Evaluation of IDEA Project in Bangladesh

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Process Evaluation Report

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Note to readers

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Key to interviews and focus group discussions

WF 1-8 WorldFish staff (Managers, field coordinators, nutrition, gender, aquaculture, market systems, training)

NGO1 (1-5) BRAC staff (managers, aquaculture, gender, nutrition)

NGO2 (1-4) TMSS staff (manager, aquaculture, nutrition, gender)

BT Business Training consultant

DG Digital Service provider

D1 Donor Program officers

F1 Bank Asia

Gov 1 District Fisheries Officer

PS1 Private sector company – Apon Wellbeing

PS2 Private sector company - Bengal Meat

PS3 Private sector company Monica Hatchery (open areas)

PS4 Private sector company Mega Feed (open areas)

FGD_GN-M: Focus Group Discussion on Gender and Nutrition (male group)

FGD_AQ: Focus Group Discussion on Aquaculture Practices

FGD_GN-F: Focus Group Discussion on Gender and Nutrition (female group)

Executive Summary and lessons

Process evaluation objectives, context and rationale.

The project, “Aquaculture: increasing income, diversifying diets, and empowering women in Bangladesh (IDEA)” implemented by WorldFish, together with non-governmental organizations (NGOs), BRAC and TMSS, was launched in 2019. Its objective was to improve incomes, nutrition, and women’s empowerment in Rajshahi and Rangpur divisions in northwest Bangladesh. This process evaluation is a part of a broader impact evaluation of the project. It explores differences between the project's design and plans and the actual implementation.

The project was designed with five intervention areas delivering the following outcomes:

1. Enhanced aquaculture productivity of homestead fish production systems
2. Increased value of marketed fish and fish-based products
3. Increased quality, reach, efficiency, and sustainability of extension services
4. Improved access to nutrient-rich foods, including fish and fish products, especially for women and young children
5. Increased empowerment of women in aquaculture production and fish value chains.

The project has two different models of delivery, both implementing the same interventions. In the private sector (T1) Local Service Provider (LSP) model, WorldFish recruited and trained LSPs to train farmers on aquaculture, nutrition and gender. In the Hybrid Model (T2), the NGOs built capacity of their LSPs to provide similar services. ‘Control’ areas had no project intervention. A third model, in which larger private sector companies operate in the ‘open’ areas (not T1 or T2 or control) was developed in project year 2 and was not part of the evaluation.

Qualitative methods were used to explore perspectives of different actors on project implementation, progress, achievements and lessons. Online interviews with project partners and stakeholders, and focus group discussions with men and women farmers from intervention and control areas were held. Interviews were transcribed and coded prior to thematic analysis.

Integrity of design: treatment and coverage.

The majority of staff and partners had a good understanding of the distinction between the designated intervention unions and the control unions and were clear they should not implement their programs in the control areas. Private sector companies active in open areas did not operate in the intervention areas. Information on field operations was checked by WorldFish monitoring team to ensure separation.

Adjustments to the planned implementation strategy

Adjustments came about as a result of operational experience, and in response to the COVID 19 pandemic, which was the major challenge to project implementation. Restrictions on movement interrupted training and extension activities and delayed expanding partnerships with the private sector. It reduced the frequency of interaction with farmers. These delays resulted in an extension of the project implementation schedule.

In 2021, efforts were made to increase the number of LSPs to meet the revised target of 450,000 farmers by project end. There were modifications to LSP training and mode of outreach. LSPs faced challenges with gender related messages and in mobilizing women farmers, hence gender specialists were engaged, although coverage was limited. To meet the overall targets, WorldFish trained agents of large private sector companies to be LSPs in the 'open' areas. Overall, 2,120 LSPs were recruited including 30 women: 28.2% by WorldFish, 23% by BRAC, 24.5% by TMSS and 24.2% by the private sector. Despite some changes, WorldFish' considered that project implementation went more or less according to plan.

Project challenges

There were challenges associated with staff recruitment, turnover and budget limitations. The program benefited from the partnership with and facilities of their two NGO partners. The strategy for developing private extension provision depended on recruitment and training of a large number of LSPs, including women. WorldFish managed the challenge of working at a large scale with NGOs who were used to a more intensive, location specific approach. A complex multilocation, multi- partner project such as IDEA brings challenges of coordination and synchronization. WorldFish's track record, their good relationship with government, their analysis of the policy context and opportunities for advocacy and action, were an advantage.

Relationships among project partners

Roles and expectations were set out in a Memorandum of Understanding (MoU) between WorldFish and each NGO and did not change significantly over the course of the project. All parties considered that supportive partnerships had been formed, and good communication established. There was consistency between the goals and expectations of private companies and those of WorldFish. Partners made financial contributions to the initiatives and benefited from financial and technical support. WorldFish collaborated with two knowledge partners, for business training and digital platforms. Both were positive about their partnership with WorldFish.

Outcome 1: Productivity of homestead fish production systems increased.

The project aimed to enhance smallholder productivity by 50%, with a revised target of 315,000 households. The focus was on improved fish management practices, use of high-quality fish seed, feed and pond inputs, access to credit and extension services and influence on policy and investment. Training was provided for LSPs, farmers, and supply chain actors. It included messaging on nutrition and gender and women's empowerment, although it was difficult to assess the depth of coverage of the latter. Bank Asia was tasked with widening access to finance for aquaculture. Their financial literacy training reached about 9,000 farmers. Loans were given to 878 farmers (34 women). Uptake was limited by farmers not fulfilling the loan criteria and limited bank capacity to support applications.

There have been positive changes in farmers' knowledge and practices. There is less evidence of impacts on production although some farmers reported increased profits. Some farmers did not change practices due to lack of time, tools or financial resources. Small-scale farmers, producing for home consumption, found some recommendations

challenging. Socio-economic background influenced uptake and impact was uneven across different households. Some farmers faced limited pond capacity due to rapid growth of both larger fish and indigenous small fish with improved feeding. WorldFish's engagement and relationship with local and national government grew to become more influential. Their systematic review of aquaculture and nutrition policies led to a series of policy consultation workshops with government stakeholders.

Outcome 2: Value of fish and fish-based products marketed by smallholder farmers increased.

Anticipated outcomes for market and enterprise areas were an increase in the value of fish and fish-based products marketed by smallholder farmers, sustainable market linkages, gender responsive market strategies, increased business skills and increased market margins. The project helped to increase market awareness, business skills and create viable enterprises, including by women entrepreneurs. Two private sector outlets sourced fish from farmers in the project area for sale in their shops, although only a small proportion of project farmers had the opportunity to link with them. Many farmers rely on their local community and agents for market information and access. Farmers reported that fish production, volume of sales and profitability had increased since the start of the project, generating additional income. This was attributed to the uptake of better practices and technology and reduced fish mortality. However, increased inputs costs have limited profit margins, while rising food prices have affected the cost of living. Personalized advice from their local LSP and market dealers plays a crucial role in decision-making. Physical distance and lack of transportation limit farmers' access to better markets or hatcheries, affecting their overall profitability. Farmers distrust of market transactions has discouraged them from selling in certain warehouses, despite higher prices.

Outcome 3: Quality, reach, efficiency and sustainability of extension services increased and enabling policy environment.

The project worked with private sector and NGO LSPs who were provided with training and support to enhance farmers' access to inputs and information. WorldFish and NGO staff considered the training to have increased LSPs' knowledge, skills, confidence and profitability. LSPs recruited farmers and formed groups for training. NGO project areas also received nutrition information from their health workers. Farmers appreciated the personal relationships with LSPs, the ease of contacting them and the speed of their response. Their coverage of the entire fish production process was particularly valued.

The project provided LSPs, partners and interested stakeholders with access to information through digital platforms. The Facebook group, "Right Fish had around 11,000 members, with live sessions viewed by 2000-3000 people. Other initiatives included websites for input suppliers and technical information, a WhatsApp group, SMS, phone calls and TV channels. The reach of digital communications was limited by uneven internet coverage, incompatible mobile formats and lack of smartphone ownership, particularly among women. Farmers' use of platforms for market transactions requires further familiarity with, and confidence in the service.

Outcome 4: Consumption of nutrient-rich foods, including fish and fish-based products improved

Training on nutrition was delivered by WorldFish and the NGOs to LSPs, NGO field staff, BRAC community health workers, TMSS Health Clinic staff and private sector partners. They, in turn trained farmers, household members, nursery owners and seed dealers. Appropriate training materials, including videos, were developed with partners drawing on government and WHO nutritional guidelines. Messages focused on micronutrients and achieving a diverse diet, the importance of small fish, and cultivation of nutritious vegetables. Nutritional information was displayed in LSP's and companies' shops and factories and shared on different media.

The project has increased nutritional awareness and there were examples of actual behavior change, such as increasing consumption of small fish and feeding them to children, which had not been done previously. In some areas, people were familiar with the recommendations, but the project brought encouragement to implement them. Informants were conscious that a longer timeframe is needed to see significant behavior change and nutritional outcomes. Economic status influences uptake by households. Appropriate distribution of food within the household is also important for nutritional outcomes. Nutrition messages are being included in NGO's other programs, including health programs.

Outcome 5: Empowerment of women engaged in aquaculture production and fish value chains increased.

The gender component aimed to encourage women's participation in aquaculture production and value chains, and to increase their decision making power and financial autonomy. The project developed a good understanding of women's and men's roles in aquaculture, decision making, and the social norms influencing women's participation. The project supported the capacity strengthening of women as fish farmers, LSPs and entrepreneurs. Recruiting women LSPs was challenging because of their limited business experience, the selection criteria and social norms. The project modified the selection criteria, raised awareness of the benefits of women in aquaculture, engaged with families, and introduced appropriate training arrangements. Gender training was provided for NGO's nutrition and health workers. Women entrepreneurs were trained through "couples' workshops". Gender transformative initiatives such as forum theatre, raised community awareness and stimulated discussion on barriers to women's involvement. Some changes in men's behavior were reported, but it was unclear if these were linked to project training. Initiatives to enhance women's access to assets, such as ponds and credit, had some success, although there were issues of control. NGO programs increased the emphasis on gender mainstreaming and inclusion of women and children.

Theory of change and progress toward outcomes

The logic of the project theory of change and the associated assumptions, largely held for the five outcomes. Questions remain on which categories of farmers were able to take up new practices and whether LSPs' businesses become more profitable. Interventions to increase the value of marketed fish and products operated well, but the

number of farmers supplying was relatively small. Nutritional messages reached their intended audience and farmers reported that consumption of small fish species had increased. Efforts to influence gender norms had a positive effect on women's participation but shifts in women's decision-making control were more complex to identify. The project included transformative change approaches at farmer and community level, and engagement at the national policy level. Assumptions concerning the stability of external conditions held, with the major exception of COVID 19.

Sustainability and future ambitions

Prospects for sustainability are quite good. Farmers thought their relationships with LSPs would endure, due to shared learning and mutual benefits; though some were concerned about the end of project support. Private sector partners were optimistic about the sustainability of their activities. Several have plans for business expansion and would like continued advice and collaboration with WorldFish. Bank Asia expected their new customers to continue with them. Several entrepreneurs who received business training have received investment from other sources. The project's digital partner was confident that the platform would continue with or without funding, but new content or expanded membership would need donor or government financial support. Men and women farmers expressed ambitions to expand their aquaculture ventures and overcome financial constraints. Small-scale farmers voiced concerns about their ability to compete with larger farmers who have more resources and can secure better prices. They expressed the need for external support, through more frequent training, financial support and incentives from external entities, such as feed companies and the government.

Lessons and recommendations

Knowledge and practice: smallholder farmers' have increased their knowledge and some have increased production and profits. An important lesson is the need to align recommendations with practical realities in terms of affordability for small-scale farmers producing mainly for home consumption, and compatibility with existing resource capacity. This highlights the need for tailored support based on economic capacities of farmers and regions.

LSPs and extension: farmer training and input provision by LSPs had some positive results. The recruitment of local LSPs serving their community ensures sustainability after the project ends. Questions remain on whether NGOs were better able to reach and influence households on nutrition and gender dimensions than private sector extension, and whether the latter achieved more efficient coverage and sales, and for which client groups. LSPs require specific personal qualities and varied in their performance. There is need for systematic assessment of the reasons for these differences.

Digital access and information: digital platforms were developed to reach LSPs and farmers with information and advice on a large scale. Short digital content was more appropriate than longer videos and online information was more understandable following face-to-face training. Private company sponsors and an advertising facility were introduced to enhance sustainability

Market approaches: selection of effective market actors is key. The two private sector partners selling fish in their shops observed that if price and quality can be balanced, then large volumes can be sold. Training for rural entrepreneurs and Couples developed business skills and market awareness. Involving market access partners earlier during training will build rapport and enhance practical results.

Financial inclusion: uptake of loans was relatively small compared to the number of account holders. Disbursement of bank loans was delayed by farmers' lack of documentation and alternative approaches to speed this up are required.

The **nutrition component** was initially community and household oriented but on a limited scale. It was then mainstreamed into the NGO's health program and government clinics. There may be trade-offs between frequent messaging to a smaller group and more occasional but widespread coverage.

Gender transformative approaches: there were examples of positive changes in attitudes and behavior relating to gender, but implementation was difficult to achieve through private sector LSPs, with limited time and financial and human capacity. Specialist gender service providers introduced promising approaches but required resources for wider implementation.

Multisectoral approaches create synergies among aquaculture, nutrition and gender. Training for project staff on the different themes would enhance understanding of interconnections and support collaboration and interdisciplinary working and communication.

Adaptive and supportive management: reflection on project implementation and the challenge of COVID 19, led to adaptations. NGOs and other project partners were positive about the level of advice and supportive feedback from WorldFish in solving problems.

Relationship with government: the project recognized the importance of building good relationships with local and national government bodies which ensured consistent messages and encouraged cooperation and support, including the opportunity for high level dialogue.

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1. Introduction

Process evaluation objectives, context and rationale.

1.1 Context

According to the report “State of World Fisheries and Aquaculture (SOFIA)-2022” by the Food and Agriculture Organization (FAO), 11 percent of the world's freshwater fish, amounting to 1.3 million tons, is being produced in Bangladesh. Fish and Fisheries play a significant role in Bangladesh, in terms of nutrition, income, and foreign exchange earnings. More than 17 million people including about 1.4 million women, depend on fisheries for their livelihood through fishing, farming, fish handling, and processing (Shamsuzzaman *et al*, 2017).

Fish play a crucial role in the Bangladeshi diet, providing more than 60% of animal protein in the diet as well as other essential micronutrients (Belton *et al.*, 2011). According to BBS (2016), per capita fish consumption was 42.1 grams/day in 2005, and increased to 62.52 grams/day in 2016. However, at the same time, there were significant decreases in iron and calcium intakes from fish; and no significant change in intakes of zinc, vitamin A and vitamin B12 from fish, reflecting the lower overall nutritional quality of fish available for consumption over time. Consumption of fish also depends on socio-economic indicators such as gender, wealth status, age, geographic location, marital status, etc. Mean fish consumption in some regions, particularly Rangpur and Rajshahi, is much lower than the national recommendation (62gm/person/day), indicating that context-specific interventions to increase consumption are needed (Bogard *et al.*, 2017b). Fish consumption by females is significantly lower than in males in all wealth groups except the wealthiest, and in those aged less than 15 years (Bogard *et al.*, 2017a).

The prevalence of very underweight children has decreased due to government efforts, falling from 31.9 percent in 2012 to 22.6 percent in 2019. The percentage of children with moderate to severe stunting has decreased from 42% in 2012 to 28% in the same time frame. However, 39% of women are suffering from malnutrition. Pregnant women, new mothers, and children who have less access are given lower priority to micronutrient-rich food, have high levels of malnutrition. Fish consumption has the potential to alter the national situation[1].

The low nutritional status of women and young children is also influenced by gender disparity in decision-making about household production and consumption, and social barriers to participation in income-generating activities (Kruijssen *et al.*, 2016). These factors limit options, opportunities and incentives for investment and improvement (Das and Khan, 2016). In addition, women's workload in reproductive responsibilities prevents them from participating fully. Nevertheless, many women are engaged in homestead-based pond management-related activities. Homestead aquaculture can increase household food consumption and improve dietary diversity by generating additional cash income and stimulating higher fish consumption (Ahmed and Waibel, 2019). Income from

[1] *Fish consumption could be the answer to malnourishment in Bangladesh* (2020) *The Daily Star*. Available at: https://www.thedailystar.net/environment/news/fish-consumption-could-be-the-answer-malnourishment-bangladesh-1977425 (Accessed: 29 August 2022).

aquaculture can help poor farmers improve the quality of household diets by purchasing more protein-rich and energy-dense food items from the market.

The project, “Aquaculture: increasing income, diversifying diets, and empowering women in Bangladesh (IDEA)” implemented by WorldFish, together with BRAC and TMSS, two major NGOs in Bangladesh, was intended to tap the potential of homestead aquaculture to improve nutrition and dietary diversity.

1.2 Overview of IDEA program objectives and components.

The IDEA project was launched in 2019 with the basic objective to improve incomes, nutrition, and women’s empowerment in Rajshahi and Rangpur divisions in northwest Bangladesh. The project is located in five districts of Rajshahi division (Rajshahi, Bogra, Naogaon, Natore, and Pabna) and two districts of Rangpur division (Rangpur and Gaibandha).

To increase aquaculture productivity among smallholder farmers and reap the pro-poor benefits of aquaculture accomplished in other parts of the country, the project drew on the accumulated knowledge from WorldFish’s longstanding work in Bangladesh to promote improved and sustainable aquaculture technology and management practices. The project was designed with five types of intervention which correspond to the five primary Outcomes which it aimed to deliver by the end of 2022. These were set out in the project’s results framework and workplan:

1. Enhanced aquaculture productivity of homestead fish production systems
2. Increased value of marketed fish and fish-based products
3. Increased quality, reach, efficiency, and sustainability of extension services
4. Improved access to nutrient-rich foods, including fish and fish products, especially for women and young children
5. Increased empowerment of women engaged in aquaculture production and fish value chains.

1.2.1 Productivity-enhancing interventions (Primary Outcome 1)

The project aimed to enhance smallholder productivity by improving fish management practices and vegetable farming around pond dykes (1.1), increasing access to quality fish seed and brood stock (1.2) and improving fish feed and pond inputs (1.3), increasing access of smallholder farmers to credit and extension services (1.4) and influencing policies and investment in support of nutrition-sensitive and gender-oriented aquaculture (1.5).

The initial target was for productivity increases of 50% for 1 million smallholder households of the two Divisions by the end of 2022. This target was revised in 2021, post COVID, to a target of 450,000 households, 70% of whom (315,000 households) would increase productivity by 50%. Policy influence was to be achieved through reports on three policy/regulatory areas, and stakeholder workshops.

Among the planned outputs were identification and validation of knowledge on improved management practices, constraints relating to access and use of quality fish seed, feed and credit, and policy options for aquaculture growth and investment. This would be used to plan productivity-enhancing interventions, training materials and policy engagement. A private sector digital service provider for aquaculture in Bangladesh would be identified

and gender responsive media and training content designed and made available. Training partners would be engaged and trained as trainers of local service providers (LSPs). Other planned interventions included training for partner hatcheries, fish seed and fish feed supply chain actors, to promote adoption of improved operating procedure/standards and ensure supply of improved quality fish seed and feed. A training manual and materials, including digital training, would be produced to promote best practices. Establishment of specific business agreements between local seed, feed and credit service providers and farmers' groups would enhance access to credit, better quality fish feed and quality seed from certified fish hatcheries and nurseries. Special events and appropriate communication channels would promote private responsible investments, and strategy/policy change in the private and public sector.

1.2.2 Interventions to increase value of marketed fish (Primary Outcome 2)

The project aimed to increase the value of fish and fish-based products marketed by smallholder households by strengthening farmers' market linkages and increasing membership of women and men smallholders in farmers' groups, including women's groups (outcome 2.1), This would increase by 50% the total value of aquaculture production sold under sustainable market linkages through groups or private sector (2.2), and by women and men small scale farmers capturing a larger share of market margins (2.3). The initial target was for the total value of aquaculture production sold in Rangpur and Rajshahi to increase by 50% for 1 million smallholder households. The revised target was for a 35-50% increase in value for 315,000 households out of 400,000 households contacted.

Farmers' market linkages, marketing strategies and opportunities were to be strengthened by using information from studies on market potential of fish products, the gender value chain, and wholesale / processing / retailing market systems. This information would also support farmer groups to become more competitive. New groups would be organised and formalised, and a training manual produced to support groups' business management and administration. Digital training materials would support a virtual community. Training of a person from each farmer group in gender sensitive nutrition-friendly aquaculture practices would further increase group management skills. Gender-inclusive and pro-poor sustainable business plans/models and/or partner agreements would be established between farmers' groups and producers/retailers. Public events and communication materials would promote products.

1.2.3 Enhancing quality, reach, efficiency, and sustainability of extension services (Primary outcome 3)

This aim was to be achieved through organizing private sector/LSPs/input suppliers and enhancing their capacity to provide services (3.1), and by establishing new LSPs to fill the gaps in existing LSPs (3.2). LSPs are usually local entrepreneurs, selling seed or feed, and charging a commission for their services. The target was for extension services to reach up to 450,000 households through LSPs and other private sector partners.

Training manuals and materials, and digital training materials and platform were planned to fill knowledge gaps among private sector LSPs for extension service provision (management practices and inputs). Partnership agreements with training partners (private sector and NGOs) would support training for private sector/ LSPs/ input suppliers to provide extension services to farmers. Women LSPs would also be

recruited. Systems and mechanisms would be developed to increase LSPs sustainability and competitiveness. A social media platform would respond to frequently asked questions, and host live sessions on technical, market, nutrition, gender and other social issues to increase knowledge of the LSPs.

1.2.4 Interventions to improve access to nutrient-rich foods (Primary outcome 4)

The objectives under this outcome were for family members (women and men) in targeted households (4.1) and non-aquaculture households (4.3) to improve their knowledge, attitudes and practices (KAP) regarding the value of fish in their diets. Key partners and stakeholders would integrate fish and fish-based products and behaviour change communication into their nutrition and health programs for households (4.2), availability of fish and fish-based products would increase in urban and rural markets (4.4) and fish-based products would be included in mother and child health and food assistance programs in Rajshahi and Rangpur Districts (4.5).

The target originally was that 1 million smallholder HHs in Rajshahi and Rangpur Divisions and an additional 1M rural and urban non-fish farming households have improved access to nutrient-rich foods, including fish and fish products. The revised target was 900,000 women and young children of fish farming and non-fish farming households have improved access.

To improve households' nutritional knowledge, communication materials for media would be developed (website, radio, TV messages), and messages delivered at household and community level. Project staff, NGO partners and community health workers and LSPs would be trained on fish-focused nutrition messaging. SBBC campaigns on mass media and digital messaging would be used for wider influence. Improved knowledge on markets for fish-based products would provide a foundation for developing new products with the private sector. Contract agreements between smallholders and fish processors would be established for producing processed fish and fish-based products. Agreements would be made with NGOs to include fish-based products in mother and child health and food assistance programmes. Relevant stakeholders, particularly women's groups/associations, at division and national level would be engaged for policy change, and policy briefs and recommendations for integrating fish and fish-based products into food assistance programs would be produced.

1.2.5 Women's empowerment interventions (Primary outcome 5)

WorldFish planned several capacity development mechanisms to empower women in aquaculture and enhance their role in aquaculture production and fish value chains. This was to be achieved by developing strategies for gender integration in partner programming for aquaculture and value chain development (outcome 5.1), increased decision-making power over productive assets by women in Rangpur and Rajshahi Divisions (5.2), increased financial empowerment of female smallholders (5.3) and increased membership of women in farmers' groups (5.4).

The original target was for increased empowerment of up to 1 million women engaged in aquaculture production and fish value chains in Rajshahi and Rangpur Divisions by the end of 2022. The revised target was for 100,000 women from fish farming households to have increased empowerment, in relation to decision making, finance and group membership.

The project expected to see partners (NGO and private sector) aquaculture and value chain development strategies become gender integrated in design and implementation, through improved knowledge on gender dynamics (measured through the Women's Empowerment in Fisheries Index (WEFI)), and communication strategies to promote gender-inclusive, socially responsible investments in smallholder aquaculture and value chain development. Women smallholder farmers would increase their knowledge of aquaculture production and value chain activities, and some would become extension service providers. Financial empowerment would be enhanced through access to loans and increasing financial returns. This was to be delivered through increased membership of farmers' groups (mixed and all-women groups), and gender transformative training.

1.3 Process evaluation report structure

The next section of this report sets out the process evaluation approach and how it relates to the IDEA project intervention logic. The process evaluation questions, and methodology are presented. Section 3 examines the implementation process, while section 4 explores the relationships and dynamics among project partners – both drawing primarily on interviews with WorldFish and NGO staff and partners. Section five looks at the pathways to outcomes, as understood by key stakeholders and presents the findings from interactions with aquaculture farmers in the field. The final sections present views on the project outcomes and prospects for sustainability as well as reflecting on lessons learned and implications for future project design.

