seeds from LSPs for convenience. In Madan, Netrokona, the ULO emphasized his role in connecting LSPs with service recipients to ensure quality assistance. Nevertheless, the study found that referrals from government bodies to LSPs are still relatively limited.

Private companies also play a role in these referral networks. For example, in Mithamoin, Kishoreganj, a representative from the private sector highlighted their efforts in connecting farmers not only to agricultural inputs but also to LSPs and government services, thereby broadening the support available. The study indicates that while referrals from LSPs to private companies and vice versa are relatively common, referrals from government entities to either LSPs or private companies are less frequent. This disparity contributes to an imbalance in the referral system.

However, LSPs remain central to this network, acting as the primary link between beneficiaries and both government and private sector services. While LSP referrals to government departments, especially the DAE, are common and effective, the study reveals room for improvement in the overall system. There is a need for more reciprocal referrals from government bodies back to LSPs, as well as increased engagement with private sector actors.

3.5.1.2 Status of other Collaborative Efforts

In the DHRC regions, LSPs interact regularly with both government departments and private companies. In the Char region, they engage weekly (18.2%) and monthly (27.3%) with

government departments, and weekly (12.1%) and monthly (15.2%) with private companies. Occasional interactions occur every few months for 37.9% with government departments and 34.8% with private companies. In the Haor region, interactions are less frequent: weekly (15.0%) and monthly (20.0%) with government departments, and weekly (13.0%) and monthly (7.0%) with private companies. Occasional interactions are more common with government departments (43.0%) than private companies (29.0%) (Annex 10). Meetings were the primary collaborative activity, making up 95.2% of efforts, while information sharing represented 69.3%.

Qualitative findings from KIIs and IDIs reveal robust collaborative efforts aimed at supporting marginal farmers in remote areas. These efforts include workshops, courtyard meetings, field days, and campaign-related gatherings. A program official from Kalmakanda, Netrokona, described quarterly NCC meetings with government departments like the DAE, which coordinate workshops and services with NGOs to improve farmers' livelihoods. UAOs or their representatives also participate in LSP meetings to broaden service reach. Private sector partners, such as one from Chauhali, Sirajganj, acknowledged the significance of these meetings.

Government departments train LSPs and local dealers to enhance service delivery in areas with limited government presence. For instance, the DAE of Kalmakanda, Netrokona, provides training for pesticide dealers, while the ULO trains vaccinators with LSPs to expand coverage. IDIs with LSPs highlighted their involvement in knowledge-sharing events, such as courtyard meetings and workshops. A program official from Shahjadpur, Sirajganj, and a private sector partner from Tahirpur, Sunamganj, noted the positive impact of these initiatives. Despite some irregularities, government representatives, like the ULO of Sundarganj, Gaibandha, recognized the collaborative efforts.

3.5.2 Comprehensive Evaluation of the Agricultural Support System

3.5.2.1 Strengths of the Agricultural Support System

The agricultural support system for DHRC communities boasts several strengths. A key advantage is the effective public-private partnerships, and the robust referral network managed by LSPs. This network ensures farmers have timely access to essential resources, quality inputs, and specialized training, enhancing their agricultural productivity and overall livelihood. Additionally, the strong community trust in LSPs facilitates smoother interactions with government departments and private companies, making it easier for farmers to seek and receive support.

Government departments like the DAE, DLS, and DAM play a significant role by providing extensive support and resources. Their collaboration with LSPs ensures that services reach remote areas, addressing logistical challenges and improving service delivery. Furthermore, private companies contribute by supplying high-quality agricultural inputs and offering technical advice, creating a comprehensive support network for farmers.

3.5.2.2 Weaknesses of the Agricultural Support System

However, the system faces some weaknesses. Coordination issues among government departments can lead to inefficiencies in service delivery and training. This lack of cohesion may result in gaps in support coverage and hinder effective capacity building. Additionally, skepticism about the capabilities and sincerity of LSPs, particularly due to their lack of formal

qualifications, can undermine their effectiveness. Concerns about private sector motives, with suspicions of a sales-focused rather than service-oriented approach, also pose challenges.

3.5.2.3 Opportunities for the Agricultural Support System

There are several opportunities for improvement. Strengthening coordination among government departments can streamline service delivery and enhance training programs, leading to a more integrated approach to agricultural support. Expanding private sector engagement, especially in remote areas, can provide more robust training and better access to high-quality inputs. Increasing LSPs' roles in disaster resilience and broadening their service coverage can further improve the system's responsiveness.

Addressing internal collaboration challenges by fostering mutual respect through joint training and transparent communication can resolve concerns and build confidence among stakeholders. Regular feedback and open dialogue will support effective collaboration and ensure accountability.

3.5.2.4 Threats to the Agricultural Support System

The system encounters several threats, including difficulties with internal collaboration. Government actors' skepticism regarding the skills and motives of LSPs and the private sector may impede progress. Furthermore, the lack of effective logistical coordination among support system actors leads to inconsistencies in service quality, impacting the overall effectiveness and reach of the support services. Addressing these threats comprehensively is essential for sustaining and enhancing the system's impact.