2. Process evaluation approach and methodology.

2.1 IDEA Intervention logic - Theory of change and assumptions

The program theory of change (See Figure 1) was constructed in 2019 by the evaluation team, based on project documents, including the results framework, discussion with WorldFish staff on their initial diagram of the project impact pathways and the project work plans. The colored columns represent the five intervention domains outlined above. The numbered text boxes in the theory of change diagram are based on the outcome areas in the results framework. The assumptions are depicted by the red circles at each important node in the theory of change. The theory of change diagram shows how the interventions interact with each other to lead to intermediate and final outcomes.

The main assumptions relating to productivity enhancing interventions, are that men and women smallholders find credit, feed and seed input provision accessible, acceptable and affordable, and take them up; (assumption 1); that there are significant gaps in farmers' knowledge of improved management practices and access to inputs and that filling these gaps will enhance productivity (assumption 3); that productivity gains and increased volumes of fish produced are realized as anticipated (assumption 4), and that there is sufficient stakeholder support to influence policies towards nutrition sensitive aquaculture (assumption 5).

Efforts to enhance quality, reach, efficiency and sustainability of extension services[2] start with the two different implementation models of engagement with input suppliers and

[2] This is the third project outcome, but it is presented next to outcome 1 in the theory of change diagram, for ease of mapping inter connections.

service providers, existing and new. These extension agents or LSPs (private sector and NGO) were seen as playing a crucial role in the delivery of services to smallholder aquaculture farmers. Training and capacity building would improve their effectiveness in providing access for smallholders to seed, feed and credit, contributing to higher productivity. Important assumptions are that private sector service providers are willing to engage in gender-inclusive service delivery and social and behavioral change communication (SBCC) to smallholder farmers; that group mechanisms function and the volume of demand and profitability is adequate to justify their effort (assumption 2)

The pathway to increasing the total value of fish and fish products sold by smallholder farmers (and hence income) starts with increasing membership of women and men in existing and new farmers groups and developing their business and marketing skills and linking them to input and output markets to achieve an increase in total value of aquaculture products sold and an increase in the incomes of smallholder farmers from the sale of fish and fish-based products. It is supported by responsible investment and business standards, by the quality and reach of extension services and the productivity increases achieved. The gender inclusiveness of farmer group formation is supported by strategies for gender integration. This assumes that effective arrangements for male and female smallholder marketing can be implemented (assumption 6) and that market strategies result in a greater share of market margins for smallholder producers and that responsible investment and business standards are in operation (assumption 7).

Increasing access to nutrient-rich foods starts with social behavior change communications (through LSPs and digital) to increase the knowledge of farming and non-farming households about nutrition and dietary diversity, the importance of fish in their daily diet and to influence attitudes and practices. Engagement with key stakeholders to include fish and fish-based products in food assistance, health and nutrition programs will lead to higher availability of fish and increased consumption. The main assumptions are that nutritional SBCC mechanisms, including digital and mass media, are appropriately targeted at the intra-household level, have the required reach and are effective (assumption 8); that there are sufficient economic incentives for processors to develop fish products and for traders to increase fish supply (assumption 9); that price relationships remain favorable to support the increased consumption of fish and other nutritious food (assumption 10). A further assumption is that an increase in commercialization with greater market integration and stronger price incentives, does not have a negative effect by reducing the volume of home fish consumption compared with the marketed proportion, or by substituting higher value species for lower value, more nutritious species (assumption 15).

The changes leading to women’s empowerment are guided by strategies for gender integration in partner programs and activities of LSPs and informed by studies of gender dynamics and women’s position in aquaculture. Gender transformative strategies and training are intended to positively influence women’s decision-making power over productive assets and their financial status, contributing to the empowerment of women engaged in aquaculture and fish value chains as well as strengthening women’s participation and influence as purchasers and consumers of fish. There are several important assumptions necessary to the realization of these outcomes; that women’s participation in groups and fish related activities does not increase their work burdens to the detriment of their health and well-being (assumption 12); that transformative

strategies can influence and change gender norms to support women's increased decision-making control over assets and enhanced participation and bargaining power (assumption 11) and that income earned by women through participation in fish production and marketing remains within their control (assumption 13) ; furthermore that women's empowerment in aquaculture will influence positively their choice and consumption of nutrient-rich foods (assumption 14).

A subsequent version of a theory of change was produced by WorldFish in 2020, which shows some changes at the activity/change-mechanism level, responding to early experience. This includes more visibility of the private sector and a stronger focus on the use of ICTs/digital communication and modification in some of the impact pathways. The pathway towards women's empowerment relies on groundwork at the policy level, stakeholder engagement at different levels, and advocating for an enabling environment for private sector investment. This will enable a policy environment for investing in women-oriented and nutrition-sensitive aquaculture and public health nutrition programs for mothers and children. The greater inclusion of women at the policy level will improve both women's participation in gender-sensitive aquaculture and the sustainable consumption of fish and fish products (outcome 4). More engagement of women in the aquaculture value chain will also increase the productivity of farmers (outcome 1). The revised framework emphasizes policy engagement rather than grassroot-based actions such as the formation of women's groups to encourage women's participation in aquaculture, access to information and productive assets, resources and credit etc.

In addition to the internal assumptions about the connecting factors necessary to realize the program logic, as in the first framework, assumptions can also be contextual – concerning the external conditions which influence the project (sometimes expressed as 'risks'). The WorldFish ToC identifies several risks external to the project which can critically affect the program.

- Climate factors can challenge project implementation. Bangladesh is exposed to various climatological (e.g. drought), hydrometeorological (e.g. cyclones, storm surge, flood), and other geophysical (e.g., landslides and erosion) hazards. Rajshahi and Rangpur are vulnerable areas in Bangladesh. Frequent natural disasters have imposed a great threat on the livelihoods of the people.
- Supply of inputs such as fertilizers, chemicals, raw feed materials and technology depends on imports. Any government restrictions on free-flow of materials could hamper the activities of the project.
- Political stability is crucial to implementing the project smoothly. Instability in both national and local level politics can also become a threat to implementing the project.

The process evaluation and the questions it explores are designed around the five original primary outcomes and nineteen intermediate outcomes (shown and numbered in the first ToC). although the additional elements from the WorldFish version are also incorporated.

Figure 1: Theory of Change (ToC) developed by Evaluation Team 2019

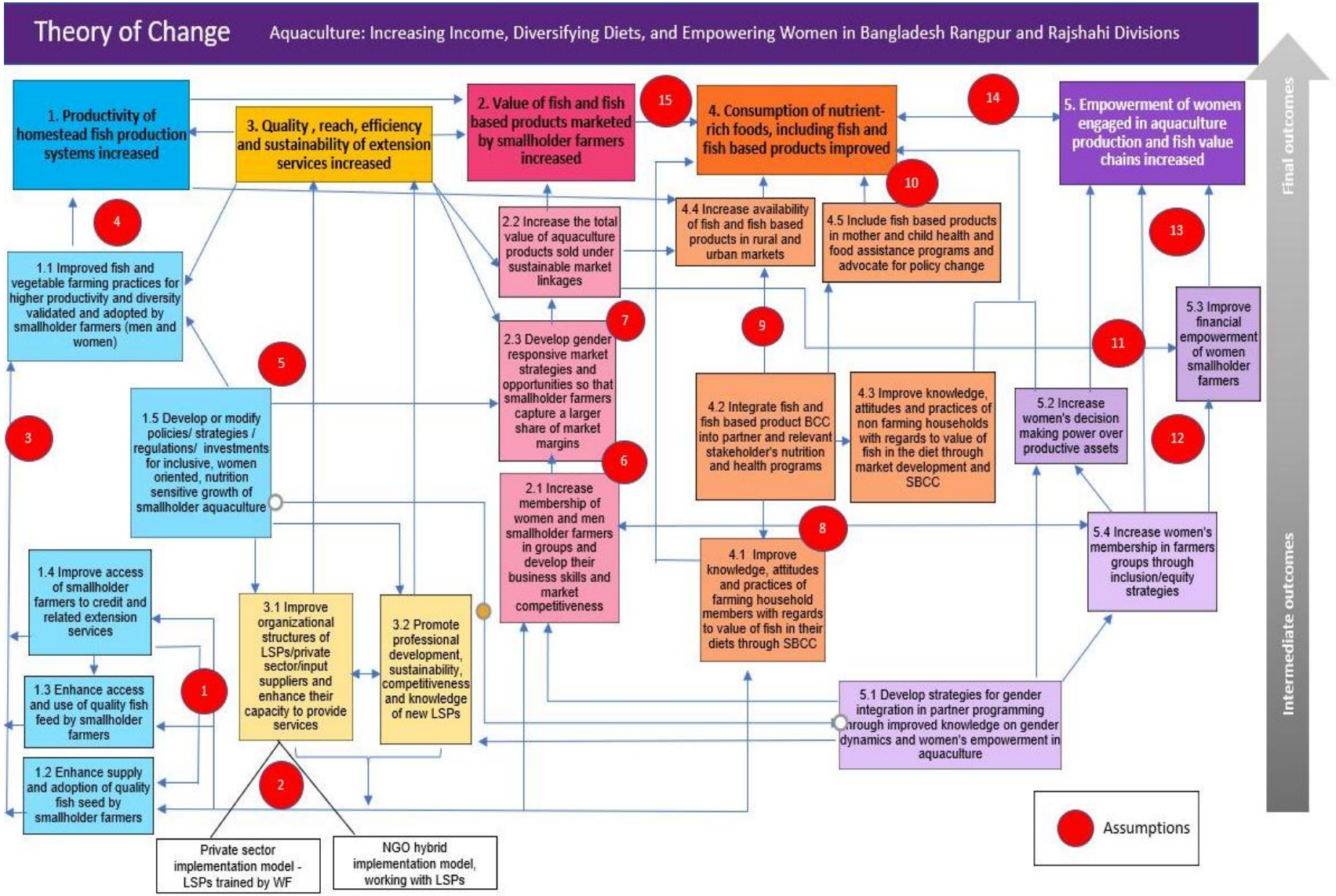
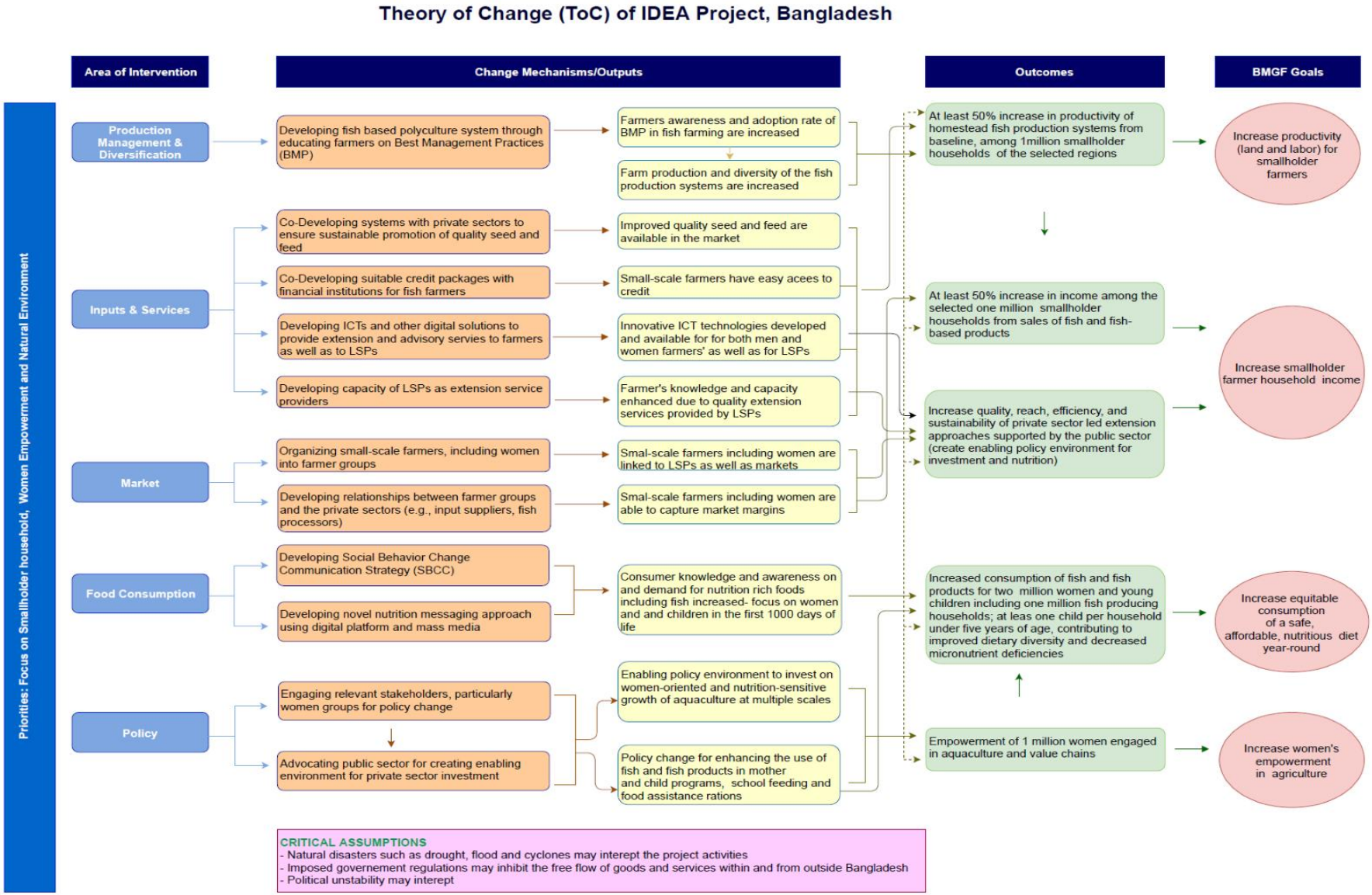


Figure 2: Theory of Change (ToC) developed by WorldFish 2020



2.2 Link to impact evaluation and RCT design.

The process evaluation is part of an overall impact evaluation of the IDEA project which aims to answer the following research question:

What are the impacts of the aquaculture investments in the BMGF-funded WorldFish project, 'Aquaculture: increasing income, diversifying diets, and empowering women in Bangladesh' on the following primary outcomes:

1. Smallholder aquaculture productivity; smallholder income (with delineation of income from fish and fish-based products).
2. Dietary diversity; the nutritional outcomes of women and children, e.g. height/weight of women (BMI, short stature), height/weight of children (HAZ/LAZ, WAZ, WHZ/WLZ, MUAC for pregnant women; food security.
3. Women's participation and time use in different nodes of the aquaculture value chain; women's empowerment and say in aquaculture-related and other household decision making.

An innovative feature of the WorldFish project is the split between two alternative and indirect models of delivery: (a) A Local Service Provider (LSP) or pure private sector model (T1) and (b) a Hybrid Model, also called the NGO model (T2). According to WorldFish, the LSP model is a decentralized extension model whereby WorldFish identifies and trains extension workers or local service providers (LSPs) who provide extension services (knowledge, technology transfer, products, etc.) to farmers. LSPs are expected to sustain themselves as small businesses, e.g. through a commission on sales of products or by charging for the provision of a variety of services to farmers. A novel (and challenging) add-on is the responsibility of LSPs – after receiving capacity building and training – to also deliver the nutritional and gender transformative modules of the project.

In the Hybrid Model, two large and well-established non-governmental organizations, BRAC and TMSS, were contracted to select and be responsible for the capacity building of LSPs to operate in their respective areas. Both NGOs have a strong track record of livelihood promotion among smallholder[3] (and women) farmers and had established programs for credit linkage and aquaculture extension services and inputs. The NGOs agreed to follow WorldFish's LSP selection guidelines and train LSPs using training materials provided by WorldFish. WorldFish provided Training of Trainers (ToT's) for the two NGOs, following which, the NGOs built the capacities of the LSPs they mobilized under this intervention. The LSPs trained smallholder farmers. Leveraging their existing network of community clinics and health and nutrition workers, TMSS and BRAC also trained grassroots workers to deliver key nutrition and health messages to smallholder farmers. However, these community and health workers were not present in the Private sector model.

To measure and generate evidence of the impact of the IDEA project in the short run, we

[3] A fish farming household is defined as a "smallholder" in IDEA project if household holds maximum of 2ha of arable land (including pond area) or if the volume of aquaculture production is less than 4MT/ha, or if at least 50% of own production is for family consumption. The farm household is considered to be a smallholder if satisfy at least one of the 3 criteria. The household does not have to own formally the land or water area. It can be either leased or owned.

adopted “Process Evaluation” as a part of a broader impact evaluation. Generally, an impact evaluation seeks to quantify the outcomes which are derived from a project’s intervention, whereas process analysis explains how differences between the project's actual design and implementation (as opposed to the intended design and implementation plan) may have had an impact on the results. Process analysis can also help to explain how the organizational, administrative, socio-cultural, political, and economic aspects that make up the context in which implementation occurs affect the results (Dixon and Bamberger, 2022). The process evaluation seeks to explain the intervention’s positive, negative, significant, insignificant, or unexpected results. This study tries to understand the mechanisms for how and why the interventions produced successful change or failed to do so, which is key to refining the theory of change (ToC) and improving the intervention effect of the IDEA project.

2.3 Overview of process evaluation.

The main objective of process evaluation is to evaluate whether the IDEA project design is effective in addressing the identified problem and whether and to what extent implementation has been sufficiently close to design for an impact evaluation. It seeks to identify the underlying causes of success and failure of the IDEA project. The process evaluation is focused on four major areas:

- To explore what has been implemented to date and the quality of the implementation – how it has been delivered and the factors that have facilitated or impeded the project.
- What are the factors affecting the program context- given the particular circumstances of COVID, the process evaluation examines how this has affected plans and activities and what adjustments have been made.
- Examine the key relationships and the accompanying assumptions in the theory of change relating to the five outcome areas and how thinking on this has evolved.
- Catching the early lessons emerging from the project

2.3.1 Key process evaluation Questions

To meet the objectives of the research, the study aimed to find answers based on the following research questions in terms of implementation, project context, the validity of ToC and assumptions, the effectiveness of interventions, and lesson learning. Moreover, to assess the impact of the IDEA project interventions on aquaculture farmers, the study also considers capturing the enabling factors and challenges which determine the project's success and how the project has been intended to achieve its goal in the short run.

1. How far has i**mplementation** followed the planned activities and the outputs foreseen in the results framework? e.g. what has been delivered and by whom (particular differences between the ‘WorldFish/private sector’ and ‘NGO’ models), how it has been delivered, to whom, and on what scale across the different outcome areas. What adjustments have been made?
2. What factors in the **project context** have constrained or facilitated project activities or affected the project strategy? e.g. COVID restrictions and consequences, policy changes, economic context, donor influence, legal institutional change, etc.
3. What is the plausibility of the **theory of change (ToC) and validity of assumptions**, e.g. timing, the extent of participation, feasibility of productivity

enhancement, enhanced market sales and income, nutrition linkage, women's role, and empowerment? Changes made. Does the strategy for engagement with private sector service providers and NGOs remain relevant?

4 **What has been effective or less effective** and why? e.g. management mechanisms of program, staffing skills, and continuity, relations with partners, communication and coordination, technical support, mobilization of LSPs, training (LSP & NGO), field activities with smallholders, extent of women's participation, quality of service delivery, marketing support, nutrition, etc.
5 Have **linkages and engagement** been developed with higher-level public and private sector bodies and decision-makers?
6 What are the **main lessons** learned to date and have these influenced management and plans for the remainder of the project?

Table 1 elaborates these process evaluation questions, identifying more specifically the relationships and mechanisms crucial to the delivery of the program which were explored in the process evaluation discussions.

2.3.2 Methodology

The process evaluation utilized qualitative methods to explore the perspectives of different actors on the implementation, progress, achievements and lessons of the project. The two main methods were interviews with key informants and focus group discussions with men and women farmers from selected villages in intervention and control areas.

After an initial stage of literature review, the interview checklists (see appendix 1) were developed (figure 3). The key informant interview checklists were designed to cover the main project interventions and followed the main outcome pathways shown in the theory of change. The checklists were tailored for specific skill areas and responsibilities of the interviewee, e.g. management, aquaculture, gender, nutrition, extension. The focus group discussion checklists explored farmers' experiences with and responses to project activities. In addition, a number of individual farmers were interviewed on their aquaculture practices.

The interviews, observations, and focus group discussions were guided by themes derived from the study objectives, not restricted to them. During data collection and analysis, themes were expanded to include new and relevant learning. The study team's objective was to ensure that all facets of the research (for example, data collection, data management, data analysis, and reporting) systematically cohered to ensure the credibility of the findings.

Initially, all the question checklists were developed in English and then translated into Bengali. Depending on the preferred language of the interviewee, the KIIs were conducted in English or Bengali through an online platform. FGDs were conducted in the local language.

All the KIIs and FGDs were audio-recorded by taking prior consent from the respondents and then these were transcribed into English. Following the translation and transcription of the data, the study team developed a coding framework and trained a coding team to code the transcripts using Nvivo software. This was followed by thematic analysis of the codes and subcodes.

Table 1: Framework for the process evaluation

Process evaluation questions	Stakeholder	Methods	Outcome Pathways (ToC)
IMPLEMENTATION			
How far has implementation to date followed the activities and the outputs planned in the results framework? • Quantity – targets achieved, extent of coverage? • Quality – delivered as planned? **What are the actual similarities and differences** between the WF implementation model and that of the NGOs and their agents? **Theory of change** – Plausibility and validity of assumptions. Development and modification: time scale, productivity enhancement, enhanced income, extension services, fish consumption/nutrition, women's empowerment, and policy influence. **Any changes in the planned interventions and reasons?** **Did the interventions reach their intended audiences**? e.g. recruitment and training of LSPs, training of NGO service providers, LSP's direct and indirect training to farmers; training for value chain actors (nurseries, fingerling producers), nutrition messaging; processing and marketing; farmers' group formation and participation of women.	WorldFish &NGO project management and implementing staff Bill& Melinda Gates Foundation, program manager	Interviews with WF &NGO management and staff • Review of program documentation and reports and WF monitoring data • Discussions /review of progress of work plan and outputs and future plans • Discussion of the theory/ies of change • Reports in monthly meetings.	Cross-cutting all pathways 1. Improved practices and productivity, use of fish seed, feed, training materials, training etc. 2. Sale of fish and fish-based products. Group membership, gender responsive training. Market & value chain development 3. Extension services. LSP & NGO partnership, training. 4. Improved access to nutrient rich foods. Communication materials, SBCC & nutrition messaging 5. Empowerment of women in aquaculture, gendered VC studies, finance, gender transformative approaches.
CONTEXT			
What factors in the environment have constrained or facilitated program operations and delivery? **The internal context**? e.g. resources, staff, higher level management decisions or strategy changes in WorldFish. **The external environment:** Impact of **COVID** on program approach and delivery. **Extent to which institutional relationships** in the sector are conducive to cooperation and coordination	WorldFish research manager WorldFish &NGO project management and implementing staff	Discussions with project management and staff Program monthly and annual reports Market price data – fish, rice and staples, fruit, veg etc.	

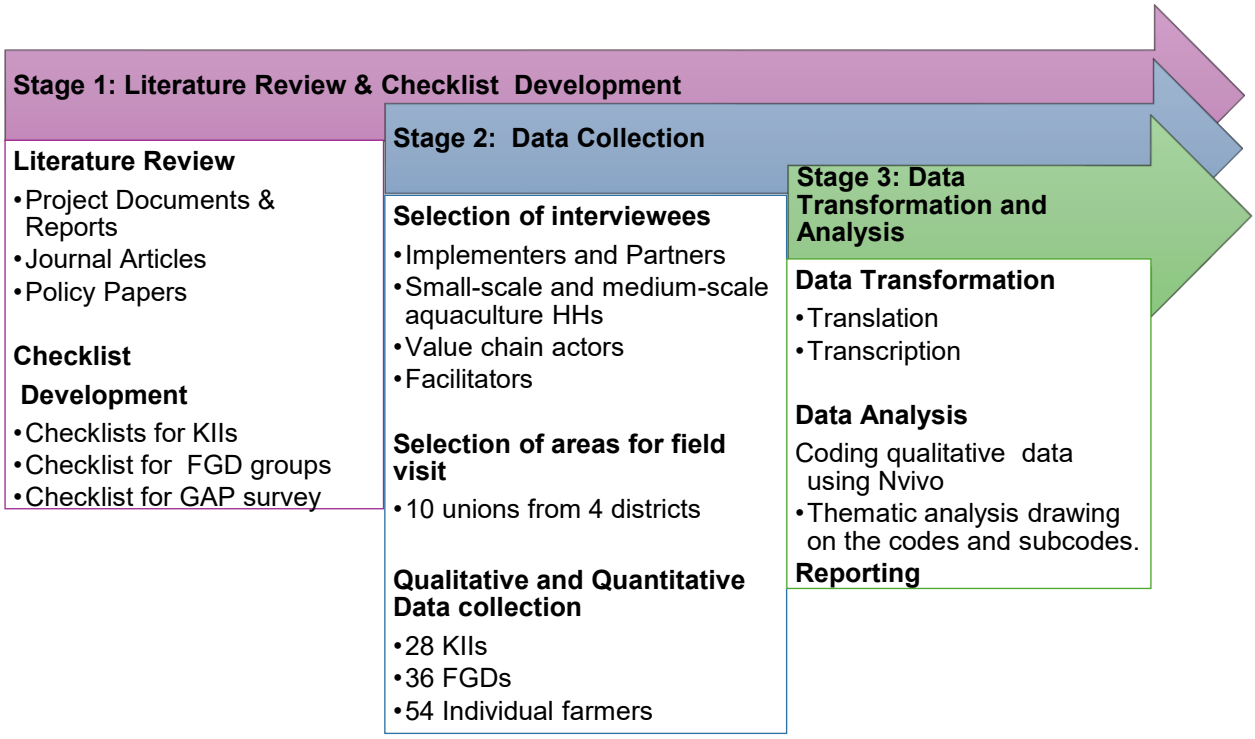
Process evaluation questions	Stakeholder	Methods	Outcome Pathways (ToC)
Any policy changes which have shaped the intervention design or implementation?			
MECHANISMS AND IMPACT PATHWAYS			
What has been effective or less effective and why? **Program strategy** • Is the strategy for engaging with private sector service providers and NGOs effective so far? • Is the planned engagement with smallholder aquaculture groups, being realized? • Is there evidence they are implementing gender transformative approaches? • Early signs of outcomes – positive and negative. Any unanticipated outcomes?	WorldFish project management, training and field staff, private sector and gender specialists	Small group discussions with WF management and staff	
WorldFish (management and staff activities) • WF relationships with partners; staffing and skills, communication with field staff, coordination mechanisms. • Selection and training of LSPs. • Support and advisory mechanisms and processes provided for WF LSPs • Experience of working with LSPs, NGOs, and other value chain actors and communication partners. Compatibility of organizational values and operations. • Linkages and engagement with value chain actors – private sector companies (feed companies, nurseries, processors) • Linkages and engagement with higher level public and private sector bodies and decision-makers	WorldFish project management, training and field staff, comms staff. Organizations conducting specific studies – e.g. rapid gender study, gender value chain study, feed market assessment, etc. Value chain actors. Policy makers	Small group discussions with WF management and staff Interviews with study leaders. Interviews with value chain actors and communication partners	All outcome pathways.
Online and digital messaging. • What online training/information provisions have been developed? Are messages on aquaculture reaching smallholder fish farmers?	WorldFish staff, (BMP and nutrition), liaison with digital service providers. BRAC/TMSS managers and field staff Companies providing	Interviews with WF staff Interviews with representatives of digital companies responsible for development and roll out	Outcomes 1 and 4

Process evaluation questions	Stakeholder	Methods	Outcome Pathways (ToC)
• Are messages on the nutritional importance of fish reaching smallholder fish farmers and non-fish producers, particularly women? (7) • Are messages being communicated to other health-related stakeholders and programs, or media?	online services, social media etc.		
Activities of LSPs/ NGO SPs • LSP recruitment – selection criteria, area of activity, gender, scale of business etc. Barriers and facilitators to engaging women as LSPs • Effectiveness of training received from WF; appropriateness of messages and technologies – technical, business, gender and group formation • LSPs engagement process with men, women farmers from different social groups; experience of group formation and functioning. What has been provided • Extent and adequacy of support and advisory mechanisms and processes provided for WF LSPs and for NGO LSPs. • Extent of participation and inclusivity of group activities (women, poorer households etc.). Factors influencing women's participation. • Coverage – their operational area within/across unions (LSPs of WF and NGOs). Understanding of target v non target areas. • Motivation and perception of business benefits (8) • Experience in developing farmers' technical, business and marketing skills. • Activities related to nutritional messaging and promoting women's empowerment. (2) How has this information been used, and with what results?	LSPs from different recruitment phases NGO service providers trained by WF Local fisheries department staff Health workers. Private sector business incubators	• Follow up survey with first phase of LSPs (private and NGO). • Survey of new LSPs (private and NGO). • Interviews	All outcome pathways,
NGO partnership, training and processes. • Relationship with WF • Effectiveness of WF approach and training	BRAC and TMSS managers	• Interviews with TMSS and BRAC managers	All outcome pathways

Process evaluation questions	Stakeholder	Methods	Outcome Pathways (ToC)
• Extent of collaboration in training and production of dissemination materials • Recruitment of project service providers v existing field staff – criteria and profiles • Support and advisory mechanisms and processes provided for NGO SPs • Understanding of target v non target areas and coverage of their SPs. • View of own roll-out progress. Challenges in implementation and how these have been tackled.		and field staff. • BRAC & TMSS implementation plans, monitoring data, and reports.	
Farmers' relationship with LSPs (WF and NGO) • Experience with training, new technologies and nutritional messaging, remotely and in person. • Perceptions and views on acceptability, affordability and relevance of technical advice. (1) • Perceptions and views on relevance and acceptability of nutritional messaging for families and community. • Have people put into practice any of the technologies recommended? Any changes in the management or stocking of ponds, feeding of fish, fish species composition etc. • Have people changed their diet in any way. Is there any change in the species composition of the fish consumed? • What factors are encouraging or inhibiting farmers' uptake of inputs, services and management practices? e.g. technical, financial etc. • Factors influencing women's participation. Reasons for involvement/non-involvement (e.g. time use, cultural constraints, preferred alternatives etc.) (11) • Effectiveness of farmers' relationship with LSPs compared to other sources of information	Farmers and farmers group leaders. Treatment and control groups.	Phone interviews with farmer group members and leaders? Baseline survey data	All outcome pathways

Process evaluation questions	Stakeholder	Methods	Outcome Pathways (ToC)
LEARNING			
• **Have adjustments been made in implementation strategy or mechanisms**, the relative emphasis of different components, target groups and engagement etc., experience to date, or because of contextual changes (policy, donor influence). Specific adjustments arising from COVID 19. • How is critical learning – from studies or from program experience consolidated and used to inform management and planning? • Is program experience being used to inform nutrition /agriculture policy? What is the extent of stakeholder support and engagement in this? (4)	WorldFish project management, training and field staff, communications staff. BMGF Program manager BRAC and TMSS managers		

Figure 3: Stages of the Process Evaluation



2.3.3 Selection of respondents

The respondents for the interviews and focus group discussions were carefully selected to discuss different areas of activity related to the project objectives. For an in-depth analysis, the study incorporates implementers, small-scale and medium-scale farmers from both treatment and control areas, value chain actors, and facilitators. Individuals and groups connected with the project provided key inputs, engaged in discussion, and provided necessary insight about implementation, the challenges to delivery, changes, and lessons of the project.

We conducted Key Informant Interviews (KIIs) with various stakeholders from the IDEA project. The purpose of the KIIs was to collect information from a wide range of people—including project staff, partner organizations, and government agencies — who have firsthand knowledge about the project. With their particular knowledge, understanding, and involvement with IDEA project, it was useful to identify the scope of work, nature of the problems, risks, mechanisms for solving problems, and overall changes happening due to the IDEA project. The KIIs were completed using virtual platforms. A total of 28 KIIs involving 36 people were held with different stakeholders of the project - staff from WF, BRAC, and TMSS, representatives of other partners - Bengal Meat, The Right Kind, Apon Wellbeing, LightCastle Partners, Bank Asia, Mega Feed, Monica Hatchery and Divisional Fisheries Officers (see table 2). The majority of the interviews with WorldFish staff and all interviews with NGO staff were conducted in the second half of 2021. WorldFish managers, marketing and nutrition specialists and divisional coordinators were interviewed in early 2022, as were the private sector partners (Bank Asia, Apon, Bengal Meat, Monica Hatchery, Mega Feed) followed by Light Castle and the Right Kind in mid-2022.

Table 2: Project stakeholders interviewed

Categories	Respondents
Implementers and Partners	WorldFish, BRAC, and TMSS key national and sub-national level program personnel, who are involved in IDEA: • Program management and monitoring WF (3) NGOs (3) • Staff responsible for activities related to the impact pathways: technical support for productivity (3), business development and marketing (1), nutrition (4), training and outreach activities (of LSPs and field staff (1), women's empowerment (3). • Staff responsible for local coordination (2)
Value chain actors	• Input level market actors- Monica Hatchery, Mega Feed (4) • Output level market actors - Bengal Meat, Apon Wellbeing (5)
Facilitators	• Local Department of Fisheries (DoF) (1)
Credit partner	• Bank Asia (1)
Digital partner	• The Right Kind (1)
Business training partner	• LightCastle (2)
Government	• District Fisheries Officer (1)
Funders	• Program Officers from Bill & Melinda Gates Foundation (2)
Small-scale and medium-scale aquaculture HHs	• Farmers directly benefitting from the program: men and women • Farmers indirectly benefitting from the program: men and women • Farmers from control areas: men and women

N.B. Numbers in brackets refer to the number of individuals interviewed in each category

2.3.4 Selection of areas for field visits.

The interviews with project management (WorldFish and NGO) and partners were conducted with reference to the whole project and its implementation area. For in-person discussions with farmers it was necessary to select districts to visit. We considered four districts from two divisions as our study areas - Rangpur, Naogon, Natore, and Rajshahi districts. A total of 10 unions of 9 upazilla[4] from these four districts were covered during data collection. As the overall evaluation study is randomized at union level, we selected 8 unions from treatment and 2 unions from control areas (See

[4] Upazila(sub-districts) are functioning as a sub-unit of a district. Rural upazilas are comprised of several union (very root level of administrative service of local government). This study is also randomized at union levels.

Table *3*3). The purpose of incorporating the farmers of both treatment and control was to capture the short-term effects of the project, which will provide evidence of the impacts in the short run and detect if there is any overlapping or spillovers of the project in control areas.

Table 3: Study Areas

Division	District	Upazilla	T1 Unions	T2 Unions	Control Unions
Rajshahi	Rajshahi	Durgapur	Pananagar		
		Baghmara		Auchpara	
		Puthia			Bhalukgachi
	Natore	Natore Sadar	Kafuria		
	Naogon	Manda		Bahrson	
Rangpur	Rangpur	Rangpur Sadar		Chandanpat	
		Pirgacha		Pirgacha	
		Pirganj	Chaitrakul		Chatra
		Kaunia	Kaunia Balapara		

2.3.5 Selection of focus group participants

Focus group discussion participants were invited according to specific criteria which allowed the exploration of perspectives from farmers in different wealth categories and from men and women. Following WorldFish's definition[5] of small-scale farmers, the study team selected farmers for each group. Actual participation in the FGDs was based on availability. The initial plan was to hold four focus group discussions at each of the eight intervention sites, one for small scale aquaculture farmers, one for medium scale farmers, and two separate gender and nutrition focus groups for men and women from aquaculture households, particularly those with young children. However, in some locations in Rangpur, the number of participating farmers in the small and medium categories was very small so they were combined in the same focus group, creating a small/medium farmers category. For sites in the control areas, the FGDs combined discussion on aquaculture, gender and nutrition and were held separately with men and women from smallholder households.

The study team aimed to include at least five farmers and at most nine farmers for each group. The average group size was 6.7. Table 4 shows the distribution of the types of FGDs and the categories of respondents. The study team conducted a total of 36 FGDs, 32 from intervention sites and 4 from control sites. A total of 242 farmers participated in the FGDs, among whom 108 were female and 134 were male farmers. All the FGDs were conducted between 15th May 2022 and 29th May 2022.

Table 4: Distribution of FGDs across different types of farmer groups and farmer selection criteria

+	Rangpur		Rajshahi		Farmers Selection Criteria
	WF	**BRAC**	**WF**	**TMSS**	
Aquaculture –small-scale farmers	1	1	3	2	Farmers having operable ponds and land under 2 hectares
Aquaculture – medium-scale farmer	1	1	1	2	Farmers who own more than 2 hectares of land and pond combined

[5]According to WF's definition, farmers who own less than 2 hectares of land and pond (combined) are considered as small-scale aquaculture farmers.

+	Rangpur		Rajshahi		Farmers Selection Criteria
Aquaculture –small & medium mixed	2	2	0	0	Small and Medium Scale Farmers combined
Nutrition and gender-male farmers	2	2	2	2	Male farmers only and at least 1 or 2 male farmers from households with children < 3 years of age
Nutrition and gender-female farmers	2	2	2	2	Female farmers only and at least 1 or 2 female farmers from households with children < 3 years of age and at least 1 or 2 non-IDEA project women from households with children < 3 years
	Control		**Control**		
Aquaculture, nutrition & gender-control male farmers	1		1		Male farmers only, from households with less than 2 ha operable pond and land area (combined) and adding at least 1 or two male farmers from households with children < 3 years
Aquaculture, nutrition & gender-control female farmers	1		1		Female farmers only, from households with less than 2 ha operable pond and land area (combined) and adding at least 1 or two female farmers from households with children < 3 years

Some common topics were discussed across all the focus groups, but questions related to productivity enhancement (outcome 1) were particularly addressed by the aquaculture mixed groups, while the gender and nutrition FGDs concentrated more on nutritional messaging, behavioral change and women's empowerment

Table 5: Topics discussed in the different focus groups.

		Focus Group Type and participants				
Out-come	**Themes**	**Aquaculture mixed**	**Gender nutrition F**	**Gender nutrition M**	**Control M**	**Control F**
	Farmers involvement in IDEA project					
1	Aquaculture practices					
1	Access to inputs (seed/feed)					
1, 5	Access to credit					
1-5	Access to information & advice including digital					
1-5	Training received					
2	Market linkages					
3	Farmers/LSP relationship					
4	Fish consumption					
4	Nutritional practices					
5	Women's participation in aquaculture & decision making					
5	Women's access and control of productive assets					
5	Gender norms and behavioral change					
	Future ambitions					

To capture farmer knowledge, attitude, and practices of “good aquaculture” which were promoted in the training sessions by WorldFish, BRAC, and TMSS, quantitative data was collected from individual farmers at the end of the FGDs. A total of 54 farmers (male and female) from treatment and control areas were interviewed. A set of 22 indicators of Good Aquaculture Practice (GAP) was derived from WorldFish-provided video lessons, covering pond management, feeding practices, fingerlings stocking, transportation, and cultivation of small indigenous species (SiS), etc. Farmers were asked whether they knew about these practices prior to the training and from where they got the information, and whether they had adopted them or not. Farmers were asked additional questions on which fish species they cultivate, annual turnover from aquaculture, source of fingerlings, steps taken to cultivate SiS varieties, and farmers feed management. Questions were asked to farmers both in the T1 and T2 areas and in the control areas.

3. Implementation process

3.1 Contextual factors influencing implementation

3.1.1 COVID 19 impact on program implementation

As an external factor beyond the project’s control, COVID was recognized as the major challenge to project implementation cited by all project participants consulted in the process evaluation:

> *“Compared to COVID, there’s nothing that even comes close in significance” — (WF2).*
>
> *“Our biggest challenge was ‘Corona’. We would do the job more smoothly, nicely if there was no Corona. It was a natural calamity. if there was no Corona, we could have made the work more fruitful …“— [NGO 1.1]*

COVID affected the project in two waves, the first from March 2020, when field work was halted for 3-4 months, but then was able to continue with modifications until March 2021. However, COVID remerged in April 2021 and a lockdown was imposed which continued until September 2021. WF and NGO managers explained how COVID restrictions on movement had hampered progress on targets, interrupted training and extension activities, affected the work of the NGOs and delayed expanding partnerships with the private sector. (WF1; WF3). It affected the ability to motivate the LSPs and reduced the frequency of interaction with farmers that was planned at the beginning of the program (WF9).

> *“Actually, it slowed the pace of the project. A lot of activities had been planned to complete by mid-2020 or early 2021 but we could not complete [them] due to COVID. We are trying to complete those activities, we have made some adjustments, some activities that were not planned previously … We have a very good response from people engaged on that.” — (WF6 Feb 2022)*

WF staff from Dhaka were not able to travel to the project field locations, although field-based staff, both from WF and the NGOs were able to carry on some activities. WF maintained regular interaction with NGO partners online.

3.1.2 Effect of COVID on local service providers (LSPs) selection, training and activities.

The restrictions on travel and on gatherings of people particularly affected the planned training programs. These were intended to be delivered in-person in residential training (WP7.2).

> *"The training that we have always prioritized for our LSPs here is basically residential training. By this, we try to create a sense of excitement. You stay there… with more LSPs. You will learn a lot from what you know… unfortunately, because of COVID, we have taken another approach" WF7.2*

The initial impetus of LSP selection was affected by the delay in follow-up, which affected the LSP's motivation. However, WF communicated frequently with the LSPs by mobile phone, providing information and advice.

In mid-2020, following some easing of the restrictions, the project took a different approach to training. Modifications included convening small groups of LSPs in the field, observing social distancing, and connecting them online to experts conducting the training. (WF7.1, WF 7.2).

At this time NGOs staff based in the project areas were able to continue selection of LSPs and a few of them conducted training of farmers, maintaining social distance and providing masks to the farmers. However, rather than training farmers in groups of 25 as originally planned, this was modified to training in smaller groups.

> *"… when the situation became a bit normal then with WF's and BRAC's combined concern, 10-12 people remained per batch, not more … and following the proper hygiene rules … we conducted training. Due to this, last year [2020] the number. of batches in our training increased much more, [we gave training to] about four hundred (425) batches. [NGO 1.1*

There were some modifications to NGO's workplans and targets and a 3-month contract extension to the first phase of their work. Both NGOs completed their phase one activities by December 2020.

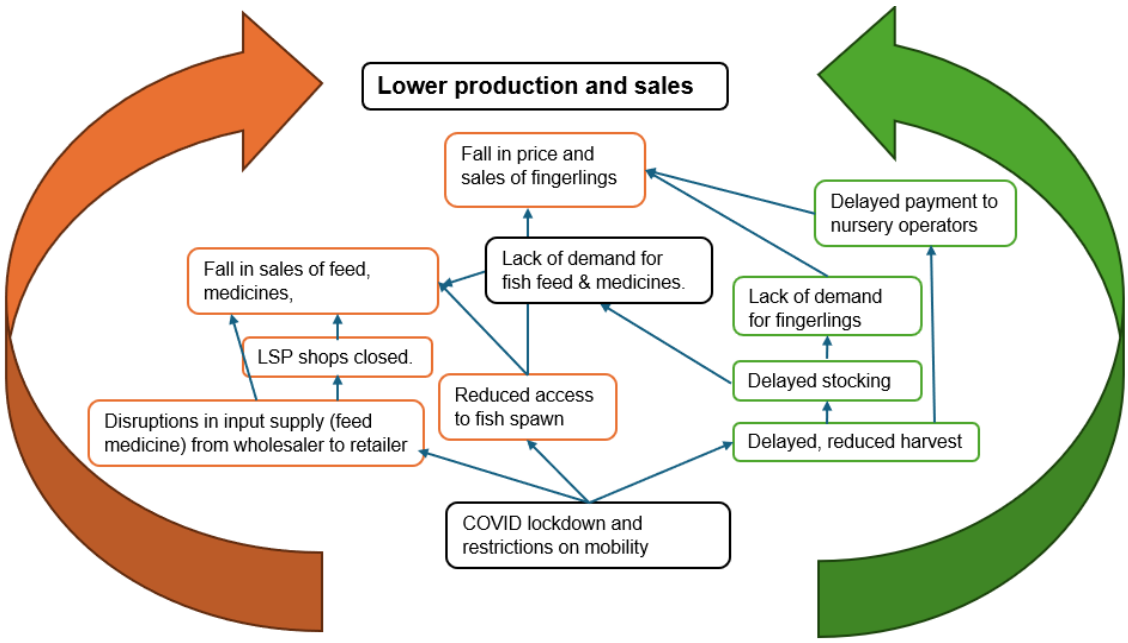
The second phase of the NGO work envisaged completion of LSP selection and training by June 2021, but as COVID re-emerged from April 2021 and a lockdown imposed, they were faced with a further time lag and were unable to roll out the training until the situation eased in August/September 2021 (NGO 1.4). Building on experience with use of digital media, more activities were arranged online and communicated with LSPs through a digital platform and WhatsApp. Some of the NGO activities at village level continued with modifications. (NGO 2.4).

> *"To address the COVID challenges, we kept continuing our activities by building awareness through information dissemination, influencing them to wear a mask, and distributing hand sanitizer among the people at the field level. When we, the project staff, went to a field visit, we were careful enough and tried to maintain social distancing, wear a mask, and interact with LSPs/ small-holder fish farmers. — (NGO 2.1)*

WorldFish also expanded the use of digital media in connecting with LSPs and farmers, including local TV, SMS, and online live sessions with farmers ([WF8)

The effects of COVID on LSPs' businesses were variable – creating more difficulties for dealers or traders with retail shops in towns that were generally closed, than for village-based nursery owners selling to individuals from their own premises. Lockdown restrictions were less strictly observed in the villages. Individual aquaculture farmers were able to move to attend to their ponds, but not to gather in groups. Commercial farmers were more affected by COVID restrictions than smallholder farmers. LSPs reported a fall in sales of all aquaculture inputs (figure 1) as farmers delayed sales and restocking. Marketing of fish faced some restrictions and some farmers suffered losses from a fall in market prices. This improved towards the end of 2021 (WF7.2), when, with increased movement depending on location, farmers were able to restock their ponds.

Figure 4: Effect of COVID on aquaculture farmers and businesses (Source: Compiled from responses in the LSP Pre-Baseline phone survey October 2020. N=42}



3.1.3 Effect of COVID on nutritional training.

In terms of nutritional training and awareness, WorldFish was working with NGO partners and their frontline health workers in rural areas. In January and February 2020, before COVID restrictions, WorldFish together with BRAC and TMSS completed nutrition training-of-trainers who would in turn train groups of community health workers. However, after COVID emerged, village people were not welcoming outsiders and for about two and a half months, the NGO health workers "were just at home". (WF8).

> *… the COVID situation in Bangladesh became worse at the beginning of 2021. We went through lockdown, and we were unable to make any movement. So … we could not do the nutrition programs earlier this year nor could we proceed at pace even if we tried. Now, as the situation of Bangladesh is getting normal, we have resumed our nutrition programs. — (NGO 2.3 Aug 2021)*

Although efforts were made in online information sharing, the frontline health workers viewed this as less effective than in-person interaction and demonstration, in fostering understanding and encouraging behavior change. (WF8)

When the situation improved, the nutrition work resumed, with staff avoiding public gatherings and using protective equipment so they could continue field activities. Home visits, small group meetings and visits to clinics were possible, but planned events like the fish fair and recipe contest were difficult to arrange because they were usually held in school premises, which were closed at that time.

3.1.4 COVID and private sector partnerships

COVID limited the extent to which WF could expand the range of partnerships in the project, rather focusing on the key partners essential to achieve its aims:

> *"[COVID] really hampered much of our work, because initially we had targeted [establishing] partnerships with many other private sector [actors], so now, ... we are really thinking it's better to concentrate on the work we have done already, so we can finish this nicely, instead of going for a new contract with new private sector [partners]." — (WF3 2/2022)*

Private sector partners involved in training provision also experienced issues with COVID. The contract with Light Castle for business training was initially to run three batches of training, assess the results and depending on the impact on the lives of the entrepreneurs, a decision would be made on scaling up. The training was completed, but because of COVID-related delays, the time was extended from a 9-month to 21-month period. At this point, the project was not in a position to promote further scaling, despite some evidence of positive results. (BT1.1).

Initial work by Right Kind in developing their digital platform included meetings with fish farmers to understand their mobile phone access, engagement with social media etc. Since they could not explore these issues in group meetings they took a household approach.

> *… we went to the farmer because we wanted to make sure that we got the genuine farmers, not anyone with fake identity. Our field staff went to the field to look at farmers' usage patterns and identify genuine farmers to sign up to the digital platform. — (DG)*

Credit extension to LSPs and aquaculture farmers was disrupted during COVID. Bank Asia, TMSS and BRAC had microfinance credit agents in the field whose mobility was severely restricted during lockdowns. Bank Asia reported that they had to stop financial literacy training and mass gatherings, but once the lockdowns had been lifted, they were able to restart these literacy sessions after following due social distancing protocols.

"Once the restrictions were a little relaxed, we started our financial literacy program, we distributed the safety materials to our customers like- face mask, sanitizer and other things. We took that opportunity and tried to scope out rural locations while maintaining the health guidelines but the rural population, they are not really bothered about social distancing, whenever we call them for a literacy event, they all joined." F1 Bank Asia.

In some cases, there were some unexpected advantages. The two private sector partners selling fish in their outlets (Apon in garment factory shops and Bengal meat in retail outlets) both commented on the advantages expressed by consumers of buying a high-quality product from a shop rather than visiting the wet market.