3.5.3 A Model to Follow: How LSPs Can Fit It

The study findings reveal that government and private sector agricultural support often face challenges in reaching remote areas and providing consistent services. Government programs are hindered by logistical constraints and insufficient staff, leaving many smallholders without essential subsidies and training. Private companies contribute by supplying agricultural inputs and occasionally linking farmers with government or LSP services, but their support is inconsistent and limited. LSPs effectively address these gaps due to their local presence and tailored approach. This study proposes a model that leverages the strengths of LSPs to improve agricultural support. By integrating LSPs more systematically with government and private sector efforts, the model ensures a more comprehensive and effective support system, providing broader and more consistent assistance to smallholders (Figure 13).

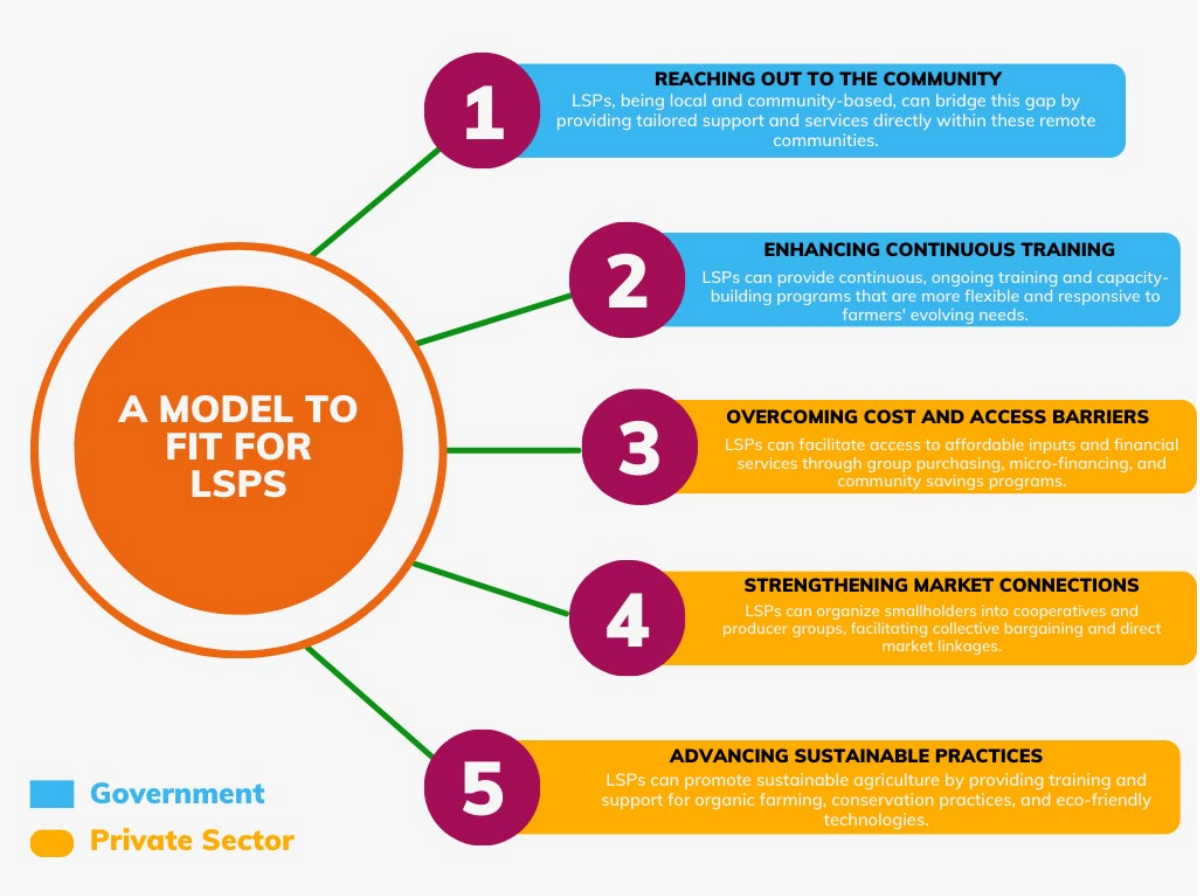

Figure 13: An Agricultural Development Model for LSPs

The figure presents a model for enhancing agricultural development in DHRC regions by leveraging the capabilities of LSPs. It addresses the limitations of current government and private sector support systems by highlighting the crucial role of LSPs in providing localized, tailored support. Key components of the model include localized operations for direct community engagement, dynamic training programs that focus on contemporary agricultural practices, the provision of affordable inputs and financial services, market integration through cooperatives, and the promotion of sustainable practices. Additionally, the model advocates for the legal recognition of LSPs and the establishment of clear operational frameworks to ensure effective collaboration with government and private sectors, supported by regular monitoring and continuous training to uphold effectiveness and sustainability.