> *I think we became more relevant after Covid, for factory owners and for our customers. If they can get perishable items from an inside factory shop, they need not visit the wet market. So, COVID did not negatively affect us; rather we used the opportunity to bring more customers for our perishable channel. — (PS 1.2)*

> *… a positive thing is that we go with a safe and quality product in the pandemic situation and the consumers are very happy with this fish, ok, so at both ends, there is challenge and opportunity — (PS2).*

3.1.5 Regional context

An observation raised by one of the NGOs, concerned the relative development of aquaculture in the north compared to the south of Bangladesh. At the time of the project design, agriculture rather than aquaculture was the preferred primary source of income in the north. Households may have had multiple ponds but were often only using one pond for home consumption while the other ponds lay fallow.

> *"So, if you compare with the southern part of Bangladesh, a lot of rivers and fish farming activities are there, and lot of businesses are there. But, in the northern side, people are mainly focusing on agriculture, but not in the aquaculture domain. So, in early 2017/18, when we were writing the proposal and we were trying to design this intervention, at that time we were literally searching for potential ponds where they will do the fish farming. So, that is the geographical challenge we found." — (NGO 1.1).*

This applies to Rajshahi and Rangpur divisions covered by the project. WF in their project proposal[6] recognized this 'untapped potential' for improving productivity of smallholder fish production with nutrition sensitive approaches and improving access to aquaculture inputs.

3.2 Integrity of design: treatment (T1 & T2 v control areas) and coverage.

Interviews with WorldFish staff, NGO and other partners showed the extent to which there was communication and understanding of the evaluation design, specifically the distinction between the designated intervention unions (T1 and T2 for WF and NGOs respectively) and the control unions. WF explained these distinctions to their staff and partners, including private sector partners, although not all of the latter knew the details, just that they were guided to focus on specific unions.

> *When we construct our partnership, or we work with any of our partners or stakeholders in the field, we strictly say that these are the T1, T2, these are the open [areas], we need to work here for a research objective and we need to make sure there is no spillover. But the thing is, there are no physical barriers in such locations … and people are moving independently and frequently to these unions. — (WF6)*

[6] Grant Proposal Narrative, WorldFish. 31/07/2018

Individually, the majority of staff and partners had a good understanding of intervention areas, and all were clear they should not implement their programs in the control areas, even though some were seen as having the highest potential.

> *WorldFish identified and provided us the control unions, so we don't work in the control unions … — (NGO1.4)*

> *WorldFish informed us, and they gave a very good brief about that, and they described their control areas and other project areas. We had a very clear understanding about it. — (F1)*

WorldFish, BRAC and TMSS selected LSPs from the intervention areas, to work only in those areas, while private sector companies – whether purchasing fish, or conducting business training, digital literacy etc. – were directed to the intervention areas and advised to avoid the control areas. These messages were an important part of the LSP training and partner briefing.

When asked about specific measures to prevent spillovers to the control areas, the responses were that field staff and LSPs were informed and they were confident that the LSPs were observing this restriction. Some NGO staff mentioned that they tried to monitor this by checking data from field facilitators and that this in turn, is checked by the monitoring team of WF. (NGO 2.2; WF 3.1). However, several emphasized that complete enforcement was not feasible:

> *.. LSPs are businessman and they are not our dedicated staff and their business centre [may be] located in the place where clients can come from anywhere … whenever we select the LSPs, we have their client list, most of them are from the LSP's union or nearby locality. — (NGO1.3)*

If the initially selected LSPs were subsequently found to be misaligned with the treatment areas, as happened in a small number of cases, they were not included in the training program.

Trained farmers from the intervention areas may visit other communities, including control areas, interact with relatives and share advice and social media etc. Spill over from digital content and mass media advocacy campaigns is potentially more of an issue.

> *if you think about the messages, these are not IDEA project-specific, [they are] very general messages, right? Like eating fish or small fish are nutrient rich … it is very common, and they can take it from anywhere. So, we tried to control them, sometimes it is not possible. We can take lot of [action] to control but sometimes it (spillover) can happen. — (NGO 1.3)*

A further safeguard was necessary when the project extended its activities with large private companies in open areas. In one case, the company had made initial plans and developed contacts to work in certain areas, including some of the T1, T2 and control areas, but when informed by WF about the restrictions, they agreed to change their selection.

> *'...we selected the places where we saw good business opportunities; after that they showed [us] these T1, T2 and other restricted areas and said it is not possible to work in our desired location.' — (PS 4.1)*

The company complied but found it unfortunate as they had identified active and enthusiastic farmers in those restricted areas and had to work hard to generate interest in the open areas.

A potential challenge to the integrity of design is any overlap with other similar programs in the treatment or control areas. The Department of Fisheries was running the Union Fisheries Project (NATP-2) which mobilizes Local Extension Agents for Fisheries (LEAF). LEAF are operating in the IDEA project areas – both intervention and control. The project offered training for women LEAF but only from the intervention areas. The Fisheries Department's offices are at Upazila level, "*so, any fish farmer or LSP comes to the upazila office for any support or help, they provide them the help, they provide them the counselling; they are not segregated to the union" (NGO 1.4)*. The government health department or nutrition department are providing services to the community clinic and Family Planning Welfare Centres at Union level. Again, these are not segregated in control or target areas.

BRAC's own Health, nutrition and population program (HNPP) operates generally in the district. Messaging on dietary diversity in pregnancy is part of the core content (NGO 1.3). but additional specific nutritional messaging was directed only to the IDEA intervention areas (NGO 1.1). Similarly, staff from TMSS Health Care Centers have been included in nutritional programming but only from Centers within their intervention area. (NGO2.3)

The government also has long established health programs disseminating similar information. Where actions were under IDEA partners control, steps were taken to avoid involving control areas, e.g. BRAC's nutrition orientation for government community health workers was directed only to those from the intervention areas and some open unions. (NGO1.1)

The project took considerable steps to communicate the evaluation design and prevent spillover, and this appears to have been achieved in terms of the operations of project partners and in collaboration with government agencies.

3.3 Challenges to implementation faced by WF, NGOs and private sector partners.

In addition to the major external challenge of COVID, a range of project challenges were reported, some associated with staffing, management and resources and some directly related to the implementation of the program activities. Challenges relating to the performance of the different program components and implications for outcomes are discussed in the outcome sections of this report.

3.3.1 Staff resources and turnover

The initial challenge after the signing of the project in September 2018 was recruitment of WF staff and the project startup. It took time to complete the lengthy recruitment processes for team members and managers, some of whom were not in place until almost a year after the project started (WF2). The first project manager was brought in as a consultant while recruitment was taking place and field offices were being established. Staff recruitment was also a challenge for the NGOs, both specialist and field staff. (NGO1.1)

Staff turnover was another challenge, both for the WF team and for the NGOs (WF7.2). There is demand in Bangladesh for experienced team leaders and field staff for projects run by NGOs and international organizations. This was particularly relevant for staff on fixed term project linked contracts about to go into their final year and interested in new opportunities. Furthermore, this demand creates a competitive salary environment, and organizations can lose staff to employers whose offer is more attractive.

> *'… in the last year, out of the top five performers we've probably lost four of them; it's that bad. Because we're just not competitive, and … Bangladesh is in a hardship location … so, you should be compensating people for that ……* — *(WF1)*

Some of the NGO respondents felt they needed more staff to cover the work in the second phase of their contracts, as they were being encouraged to scale out the program. In phase two, the emphasis was less on direct intervention by project recruited staff and more on integrating activities into the core NGO programs and expanding LSP recruitment. For BRAC, in the second phase (from 2021) the project activities involved the mainstream program, rather than an increase in project-employed staff. During COVID, BRAC staff worked a lot along with the government in mask distribution, sample collection, referral of patients etc., so had limited time to focus on location specific project work.

Most of the private sector partners either recruited new staff or consultants, designated existing staff to be responsible for implementing work with WorldFish, supported by their organizations and, in some cases, field staff. In the latter case, this was challenging, given the ambitious coverage and targets, and the need to continue with normal company business.

The digital service provider, The Right Kind faced challenges due to their limited numbers of field staff for the task of developing a digital platform for users in the two project divisions. They were not involved from the beginning of the project but were brought in to replace the initial digital company as no progress was being made. Staff and financial limitations meant they could only visit a farmer's household once to orient them on the platform, although to familiarize users and encourage regular use of the platform requires multiple visits.

3.3.2 Project funding

WF officials reported availability of adequate resources for the components as initially planned. However, delays because of the pandemic, financing staff during lockdowns, or adjustments made through learning from experience, created additional demands, which were difficult to meet because of limited resources. WF staff were conscious of additional useful work that could be achieved with additional budget, in particular, implementing at scale innovative experiments like forum theatres and community interactive games. An example was the board game LUDO, used to explore gender issues within the household such as the disadvantages of child marriage and advantages of women selling fish.

> *"If we could print this LUDO in huge numbers, and circulate it within the communities, that could be really effective material for gender transformative approach. But because of money, we couldn't do that. … [with] the forum theatre,*

we are reaching 60 villages with one single show. But the way the team leaders and I [are] thinking, if we had two shows in each village that would be more effective for the villages to realize the importance of gender. So, these are the resource related challenges we have." — (WF4).

Several of the NGOs and private sector partners mentioned budget limitations which had implications for staffing and coverage and the production of technical content for communications activities. The NGOs were tasked with recruiting a large increase in the number LSPs in their second year on the project and faced challenges of their own staff availability to implement this.

WF management noted some complementarity between funding sources. The IDEA project benefited from some outputs from other projects, for example the Two Degree Initiative (2DI) under CCAFS and genetic improvement of carp under the WorldFish Carp Genetic Improvement Program (CGIP). The latter, which was piloting the introduction of hybrid species of carp (Catla catla, Labeo rohita and Hypophthalmichthys molitrix), conducted successful trials and worked towards commercialization and functioned as a supplementary component within the IDEA project.

There was no reallocation of resources between project components in Bangladesh and Nigeria, 'the two were managed quite separately'. (WF1)

There are several examples of how the program benefited from the existing programs and facilities within the two partner NGOs. Examples are the BRAC microfinance credit programs and credit agents, and BRAC fisheries agents who run hatcheries, who were introduced to LSPs during LSP training. As part of the nutrition and health services, TMSS community health workers referred farmers in need of health care support to TMSS community level Health Care Centres (THCC). TMSS has also leveraged their microfinance presence in these areas to provide credit support and loan facilities to project farmers.

3.3.3 Project scale and sustainability

WorldFish faced the challenge of working at scale, and in partnership with NGOs who were used to a more intensive, location specific approach.

"… you know this is not the traditional kind of project that we are implementing because here always, we are looking at the intervention[s] that we are designing; is that intervention actually scalable, can we reach thousands and thousands of farmers with those interventions, so [from] that perspective we found a big problem with many of the staff at the beginning because they started designing something ... from the traditional concept of a target household-based approach. So, it was really, really challenging to make them understand ... we told them always to think about what will be next … something which will actually reach to the farmers even after the end of the project. So, this was really a challenging task, but now I think everyone is on the same track, so we can think [about] achieving the targets of the project. — (WF 3)

Similarly, to ensure wide scale coverage and sustainability it was necessary to recruit and train a large number of LSPs, including female LSPs.

> *We had sort of targeted that [LSP recruitment] as the linchpin essentially of sustainability, so these were existing and potentially new small businesses who were essentially agro dealers and they would help to connect farmers to inputs and offtake because they would be a sustainable business. — [D1]*

The challenge was to establish channels that could effectively implement the nutrition and gender transformative components. The role of the female LSPs in both treatment areas, particularly in the WF arm was important.

> *I think one of the major challenges was recruiting, specifically women LSPs. I think we had said at the outset that World Fish would be able to recruit more female LSPs. I think they ended up with very few — [D1]*

Both NGOs found it challenging to reach the target of 500 LSPs each, specified in their second contract. Furthermore, the target of 5% female LSPs was difficult to realize.

> *So we are finding some challenges - to find 500 LSPs [and] actually get them. We are able to find [them] but it's actually time-consuming. — (NGO 1.4)*

> *[my target is for] 5% of the total 500 LSPs, that is 25 LSPs [to be] female. … In fact, the challenges that women face in aquaculture are very high, as we can see from the [low] number of [women] LSPs. — (NGO 2.2.)*

3.3.4 Project coordination and synchronization

A large complex multilocation project such as IDEA brings challenges of coordination and synchronization among the activities of different partners and programme components. Mobilizing LSPs, farmers, local officials for training and for meetings at the appointed time required some effort.

> *As we work with people, sometimes we face difficulties to match the schedule, like for a training I need to bring 25 people staffs, Upazilla Fisheries Officer, so it is really difficult to bring them under one roof in a same time; some people promise us that they will come but they don't, 2-3 persons miss that, — (PS3)*

It was recognized that the scale of the planned coverage posed challenges for NGO's planning. (WF7.4)

3.3.5 Market challenges

Apart from specific business development issues, the two private sector partners buying fish for processing and sale in garment factories and retail shops, mentioned the market situation, the supply chain and its potential risks.

> *"…The most challenging part is connectivity [in] the supply chain. We have almost 17 years' experience and we always suffer from this connectivity, and that's why if we reach the connectivity level in a way that the farmer can supply as far our demand, that will be the biggest milestone achievement… " — (P2)*

They tried to address these challenges by consulting with WF and setting up fish preservation units, different processing centers for various varieties of fish and channels for transportation. Business also faced price fluctuations in the market, particularly inflation in food and feed costs after COVID of around 25 to 30%. It was difficult to arrive

at a price that was both profitable for the market partners, based on market demand, and the project farmers selling the fish.

> *"… we are struggling to buy fish from World fish farmer groups. We plan everything and then fail because of the price point. So far, we didn't find any farmer, farmer group or farmer group leader that can match the price point that our customer group have from their nearby markets, so that is a big challenge." — [P1.2*

Another challenge for the companies selling fish, was to persuade the average customer who generally purchased fish from the wet markets or roadside sellers, to invest in the quality and hygiene of the fish that the companies were selling in their outlets. They found customers to be very price sensitive. The companies tried to address this issue by reaching out to potential customers through targeted advertising, special offers and online campaigns.

> *"I think one of the main challenges was to bring the customers … to the shop to buy perishable items, they are buying it from the very early morning in the wet market or from the roadside shop after their work because they didn't care about the quality. So we had to convert that customer to our customer. — (P1)*

A further challenge, specific to the company attempting to establish shops within garment factories, was to convince factory owners to permit the operation of these shops as factory owners had concerns about adherence to industry compliances.

In addition, seasonality in fish supply was challenging for the newer players in the market, who at times could not source the products they wanted within a reasonable time. [P2]

3.4 Factors facilitating implementation

In discussing external and internal factors which enabled effective implementation of the project, WF's experience in running previous projects was cited by both WF and the funder.

> *"it's not because we had it easy, it's because we have been doing this kind of job for a long time in Bangladesh. So, all the pieces were in place for this project to run smoothly. … We had the right connections, interactions with the government, we had the local experts that understand what needs to be done and how to interact with other stakeholders [and] with the partners. …. These are the resources not of the project itself, but what WF built over the years in Bangladesh." — (WF2)*

WorldFish's track record, their good relationship with the government, their analysis of the policy context and the opportunities for advocacy and action, were noted, as was the combination of WF's genetics capacity and agreement of government to carry out those programs and get fish into farmers' fields. WF's partnerships at national and local level were also seen as significant. As previously mentioned, the collaboration with the two NGO's BRAC and TMSS was advantageous in reaching grass roots level. The project integrated its approaches with the NGO's activities, facilities and staff. Partnership with strong private sector players was a factor in working towards sustainability.

Other factors mentioned by project partners were the support from ‘champions’ in the form of dedicated staff and a committee member and other partners in the fish value chains.

3.5 Adjustments to planned implementation strategy: targets, delivery, content and reach.

Adjustments to the planned interventions and elements of the project design came about as a result of operational experience, and as a response to the restrictions and impact of COVID 19 pandemic. The latter had an impact on the timing and progress of farmer training and interaction with communities, resulting in the need to review the initial ambitious targets for the numbers of farmers to be reached. There was a process of reassessment of what could be realistically achieved with the available resources within the remaining project period, which was agreed with the funder.

3.5.1 Changes to LSP recruitment and training approach

The role of LSPs was central to the project’s implementation strategy and the ‘linchpin of sustainability’. LSPs were existing, or potentially new small agro dealers, operating as sustainable businesses, who would connect farmers to a range of inputs and provide training and information on production and management, nutrition and women’s empowerment.

In phase 1, (2019-20) both WorldFish and the NGOs recruited LSPs and conducted five days of training for them. In the first phase there were 20 LSPs recruited by each NGO and 113 LSPs by WorldFish. The LSPs, one per union, each formed four groups of 25 farmers, reaching a total of 2,000 farmers. The memorandum of understanding LSPs signed with WorldFish specified that in forming farmers’ groups the LSPs would include male and female farmers and that in addition to introducing new technologies and innovations, they would share information on nutrition, dietary diversity and women empowerment.

In phase 2, in 2021, there was a concerted effort to increase the overall number of LSPs, in order to extend coverage. There were some modifications to the LSP training and outreach mode in response to the preference of trainees and the need to accommodate training for larger numbers of LSPs.

> *There was some … feedback on the five-day training - can it be shortened or be [made] more easily adoptable for LSPs? Because our LSPs are not so educated, the information is too much … it’s all new to them [including] nutrition and gender. So, it was changed; we shortened the training period to four days … so that the LSPs can grasp and can take from the training. — (NGO 1.4)*

The detail in the training content was also reduced. The main messages of the training modules were captured in banners and a shorter version of the training guide was produced to which the trainers could repeatedly refer.

WorldFish reduced the LSP residential training to three days, and two days’ training was provided for the companies in the open areas.

The revised arrangement was that four LSPs were recruited per union, each LSP forming one group of 20-25 farmers. Although the farmer coverage per union was the same, the concept differed in that the farmer groups were seen as 'practice groups', including existing customers of the LSP. The idea was that after training by the LSP, farmers would apply their knowledge within the group and reach out to share it with neighboring farmers. The practice group covered farmers from a maximum of three adjacent villages. (WF5). Each NGO had a target to recruit 500 LSPs, and WF a similar number. These 1500 LSPs would train approximately 30,000 farmers directly, while other farmers in their locality would be reached indirectly through the trained farmers from the groups. Recruitment of this number of LSPs in a relatively small area was quite a challenge and time-consuming but was intended to have a greater impact.

> *…the reach is actually very much increased and through them and the training we hope that this directly will impact the productivity and will increase income at farmer level as well as household level. — (NGO 1.4)*

WF had a revised target of reaching out to 450,000 farmers by the end of the project. Assuming each trained farmer reached 10 others, this would make a total of 300,000 farmers. This accounts for WF's development of a supplementary strategy of working directly with private sector companies and their agents as LSPs in the 'open' areas to expand the numbers.

The final number of LSPs recruited was 2,120 of which 598 (28.2%), were recruited by WorldFish, 488 (23%) by BRAC and 521 (24.5%) by TMSS. 513 (24.2%) were recruited by private sector partners to operate in 'open' areas (i.e. neither control or T1 or T2 areas). There were 30 female LSPs recruited.

Monitoring the reach of the trained farmers has been a challenge for WF. WF was able to directly monitor about 50,000 farmers from the demo groups, but the reach and impact of members of these farmer groups on other farmers was difficult to monitor. They tried to address this issue by conducting a series of performance and household surveys between 2021 and 2022.

3.5.2 Private sector role in implementation

One of the most important developments in the project's strategy was the increased importance given to the role of large private sector companies. The role of private sector input suppliers was part of the original project design, but initially it relied on the recruitment, by WorldFish and the NGOs, of relatively small-scale LSPs, rather than large-scale companies. In 2021, the project introduced a third model – a pure private sector model – and contracted two large feed companies and two hatcheries in an effort to operate at a wider scale. The pure private sector model became a third type of approach in addition to the continuing T1 LSP model and the T2 NGO hybrid model of implementation. The private companies were directed to work in open zones, not the T1, T2 or control areas, so as not to conflict with the evaluation study design.

> *… We've still got the hybrid system we talked about, so we're doing some of the work along with BRAC & TMSS. I think it was a recognition that it's a step in the right direction, but we need to make it bigger, and we need to have a more diverse network and partner with the private sector. — (WF1).*

WorldFish recognized the different strengths of the different implementation partners. The involvement of the private sector related to the challenge to deliver the project at scale, whereas the approach of NGO partners was to engage more intensively at household and community level, integrating gender, nutrition and other components.

> *NGOs like BRAC and TMSS, have familiarity with those kinds of mobilization and other things which these feed companies do not have, but [the companies] have a very strong supply chain network. In the case of the feed companies, they have strong dealer networks and in the case of the hatcheries they have a very good seed network. We are actually trying to use those networks to reach the farmers with group messages. ⎯⎯ (WF 3)*

WorldFish had experience of working with private companies in a previous project (USAID Bangladesh Aquaculture Project) which was successful in some cases, although not all. This suggested that if good partners can be found among the feed companies or hatcheries, they could perform well.

The NGO field staff were used to a household-based intensive and direct interactive development model in their own organizations. Recruiting and working with LSPs was a new approach for them, so initial recruitment of LSPs was slow because they were uncertain how they would work with them. Post COVID, there was greater understanding and they selected 500 LSPs within three or four months and were capable of greater coverage. (WF3)

The project provided training for private companies similar to the other models, including training of trainers, initially for their program staff and then for their dealers. The dealers then started organizing small farmer groups for training. In this sense it was similar to the NGO model but involved company staff and their dealers.

A further factor influencing this private sector model was the outcome of research on improved carp varieties (G3 Roho) and the production of seed which became available to farmers for purchase through selected hatcheries in 2020. Disseminating this to farmers required developing a good partnership with hatcheries and supplying them with seed, which they in turn, could disseminate through their seed networks to thousands of farmers.

3.5.3 Changes to the nutritional messaging component.

There were similar adjustments in the nutritional messaging activities. In phase one, BRAC recruited and trained their own project-dedicated community nutrition workers, one for each of the initial 20 unions, while TMSS recruited 20 nutrition volunteers from the selected unions. But in 2021, in phase 2, BRAC changed to training their own community health workers with a one-day orientation on nutrition. TMSS phased out the nutrition volunteers, instead relying on orienting the staff of 92 TMSS Health Clinic Centers which provide health and nutrition awareness to local communities as part of their core work (NGO 2.4).

> *The main strategic change is that we have shifted from [having] dedicated community nutrition workers, to the community health workers of the mainstream staff. …we are working with our existing staff and networks of LSPs and community health workers …so, that will be more cost effective and more*

sustainable. — [NGO1.3]

So, we think that that will be the most sustainable approach, because if BRAC mainstream staff can grasp the message [and] all the knowledge, then they will deliver this beyond this project period. — (NGO 1.4)

This brought the T2 model closer to the T1 approach where nutrition messaging was to be included in the core work of the LSPs rather than employing dedicated staff.

3.5.4 Gender transformative approaches and gender empowerment

The initial project approach emphasized the link between the development of the LSPs, enhanced productivity, improved nutrition and gender empowerment. The LSPs were intended to be instrumental in group formation, technical training in best management practices, facilitating market access for women, nutritional messaging and gender transformative approaches. Together, these would also be the foundation for increasing women's empowerment through greater inclusion in aquaculture, enhanced decision-making power over productive assets, financial empowerment, nutritional knowledge and increased consumption of fish.

Adaptations to implementation were brought about through the experience of LSPs in the field and the challenges they faced in communicating gender-related messages. The difficulties in recruiting female LSPs have been mentioned above. WF officials realized that LSPs were struggling to convey these messages to farmers during training sessions and decided on a different approach in late 2021.

".. at the beginning of the project, we had a plan that the LSPs will be conducting these gender transformative approaches, but we found that the LSPs are really not that capable to conduct the[m]. …So, we had to shift from this idea … Our field people [were] really busy with LSP and farmer selection …so we identified consultants, external people with a gender background, [to] conduct GTA sessions within the communities — (WF4).

Project staff commented on the significance of social norms within communities and the challenges posed to the implementation of gender transformative approaches.

The first thing we are fighting or struggling with [is the] notion that fishing is a men's job, it's not women's job. It's not only in north Bengal but also all over in Bangladesh. It's kind of perceived that fishing is men's job and women should not be there. So, when people have this kind of mindset, it's really challenging to do … things like getting women involved with fishing or aquaculture activities. — (WF4)

NGOs reflected on the challenges faced during mobilization of women farmers under the IDEA project. In their experience, local norms made it difficult to convince women to join farmer groups even if they were engaged in aquaculture activities within their family. The approach taken by the NGOs and WF was to engage in dialogue with the family members, the village elite, and local religious leaders to convince them of the importance of men and women's equality and the importance of women's role in aquaculture. They also observed that women were not confident in their capacity to take part in activities that required them to engage outside their homes, for instance, dealing with market

players for inputs, sale of harvest and seeking and managing finance. BRAC tried to address this issue by providing information to women regarding credit that they could seek through their microfinance wing and leveraging resources from their other programs that focused on women empowerment to build women's esteem.