4 Discussion

This study evaluates the agricultural support system in DHRC regions, focusing on its strengths, weaknesses, and areas for improvement. It highlights effective practices and gaps, especially in reaching remote communities. Positive impacts, such as improved farming techniques and increased resilience, are noted alongside persistent challenges like financial barriers and limited resources. Systemic issues, including poor coordination and infrastructure problems worsened by natural disasters, are also addressed. Enhancing public-private partnerships is emphasized as a key strategy for improving the support system's effectiveness.

4.1 Transition towards Improved Agricultural Practices

The adoption of sustainable agricultural practices in Bangladesh varies significantly across regions due to environmental challenges and support levels. In relatively stable areas like Jashore in south-western Bangladesh, where the threat of natural disasters is minimal, practices such as crop rotation, organic farming, and integrated pest management are more prevalent due to favorable conditions and better access to resources. These practices are supported by the region's more stable climate and infrastructure, which facilitate the adoption of advanced agricultural techniques (*Dewan et al., 2018*). Conversely, flood-prone and disaster-affected areas, such as the DHRC regions, encounter substantial obstacles, including frequent flooding, salinity, and inadequate infrastructure, which complicate the consistent application of these practices (*Bangladesh Water Development Board, 2023; Miah et al., 2020; Sarker & Rahman, 2021*). This often results in single-season cropping, leading to reduced cropping intensity in both the Char areas (*Hoque et al., 2011; Karim et al., 2017*) and the Haor regions (*Alam et al., 2011; Suvra, 2021; Rabby et al., 2011*). Addressing the challenges faced by farmers in DHRC areas has required a collaborative approach involving government bodies, private sector entities, and LSPs.

In these areas, program beneficiaries have notably shifted from traditional farming to improved practices, driven by targeted interventions. This transition is evident not only among beneficiaries but also among non-beneficiaries who have received training from government bodies or benefited from knowledge spillover. The widespread adoption of multi-crop, year-round farming techniques—including homestead gardening, HYVs of crops such as rice, wheat, maize, and potatoes, flood-tolerant rice varieties, as well as loft rearing, meat rearing, and hatching baskets—illustrates this shift. This trend aligns with *Raji et al. (2024)*, who found that training programs significantly enhance the adoption of modern agricultural techniques, leading to increased food security and income generation in vulnerable regions.

Key initiatives such as the CDSP and the HFM&LIP have played a crucial role in this shift. CDSP's improvements in water management and infrastructure also benefit coastal char livelihoods (CDSP, 2023) while HFM&LIP's focus on agricultural and fisheries productivity impacts the Haor basin (*JICA, n.d.*). Government departments like DAE, DLS, and DoF further support this progress through subsidies, infrastructure improvements, and training programs (*Uddin, 2008; Rahman et al., 2014; Department of Agricultural Extension, 2016; Molla, 2018*).

These efforts align with the findings of Islam et al. (2024), which emphasize the critical role of government-led initiatives in transitioning from traditional to improved agricultural practices.

The study findings highlight that private companies such as Bengal Meat, ACI Ltd., BRAC Seed, and Lal Teer, along with other veterinary services and agricultural input suppliers, play a crucial role in filling the gaps left by government services. They provide vital inputs such as seeds, feed, and pesticides, facilitating the adoption of improved practices (*Rashid et al., 2016; Husain et al., 2018*). This involvement supports the findings of *Kabir et al. (2023)*, highlighting the role of the private sector in enhancing productivity and resilience.

The study highlights the substantial adoption of HYVs, homestead gardening, and flood-tolerant rice varieties among program participants, driven by effective support from LSPs. LSPs are vital as they offer essential technical guidance and inputs. According to *Raji et al., (2024)*, this support is directly associated with enhanced food security and increased income. These findings align with *Uddin (2008)* and *Rahman et al., (2014)*, who stress the importance of such support in advancing agricultural practices. (Kabir& Islam, 2023) further supports the idea that exposure to improved practices can lead to broader community adoption.

The adoption of homestead gardening among SHOUHARDO III Plus beneficiaries demonstrates the program's effective approach to sustainable agriculture. By using a collective gardening model, the program addresses land scarcity, allowing landless individuals to engage in agriculture and enhancing food security and community resilience. This innovative approach, which is not widely used in government initiatives, highlights the program's significant impact on overcoming agricultural challenges in land-constrained areas. It also offers a valuable model for utilizing fallow land under government control, as suggested by *Tariquzzaman et al., (2014)*, which could be employed through similar communal strategies.

The study also highlights significant knowledge spillover effects, where the successful adoption of improved agricultural practices by some beneficiaries promotes wider acceptance within their communities. This shift from traditional to improved agricultural methods is amplified through peer-to-peer learning, as evidenced by *Fafchamps et al., (2021)*. Effective practices frequently disseminate through informal networks, leading to broader community adoption of modern techniques (*Islam et al., 2022*).