The gender transformative approach was designed to influence social norms influencing women's participation in aquaculture and social empowerment. The plan was to organize GTA exercises first at the individual household then community level, and then follow with forum theatre but due to COVID related delays, they started with the forum theatre, a type of theatre based on a scenario illustrating an issue facing the community, and then encouraging audience interaction in suggesting options for its resolution. Developed in the 1970s, in Brazil (Boal, 1985), it can change awareness of social relations and practices.

> *"…The benefit of first organizing forum theatre is that the whole community is already aware about the … gender transformative approaches within the community. Then, it would be easy for us to run the individual or household level shows/exercises — (WF4)*

Much of the work was exploratory, seeing how the activities could best be implemented and then adjustied accordingly.

> *There were standard forum theatres that have been done in other places, but we are combining that with soap operas and gathering material from these for forum theatres. So those we called experiments … it's not a scientific design or anything, but a very interesting activity [we are] implementing.*

3.5.5 Changes in targets, coverage and timelines

As highlighted in section 3.1.1, COVID related delays in implementation and adjustments to some of the planned interventions, resulted in the need to review the initial project targets with the funder. It was also recognized that different targets would be associated with different activities according to their specific staff resource and skill requirements,

Toward the end of 2020, the WF project management reflected on the IDEA project experience and their learning from previous projects in terms of reach and impact, and decided to rationalize what they could deliver with the available resources. This resulted in adjustments across the different project years, and some overall changes to targets. The reach of productivity-raising interventions and knowledge sharing (primary outcomes 1 and 3) was reduced from 1 million smallholder households to 450,000. The productivity increase of 50% was retained, but for 315,000 households. The target of 700,000 smallholders adopting improved management practices, quality seed and feed and accessing credit was reduced to 100,000. The target for LSP recruitment to cover the 450,000 households, was 2,292, including 20 women LSPs. The initial plan to achieve a 50% increase in the value of fish and fish-based products sold for I million smallholder farmers (primary outcome 2) was reduced to a 35-50% increase for 315,000 households (out of 450,000 households contacted) who would also have an increased share of market margins. The strategy of forming farmer groups was also modified, with increased reliance on online groups and working through broader networks with the private sector.

> *.. initially, we started with our focus on small size village places like small businesses. Within the past few years as you know, we have also engaged with other feed companies, with hatchery operators and utilizing our own networks … [this] means that whatever information you can share with the private sector partners through the project means that, when we'll be gone, the partners can still read it." — (WF 1)*

The nutrition component initially targeted 2 million households (50% fish farming and 50 % non-fish farming). This was revised to 900,000. The original target of 1 million women, for the women's empowerment component was particularly high. This was reduced to 100,000 women having increased empowerment in decision-making, finance and group membership.

WorldFish staff recognized that implementing a gender transformative approach on the initially planned scale was not feasible, given the limited number of staff with gender expertise. The target was reduced to 100,00 women members of fish farming households to have increased empowerment (instead of the initial 1 million target).

Overall, the view of WorldFish management was that the project had been "*implemented according to plan, more or less; it follows the original design in terms of the components of outcomes, and effective output. … I would say that we followed the same rationale, and … what we have been doing in the field [is] what the project set out to do at the beginning." (WF 2)*

4. Relationships in implementation

4.1 Relationships between WorldFish and NGOs

4.1.1 WorldFish and NGOs motivation for collaboration and expectations

The main rationale for WF to work with NGOs (BRAC and TMSS) was to enhance impact by utilizing their networks and building on their programmes at grass roots level. A clear example cited by WF, is BRAC's ability to spread fish-related nutrition information more widely in the country and internationally.

> *'… we couldn't hope [to] undertake [work] at this scale and reach without plugging into their existing networks … and obviously building on their strengths. … I think it's been a key component of the work. — (WF 1)*

WF mentioned that both their partner NGOs have a strong background in microcredit, in support of village livelihood development, together with skills in social mobilisation to organise microcredit groups. Another factor in the selection was their good private sector links.

> *" … these private sector linkages plus their strong footing in the rural setting of Bangladesh with micro credit, and their experience in working in different livelihood projects and especially some core programs in gender and nutrition, encouraged [us] … to select those NGOs to work with us — (WF3).*

The roles and expectations were set out in a Memorandum of Understanding (MoU) signed with each NGO. These did not change significantly over the course of the project.

The reasons the NGOs were motivated to collaborate with WF on the IDEA project were explored. BRAC mentioned their experience with nutrition related projects, including working with the Bangladesh national program, their field capability and trained staff. They welcomed the opportunity to expand to more geographical areas and activities.

> *'[We are] set up in the field actually, so [we] don't have to recruit newly, … when initially World Fish approached [us], [we] showed interest ... but the first phase was very pilot phase; ... in [the] second phase we are actually expanding". — (NGO 1.4)*

> *[We are] working … in 100 upazila at a time, [in] around 20 districts. We [have] very much capacity and [are] very interested to work in big projects or a big coverage area. — (NGO 1.4)*

NGO representatives were asked whether their expectations of the project had been met so far. They noted that they were able to reach more households in the second phase, but indirectly through the LSPs and government community health workers. The two NGOs were responsible for different divisions and valued each other as counterparts, but it meant that each was restricted to their own area.

WF staff generally considered that good partnerships had been formed, which worked effectively (WF7)

4.1.2 Communication and information sharing

On communication and information sharing, WF explained that they hold monthly meetings with each of the NGOs (and other partners). The partners submit quarterly progress reports according to the agreement in the MOU. Communication is further enhanced through WF staff visits to the NGOs staff in the field.

> *"For each of their activities, they actually sit with me, not only me - for all thematic areas the partner actually takes our feedback or suggestion, and we also try to give them suggestions, and sometimes, we provide training to their staff directly." — (WF4)*

NGOs communicated with WF through monthly meetings in addition to ad hoc calls. The monthly meetings were initially in-person and then over the phone during and after COVID. The meetings allowed both sides to share issues and discuss, including implementation challenges. The NGO's monthly written reports to WF provided information on activities and challenges. The NGOs were positive about the level of supportive feedback from WF and advice in solving problems.

> *'we openly discuss, regarding the situation at the field level. Then we give our presentation, we talk about our weakness, we talk about our strength, demand, then it is decided where we are, how we will overcome any issue.' — (NGO 1.1)*

> *World Fish is very much supportive because if we tell them anything, they respond very quickly and they give the solutions. … there is so much feedback and we can share over the phone anything if arises.* — (NGO 1.4)

4.1.3 Extent and effectiveness of support and advice from WF

In response to a question on WF support or advice for the NGOs during project

implementation, the NGO managers explained that this had been very effective. The presence of WF's local offices in Rajshahi and Bogura had been useful in providing support in terms of materials and resources, including requirements for training sessions (NGO 2.3, NGO 2.4). They indicated interest in acquiring water testing kits which would give their LSPs more confidence in diagnosis and recommendations (NGO 1.1)

The training of NGO staff by WF was done with the participation of their whole IDEA project team including senior management and specialists in aquaculture. 'The whole WF team was with us' (NGO 1.2). WF also supported the NGOs throughout the training of the NGO's LSPs at district-upazila level (NGO 2.4).

For the gender and nutrition components, the NGOs found the WF nutrition and gender specialist helpful in providing the overall orientation and guidelines and supporting training in the field, attending in person where possible, or otherwise online.

NGO staff reported that WF staff monitored their activities and discussed approaches in program implementation and offered advice (NGO 2.3).

> *"Their communication and teamwork with us are very good. Our teamwork [in] this project is very good". — (NGO 2.4)*

WF described the training provided - project orientation training, training of trainers from NGO staff who would then train the LSPs. They reviewed the NGOs proposals submitted and provided feedback, helping to structure the activities, results, outcomes and targets. They provided training on gender and nutrition (WF4) and advice on building marketing linkages between LSPs and private sector partners (WF6). WF liaised with the NGOs to identify participants for business incubation training and for the Couples Workshops, conducted by knowledge partners, who WF hired for these activities. (WF4)

4.2 Relationship between WorldFish and private companies

4.2.1 Private companies' motivation for collaboration and expectations

There is an important distinction between two private companies working with WorldFish in the implementation areas (T1 and T2) and four feed and hatchery companies collaborating in the open areas. In both cases, interviews with these partners indicated consistency between their goals and expectations and those of WF.

From the fist category, the partner company that was running shops in garment factories was interested in collaboration in order to introduce perishable products, including fresh fish, and to make it accessible in their shops for lower income workers and thereby improve their nutrition.

> *"in Bangladesh 43% [of] garment workers are malnourished. … the strategic focus of the company [is on] health, hygiene and nutrition, so that is helping us from an impact point of view as well". — (PS1.2)*

They recognize that high prices and lack of access to credit are the main constraints on consumption of perishable food, such as fruit, meat and fish. Workers mostly rely on potato, rice and lentils. However, increasing awareness about nutrition and consumption behavior can only have an impact if there is convenient and affordable access to fish products.

The way we are creating this is that they can get fish on their premises, and can buy on credit, which they cannot get in any other marketplace ….". — (PS1.1).

The objective of a second partner company, which was sourcing and selling meat products in retail outlets in different districts, was to supply a ready-to-cook, quality fish product to their customers. They recognized that through collaboration with WF they could access quality fish which was a primary requirement and become part of the value chain. By purchasing directly from farmers, they hoped to meet WF's objective of increasing farmers' earning capacity, productivity and profitability.

In the second category, was a hatchery operator who was contacted by WF for possible collaboration based on the quality of their operation. They took the opportunity to work with WF to improve the hatchery's quality and fish varieties. The owner was interested in enhancing their skills and providing good quality fish to farmers, both to improve the business but also as social welfare. (PS3.1)

A fourth commercial partner was a feed company, which joined relatively later in the project (July 2021). In addition to business objectives, they cited their social responsibility and interest in extending the dissemination of technical knowledge at the grassroots level.

"… it also creates social awareness. In the past, we mainly focused on the monetary profit, but now … we are talking about family nutrition in those trainings, there are discussions on women engagement, I mean gender issues. In our country there is problem of gender sensitivity, so we are working on those and trying to deliver these messages. As we are reaching so many people, if at least 10% of them become motivated and increase their production, our sales will also increase … and it will contribute to the national economy and we will be a part of it." — (PS4.1)

All partners had made financial contributions to the initiatives.

4.2.2 Communication, information sharing and support

The private sector companies interact with WF by phone, email and WhatsApp and occasional in-person meetings and field visits and workshops. (PS1.2, PS2.2)

"At the beginning of the project, we had a coordination call … every week to discuss any challenges we are facing. We tried to solve this together" — (PS1.2)

They also report monthly to WF. The companies valued the ability to contact WF with technical questions (e.g., on expiry dates) or problems at any time.

".. the initiative is new, sometimes we face difficulties to understand something, so for this we communicate [with] them regularly and at any time, they always support us. …We do not have any complaints regarding support from them." — (PS3.2)

The private sector companies did not report engagement with the project's NGO partners. This would not be expected from the hatchery and feed company, both of whom were working in 'open areas', not the implementation or control areas of the evaluation. However, two of the private sector companies, both selling fish (in retail and factory) met

and exchanged knowledge, recognizing that their customer groups were quite different (one selling to high-end customers and the other to low-income workers)

4.2.3 Extent and effectiveness of support and advice from WF

The companies received support from WF in the form of a subgrant agreement. The first small company indicated that this enabled them to take the risk of going into new perishable products, by supporting some of the costs incurred during the project.

> *"… our margin is very low, we never identified perishables [as] something we do, because of the high risk … and because we don't know how to source, …but [we] know the market could [have] very [high] potential for us" — (PS1.1)*

The company selling fish in retail outlets, was linked with WF listed farmers (about 40, including about 10 women farmers) in Rajshahi and Rangpur divisions. They also received technical support through WF, on guidelines and standard procedures. WF is also providing some information and marketing support.

> *"whenever we make any kind of content regarding fish, WF always gives us some knowledge support because, actually, we are meat expert[s], so we don't have much knowledge about fish; which type of nutrition there is in a particular fish, what are the benefits of consuming this kind of fish…. Then, after getting insights from WF, we developed our marketing content, then we posted it on our social media."* — (PS2.3)

At the product launch, WF provided support for a discount to consumers. When farmers enlist with WF, they get some extra price incentives for supplying the company. (PS2.2) The company is investing in a second fish processing plant.

Both the companies selling fresh fish benefited from WF's help in connecting them to farmers who produce quality fish.

> *"WF connected more than 100 farmers with [the companies] and some of them, at least 10-15 percent are from [the NGOs areas]. So, all the information is disseminated adequately and appropriately to them." — (WF6)*

> *"the IDEA project Bangladesh team ….. provided us a list of around 30 farmers from each region and introduced us to those farmers." — (PS 1.2)*

The hatchery received support from WF to employ technical support, for office materials, hatchery infrastructure improvement and farmers training. They have installed four aerators and plan to purchase a water quality testing kit. One of their main targets is producing G3 Rohu for farmers to buy. They were given G3 Rohu and demand is high, but as of May 2022 they had not started production of spawn. They conducted seven training events, for nurserers and seed traders.

> "*Farmers often consult these people when they face problems. We also keep in touch with them, we told them if they face any problem they can contact us." (PS3.2)*

In addition, they ran linkage-building workshops with different fisheries market actors to help expand their business and together with WF conducted several trainings with their famers.

The feed company company benefited from WF financial support and technical feedback on technical publications the company was producing. WF was present at the training of the company's dealers (master trainers) who train farmers.

4.3 Relationship between WorldFish and knowledge partners

4.3.1 Knowledge partners' motivation for collaboration and expectations

WF collaborated with two knowledge partners, one supporting business training and development and the other, a consultancy supporting the development of digital messaging and platforms[7]. The business development partner's main objective was to support businesses to grow, become more efficient and achieve their full potential in order to help the Bangladeshi economy. They collaborated with WF in a program for SMEs and MSMEs in aquaculture.

> *"… our key aims are helping them to … structure their businesses, so that in the days to come, they get access to capital, get more market linkages and grow as a business. — (BT1.2)*

The digital partner, with experience working with development partners and private companies, was first in contact with WF in 2019 when they were looking for digital partners for IDEA. Digital connectivity and digital expansion were the means for the project to reach large numbers of farmers. The digital partner initially did a scoping study on digital communication providers with whom World Fish could potentially partner. The study confirmed the lack of players with an aquaculture focus. As funds were limited, the collaboration started small by developing a Facebook platform (The Right Fish), the virtual market place Right Haat and then expanded, including work on other WF projects.

> *"WorldFish has been a very good client of ours, and we've also been a very good partner of World Fish".*

4.3.2 Communication and information sharing

The business development partner commented on the very good rapport and good communication with WF, over phone, emails and in person, once the COVID situation normalized.

> *" .. there was always free flow of information, we haven't had any trouble. Every time we wanted to have a meeting, they were always very supportive; they were always very prompt." — (BT1.2)*

There was limited interaction with the NGO implementers. The digital partner did not comment specifically on communication issues with WF.

4.3.3 Extent and effectiveness of support and advice from WF

The business development partner initially conducted a market study in Rangpur and Rajshahi to access the current conditions. WF supplied a list of aquaculture entrepreneurs from the two project divisions who were invited to provide initial information. These were filtered down to 75 who were trained in 3 batches of 25. Participants included some of the project LSPs and also other service providers who were not part of the IDEA project. The curriculum was agreed with the WF team and was

[7] A third company ran the Couples workshops, but were not interviewed.

delivered on a hybrid model and in person. World Fish brought in consultants to run some specific sessions and WF staff helped with some technical sessions. The program is called business incubation by WF but is occasionally termed business accelerator.

The digital consultancy said that they enjoy their partnership with the IDEA project, but are a small partner compared to others such as the NGOs. The company worked closely with WF on contacting and training farmers in the field, on creation of Facebook groups, an interactive expert facility to give expert advice (Dr Fish) and a website with technical videos on aquaculture, nutrition and women empowerment as well as a digital market place. World Fish experts were part of the package which farmers could access digitally, including live Facebook sessions. The company found WF to be flexible and receptive of their ideas and encouraging of their plans for future sustainability. They were proud of the quality of the information on their platforms, in contrast to the prevalence of misinformation on some social media channels.

> *"[The] good thing is that all our contents that we've given out - something we really take pride in -- none of them are unverified; they're either verified by the government officials or by World Fish." — (DG)*

4.4 Outcome 1: Productivity of homestead fish production systems increased.

4.4.1 WF, NGO and partners perspectives on implementation and changes – outcome 1.

The project aimed to enhance smallholder productivity by 50%, with a post COVID revised target of 315,000 households. This was to be achieved through improving fish management practices and vegetable farming on pond dykes, increasing access to quality fish seed and brood stock and to quality fish feed and pond inputs. Further actions would increase smallholders' access to credit and extension services and influence policy and investment in support of nutrition-sensitive and gender-oriented aquaculture.

The means of delivering these changes were through recruitment of training partners, the training of local service providers, and recruitment of a digital service provider (see section on extension, 5.3.1). Other interventions were training for partner hatcheries, fish seed and fish feed supply chain actors, to improve quality and standards of fish seed and feed, and the production of training materials to promote best practices.

- Assessment of farmer needs (seed, feed, credit), gaps in knowledge of best practices.

Early in the project, challenges facing small-scale aquaculture farmers, gaps in knowledge of best practices and constraints on production were identified. The average pond size for aquaculture farmers in Rangpur and Rajshahi divisions is very small, with most farmers owning between 15 and 30 decimal (.061- .121 ha). In Rangpur district, only 15% of producers have ponds above 2 hectares. Hence the number of people farming fish commercially is low. The major challenges and gaps identified were:

- Seasonality - in some areas, ponds do not have year-round water which limits the production season, unless a farmer can access a pump. Rainy season run-off causes pollution in ponds.
- Some farmers lack the finance to enable them to invest in aquaculture.
- Farmers lacked training and motivation.
- Lack of quality hatchery and technical knowledge in seed production

- Losses during fingerling transportation.
- Access to pure strains of recommended fish species.
- Smallholders are stocking fingerlings at a high density, more than the actual required rate.
- Poor-quality feed given and inappropriate feeding practices followed.
- Fish diseases - outbreaks are mainly related to water pollution, water conditions, and the pond environment (use of feed, high stocking density, run-off into pond).

These insights informed the design of the project, including the content of the aquaculture training provided for LSPs (and through them to farmers), the design of training materials, the inclusion of access to credit, and partnerships with hatcheries and feed companies.

- LSPs trained in aquaculture best management practices, training of hatcheries and seed supply chain actors.

Aquaculture specialists from WF and the two NGOs gave detailed and consistent accounts of the topics covered in LSPs training.

Table 6: Aquaculture Topics covered in LSP training as reported by WF and NGOs

All aspects of pre-stocking, stocking and post stocking management: pond construction, pond cleaning, removal of aquatic vegetation and predatory/unwanted fish species, liming, fertilization, checking the natural productivity of the pond, checking water quality, fish stocking, and [not] using pesticide in their pond. Specific messages were:

- Not to use insecticides to remove predatory fish species or SIS varieties
- Not to remove SIS and small fish varieties from ponds.
- Dyke construction to stop rainwater from flooding the pond and polluting it. Vegetable cultivation on dykes
- Maintaining correct stocking density, as it affects productivity.
- Disinfect fingerlings before stocking to prevent disease spread; acclimatise them before release into ponds.
- Not to purchase fingerlings from local hawkers (Patilwalas) because of low quality and limited choice.
- Promoting supplementary feed in addition to natural food; prescribing correct amount of feed for various species and encouraging sampling of fish biomass to calculate the feed requirement.
- Increasing natural feed in pond and not using fertilizers in excess. No use of animal manure.
- Correct use of medication for fish related diseases, purchasing medicines from correct sources.

The general orientation of the training was to encourage good aquaculture practices, with the emphasis on prevention of problems, "*We are recommending and encouraging farmers to go for prevention [rather] than cure".* (WF5). In the first phase, the LSPs worked with four groups of farmers, whereas in the second phase, they provided training to one 'practice group'. Whenever they are conducting training, they are supported and monitored by the WF or NGO field staff. LSPs that are fish-sellers and seed-sellers, provide technical services to the fish farmers. Hatcheries and feed companies have also received training of trainers from WF and are also promoting fish-based nutrition and gender transformative approaches at the farmer level.

In addition to the above topics, the LSP training also covered the basics of aquaculture extension work and farmer participatory training approaches, gender and women's engagement in aquaculture, dietary diversity and household nutrition, and monitoring and work plans. The training integrated aquaculture and nutrition messaging, emphasising the value of small indigenous species (SIS) and encouraging their production and consumption. SIS are nutrient and micronutrient rich and can kept in the same pond with carp without hampering carp production. Furthermore, the survey found that SIS are becoming scarce and that promotion of their cultivation among small scale farmers would help to protect them. They are also suitable for very small ponds which can't support large fish.

Key informants emphasized that raising awareness of gender issues was integrated into all the training conducted, however, it is difficult to assess in what depth the topic was covered. Different strategies for promoting gender inclusion were pursued (section 5.5.)

- Production of training materials and guidelines and generation of digital content for LSPs and Farmers.

Aquaculture training materials were developed by WF and shared with the NGOs and drafts were jointly reviewed. The NGOs gave feedback after field testing with LSPs. Information materials for farmers, such as festoons and guidebooks were similarly shared:

> *sitting down with them we shared things, such as this picture can be given here, this writing can be said here, the people of the village will understand this well, maybe if we can add such a thing in this place, then it will be good … then they finalized it. Although materials and the brochure were supplied by World Fish, everyone here has participated in creating them. — (NGO1.1)*

The training module handbook was a detailed and comprehensive coverage of aquaculture practice, suitable for the LSPs, but feedback from the field requested a smaller, briefer version in the form of a brochure, covering the main messages, which would be more appropriate for farmers to use. The LSPs were provided with three festoons - pre-stocking, stocking and post-stocking, and leaflets and brochures to assist in their training of farmers. There were posters on gender which were discussed in the training and a festoon and leaflet on nutrition.

> *I will say that the materials are 80-90% effective for small-holder fish farmers. … the fish farmer can gather the comprehensive knowledge they need from these materials. Aquaculture knowledge will be disseminated by sharing — (NGO2.1)*

- Differences and similarities among WF, BRAC and TMSS in implementation of activities

Key informants from WF and the NGOs agreed that they were using the same criteria for recruitment of LSPs and the same training content and delivery. There were some differences in delivery of training during COVID. Efforts to sensitize communities on women's empowerment were also conducted across all arms of the project. Apart from the nutrition content in the LSP training module delivered to all, delivery of the nutrition element of the program differed where NGO community health workers or health clinic

staff were provided with separate training on nutrition and the benefits of fish consumption as part of their work in NGO health programs or work in rural clinics.

- Access to credit and related services

Facilitating wider access to finance for aquaculture was an important project objective for WF and the two NGOs. The project worked with formal credit provider, Bank Asia as a source of banking credit for LSPs and farmers, through its district based, agent service model. Prior to the project, levels of loan acquisition were very low among farmers, whether from NGOs microfinance facilities, or financial institutions. Loans were more commonly taken for agriculture rather than aquaculture.

One of the main responsibilities of Bank Asia in this project was to create awareness among the community through financial literacy training, informing LSPs and farmers on how they can apply for loans. For loans up to Tk 50,000, applicants require a certificate from the local administration confirming they are a farmer and their national identity card to open a bank account. For a loan over TK 50,000, collateral in the form of the title documents of the land, or a legal lease agreement and the guarantor's information are required. By the end of the project, Bank Asia had given loans to 878[8] farmers (among them 34 women) with an average loan size of 70,380 taka.

Financial literacy training in Rajshahi and Rangpur aimed to reach 10,000 farmers. With WF support, Bank Asia facilitated 302 financial literacy events covering about 9,000 farmers, of whom 6,500 farmers have opened accounts. The difference between the numbers of people trained compared with the 878 actually receiving loans, is striking. This was attributed to some farmers not fulfilling the loan criteria as well as the bank's capacity to support individuals in the application process.

WF helped to connect Bank Asia with local service providers and farmers for capacity building and training. It was not subsidizing their business interaction.

Differences between Bank Asia and other credit sources.
Bank Asia identified their interest rate as the main difference between their loans and microfinance credit. Microfinance institutions offer 14-15% interest rate while Bank Asia are offering farmers 8%. (4% during COVID. An advantage of MFIs is that they can process the loan in a very short time. Bank Asia has made efforts to speed up loan processing though decentralising to rural agents. While MFIs provide group loans, those of Bank Asia are individual. Bank Asia sees their relationship with the MFIs as complementary rather than competitive. *"Alone, Bank Asia cannot cover the entire Bangladesh. We all need to come up with our efforts, with our ideas to make [that] untapped population under the financial inclusion". (Bank Asia)*

Both NGOs provided loans to farmers (46) and also to LSPs (9) in the T2 areas, including 23 women.

What types of farmers have access to those loans?
WF tracks the number of loans provided by Bank Asia and the NGOs microfinance programs. Small seasonal loans of 50,000 taka (for 6 months) can be useful for small scale aquaculture producers, e.g. owning 1 decimal/ 40 m^2 pond, up to 30

[8] Some of these loans may have been given to farmers in the open areas.

decimal/1200m^2 pond. After 5 or 6 months they become able to repay the money by selling fish in the market and can accumulate capital for the next production cycle. Larger loans are available for commercial purposes.

Women and access to credit

Efforts were made by Bank Asia to recruit female customers as a priority. The bank has a good level of female customers (62%), mainly because the bank disburses social safety net payments several of which target women. In contrast, just 11% of loanee customers are women. Participation of women is higher in SME and crop segments, than fisheries. A further problem relates to gender norms and the degree of control women have over the use of the loans they take.

> *we are really struggling to ensure 100 percent control of women on this loan amount, because sometimes woman's husband decides that he needs to buy a van or start a new business. Then, he pushes his wife to get a loan. Then, she gets the loan, and the man actually goes ahead with his own purpose. Women really have nothing, or very limited things to say with this loan amount. This is a challenge. But as we are having that couple workshop, women will have their own bank account in their [own] business name ... So, there will be an enhanced chance that a women will be able to deposit her money to her business account. – – (WF4)*

- WF and NGO's views on changes in farmers' knowledge and management practices,

NGO and WF field staff reported seeing improvement in LSPs' knowledge and practice, for example, careful pond preparation, acquiring good quality fingerlings and acclimatizing them before stocking the pond, and more efficient feeding of fish. The training enabled the LSPs to fill gaps in their knowledge and to revise their prior knowledge. LSPs are utilizing the messages provided. The input dealers/feed dealers are hanging the festoons in their shops and distributing brochures to the fish farmers.

WF conducted monitoring surveys (2019/20, 2021/22). Project managers reported changes in farmers' practices and gave good examples of improvements in businesses but were cautious about claiming wider impacts on production.

> Since I have been in the program, all the changes we see with the naked eye, are very encouraging to me. … everyone we work with has to admit that we've been able to develop ourselves a lot since this training, and we've been able to create a proper channel for our business. … because of our involvement with this program, their economic situation changed. Many people used to run a small shop, which was probably a 10 feet by 11 feet space. We see that they have now made huge stores with loans from various banks due to joining our program; those who used to have two / three aquaculture projects now have leased seven to eight…They have got trade licenses for fish farming; they have joined various organizations, and have even taken loans ... there's been some change, and they openly admit that if they had not gone to [the NGO], if they had not attended World Fish training, they wouldn't have been able to bring about these changes in two years. It is also very encouraging to us that we have been able to play some role in improving the quality of life of these people, by the development of aquaculture. (NGO1.1).

- Research activities

The project conducted several research studies on carp polyculture, feed management, seed composition, small indigenous species and on fisheries policy. WF as part of the Carp Genetic Improvement Program (CGIP) funded by Fish Innovation Lab, USAID and WF, ran a confirmation trial which stocked three strains of Rohu (improved Rohu, a commercial strain, and a river-sourced fingerling) in the same pond with other species. Nine ponds were stocked which farmers managed as their own, deciding on feeding etc. WF did regular sampling to compare the growth performance, finding some promising results with the improved Rohu showing a higher growth rate. The partner NGOs were aware of the research and preliminary results. WF also carried out some research to find out the most suitable dissemination options for farmers to get good quality seed.

- Policy engagement actions.

The project engaged with government bodies both at local and national government level. As part of implementing the project within the target districts, the project provided orientation for the upazila/ sub-district level fisheries officers, and other local government staff. Divisional, district and upazila fisheries officers were invited to LSP and farmer training sessions and participated in discussions.

> *… they're collaborating with my fisheries department. They gave us support in our activities, sometimes we gave lectures as trainer, sometimes we went as trainee. — (Gov 1)*

The project trained government community health workers based in 20 community clinics.

Project leaders reported a very good relationship with the Department of Fisheries. At village level, the government supports Lead Extension Agents for Fisheries (LEAF). In response to a government request WF provided training for them, including women LEAF. The training included components on nutrition, gender and business and they were also linked to financial institutions.

WF also tries to engage with policy makers through their communications, e.g. campaigns in annual nutrition week, national fisheries week etc. WF has also encouraged government officials to join the RightFish Facebook platform. Two or three high level officials and more than 50 field level aquaculture or fisheries officers joined the platform.

WF Bangladesh's engagement and working relationship with the government has evolved to become more influential. WF conducted a systematic review of aquaculture and nutrition policies and found that there is a strong nutrition policy overall, but there are issues with implementation, while aquaculture policies are weak on nutrition.

> *we found that the national nutrition policy is well written and covered the fisheries nutrition quite nicely, but in the fisheries policy, there is a big gap about nutrition and fish consumption issues. … we are revising these with the help of our fisheries department and other organizations. — (WF8)*

WF held two workshops in Rajshahi and Rangpur, with wide government stakeholder participation from fisheries, health, nutrition, women's empowerment, to address what is missing and what should be included. Two more workshops in other regions of the country,

and a national workshop were planned for 2022 including policy makers, to discuss proposals for change, particularly on nutrition issues in national fisheries policies. (WF8)

> *… I think one of the exciting things is that we are … assisting [the government] to develop their in-country aquaculture policy network and we have already had meetings, and we are engaged to have several more meetings this year to support the development of policies. — (WF 1)*

WF raised the issue of women's access to ponds for aquaculture in the workshop discussions, drawing on the example of a pilot women's group pond in Rangpur.

> *… if there is a government owned open access … water body and if women groups are interested and government will give them things, that will encourage more women to be involved with aquaculture… — (WF 1.3)*

4.4.2 Farmers & community perspectives on implementation and changes – outcome 1

- Training and advice received by male and female farmers (e.g. fish seed, feed, veg. production, pond management etc.)

Table 7: Topics covered in farmer training sessions as reported by farmers

Sl. no.	Topics	Brief description	T1/T2
1.	Aquaculture Practices	"*How to check water quality, how to use fertilizers. When we use limes, before that we check the water quality by using our hands".* The respondents were also taught pond management, including cleaning, using lime and fertilizers, and ensuring the pond is pest-free. They were taught about fish stocking and care, including, but not limited to, how to release fingerlings, how to take care of them, and how to manage them; how to identify and remove predatory fish; and how to identify good quality fingerlings. They also learned how to transport fingerlings and ensure their health during transport.	T1 [Male] T2[aqua mixed]
2.	Gender sensitisation	Joint Decision-Making: Discussions highlighted the importance of husband and wife making joint decisions regarding food and ensuring nutritional well-being for their families Empowerment through Aquaculture: The training discussed how women can be empowered by participating in aquaculture and related activities like poultry farming, vegetable cultivation on dykes, and taking care of ponds. Games and Activities: The training used interactive methods, such as games, to illustrate shared tasks and gender roles, helping participants understand and effectively engage in shared responsibilities.	T1 [Male & Female] Rangpur T2 [Female] -Rajshahi
3.	Nutrition	Respondents mentioned that the training included basic nutrition advice, such as the importance of consuming a	T1 [Male and Women-

		variety of food, including vegetables like taro, spinach, sweet pumpkin, black cabbage, gourd, beans, eggplant, Malabar spinach, and papaya. There was also advice on incorporating animal protein into the diet, including fish, meat, and eggs. The continuation of breastfeeding for 24 months was also discussed. There was a focus on small indigenous fish species such as *Mola*, *Tengra*, *Darkina*, and *Punti*. These were highlighted for their nutritional benefits, particularly for children and pregnant women. Specific guidance was given on the nutrition of mothers and children, particularly the need for pregnant women to consume nutritious foods like small fish, chicken meat, and vegetables. The training included information on preparing food for children and the importance of exclusive breastfeeding for the first six months, followed by nutritious family foods along with continued breastfeeding. LSPs played a role in disseminating information, but this was often dependent on the buyers' interest. There was no organized effort from LSPs to gather groups and provide nutrition education. Some respondents mentioned that they received additional nutritional information and materials from community clinics, although there was some confusion about the source of these materials (whether from BRAC or government clinics).	Rangpur] T2 [aqua mixed-Rangpur]

- Training conducted and advice provided -control group:

Female respondents from a control village in Rangpur shared that they received aquaculture training from the Department of Fisheries (DOF), specifically from government fisheries officers. A respondent’s husband worked at the Department of Fisheries, possibly influencing their access to training. The training included practical aspects, such as cultivating vegetables at the pond's banks. Additional items like notebooks, pens, glasses, umbrellas, and fingerlings were provided, and these were supplied by the Fisheries Office.

The training took place three or four years ago, and the female respondents received three such training sessions. No training from other organizations was reported, and respondents explicitly mentioned no training from World Fish or BRAC.

A male respondent from a control village in Rangpur received three sessions of training on aquaculture, each lasting three days, four years ago. The training included practical aspects such as cleansing the water, removing weeds, avoiding certain plants, ensuring no shade on the pond, cleaning and applying lime, using dry cow dung, adding water and fertilizer, and releasing fingerlings. He also learned about preparing a pond for aquaculture during the training.

In a discussion with male respondents from a control block in Rajshahi, there is a mention of a Feed Company. However, it appears that their focus was on selling their products rather than providing training. The respondents were given snacks and some merchandise but no training. Some respondents mentioned that this meeting (or training) took place in the market. During this session, they were taken to a pond, where the water was tested, and then they were advised to use their products.

Female respondents from a control village in Rajshahi mentioned that they haven't received advice or help from government departments (e.g., fisheries department) or NGOs (e.g., BRAC, Thengamara/TMSS) regarding nutrition and fish farming. No training was reported.

- Farmers' access to information through online platforms and digital media.

Male respondents mentioned receiving information through SMS from BRAC regarding nutrition and fish consumption. (FGD_GN-M) Details about collecting *Tilapia* and information about prices of *Silver Carp, Rohu*, and *Mrigel* were disbursed. A respondent from a T2 village in Rangpur mentioned support and advice provided through phone calls on issues such as fish feeding, impact of sunlight, and medication.

Responses across T2 villages in Rangpur vary. While some male respondents acquired aquaculture information through Facebook and YouTube, others noted not owning smartphones, consequently missing out on information shared through Facebook groups, which WF utilized for disseminating knowledge, comments, and feedback on aquaculture practices.

Respondents generally expressed positive feedback on the materials provided, indicating an understanding of the content. Some found the materials easy to understand and valuable for their aquaculture practices. One of the main challenges includes variations in training participation, slow internet connections that affect online activities, and occasional neglect of reading materials.

- Sources of aquaculture inputs and constraints on accessing quality seed and feed

Respondents from a T1 village in Rangpur mentioned that they used to collect medicines for fish from local markets before the project. This indicates that they relied on nearby marketplaces for aquaculture inputs. Some respondents mentioned sourcing fingerlings and feed from other farmers in their neighborhood. A respondent stated, "*We generally buy [from] who has aquaculture business, we did not change anything [post the project]*." (FGD_AQ)

According to a respondent from another T1 village, this practice was common, especially among those cultivating for home consumption. Another respondent from the same village clarified, "*Actually, those who cultivate for home consumption usually source it locally, but who are cultivating pond for commercial purpose they usually source it from outside (like, feed, seed)*." (FGD_AQ)

Respondents from a T2 village in Rangpur mentioned fish hatcheries as a source for fingerlings. *Virat, Jamtala, Gaibandha, Satir, Rangpur*, and *Monica Hatchery* were mentioned as sources.

Some respondents from a T2 village in Rajshahi mentioned obtaining fingerlings and feed from *Choubariya Haat*, a Government Hatchery.

Constraints on Accessing Quality Seed and Feed:

- Poor quality fish seed/fingerlings: Some respondents reported purchasing poor-quality fish seed/fingerlings. In one case, the seed was damaged after rain, leading to the need to buy and release new seed. Specific hatcheries were mentioned as not providing satisfactory results, while respondents had success with Monica Hatchery.
- Limited government support: Respondents expressed a lack of government support or communication with fisheries officers. There was a perception that government officials did not provide tangible support or resources for aquaculture.
- Financial constraints: Respondents indicated that obtaining inputs like fingerlings and feed would not be problematic if they had sufficient financial resources.

- Factors influencing different households' uptake of inputs, services and management practices

Small-scale farmers found it challenging to apply detailed measures as shared in the training, indicating a resource-related difference. This implies that the effectiveness of training may vary based on the scale of operation. A male respondent from a T1 village of Rangpur shared, *"It [advice received during training] is possible or applicable only for the large-scale farmers; for small-scale farmers, it is not possible as they only cultivate for household consumption."* (FGD_AQ)

The respondents from a T1 village in Rajshahi indicated a discrepancy in the project's outcomes, possibly related to the socio-economic background of participants. Many participants cannot afford to follow World Fish's suggestions. This suggests that the project's impact might not be uniform across different households.

The respondents from T1 villages in Rajshahi expressed an apparent reluctance that people harbor toward the project. The number and types of fish cultivation have not increased after the project, and the number of farms have also remained unchanged.

- Access to credit for aquaculture – Bank Asia, micro finance institutions, government sources

Male respondents from a T2 village in Rajshahi provided varying accounts regarding loan facilities discussed by different organizations. A respondent mentioned promises of assistance with obtaining loans from organizations like TMSS microfinance, though they expressed skepticism due to perceived inefficiencies. One of them recalled the distribution of snacks and water during meetings but didn't recall loan discussions. Another respondent mentioned TMSS microfinance officers collecting information on fish cultivation, expressing doubts about their loan disbursement efficiency compared to organizations like BRAC and ASA. A female respondent from a T1 village in Rangpur stated that along with knowledge disbursement, financial help would benefit them. It could be in the form of loans/credit with low interest rates. (17-2-1)

- Factors affecting decisions on types of fish cultivated. Changes made in the number and type of fish cultivated (SIS and non-SIS varieties)

The discussion focuses on the change in the number and types of fish cultivated before and after the implementation of the IDEA project, specifically examining the introduction of **Small Indigenous Species (SIS) varieties.**

Polyculture is practiced by the farmers. *Magur* cultivation is mentioned as a new addition by small-scale aquaculture farmers, with clarification on the type of *Magur* - it being a cross-version, not a monster fish- as stated by a male respondent from a T2 village in Rangpur, "*That is Pakistani fish [Magur], not monster, that's the cross version*." (FGD_AQ)

While the addition of *Mola* fish is highlighted, there were certain challenges and considerations for cultivating Mola fish, including the need for deep ponds.

A small-scale aquaculture farmer from a T1 village in Rajshahi added "*The types were the same before, and the numbers have increased. But the Mola fish was something we did not cultivate before, now we do*." (FGD_AQ)

Farmers from a T1 village in Rajshahi note an increase in the number of fish types cultivated after the project, specifically mentioning the addition of Mola fish to their cultivation practices. A female respondent from a T1 village of Rajshahi highlighted that SIS fish species, including *Mola*, *Darkina*, *Punti*, and *Shing*, are present in their ponds.

The respondents from a T1 village in Rajshahi mentioned training highlighting the nutritional value of fish, including SIS varieties like *Mola* and *Dhela*. However, farmers expressed challenges in cultivating these due to their "weed-like" characteristics[9] and potential harm to larger/bigger fish.

Another set of farmers from a T2 village in Rajshahi reported maintaining a similar variety of fish as before the project, emphasizing the consistent cultivation of the same types. However, a change was noted in the cultivation of *Mola* fish, with farmers choosing to keep them instead of removing them.

Male farmers from a T2 village in Rajshahi discussed the use of poison in ponds to catch fish and the unintentional inclusion of small fish with fingerlings. There was agreement on the value of small fish, but clarification was made by a male respondent that gigantic/big fish, if present, can lead to the extinction of small fish. He states, "*No, that's right. If you have gigantic fish, it will eat small fish*." (FGD_GN-M)

Change in Number and Types of Fish Cultivated Before and After IDEA (Non-SIS Varieties)
A male respondent from a T1 village in Rangpur mentioned a shift from cultivating risky species like Shing, Magur, and Koi to focusing on carp species such as Rui, Katla, Mrigel, and Silver. The change was attributed to previous losses when cultivating Indigenous species.

[9] "Weed-like" here indicates that the SIS were deemed to have the characteristics of weed plants - *characteristics that make them hazardous, aesthetically unappealing, difficult to control in managed environments, or otherwise unwanted in farmland, orchards, gardens, lawns, parks, recreational spaces, residential and industrial areas….*

Import of various fish species, *including Bata, Catfish, Silver cup, Rui, Katla, Giant fish, Glass Cup, Lobster, Rockfish, Shrimp fish, Pabda, and Shrimp*, was discussed. The import of these species has increased in the last one and a half to two years.

Respondents shared that profit has increased over the last five years without specific details on changes in hybrid species cultivation. They also mentioned having no idea of measurements before the project.

No significant changes in fish species were reported, but improvements in growth and release practices were highlighted. A female respondent from a T2 village of Rangpur added, "*No, it is same. Before, there was a problem of gas, fish died; now fish do not die, it has a good growth; we are releasing fish based on pond size, so now it is growing rapidly."* Gas-related issues in the pond causing fish deaths also reduced. (FGD_AQ)

A uniformity in fish cultivation was observed in another T2 village of Rangpur, where carp species like Silver, Mrigel, Rui, Katal, and Mriga were mentioned as being cultivated more, along with a certain amount of Bata *fish*.

In a T2 village of Rajshahi, the farmers stated that the types of fish cultivated remained the same before and after the training, with a focus *on Bata, Mirki, Japani, Silver Carp, Rohu, Katla, and Tilapia* after the training. While most respondents across villages in Rajshahi reported no changes in fish cultivation practices even after the project, a shift was observed in the types of fish cultivated in a T2 village—from indigenous *Tilapia to Monosex Tilapia*[10] sourced from a Government Hatchery (pre-WF).

- Change in farmers' knowledge of best management practices?

There has been a positive change in farmers' knowledge of management practices. While there are cases of certain practices not being adopted by the farmers due to lack of time (T1) or not having received certain tools promised during the training (T2), the project's training has led to improved knowledge and practices in pond preparation, feed management, and species selection.

Farmers have applied lime in pond cleaning and have learned the correct ways to release new species. They now weed out unnecessary plants from the ponds and avoid growing predatory species to improve fish health. Similar positive trends were observed in Rajshahi, including better feeding practices and enhanced production through increased feeding frequency. Additionally, harmful practices such as using cow dung and chicken feed have been discontinued after the training received from World Fish.

[10] Naturally male tilapia grows rapidly than female. Separating the male tilapia and raising them separately is called monosex tilapia fish farming. These types of fish grow faster and well adopted to supplementary feed. You can raise them in high density, and they never make hole in the pond for breeding. Commercial monosex tilapia farming is very profitable business. (*MONOSEX TILAPIA*. (2016, March 23). AQUACULTURE IN BANGLADESH. https://fishbd.wordpress.com/mosex-tilapia/#:~:text=Naturally%20male%20tilapia%20grows%20rapidly,in%20the%20pond%20for%20breeding.)

- Aquaculture management practices adopted or not adopted and reasons. Differences in uptake by households with different resource levels, scale, social characteristics.

Practices not adopted and reasons:
A respondent from a T1 village in Rangpur mentioned that they had not changed their aquaculture practices following the training in 2020. Another male respondent stated that they had not tried the advice given due to a lack of time.

The female respondents from a T2 village in Rangpur discussed not having received certain tools promised during the training, such as a pH Scale. They also mentioned not using methods like the Secchi disk[11] due to not having the necessary equipment.

Male respondents from a T1 village in Rajshahi discussed the fast growth and high feed consumption of indigenous *Puti* fish (small fish), leading to issues with pond capacity. This seems to indicate a challenge or issue related to the practices introduced.

The male respondents from a T2 village of Rajshahi expressed dissatisfaction with the current state of aquaculture, citing a significant financial loss and challenges with the rising costs of fish feed and other inputs. One of the male respondents added,

> *"See, I made loss of around 6 lac taka [BDT] in the last two years. Currently, fish price is not commensurate compared to the rising cost of fish feed/inputs. I sold Katla 260-280 taka per kg (for 2-4 kg weight each) in Dhaka. Whatever I am producing is not going to be priced accurately with the rising inflation. The price of fish feed is extremely high." — (FGD_AQ)*

They also mentioned a reluctance to adopt new practices due to existing losses and natural disasters.

Practices adopted and reasons:
Many respondents mentioned positive changes in their aquaculture practices after receiving training from IDEA. They gained knowledge about pond preparation, feed management, and species selection.

There's evidence of improved stocking practices, with respondents mentioning a shift from traditional practices to more informed decisions based on pond size and species characteristics.

A male respondent from a T1 village in Rangpur shared, "*Yes, we do not cultivate and predatory species [Boal, Magur, Shol, Gorui, Shal] after listening from WF."*

Both male and female respondents discussed the importance of pond preparation, including activities like cleaning, removing weeds, and applying lime. This indicates a recognition of the impact of pond conditions on fish health.

[11] A Secchi disk is an 8-inch (20 cm) disk with alternating black and white quadrants. It is lowered into the water of a lake until it can no longer be seen by the observer. This depth of disappearance, called the Secchi depth, is a measure of the transparency of the water. (*North American Lake Management Society (NALMS)*, 2019)

Several respondents mentioned clearing weeds and removing garbage from pond surroundings, indicating a focus on maintaining a clean and healthy environment. Some respondents mentioned the importance of training materials provided by IDEA, indicating that written resources and charts contributed to their understanding and adoption of practices.

Respondents expressed the need for ongoing learning, indicating that aquaculture practices are dynamic and require continuous education and support. A male respondent from a T2 FDG village in Rangpur added, "*If we did not get any information from the IDEA project, we could not be enriched with information today. We did not know about the new methods of practicing aquaculture. We could have been uninformed*." (FGD_GN-M)

In Rajshahi, we observe similar trends. Respondents from a T1 village highlighted corrections in the amount of feed given, emphasizing the importance of proper feeding practices. There were positive outcomes reported, such as enhanced production through increased feeding frequency.

Changes include cleaning dykes, reducing trees and weeds, and overall pond cleanliness. The application of lime and its quantity, previously unknown, is now a practiced method for pond maintenance. The respondents also mentioned having discontinued some practices after the WF training. One of them mentioned "*From the WF training we got to know the detrimental effects of using cow dung and chicken feed, so we have discontinued this practice*." (FGD_AQ)

Difference in uptake:
Small-scale farmers find it challenging to apply detailed measures as shared in the training, indicating a resource-related difference. This implies that the effectiveness of training may vary based on the scale of operation. A male respondent from a T1 village of Rangpur shared, *"It is possible or applicable only for the large-scale farmers; for small-scale farmers, it is not possible as they only cultivate for household consumption." (FGD_AQ)*

The respondents from a T1 village in Rajshahi indicated a discrepancy in the outcomes of the project, possibly related to the socio-economic background of participants. They observed that many participants cannot afford to follow the suggestions made by World Fish. This suggests that the project's impact might not be uniform across different households.

The respondents from T1 village in Rajshahi expressed an apparent reluctance that people harbor toward the project. The number and types of fish cultivation have not increased after the project, and the number of farms has also remained unchanged.

4.4.3 Synthesis of findings on outcome 1.
The challenges facing small-scale aquaculture farmers, their gaps in knowledge and constraints on production, informed the content of the aquaculture training materials and partnerships strategy.

WF and the NGOs applied the same LSPs recruitment criteria and followed the same training content. Hatcheries and seed supply chain actors were also trained. The training integrated aquaculture and nutrition messaging, emphasizing the value of small indigenous species (SIS) dietary diversity and household nutrition. It raised awareness of gender and women's empowerment in aquaculture, however, it is difficult to assess in

what depth or spread this topic was covered. Some of the Control areas had received aquaculture training from the Department of Fisheries.

Bank Asia was tasked with widening access to finance for aquaculture, offering loans for LSPs and farmers at favorable interest rates. However, a limited number of loans were taken and uptake by women was particularly low.

Several research studies were conducted on carp polyculture (improved Rohu), feed management, seed composition, small indigenous species, and fisheries policy, as well as research on suitable quality seed dissemination options for farmers.

WF managers reported positive changes in farmers' practices and improvements in businesses but were cautious about claiming wider impacts on production. Some farmers reported increased profits over the last five years. In some cases, farmers did not adopt practices due to lack of time or financial resources, lack of certain tools, or because of existing losses and natural disasters. They cited a lack of government support and resources for aquaculture. Small-scale farmers producing for household consumption find it challenging to apply detailed measures. This implies that the effectiveness of training may vary according to the socio-economic background of participants, and that the project's impact might not be uniform across different households.

The project engaged with government bodies and policy makers including department of fisheries at local and national level. WF's analysis of aquaculture and nutrition policies found a strong nutrition policy overall, but issues with implementation, while aquaculture policies are weak on nutrition. WF organized a series of policy consultation workshops.