4.2 Challenges in Adopting Improved Agricultural Practices

The study findings reveal several challenges associated with the adoption of improved agricultural practices, including HYVs, goat rearing, tower gardening, and loft rearing, within the DHRC regions. Notably, non-beneficiaries in these communities exhibit limited willingness to adopt these practices. This reluctance is often attributed to concerns about achieving fair market value, particularly in areas where traditional crops have established market value (*Karim et al., 2017; Bokhtiar et al., 2024*). The reluctance to adopt modern techniques and methods often prevents traditional farmers from embracing new agricultural practices (*Rahman & Das, 2019*).

The study findings indicate that the adoption of modern agricultural practices is significantly influenced by the education level of farmers, aligning with *Abdulai's (2016)* suggestion that

education facilitates the uptake of new technologies. Educated farmers are better equipped to understand and implement advanced techniques, which enhances their ability to adopt and benefit from modern agricultural practices. The study findings also suggested that while education positively influences the adoption of modern agricultural practices, this relationship is also affected by land and financial constraints. Limited land availability hinders the implementation of practices such as multi-crop farming or advanced techniques; financial constraints also pose significant barriers, with initial costs for seeds, equipment, or infrastructure often being prohibitive for many farmers (*Sarker, 2015; Karim et al., 2017; Bokhtiar et al., 2024*).

Farmers' perceptions of risk play a crucial role in the adoption of new practices. The study finds that farmers in flood-prone areas exhibit caution towards new methods due to perceived risks. This reluctance to adopt innovative techniques without concrete evidence of success from peers is consistent with the previous study findings (*Faruk & Maharjan, 2023*). Motivation and peer influence are also significant factors in the adoption process. Observing successful implementation of new methods by neighbors often inspires other farmers to adopt similar practices (*Fafchamps et al., 2021*). The role of peer-to-peer learning in facilitating broader adoption is well-documented (*Islam et al., 2021*). Additionally, the study highlights that manpower and labor availability present challenges in adopting improved practices. The transition from single to multiple cropping systems demands additional labor, which is often costly for these marginal farmers (*Sarker, 2015; Karim et al., 2017; Bokhtiar et al., 2024*).

4.3 Impact of the Agricultural Support System

The study findings emphasize the transformative effects of the agricultural support system on crop production in DHRC regions, particularly in terms of enhanced crop diversity and productivity. This aligns with existing literature, which underscores the benefits of introducing HYVs and improved farming practices (*Bonik Barta, 2024*). Moreover, *Rahman & Connor (2022)* found that the adoption of HYVs in Bangladesh significantly boosts crop yields and profitability, largely due to improved resistance to pests and diseases. Similarly, participants in the study reported that the introduction of high-yield maize and rice varieties has made crop production more profitable and sustainable, corroborating the findings of *Tabassum & Rezwana (2021)*, who also linked the adoption of improved varieties and practices to increased agricultural productivity and resilience in Bangladesh.

The study also highlights a shift towards improved breeds of livestock and the adoption of climate-resilient crops, which is consistent with a previous study (*Anik et al, 2021*). These interventions help mitigate the adverse effects of climate change on agriculture. Specifically, the use of drought-resistant and flood-resistant crop varieties in the study reflects an adaptation strategy identified by *Ferdushi et al, (2023)* as crucial for cultivating crops under challenging conditions. Furthermore, the introduction of practices like loft rearing and tower gardens, as reported by participants, aligns with broader agricultural adaptation frameworks discussed by *Anik et al, (2021)*.

The study findings on livelihoods and employment opportunities are particularly striking. Program beneficiaries have seen significant improvements in income levels, with a notable

decrease in the number of people earning below 10,000 BDT and an increase in those in higher income brackets. This outcome is supported by studies such as those by *Tabassum & Rezwana (2021)*, which found that improved agricultural practices lead to higher household incomes and reduced poverty levels. The study findings highlight the crucial role of LSPs in empowering women in agriculture by facilitating market access, providing training, and ultimately increasing household income—a role that is also supported by previous research (*Kabir, 2024*).

The study also revealed that women's participation in income-generating activities improves their decision-making power and community involvement. Economic independence through agriculture allows women to influence household and financial decisions. This finding aligns with existing research (*Roy et al., 2017; Ghosh et al., 2021*) and is further supported by the program's establishment of Girls' Forums and VSLAs, which enhance women's engagement in community development, as explored in the study.

4.4 Challenges of the Agricultural Support System

Government bodies like the DAE, DLS, and DoF face significant challenges in providing agricultural support, including limited training reach, manpower shortages, and inconsistent advice (*Pandey, 2015; The Daily Observer, 2021*). These issues, particularly in remote areas and during crises, impact effective service delivery and support (*Pandey, 2015; Rahman et al., 2020*). Additionally, logistical and bureaucratic barriers hinder the distribution of agricultural inputs. Enhancing training infrastructure, increasing manpower, and improving coordination and financial support are crucial for overcoming these obstacles (*Rahman et al., 2020*).

The private sector, while providing valuable support, also encounters significant challenges. These include limited training programs, regional constraints, and variable product effectiveness (*Rashid et al., 2016; Husain et al., 2018*). High costs of inputs and minimal disaster support are additional concerns (*Karim et al., 2020; Rahman et al., 2024*). A critical issue is the manpower shortage within private companies, which affects their ability to offer comprehensive support (*Rashid et al., 2016; Husain et al., 2018*).

In contrast to the challenges faced by government and private sector entities, the study highlights that LSPs are crucial in filling gaps left by these actors. Their community-based approach ensures consistent training and technical support, addressing issues like limited accessibility and inconsistent advice. LSPs effectively manage manpower shortages by offering localized support, improve input provision and market access with competitive prices, and facilitate loans through VSLAs. They also provide immediate assistance in remote areas and during disasters, proving effective in overcoming these challenges, as supported by previous studies (*AKM et al., 2015; Kabir et al., (2023*).

4.5 Dynamics of the Current Support Systems

Government departments, particularly the DAE, are instrumental in supporting agriculture across DHRC areas. The DAE's comprehensive involvement encompasses crop cultivation, pest management, and soil health. This support is crucial in both Char and Haor regions,

where the department utilizes methods such as field discussions and plot demonstrations to provide practical, hands-on learning. Additionally, the DLS and the DoF also Adapt their strategies to meet the specific needs of these regions. For instance, their field visits and demonstrations offer tailored advice to address the unique challenges of floods and waterlogging. These approaches are effective in overcoming barriers related to literacy and remoteness (*Mbure & Sullivan., 2018*). Government projects such as the CDSP and the BWDB Systems Rehabilitation Project further contribute by enhancing infrastructure for flood control, drainage, and irrigation. These improvements are crucial for boosting crop production and resilience (*Saha, 2013*).

The study findings indicated that private sector entities are crucial in supplying essential agricultural inputs, including feed, seed, fertilizer, and pesticides. Companies such as BRAC Seed and Aftab Feed play a key role in providing high-quality resources that boost crop yields and livestock productivity. Although their involvement is primarily transactional, it is vital for ensuring that farmers obtain the necessary inputs for effective agricultural practices (*Sarker et al., 2021; Baishakhy et al., 2023*). The impact of these inputs on enhancing agricultural productivity is well-documented in the secondary literature (*Rashid et al., 2016; Husain et al., 2018*). However, access to bank loans is constrained by documentation and collateral issues, which significantly impede farmers' ability to secure financing for agricultural investments (*Sarker et al., 2016*). Consequently, despite substantial private sector support, financial barriers from banks limit the adoption of modern agricultural practices, forcing farmers to borrow primarily to meet both production requirements and current consumption needs (*Alam et al., 2018; Quddus et al., 2019*).

LSPs are crucial in facilitating access to agricultural inputs and providing region-specific technical support. They help farmers procure necessary supplies and offer guidance on their optimal use, which is vital for overcoming barriers to input access in remote and flood-prone areas (*Sarker et al., 2021; Baishakhy et al., 2023*). This localized support is crucial for tackling the specific challenges encountered in DHRC regions, such as providing technical assistance and implementing integrated pest management strategies (*Hoq et al., 2022; Mazumdar et al., 2022*). In addition to facilitating input access, LSPs enhance market linkages and financial inclusion through VSLAs. These initiatives improve market access and provide vital financial resources, enabling farmers to invest in essential inputs and boost productivity ((*Shill et al., 2016; Akther et al., 2017; Alam et al., 2018*). LSPs utilize culturally appropriate methods such as tea stall meetings and field visits to engage with farmers, providing opportunities for verbal explanations and hands-on demonstrations. This approach is particularly effective in low-literacy communities, where LSPs' direct, field-level services are valued for their accessibility and responsiveness (*Mbure & Sullivan., 2018*). However, this integrated support system, which includes practical assistance, market access, and financial management, plays a crucial role in fostering long-term agricultural productivity and resilience (*Uddin 2008; Rahman et al. 2014; Rashid et al., 2016; Alam, 2022*).

4.6 Opportunities Within the Support System

The agricultural support systems for DHRC communities combine effective mechanisms with areas for improvement. The study shows that LSPs play a key role in improving access to resources through their referral networks. Collaboration between LSPs and government departments like DAE, DLS, and DAM helps overcome logistical challenges and enhances service delivery, effectively supporting the agricultural support system. This approach is consistent with the findings of *Rashid et al., (2016)* and *CIMMYT (2023)*, which highlight the critical role of integrated efforts in enhancing agricultural service delivery. The trust communities have in LSPs facilitates smoother interactions with government offices and private companies, supporting *Iris et al.,'s (2022)* findings on the benefits of trust in local intermediaries.