4.5 Outcome 2. Value of fish and fish-based products marketed by smallholder farmers increased.

4.5.1 WF, NGO and partners perspectives on implementation and changes – Outcome 2.

The anticipated outcomes for market and enterprise areas were an increase in the value of fish and fish-based products marketed by smallholder farmers, sustainable market linkages, gender responsive market strategies and increased business skills and an increase in market margins.

The program's activities were informed by market studies. A Gender Value Chain Study was conducted that identified women's role and extent of participation within the aquaculture value chain, and a gender scoping study which looked at the barriers and opportunities for women to be involved in aquaculture.

The strategy for developing aquaculture enterprises emphasized all round market support, addressing the challenge of quality input supply (by involving feed and seed companies), and creating output channels to supply markets (through Bengal Meat and Apon Wellbeing), together with access to finance.

The project organized several market linkage meetings where farmers, LSPs, traders, seed companies, feed companies participated and discussed their services and products and aquaculture technologies. 10 business promotional meetings were organized in the treatment areas, and 12 events in open areas. 290 farmers from treatment areas participated.

- Business skills training and business development.

The four-day **training for LSPs** included a topic on business entrepreneurship.

> *… we try to provide them with an overall business context and understanding of what you need to do to become an entrepreneur, what criteria need to be followed. — (NGO2.1)*

The training included how to operate a sustainable business, how to market and promote their product, financial management and business communication and relationships. WF supported LSPs to develop an annual production calendar on which to base their business plan, orders and distribution. They were linked to financial partners like Bank Asia and the NGO microfinance programs who engaged them in their financial literacy program. Access to loans was important for LSPs in the feed market to allow them to sell to farmers on credit.

The changes reported under the project are that some LSPs are utilizing the knowledge in their day-to-day business operations. Some are doing business with Bengal Meat and Apon and some have accessed bank loans.

> *these are the positive changes and based on that we can say these trainings were effective and the change in livelihood and behavior is happening in that region. But it will take time to change the whole set of things in Rajshahi and Rangpur. – – (WF6)*

The business accelerator (or incubator) training for entrepreneurs aimed to strengthen the business expertise of potential entrepreneurs and expand their business horizons. The training was conducted by a company specializing in this field, having customized the training to the needs of aquaculture entrepreneurs. Three batches of training were completed, two in Rangpur and one in Rajshahi. Following a one-day assessment of a larger pool of initial applicants, the 25 top scorers (for each batch) were invited to a two-day residential accelerator program, followed by two weeks distance learning, one day investment readiness training and a ‘demo’ day when the entrepreneurs pitched their business plans to potential market partners and banks. Of the 63 people trained, six were female;

> *… this is quite male dominant industry and most of the workers, even the traders all of them are male, so, it was very hard for us to find female entrepreneurs. — (BT1.2)*

The best performers were awarded a seed impact investment fund of 50,000 BDT. This was a blended capital model to be paid back after a year, in the form of revenue sharing. The first award was given to a woman entrepreneur and BRAC LSP from Rangpur and the second to a man from Rajshahi. WF staff commented:

> *if we can show case this kind of successful women then, they will be really inspiring for the other women in the community or the project area. — (WF 4)*

Entrepreneurs who were interested applied for loans. Around six people received commercial bank financing and microfinance was received by another 8-10 people. Five others received funding through an NGO run project. Participants’ feedback suggested

spreading the training over a longer period, including more sessions, having an earlier introduction to market partners and having a joint project. Follow up was limited to occasional telephone contact and enquiries from the trainees, but the company was in touch with the entrepreneurs who had received investment funds.

Although numbers of trainees were relatively small, the reported benefits were an improvement of around 20% in understanding relating to the topics of training (as measured by pre- and post-training assessments); publicity and positive examples were shared of rural entrepreneurs, including women. However, the results of the investment and market linkage activities were less clear. No information was available on whether trainees had managed to scale up their business following the training, or how successful they were in the new market outlets.

Couples Training was an innovative part of the business development program. WF hired a different training agency to deliver four Couples Workshops in Rangpur, Bogra, Natore, and Naogaon in 2021. The two-day workshops were intended to enhance the abilities of women entrepreneurs to run aquaculture businesses, with the joint effort of their husbands.

> *Our scoping study identified that if women get involved with aquaculture, it actually needs support from the household members, specially from husbands. … in that workshop, the women will be attending along with their husbands … we will be trying to develop the business knowledge and capacity of women; at the same time, the husbands will be motivated to be an associate or helper of their wives so that wives can flourish as a businessperson, and the husband can contribute to this process. — (WF4)*

The 40 couples selected to participate were initially identified and visited by the WF field team. The workshops focused on business plan development, specifying the leading role of the wife and the supporting role of the husband and setting monitorable targets. Interviews for the process evaluation were held too early to capture comments on subsequent progress, but WF's final report indicates that by early 2022, 30 women had formalised their businesses and nine were given government awards.

- Increasing the market for fish and linkages to sales.

To increase market demand and opportunities, WF has engaged with two companies, Bengal Meat, known for meat processing for sale in retail shops in urban markets and Apon Wellbeing which operates retail food shops in readymade garment factories. Both companies were introduced by the project to farmers who were potential fish suppliers. They are sourcing fish from the project implementation area (not the control area), buying from individuals and groups. Some project LSPs are collecting fish from farmers and are supplying Bengal Meat. WF also provided support on packaging branding, communication, awareness and nutrition messaging.

There are interesting similarities and differences between the two companies' initiatives as described by informants. Some similarities were:

- Sale of fresh fish was new to both companies and Apon was not previously selling perishable goods.
- The companies screened the listed farmers in terms of their scale of production and management practices and explored logistic arrangements for packing and

delivery of the fish.

- Both companies made written agreements with farmers or farmers groups registered by WF, with details of product requirements, payments etc. Apon had a list of 70 farmers and had signed agreements with 31 farmers, although only five (all men) were actively supplying. Bengal Meat engaged 40 farmers (25% female).
- Both companies started small in a pilot phase. Apon started with one factory shop expanding to two, then eight further shops. Each factory has an average of 2000 workers. Bengal Meat started by processing and selling 1mt of Ruhu in urban shops. It currently is selling fish in 50 shops in different parts of the country.
- The companies started by processing Rui fish, then diversifying, for Apon, to include Pangas, Shrimp and Tilapia, and for Bengal Meat, Katol, Butter Fish, Gulsha, Pabda and Mola fish.
- Both companies show signs of an expanding business. Apon sells on average 1.6 to 2.5 tons each month. Bengal Meat sources an average of about 3 tons per month. Bengal Meat launched Bengal Fish, separate from their meat processing unit and invested in a fish processing plant.
- Both companies engaged in nutritional messaging: WF helped in developing the materials. Apon shared nutritional messages through the RMG factories announcement systems, television inside the shops and in their day care centres. They also did SMS marketing with the customers, and display banners and posters. Bengal Meat held a communications campaign in major cities, organizing various advertising and promotional posts and events in social media (Facebook and Instagram) and through SMS. To effectively build brand awareness for the recently produced fish product, Bengal Meat sent out about 200,000 SMS to the target population. They also launched a recipe context and worked with social media influencers who provided reviews of the product. Bengal Meat reported reaching 3.9 million people across Dhaka, Chittagong and Sylhet city corporations.

Some important differences between the two companies are:

- **Customer profile**: Apon Wellbeing's stores provide factory workers with food requirements at a fair price and other benefits such as discounts, purchase on credit and health insurance. The majority of workers are female and relatively low paid (monthly average income is $150). There is high demand for fresh food and ready-to-cook fish, but high sensitivity to price. The importance of providing both convenience and access to nutritious foods was emphasised.

  perishable [foods] are required by this customer group, but because they are always cash [short], they don't actually access them. … we [gave] credit access to these workers … so we solve the nutrition issue and … change the consumption behaviour of this worker group. — (PS1.1)

  Bengal Meat target lower-middle-income to high income customers, attracted by the convenience of a ready to cook product that is also economic.

- **Size specifications:** linked to their customer profiles, the companies sell different sizes of fish in different quantities. Apon sell more smaller sized fish relating to the limited buying capacity of garment sector workers. Bengal meat faced the challenge of sourcing fish of the required size to supply a consistent product.

Some farmers found these specifications and other requirements difficult to cope with (see example from FGD in 5.2.2).

- **Prices and sourcing**: Both companies reported making efforts to source fish from WF farmers. However, Apon found prices expected by WF farmers too high (about 30-40 taka more than in other areas) to pass on to their customers and so mainly purchased from farmers closer to their processing centers to reduce costs. They bought 40kg of mola fish from a WF farmers' group but made a loss on the sale. They bought more than 30 tons from farmers outside WF area. Bengal Meat bought from individuals and farmer groups including substantial amounts from WF project farmers - around 50% (varying from 30-80%). They provide farmers with a premium (50-70 taka above the market price) as an incentive.

- Processing fish-based products.

Training for farmers was conducted on how to make/produce dry fish in a healthy way. 44 women entrepreneurs/ fish farmers attended the training. This was already being done on a small scale for home consumption, but the project introduced safer processing practices.

> *… they learnt how to process the dry fish. They are nutrient rich, like a powerhouse of micronutrients. They learnt about dry fish storing and how to preserve them and not only consume throughout the year but also sell them. — (WF6)*

After the training, those involved were able to fulfill their household consumption needs and sell dried fish in the local market.

Apon Wellbeing tried selling dried fish in their shops but there was a lack of consumer demand.

4.5.2 Farmers & community perspectives on implementation and changes – Outcome 2

- Farmers experience of business and marketing skills training – as individuals and groups.

Farmers generally seemed to appreciate the practical and localized knowledge provided by both LSPs and independent sources. There is a perception that while formal training and project support are valuable, the immediate and often personalized advice from local figures like their local LSP and market dealers plays a crucial role in their decision-making. Moreover, the trust and ease of access to local sources and the ability to negotiate or buy on credit from these providers add a significant dimension to their reliance on these services

- Fish selling arrangements, formal and informal, since the start of the project:

Absence of Written Agreements: Farmers across T1 and T2 villages mentioned the lack of written or verbal formal agreements with fish buyers. Farmers tend to sell to anybody they like, which demonstrates the informality of the market structure.

Direct Sales and Market Dependency: Whether from their ponds or in the market, aquaculture farmers often sell their produce directly to consumers. Some consumers visit the ponds specifically to buy fish, but others need the farmers to transport the fish to the market. Market prices are a major factor in the selling process; farmers regularly visit the market to monitor pricing prior to making a sale. A farmer from a T1 village in Rangpur mentioned:

> *"We go to market, suppose we go to market in morning and ask the prices, based on that we fix our rates." — (FGD_AQ)*

Informal Price Negotiations: Prices are established informally and depend on the market's state, the size of the fish, and discussions between buyers and farmers. Although it is possible, negotiating is dependent on the going market rates.

Obstacles to Profitability: Farmers voiced concerns regarding profitability, with some highlighting the lower payments made by middlemen or warehouse buyers. Farmers believe that the people in charge of the supply chain after the farm gate profit more than they do.

Producer-Buyer Interaction: The buyer-producer relationship is characterized as informal and demand-driven. There is little to no scheduled sales time; buyers come in or call when they need fish.

Dependency on Local Service Providers (LSPs): To determine their selling strategy and grasp the current fish prices, farmers occasionally rely on information from LSPs or their own regular market trips.

- Fish marketing support received under the IDEA project.

Support from WF: In a few instances, male farmers from a T1 village in Rajshahi and a T2 village in Rangpur reported receiving information from Right Haat and Local Service Providers (LSPs) regarding fish market prices and sourcing options for G3-Rui[12]. While small scale farmers in Rajshahi were directed to Monica Hatchery, they had not yet established contact with the hatchery for fish procurement.

Lack of Support: Many farmers (mainly from the aquaculture farmers focus group discussions) from both T1 and T2 villages said that they received no assistance or training from the project in terms of selling their fish or marketing their products effectively.

Informal Market: The respondents generally sold their fish in local markets or Arots without any formal agreements or structured support. Sales decisions were made based on the immediate availability of buyers or the accessibility of nearby markets.

Challenges in transportation and accessibility: Aquaculture farmers from T2 villages in Rangpur noted transportation difficulties as a significant challenge, with some

[12] In 2020 and 2021, WorldFish released the genetically-improved 'Generation 3' or 'G3' rohu strain as hatchlings to several hatcheries on a limited scale. WorldFish-developed Generation 3 rohu grows more than 30% faster than conventional rohu strains. (2023, January 1). WorldFish. https://worldfishcenter.org/publication/worldfish-developed-generation-3-rohu-grows-more-30-faster-conventional-rohu-strain

hatcheries being too far away for farmers to access easily. **This led to farmers not utilizing these resources even when they were introduced by the project.** The physical distance and lack of transportation options limited farmers' access to better markets or hatcheries, affecting their overall profitability.

Distrust in market transactions/warehouses: There was significant distrust among farmers from a T2 village in Rangpur, regarding market transactions, particularly in dealing with warehouses. Farmers believed they were being cheated on the weight of their fish, which discouraged them from selling in certain warehouses, despite potential higher prices.

Self-Reliance: Despite limited formal support, farmers in T1 and T2 villages demonstrated resilience by relying primarily on their own knowledge and experience to navigate the market. They leveraged existing contacts and information to make independent selling decisions.

A group of farmers from T1 village in Rangpur noted that the **project's focus was primarily on fish farming techniques and disease management, with insufficient attention given to marketing and sales support.**

> *"They only told us what to feed, what not to feed, what is good or bad for fish, how we can grow fish, these kinds of things. If there are diseases, in that case they give advice, for selling of fish no such things we have got." — (FGD_AQ)*

- Take up of opportunities for sale to Bengal Meat and Apon Wellbeing?

Respondents in the FGDs consistently mentioned that they had not received assistance, support, or information from WF in terms of connecting with companies like Bengal Meat or Apon Wellbeing for selling their fish.

Many respondents rely on their local community and agents for information about selling fish rather than getting support from the WF project.

A significant number of respondents from T1 villages in Rajshahi had not heard about Apon Wellbeing or Bengal Meat, indicating a lack of awareness about potential buyers in the market. Some respondents highlighted challenges related to the conditions imposed by potential buyers like Bengal Meat, such as specific weight requirements and complex terms that make it difficult for farmers to meet the demands. A respondent from a T1 village of Rajshahi shared:

> *"No one sells fish to Bengal Meat with such conditions that if we take 400 gram fish they will take but if it is 300gram, it will be canceled. What will happen to us if they cancel after taking a lot of fish? If they tell us how many kg of fish, you will take then we will contact them but if we take that fish from our pond … and they cancel, that cannot be tolerated." — (FGD_AQ)*

Some of them expressed an interest in having direct contact with potential buyers and suggested that if WF could provide contact information or facilitate meetings, they would be willing to make deals.

- Change in the volume and value of fish sold and reasons?

Respondents consistently reported an increase in fish production and sales since the start of the project. Specific examples include a shift from 10 kg to 40 kg of Rohu fingerlings, and from 5 kg to 15 kg of Tilapia.

> *I cultivated 10 Kg of Rohu fingerlings, now it has become 40 Kg. They* [indicating to another respondent*] have cultivated 5 kg of Tilapia, now it has become 15kg, it lays egg very much (Tilapia) and also grows really fast, we also ate and sold that, and even distributed to our relatives. — (FGD_AQ)*

Male respondents(T1) mentioned that the application of new approaches, learned through the project, contributed to increased fish production. A male respondent from a T1 village in Rajshahi added:

> *Earlier, we fed the fish without following any rules; that's why a huge amount of feed was wasted. But, now we use a bowl to feed the fish. Doing this, fishes are getting fed properly, wastage gets minimized, and pond's bottom remains clean. We came to know all these due to the IDEA project. Our production has increased. However, cost has increased too. But we are making profit due to a large amount of production. — (FGD_GN-M)*

Respondents from a T2 village in Rajshahi attributed the increase in fish production to technological advancements and the knowledge gained through the project.

Some respondents (T2-AQ) mentioned a shift from the traditional practice of selling fish once a year to selling fish three times a year. This change was associated with improved fish care, feeding practices, and overall project-guided enhancements.

- Changes in income from fish sales and fish products

There has been an overall increase in income from fish sales, as indicated by respondents from (aqua-mixed) T1 villages of Rangpur and Rajshahi. For example, one respondent mentioned that previously they could not sell fish for 10-12 thousand taka/BDT, but now they can sell fish for much more during the season. Another respondent noted that after buying 1 kg of fry for BDT 8,000, they could sell 40 kg of fish for BDT 17-18 thousand, with the potential for even more profit if kept longer in the pond.

Several respondents provided specific figures indicating a significant multiplier effect on their income. In one case, it was noted that income from aquaculture had increased from 25,000 to 70-80,000 taka.

The project introduced better practices that have led to increased production and reduced losses, which boosted profitability. For instance, one participant highlighted that better pond management practices have decreased fish mortality, leading to better production and profits.

Sales volumes have doubled in some cases, leading to significant increases in income. One respondent mentioned that their fish sales have increased from two crores to over three crores since 2018-2019. Another respondent emphasized that while profits have increased, so have food prices, which is a concern.

Farmers from the T2 villages of Rangpur and Rajshahi provided similar instances of increases in the value of fish sold since the project's inception. For instance, one respondent mentioned that while they previously did not sell fish for more than 20,000-50,000 taka/BDT, they are now selling fish for 60,000-70,000 or even up to 1 lakh taka/BDT. Another respondent highlighted that they sold about 1.5 lakh taka/BDT worth of fish, indicating a significant rise in income.

Respondents discussed how both the market price and production volume have increased over the past five to six years. Improved fish farming techniques, such as better pond management and reduced fish mortality, have led to higher profits as the fish fetch better prices in the market.

- Change in margins on fish sales compared to pre- project

The change in margins of fish sales compared to the time before the project, shows a complex picture where both increased costs and improved practices influence profitability:

Increased Costs Impacting Margins:
A farmer from a T2 village of Rangpur mentioned that while fish prices have increased, so have the costs associated with aquaculture, such as feed prices. This has led to **relatively smaller profit margins despite the higher prices.** The profit has increased "a little," indicating that while the project has led to improvements, the increased costs have offset much of the gain.

Higher Sales and Growing Profits:
The focus group discussions in the T2 villages of Rangpur reflect a positive outcome where increased production and sales have led to higher revenues. Another respondent/farmer reported selling more fish since joining the project, leading to greater sales overall. Similarly, another farmer noted growing profits alongside increased sales, indicating that the project has had a positive impact on both production and profitability.

Shorter Profit Cycles:
A farmer from a T1 village in Rajshahi described how profit cycles have shortened due to improved practices[13]. Earlier, the profit was limited to 10,000 taka/BDT annually, but now, with better fish farming techniques, profits are realized within months. This suggests an improvement in margins due to faster turnover, even if the absolute profit increase may vary.

Increased Production and Market Access:
Farmers from T2 village of Rajshahi show an estimated 30% increase in profits, even as feed prices have also risen. A respondent/farmer confirmed the increase in profits, and another noted that while costs have increased, the overall profit margins have improved, albeit modestly.

Market-Based Pricing and Better Profits:
A farmer from a T2 village in Rajshahi pointed out that moving from direct sales to market-based pricing has allowed for better profit margins. Increased fish production and improved market conditions have led to higher overall profits.

[13] And introduction of Monosex tilapia

Overall, while increased production and market-based sales have positively impacted profits, the rise in costs, especially feed, has limited the extent of improvement in profit margins.

4.5.3 Synthesis of findings on outcome 2.

The discussions with WF and NGO staff and private companies indicated some positive developments in building market awareness, increasing business skills and creating viable enterprises, including by women entrepreneurs. Sales of fish from smallholder farmers have increased through market linkages with private sector outlets.

Part of this success was attributed to the previous and current work of WF in developing aquaculture systems and supporting more direct relationships between producers and sellers in the aquaculture value chain to increase the benefits to farmers. Actually realising these benefits is a slow process, which depends on further expansion of businesses and sufficient market incentives to encourage companies to source from smallholders and for more smallholders to engage in market supply.

Discussions with farmers highlighted their view that fish production, volume of market sales and profitability had increased since the start of the project, generating additional income. This was attributed to the uptake of better practices and technology. However, increased costs of inputs have limited profit margins, while rising food prices have affected the cost of living. Not all project participants had the opportunity to link with private companies buying fish. Many continue to rely on their local community and agents for information about selling fish,

4.6 Primary outcome 3: Quality, reach, efficiency and sustainability of extension services increased and enabling policy environment.

4.6.1 WF, NGO and partners perspectives on implementation and changes – outcome 3.

This objective aimed to increase the quality, reach, efficiency and sustainability of extension services through an innovative approach working with private sector and NGO service providers. Training and support were provided to local service providers (LSPs) to enhance farmers' access to inputs and information on best management practices, nutrition, women's empowerment, credit and potentially, offtake.

An important initial stage in the project was the signing of agreements with partners to train local service providers. Agreements, covering 12 months (later extended to 15 months), setting out respective roles and expectations, were signed with two NGOs in 2019. In 2020, partnerships were established with a company providing business training for entrepreneurs and a digital service provider. Two further partnerships with private sector feed and hatchery companies were agreed in 2021, but these were working in 'open' areas, not in the T1 and T2 areas.

- LSP selection criteria and recruitment (WF & NGOs).

The initial identification of potential LSPs was done by WF (113 LSPs) and the NGOs (20 LSPs each) on the basis of their knowledge and contacts in their operational areas. In the second phase, from January 2021, to reach their target of 500 LSPs each, the WF and NGOs field staff liaised with the upazila and district fisheries offices, local leaders,

existing LSPs, and conducted market surveys to identify individuals. A list of names was screened and scored by their field staff against the selection criteria for LSPs (Table 7) via mobile phone calls or personal visits, then a short list was compiled.

In the second phase, the same criteria were followed, but with some modifications. Effort was made to widen the scope and size of the LSP businesses recruited. The initially recruited LSPs were mainly fish feed sellers and fingerlings producers, but larger scale feed dealers and fingerlings traders were targeted, to expand the scale of operations. There were consistent accounts of the operation of the LSP selection criteria among both WF and NGO project staff (for T1 and T2). It was more difficult to find LSPs in areas where aquaculture was less predominant.

Table 8: LSP selection guidelines developed by WorldFish

Must Have
• Active aquaculture/agriculture input value chain actor i.e. professional input trader (feed, seed, etc.) year round • Education: Minimum class eight, in general higher the better • Permanent resident of the community • Previous experience with related subject matter • Well-accepted among community people • Good communication skills • Self-motivated • Professional attitude
Good To Have
• Age: 18 years to 45 years (flexible for potential candidate/s and youths will be given preference) • Has experience in fish farming/trades/inputs selling • Good interactions with farmers • Interested in serving their community (volunteer attitude) • Priority is given to advanced/lead farmers developed by respective extension departments. • Willing and interested in serving the farmer while doing business/supplying inputs. • Willing and interested to organize farmer groups and provide formal/informal/need-based training. • Willing and interested in helping farmers to build their service-acquiring network. • Work experience with WorldFish or other NGO-driven projects. • Has a mobile phone or similar technology literacy • Has the financial means to accept a moderate level of business risk. • Has the qualities to play the role of a polymorphic thought leader.

The project learned that businesses have very different raationales and scale of operations which affected their motivation to become an LSP:

> *…we suspect that these … medium size LSPs are not into farmers' training, they are selling a large amount of seed. … The small LSPs are engaged more with farmers - we see their potential … but we also have the prize of larger LSPs, … because these have other kinds of political interests. They want to … build social capital. So, they are very active in training farmers. — (WF 2)*

Criteria and flexibility in application.
Trade licenses were not specifically considered a requirement for LSPs in phase 1, but in phase 2, LSPs were strongly encouraged by WF and the NGOs to apply for them and were assisted in making the connection to the appropriate issuing authority. This message was reinforced during training – that a license facilitates access to financial and other support. Donors also encouraged the acquisition of trade licenses as a means of ensuring accountability of private sector companies.

Mobile phone ownership was a desirable criterion, but *smart* phone ownership was not specified. This created problems for some LSPs in accessing online platforms. The educational specification was also applied flexibly where effective business people and village level seed traders had only primary level education. Similarly, the age limit was applied flexibly where older people were actively working.

Recruitment of women LSPs was a challenge (see section 5.5.1). The criteria were applied more flexibly in the case of interested women, particularly in terms of educational qualification and years of operation. Ideally, an LSP should have been engaged for a minimum of three years in their business, but where businesses were actively operating and were accepted in the locality, they were included, as were dealers with long established animal feed business but who were relatively new to aquaculture.

The second phase LSP recruitment targets were achieved. A total of 2,120 LSPs were recruited (WF – 598, BRAC – 488, TMSS – 521) with 513 LSPs recruited by private sector partners for 'open' areas. 30 female LSPs were recruited, many of them nursery operators.

- Training and capacity building of LSPs

The approach to LSP training and the modifications made (reduction in training duration, simplification of materials etc.) as well as adjustments to cope with COVID 19 are discussed in 3.5.1 above. The first LSP training in 2020 was in-person and included practical sessions.