The study findings indicate opportunities for enhancing the agricultural support system through improved coordination among government departments, which could streamline service delivery and expand training. Research shows that better inter-departmental collaboration ensures comprehensive service coverage and effective capacity building (*Rashid et al., 2016; Velten et al., 2021*). Additionally, expanding private sector engagement in remote areas can enhance the availability of high-quality inputs and technical advice. Previous studies highlight that private sector involvement can lead to innovative solutions and improved access to resources for smallholders (*Rashid et al., 2016; Husain et al., 2018; Kabir et al., 2023*). Another key area for improvement is strengthening the role of LSPs in disaster resilience. Enhancing their capabilities and expanding their services to cover more areas can increase the system's responsiveness to environmental challenges. A study by *Islam et al., (2017)* emphasizes the importance of local actors in building resilience and supporting adaptation strategies in vulnerable communities.

Despite challenges, there are significant opportunities to enhance agricultural support in DHRC regions. For instance, integrating fish farming with duck rearing exemplifies a successful multi-crop system that boosts resilience and productivity, aligning with *Uddin et al., (2015)*, who emphasize the benefits of optimizing land and water use and diversifying income. Subsistence farming in Bangladesh, often reliant on single-crop systems, faces high risks due to income fluctuations. Integrated Farming Systems (IFS), such as combining crop and fish farming or livestock, can improve economic stability and productivity. Diversification is crucial in Bangladesh's complex agro-ecological conditions. Current rice-dominated systems face challenges like resource depletion, and incorporating crops like Napier grass for livestock feed and maize for its nutritional benefits can enhance productivity, particularly for small and marginal farmers in char areas (*Mamun et al., 2012; Ehsanul & Ehsanul, 2016*).

5 Study Limitations

The study team implemented strategies to minimize biases, such as employing female enumerators to foster trust and engagement with participants. Nonetheless, several limitations persist. The survey design and secondary literature review may have introduced biases, potentially overlooking critical perspectives on community healthcare services. Geographic limitations confine the findings to the Char and Haor regions of Bangladesh, and the relatively small sample size further restricts broader applicability. Additionally, the cross-sectional design of the study limits its capacity to account for temporal and seasonal variations in agricultural and community dynamics. Potential issues such as selection bias, recall bias, and uncontrolled confounding variables may also impact the reliability and external validity of the study's conclusions.

6 Agenda For the Future

To drive agricultural development, addressing the limitations of current government and private sector support is crucial. LSPs play a pivotal role in this context. Future strategies should focus on leveraging LSPs' local presence to deliver tailored support in remote areas, providing adaptive training to keep farmers abreast of modern agricultural practices. Enhancing access to affordable inputs and financial services through group purchasing and micro-financing will be critical in overcoming cost barriers for smallholders. Strengthening market integration by organizing smallholders into cooperatives can enhance their bargaining power and market access.

In addition, promoting sustainable practices through targeted training in organic and eco-friendly technologies will support long-term environmental stewardship. For maximum impact, LSPs should be legally recognized to facilitate effective collaboration with government and private sectors. Establishing clear operational frameworks and ensuring regular monitoring and continuous training will maintain their effectiveness. By focusing on these areas, LSPs can bridge gaps in agricultural support, enhancing productivity, resilience, and overall sector advancement.

7 Conclusion

This study underscores the critical need to address the limitations in agricultural support systems within Bangladesh's DHRC regions. Government and private sector initiatives frequently encounter logistical challenges, high costs, and issues with local relevance, which undermine their effectiveness. The proposed model presents a solution by leveraging the strengths of LSPs. By operating within local contexts, LSPs can deliver customized support to underserved communities, including adaptive training, affordable inputs, and financial services. They also facilitate market integration through the formation of cooperatives and promote sustainable practices, thereby significantly enhancing productivity and resilience.

To maximize the effectiveness of this model, it is essential to grant legal recognition to LSPs and establish clear operational frameworks that enable effective collaboration with government and private sector entities. Ongoing monitoring, evaluation, and continuous training are crucial to sustaining their impact. Implementing this model will create a more responsive and equitable agricultural support system, effectively bridging existing gaps, fostering sustainable growth, and supporting the long-term development of the DHRC regions in Bangladesh.

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9 Annex

Annex 1: Sampling Distribution of Households

Region Type	District	Upazila	Number of participants		Total Participants
			Beneficiaries	Non- Beneficiaries	
Char	Kurigram	Char Rajibpur	12	12	24
		Phulbari	12	12	24
		Nageshwari	10	10	20
	Gaibandha	Phulchari	12	12	24
		Saghata	12	12	24
		Sundarganj	10	10	20
	Jamalpur	Islampur	17	17	34
		Bakshiganj	17	17	34
	Sirajganj	Belkuchi	12	12	24
		Chauhali	12	12	24
		Shahjadpur	10	10	20
Total (Char)			**136**	**136**	**272**
Haor	Kishoreganj	Austagram	12	12	24
		Mithamoin	12	12	24
		Itna	10	10	20
	Netrokona	Kalmakanda	12	12	24
		Madan	12	12	24
		Khaliajhuri	10	10	20
	Sunamganj	Dowarabazar	16	16	32
		Tahirpur	18	18	36
	Habiganj	Ajmiriganj	17	17	34
		Baniachong	17	17	34
Total (Haor)			**136**	**136**	**272**
Grand Total (Char and Haor)			**272**	**272**	**544**

Annex 2: Sampling Distribution of LSPs

Region Type	District	Upazila	Collector		Fish fry hawker		Seed agent		Vaccinator		Total
			Male	Female	Male	Female	Male	Female	Male	Female	
Char	Kurigram	Char Rajibpur	1	0	1	0	2	0	2	0	6
		Phulbari	1	0	1	0	2	0	2	0	6
		Nageshwari	1	0	1	0	1	1	1	1	6
	Gaibandha	Phulchari	1	0	0	0	1	0	3	0	5
		Saghata	1	0	1	0	2	0	1	0	5
		Sundarganj	0	1	1	0	1	0	1	1	5
	Jamalpur	Islampur	3	0	2	0	2	0	2	0	9
		Bakshiganj	3	0	2	0	2	0	2	0	9
	Sirajganj	Belkuchi	2	0	0	0	0	1	2	0	5
		Chauhali	1	0	0	1	1	1	1	0	5
		Shahjadpur	1	1	1	0	1	0	1	0	5
Total (Char)			**15**	**2**	**10**	**1**	**15**	**3**	**18**	**2**	**66**
Haor	Kishoreganj	Austagram	0	0	0	0	2	1	4	1	8
		Mithamoin	1	0	1	0	2	1	2	0	7
		Itna	2	0	0	0	1	1	2	0	6
	Netrokona	Kalmakanda	1	0	4	1	3	2	2	2	15
		Madan	0	0	0	0	8	0	7	0	15
		Khaliajhuri	1	0	0	0	5	0	9	0	15
	Sunamganj	Dowarabazar	3	0	4	0	3	1	2	1	14
		Tahirpur	3	0	0	0	2	1	3	1	10
	Habiganj	Ajmiriganj	1	0	0	0	0	2	1	1	5
		Baniachong	1	0	0	2	1	0	0	1	5
Total (Haor)			**13**	**0**	**9**	**3**	**27**	**9**	**32**	**7**	**100**
Grand Total (Char and Haor)			**28**	**2**	**19**	**4**	**42**	**12**	**50**	**9**	**166**

Annex 3: Sampling Distribution of KIIs

Region Type	District	Upazila	District level							National level	International partners
			Dept. of Agricultural Extension	Dept. of Fisheries	Dept. of Livestock Services	Project Officials	Private Sector Partners	Local Leader	Total	DG of DAE, DoF, DLS	Kuza Biashara
Char	Kurigram	Char Rajibpur	1	0	0	1	0		2	3	1
		Phulbari	0	1	0	0	1		2		
		Nageshwari	0	0	1	0	0	1	2		
	Gaibandha	Phulchari	1	0	0	1	0		2		
		Saghata	0	1	0	0	1		2		
		Sundarganj	0	0	1	0	0	1	2		
	Jamalpur	Islampur	1	0	0	1	0	1	3		
		Bakshiganj	0	1	0	0	1		2		
	Sirajganj	Belkuchi	1	0	1	0	0		2		
		Chauhali	0	1	0	0	1		2		
		Shahjadpur	0	0	1	1	0	1	3		
Total (Char)			**4**	**4**	**4**	**4**	**4**	**4**	**24**		
Haor	Kishoreganj	Austagram	1	0	0	1	0		2		
		Mithamoin	0	1	0	0	1		2		

Region Type	District	Upazila	District level							National level	International partners
			Dept. of Agricultural Extension	Dept. of Fisheries	Dept. of Livestock Services	Project Officials	Private Sector Partners	Local Leader	Total	DG of DAE, DoF, DLS	Kuza Biashara
		Itna	0	0	1	0	0	1	2		
	Netrokona	Kalmakanda	1	0	0	1	0		2		
		Madan	0	1	0	0	1		2		
		Khaliajhuri	0	0	1	0	0	1	2		
	Sunamganj	Dowarabazar	1	0	1	1	0		3		
		Tahirpur	0	1	0	0	1	1	3		
	Habiganj	Ajmiriganj	1	0	1	1	0		3		
		Baniachong	0	1	0	0	1	1	3		
Total (Haor)			**4**	**4**	**4**	**4**	**4**	**4**	**24**		
Grand Total (District level, International, and National level)			**8**	**8**	**8**	**8**	**8**	**8**	**52**		

Annex 4: Sampling Distribution of IDIs

Region Type	District	Upazila	LSPs	Program Beneficiaries	Total
Char	Kurigram	Char Rajibpur	0	0	0
		Phulbari	0	1	1
		Nageshwari	1	0	1
	Gaibandha	Phulchari	0	0	0
		Saghata	0	1	1
		Sundarganj	1	0	1
	Jamalpur	Islampur	1	0	1
		Bakshiganj	0	1	1
	Sirajganj	Belkuchi	0	0	0
		Chauhali	0	1	1
		Shahjadpur	1	0	1
Total (Char)			4	4	8
Haor	Kishoreganj	Austagram	1	0	1
		Mithamoin	0	1	1
		Itna	0	0	0
	Netrokona	Kalmakanda	1	0	1
		Madan	0	0	0
		Khaliajhuri	0	1	1
	Sunamganj	Dowarabazar	1	0	1
		Tahirpur	0	1	1
	Habiganj	Ajmiriganj	1	0	1
		Baniachong	0	1	1

Region Type	District	Upazila	LSPs	Program Beneficiaries	Total
Total (Haor)			**4**	**4**	**8**
Grand Total			**8**	**8**	**16**

Annex 5: Sampling Distribution of FGDs

Region Type	District	Upazila	Community people (Mixed groups)	Program beneficiaries	Total
Char	Kurigram	Char Rajibpur	1	0	1
		Phulbari	0	0	0
		Nageshwari	0	1	1
	Gaibandha	Phulchari	1	0	1
		Saghata	0	0	0
		Sundarganj	0	1	1
	Jamalpur	Islampur	1	0	1
		Bakshiganj	0	1	1
	Sirajganj	Belkuchi	1	0	1
		Chauhali	0	0	0
		Shahjadpur	0	1	1
Total (Char)			4	4	8
Haor	Kishoreganj	Austagram	1	0	1
		Mithamoin	0	0	0
		Itna	0	1	1
	Netrokona	Kalmakanda	1	0	1
		Madan	0	1	1

Region Type	District	Upazila	Community people (Mixed groups)	Program beneficiaries	Total
		Khaliajhuri	0	0	0
	Sunamganj	Dowarabazar	1	0	1
		Tahirpur	0	1	1
	Habiganj	Ajmiriganj	1	0	1
		Baniachong	0	1	1
Total (Haor)			**4**	**4**	**8**
Grand Total			**8**	**8**	**16**

Annex 6: Educational Qualification of the Respondents

Educational qualification (%)	Char	Haor	Total
n	272	272	544
Can only sign	36.8	34.2	35.5
Completed primary education	25.7	23.5	24.6
Up to JSC/equivalent	10.3	15.8	13.1
Did not complete primary education	10.3	10.3	10.3
SSC/equivalent	8.1	7.0	7.5
HSC/Diploma/ equivalent	3.7	3.3	3.5
Did not enroll in any school/ learning center	1.8	3.7	2.8
Masters/Equivalent	1.5	1.1	1.3

Annex 7: Household Occupation of the Respondents

HH Occupation (%)	Char	Haor	Total
n	272	272	544
Farming	70.1	67.0	68.6
Day labourer	13.3	9.7	11.5
Business	7.5	7.4	7.5
Transport service (Bike/Auto Driver)	5.6	7.1	6.4
Fishing	1.5	4.8	3.2
Private employee	1.1	1.8	1.5
Others (Livestock, Handy craft, etc.)	0.9	2.2	1.6

Annex 8: Household Income Level of the Respondents

Income Level (%)	Char	Haor
n	272	272
Below 10k	6.6	20.6
10k-19k	71.3	43.4
20k-29k	16.5	19.1
30k-39k	2.6	11.8
40k or above	2.9	5.1

Annex 9: Knowledge Transfer Mechanism Employed by LSPs

Responses (%)	Char	Haor	Total
n	66	100	166
Workshops and training sessions	93.8	86	89.1
Field visits	80	76	77.6
Courtyard meeting	73.8	57	63.6
Linkage meetings with government and NGOs stakeholders	67.7	52	58.2
Demonstration plots	50.8	24	34.5
Farmer field business schools	36.9	30	32.7
Mobile applications	29.2	22	24.8
Informational pamphlets	24.6	23	23.6
Miking	16.9	9	12.1
Social media platforms	9.2	13	11.5
Postering/wall writing	7.7	10	9.1

Annex 10: Referral Mechanism of Government, Private Sectors and LSPs

Area	Frequency	Government	Private	LSPs	Total
Char	Very frequently (Weekly)	18.2	12.1	39.4	23.2
	Frequently (Monthly)	27.3	15.2	40.9	27.8
	Occasionally (Every few months)	37.9	34.8	19.7	30.8
	Rarely (Once or twice a year)	16.7	22.7	0.0	13.1
	Never	0.0	15.2	0.0	5.1
Haor	Very frequently (Weekly)	15.0	13.0	42.0	23.3
	Frequently (Monthly)	20.0	7.0	39.0	22.0
	Occasionally (Every few months)	43.0	29.0	13.0	28.3
	Rarely (Once or twice a year)	22.0	29.0	5.0	18.7
	Never	0.0	22.0	1.0	7.7