> *In the first phase, they were trained directly in the classroom. Then we had … workshops, we went to the pond and had some practical sessions; how to check the pH of the pond water, how to check the natural food of the pond, what are the features of an ideal pond. — [NGO1.2]*

In the second phase, some online training was delivered to small groups of LSPs, with support from WF field staff. Online training of trainers was conducted by the NGOs, but their subsequent LSP training was in-person in small groups. The topics spanned prestocking, stocking and post stocking, including, stock management, fish species selection and combinations of types of fish, stocking density, water purity testing, transporting and handling baby fish, observation on oxygen levels, diseases, fish feed quantities, fertilizer application, marketing etc.

The field level training for LSPs was supported by WF and NGO staff, and the District Fisheries Office, Upazila fisheries officer, fisheries extension officer and the Government Hatchery Officer were invited as resource persons. For nutrition training, a nutrition technical person from the Bangladesh Government was invited. The training established connections between LSPs and WF and the NGOs as continuing sources of advice and support:

…they [LSPs] try to reach us for any problem. … if any complaints come from the field or any request comes from field for pond visit, our staff can go there … and try to solve this problem. — (NGO 1.4)

A difference between the NGO and WF LSPs was that the NGO LSPs worked in the context of the already established NGO programs for health, nutrition and aquaculture. WF LSPs worked as individual entrepreneurs, although monitored by WF field staff. This was not considered to be a major difference, as all were following similar criteria for the operation of their training activities.

- Degree of LSP's knowledge enhancement by training and support

The views of key informants were explored on how far training of the LSPs was successful in increasing LSPs knowledge and capacity to provide extension services to farmers and motivated them to train farmers on the different topics. The training on aquaculture practices was considered to be well understood by the LSPs. Discussions in the training sessions were important in encouraging learning, both acquiring new information (vegetable farming at pond edges, pond preparation and stocking rates) and correcting some former practices.

They learned real things from us … something[s] they actually do not know, so it helps them a lot … they used a lot of medicines, unknown medicines or motivated by some business companies [to] use their products. From our training, they started to use less medicine or no medicine … we saw the change. — (NGO 1.4)

They thought that the more they [stock], there will more production but [it's] not like that. There is a break-even point on how much should be [stocked] in comparison to the size of the pond.

WF and NGO staff considered the training to have been successful in supporting the development of the LSPs and increasing their skills, confidence and profitability. Examples were given of success of their LSPs which were reported during refresher training.

A fish farmer approached the LSP and wanted to buy 160 kg fingerlings ... Then the LSP asked the fish farmer about the size of his pond. He already knew the fish farmer but never knew about the pond - this kind of concern came after working with us, the "IDEA Project". Then he gave the fish farmer only 40 kg fingerlings, whereas he had wanted to take 160 kg. The LSP was able to convince the fish farmer that he had to release the fish under proper management and at the right concentration. If the fish were released at a higher density, their growth would be less. However, the growth of his fish was higher than last year, almost double and the feed that would have [been used] in feeding 160 kg of fish has also been reduced. Where he used to give 30 kg of feed, now he now gives 10 kg. … [previously] there is a possibility of fish diseases and gas accumulation in the pond, but this time these problems did not occur. For that fish farmer, that LSP has now become a role model in his union. That LSP is now like a public representative and people come to him for help in that union. Fish farmers come to him and get all kinds of suggestions on fish farming, not only those who are in our practice group, but also more people come to him. The number of his customers has increased…. his business has been expanding day by day. [NGO1.2

- LSPs strategies for training and engagement with farmers

The strategy for LSPs to engage with farmers was modified after phase 1 to ensure wider coverage. Initially, the 40 NGO LSPs and the 113 WF LSPs, each worked with four groups of 25 farmers, reaching approximately 15,300 farmers. In phase 2, 1,500 LSPs (500 from each NGO and from WF) worked with a 'practice group', training 20-25 farmers who would in turn reach others, to make a total of 300,000 farmers. To meet the overall target of 450,000 households, WF worked with private sector partners in the 'open' areas.

The LSPs received information materials to support their training, e.g. festoons covering different themes in aquaculture management and nutrition. The training materials – training module, guidebooks and festoons have helped LSPs communicate with farmers.

The project areas under the NGOs had an additional source of nutrition information provided by their health workers and health program staff (about 600), who were also trained by the project.

> *[fish farming households] received nutrition training in both ways. Mainly [men] received the training from the LSPs, and household members received nutrition counselling through our community nutrition workers. — (NGO1.3)*

These workers were also tasked with reaching non fish farming households in the communities.

- Information sharing beyond selected farmers

LSPs had direct responsibility for training their practice group. However, some of the training sessions included some additional people, including household members. LSPs advised the trained farmers to disseminate the messages to nearby farmers. The LSPs also provided ad hoc advice to others, including neighbouring fish farmers and their customers in villages and in their retail outlets etc.

> *If someone passes by, suppose it may be one of his brothers, or one of his uncles that has a problem in his aquaculture and they are talking about the problem, no LSP can say no to them. They talk and give advice. When our staff go to the field - if there is any problem in that area …, if anyone asks, then they give advice on that aquaculture problem. — (NGO1.1)*

- Extent of farmers' knowledge and capacity enhancement by LSP's extension services

The project received much informal and anecdotal feedback on the effectiveness of the LSPs, and the differences made to farmers, but it was difficult to systematically assess how effective they were. Sources of information were the records of training and numbers of farmers involved and reports from field staff with their observations of changes in practice.

> *…Earlier, when we selected them in Phase-1, we found that an LSP, say, had one pond but, now he is cultivating in 3-4 ponds, in some cases 8-10. After receiving the training, they have been able to increase their skills and so their business. We have found this in our field visit. — NGO 2.1*

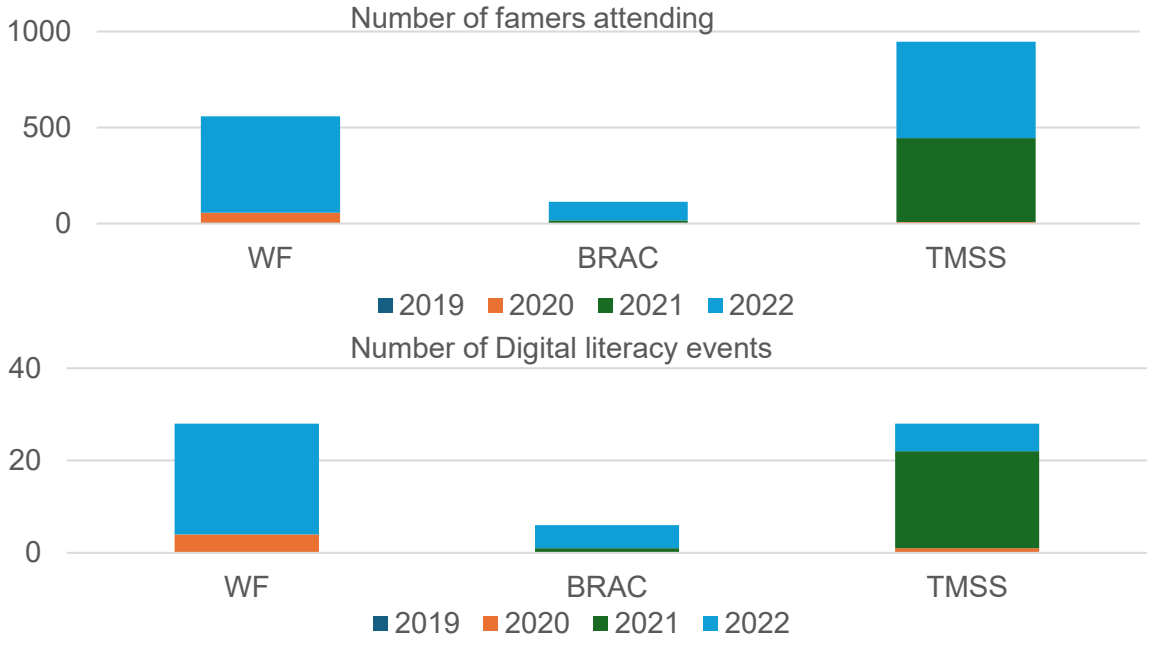
The people of this region used to [put] dung in ponds when fish farming which is strictly forbidden. … Firstly, since we did this training, they are no longer using any kind of dung in aquaculture. Secondly, they used to [use] gas tablets for fishing but, now they say that [since] they came to know that eating fish killed by gas tablets is like eating fish with formalin, no one has used them. They had three thousand fish in their aquaculture earlier, with 300 gram weight of per fish. They did not know how much food would be needed in that aquaculture, since the fish remained under water they didn't see them. After harvesting, they got less profit. The reason is that 80-90% of their money had [gone] on food expenditure. Now, after the training, aquaculture is becoming very profitable for them. Their expenses have come down, their income has gone up a lot. They have learned from us how to give fish feed, and they are now practicing this new knowledge. They used to use different medicines, which are completely forbidden for aquaculture. Now they are not just applying the new knowledge, but are also advocating on our behalf to the people outside who come to them to buy fish fry, to buy food, to buy fish, They have applied it … after receiving training and now they are also practicing this outside. [NGO1.1]

- LSPs' and farmers' access to and use of digital information sources.

The use of digital means to provide information for LSPs and farmers was increasingly emphasized as the project progressed, as a way for the project to reach as many farmers as possible, within a limited budget. After some initial searching for an appropriate company to support digital extension services, the project made an agreement with the company, 'The Right Kind', as a digital partner. One of the first initiatives was to establish a Facebook group, 'Right Fish', for aquaculture farmers and LSPs as an interactive platform where aquaculture, nutrition and gender experts from WF could provide information, conduct training sessions, and respond to farmers' questions.

The Right Kind, with support from WF and NGO staff, signed up LSPs and participating farmers to the Facebook group during the initial in-person training and conducted digital literacy training for farmers, reaching 1,618 farmers in 62 training events in T1 and T2 areas. In addition, 3,345 farmers were trained in 174 events in the Open areas.

Figure 5: Digital literacy training



Source: WF MIS

Facebook live training sessions were organised, and videos were put online (e.g. on the importance of fish, vegetable gardens, nutrition diversity and fish consumption, and adult nutrition). Video clips of successful female fish producers were shared, and a live session/ talk show on "Women's involvement in Aquaculture: Experience from the field". An important lesson arising from an understanding of farmers' usage patterns, was that 'bite' size digital content (e.g. 4 mins and less than 10 minutes) is more appropriate than videos of longer duration as farmers buy internet access in small top-ups.

The Right Fish Facebook platform has around 11,000 members (farmers, retailers, government officials), around 80% of whom are in the project area and 20% from Southwest, recruited under a different project. The project's private sector partners were not involved as members of the platform.

Further platforms, groups, websites and messaging were developed:

- Right Haat, a website where input suppliers could advertise inputs and services. It has about 2000 people registered and is expected to continue beyond the end of the project. Five partner companies bought space on the website. The ambition was to have a self-sustaining e-commerce site, where farmers could place orders and access market price information, this would depend on additional staff and funding.
- Doctor Fish, where a WF expert technical team addresses problems raised by fish farmers.
- A group for LSPs to communicate with each other on business and related information.

Other media used were:

- A WhatsApp group for male and female farmers, LSPs, and WF and NGO staff to share aquaculture and nutritional information.
- Use of SMS for nutritional messaging.
- The videos on social media were also shown in other contexts - in health centres (TMSS) and on dish channel/ cable TV, or in community meetings. Videos of the Forum theatre were also shown. Nutrition messages were shared in the scrollbar of the national TV channel.

- Factors influencing participation in and utilization of platforms:

Membership and targeting

Recruitment to the platform was through recommendation by WF field staff and LSPs, having established that applicants are genuine farmers with a smartphone in their household, owning a pond and to be in fish farming. Where possible, recruitment excluded farmers from control unions, but it is uncertain the extent to which that could actually be controlled.

Where COVID restrictions permitted, the LSPs and TRK field staff trained farmers in-person on using and engaging on Facebook. "W*e realized it is not possible to orient somebody on smartphone or Facebook or a Facebook group over phone."* (DG). Monthly reports provide information on numbers accessing the different Facebook pages.

Access to smart phones:
For a rural audience there was a problem of access to the internet and limited smartphone ownership (an estimated 10-15 % of aquaculture farmers and 40 to 45% of LSPs own smartphones). Internet speeds in many villages are very slow. The majority of farmers owned a mobile phone, but not necessarily a smart phone. Those that owned smart phones did not always make use of them outside their house. They were used in leisure time at home to watch videos and other material.

> *…they treat it like an asset, a prize possession. They don't carry it with them, they leave it at their house, maybe they lock it in their [drawer]. …They are aquaculture farmers, and their work is with water. That's why most of the time, they use their basic phone, not the smart phone. — (WF 7.1)*

Women's access to digital information
Several factors limit women's use of digital media. Smartphones are more likely to be owned by men. On Facebook, 89 percent of the viewers are male and 11 percent, female. Where there is a smartphone in the household, women may be able to use it in the house, but in other cases women are not allowed to interact on Facebook or WhatsApp with people outside the household. This depends on the specific situation and norms of the household. (WF2).

Use of digital information
A further lesson was that online information was more understandable for LSPs and farmers following face-to-face training. TRK helped farmers to understand how to search for information on the internet and to assess the quality of the information. Right Fish, unlike other similar digital platforms or YouTube, has quality checked contents. The membership of the Right Fish Facebook platform indicates potential large-scale use, but measurement of the reach and coverage poses difficulties. Viewer numbers of live sessions are a good indication (2000-3000 people). For other media, e.g. TV, membership of the cable network is known, but not actual viewer numbers.

Future directions
The digital community evolved towards a more interactive approach, a platform where farmers could ask for solutions. Key informants' views on the future were explored. Beyond the project end, TRK could continue without funding, but not expand or create new content. Potentially there are two options, either separately or in combination: for the digital services to continue as a sustainable stand-alone commercial venture, or as an alternative extension service provider with donor or government support.

4.6.2 Farmers & community perspectives on implementation and changes – outcome 3

- Farmers experience of training from LSPs

Types of advice and other services received from LSPs:

- LSPs played a crucial role in supporting fish farmers by providing a range of services, advice, and assistance. But the effectiveness of this support varied.
- Farmers sought advice from LSPs on various aspects of fish farming, including nutrition, diseases, and general practices. LSPs provided guidance on topics such as planting vegetables around ponds (dyke cultivation), feeding, and raising fish.

- Farmers contacted LSPs when facing problems or emergencies in their ponds. LSPs offer immediate advice and solutions, such as recommending specific medications, fertilizers, or procedures.
- Farmers relied on these LSPs for the procurement of essential materials for fish farming.
- Some LSPs provided information on market conditions and potential buyers for fish. Farmers were connected with markets through LSPs, although this aspect seems to have varied in effectiveness. A respondent from a T1 village of Rajshahi added, "*She knows what is good or not. She suggests us shops from where we can get good quality material."*
- LSPs offered technical support, including water testing for parameters like pH and ammonia levels. Farmers relied on LSPs to diagnose problems related to water quality and received appropriate advice.

- Farmers' group formation and mechanisms.

The process of forming groups by LSPs involved proactive home visits to identify and enlist farmers practicing aquaculture. The inclusion criteria[14] were minimal, primarily based on the availability of ponds. The groups formed initially received training, with a system in place for expanding the number of groups.

BRAC: The LSPs visited farmers' houses who could potentially join the groups and noted down their names. A respondent from a mixed group of aquaculture farmers in a T2 village in Rangpur stated *"She [LSP] went to our home and noted our names" (FGD_AQ).* There were no specific conditions or prerequisites that farmers needed to fulfill to join the project. The primary criterion for noting down names seemed to be the ownership of ponds. Another respondent from the same village added *"No, there were no such conditions... We have ponds, based on that she noted our names*" (FGD_AQ)

Initially, training and group formation began with a single group. Over time, this expanded to more groups, indicating an ongoing process of recruitment and organization.

TMSS: In certain cases, lists of potential group members were obtained from local administrative bodies like the Union Porishod[15]. This indicates collaboration between LSPs and local governance structures. A respondent from a T2 village in Rajshahi added, *"From the Union Porishod he got the list of us farmers"* (FGD_AQ)

The LSPs had a direct approach; they personally introduced themselves to the farmers and ensured a level of familiarity and trust by directly engaging with them at their homes. "*He came to our houses then asked everyone who is practicing aquaculture and took down their names*" mentioned a respondent from another T2 village in Rajshahi. (FGD_AQ)

[14] There was only one instance where a respondent mentioned a criteria:' … *you should have at least 5 decimal pond, better if this limit exceeds'.* [18-1-1]

[15] Union Parishad (UP) is the lowest tier local of government institution which provides services to citizens at their doorstep. It is the only institution to ensure good governance, development planning, implementation, transparency, and accountability for rural areas in Bangladesh. *Understanding the Effectiveness of Union Parishad Standing Committee: A Perspective on Bangladesh*. (2017, November 7). South Asia@LSE. https://blogs.lse.ac.uk/southasia/2017/11/07/understanding-the-effectiveness-of-union-parishad-standing-committee-a-perspective-on-bangladesh/

- Farmers' relationship with LSPs (WF and NGOs). Access to information and advice by men and women?

The respondents were often first contacted by LSPs who were familiar to them due to prior interactions or community ties. In several cases, LSPs were well-known in the community either through personal relationships or professional engagements related to aquaculture and related activities. This familiarity likely facilitated smoother initial engagement and trust-building for the project.

A female respondent from a T1 village in Rangpur, stated that she already knew the LSP through meetings at the school premises. Another female respondent from a T2 village in Rangpur mentioned that the LSP(s) who influenced respondents' participation, were associated with BRAC and known for their roles in the project. In another case, the LSP was their neighbor, who the farmers had known for most of their lives.

There is a trend of calling the LSPs when there are any problems with the fish or pond water, such as fish floating or needing ammonia. Generally, the men of the house contact them, but there is no gender-based restrictions; women can also speak to them about issues around the ponds.

While most respondents were fairly in touch with the LSP(s), a few others didn't have their contact numbers and only attended the training or interviews when other farmers they knew had joined.

- Farmers' access and use of digital media. SMS messaging, Facebook, WhatsApp, video, The Right Fish platform.

Respondents mentioned receiving information through SMS from BRAC regarding nutrition and fish consumption. Another respondent from a T2 village in Rangpur mentioned support and advice provided through phone calls; they addressed issues like fish feeding, sunlight impact, and medication through these calls.

Responses from different T2 villages in Rangpur vary. While some respondents acquired aquaculture information through Facebook and YouTube, others noted not owning smartphones, consequently missing out on information shared through Facebook groups, which WF utilized for disseminating knowledge, comments, and feedback on aquaculture practices.

Challenges faced in using training materials.
Respondents generally expressed positive feedback on the materials provided, indicating an understanding of the content. Some found the materials easy to understand and valuable for their aquaculture practices.

One of the main challenges includes variations in training participation, slow internet connections that affect online activities, and occasional neglect of reading materials.

Challenges faced in accessing online platforms:
The challenges faced in accessing online platforms, particularly related to aquaculture and information dissemination, are mentioned below.

In a T1 village of Rangpur, some respondents, particularly women, do not have smartphones, which restricts their online access. Several female respondents shared that they do not use or own a “touch phone” or a smartphone, which would provide them the opportunity to watch or listen to the information shared on online platforms. When asked about it, one female respondent stated, “*I mean, I don’t have touchphone. If I had one, I would watch it in my leisure time like other common people. Since I don’t have a smartphone, I don’t have demand.”* (FGD_GN-F)

The absence of internet connectivity for some, as mentioned by the female respondents, indicated a barrier to accessing online information

Another challenge faced by respondents from a T1 village in Rangpur was the difficulty in reading messages due to incompatible mobile formats. Male respondents expressed their inability to comprehend messages or access nutrition-related information because of the limitations of their mobile devices. One of the male respondents pointed out issues with the language formatting of mobile phones, “*The messages are written in Bengali, this mobile does not support Bengali.”* (FGD_GN-M)

The respondents of another T1 village of Rangpur revealed a lack of awareness and understanding of online platforms like Facebook and WhatsApp among the people. They mentioned that such technologies are better understood by the younger generation in their households, indicating a generational divide in digital literacy.

Respondents from a T2 village in Rangpur suggested that while some people associated with the project did not face issues accessing online videos, slow internet connectivity was acknowledged as a potential challenge. This implies that internet infrastructure limitations impact the access to online content shared by WF.

The focus group discussions with respondents from T1 villages in Rajshahi highlighted that women may be less familiar with using touch-screen mobile phones, potentially resulting in reduced participation in online activities. Respondents in a Facebook group might not actively engage with content or comments due to factors such as a lack of understanding or time constraints.

In the T2 villages of Rajshahi, the absence of smartphones in respondents' households has resulted in reduced engagement with online platforms. Additionally, respondents exhibit reluctance to adopt online tools such as the Right Haat platform, despite being aware of its existence. Their preference for traditional methods of ordering fingerlings suggests a resistance to transitioning to online services.

- Extent to which farmers knowledge and capacity was enhanced by extension services provided by LSPs

Farmers' knowledge and capacity were indeed enhanced by extension services provided by LSPs, but with varying degrees of satisfaction compared to government services.

Timelines and Accessibility: Farmers from the T2 villages in Rangpur expressed that information and assistance from LSPs were received more quickly and conveniently compared to government services. The process with government services was perceived as slow, with delays in activities such as fish growth checks and marketing assessments

Comprehensive guidance: LSPs provided comprehensive guidance covering the entire process from pond preparation to fish marketing. This detailed support was appreciated by the farmers as it helped them manage their aquaculture practices more effectively.

Quality of Training: Farmers from a T1 village in Rajshahi compared various training programs and found that both government and LSP training programs had their strengths. For example, LEAF training was appreciated for its financial support and practical demonstrations, while WF training was noted for its comprehensive content.

> *"The LEAF training gave us money and food; we don't get money from the WF trainings. The LEAF one takes us outside and there are demonstrations done by the ponds. I feel the WF trainings should also provide some money… We can be open in both, but since Latif bhai [LSP] a local person, it is easier to raise doubts here." — (FGD_AQ)*

Technical Support and Problem Resolution: There were mixed opinions on the technical support provided. Some farmers from the T1 and T2 villages of Rajshahi felt that government officials had more technical knowledge and provided reliable advice, while others appreciated the prompt and practical assistance from LSPs. Issues like water pH testing were mentioned as areas where support from external companies was sometimes necessary due to the lack of immediate and accurate government assistance.

A farmer from a T1 village of Rajshahi mentioned not getting proper technical assistance, the respondent added:

> *"Yes. We have to call them from our other company and contact them or we have to accept their advice, but we are not getting this help from World Fish, because they are not able to test the water so, I am not accepting the advice."*
> *— (FGD_AQ)*

Despite some shortcomings, many farmers valued the personalized and immediate support from LSPs. They found it easier to communicate with local service providers who were familiar with their specific situations and could offer tailored advice.

4.6.3 Synthesis of findings on outcome 3.

The revised LSP recruitment targets were achieved (a total of 2,120 LSPs) including 30 female LSPs. LSPs were convened for training, either in person or with online resource people, supported by project staff. WF and NGO staff considered the training to have increased LSPs' knowledge, skills, confidence and profitability. LSPs recruited farmers and formed groups for training purposes. The NGO project areas also received nutrition information from their health workers who were trained by the project. WF field staff diaries indicate the extent of coverage of training sessions and the topics addressed. LSPs provided a range of services, with some variation in their effectiveness. The project received informal feedback on the LSPs, from field staff and farmers. Farmers appreciated the personal relationships established, the ease of contacting the LSPs for advice and the speed of response. The comprehensive coverage of the entire fish production process was particularly valued. In comparison, some strengths of Government extension services mentioned were financial support, practical demonstrations, and their technical knowledge.

The project provided LSPs with access to information through digital platforms and for farmers through LSPs. The Facebook group, “Right Fish”, by the end of the project had around 11,000 members, with live sessions viewed by 2000-3000 people. Other initiatives included the Right Haat website where input suppliers advertise inputs and services, and information services through Doctor Fish, a WhatsApp group, SMS, phone calls and TV channels. The reach of digital communications was limited by uneven internet coverage and lack of smartphone ownership, particularly among women. Farmers’ use of platforms for market transactions requires further familiarity with, and confidence in the service. Digital services could potentially continue as a sustainable stand-alone commercial venture, or as an alternative extension service provider with donor or government support.

4.7 Primary outcome 4: Consumption of nutrient-rich foods, including fish and fish-based products improved

4.7.1 WF, NGO and partners perspectives on implementation and changes – outcome 4.

Nutrition training was delivered by WF and the NGOs to LSPs, NGO field staff, community health workers (BRAC), Health Clinic staff (TMSS) and private sector partners, who in turn trained farmers, household members, nursery owners and seed dealers. The content of the nutrition training was developed in consultation with BRAC training unit, drawing on their experience and on government nutrition guidelines and WHO guidelines on infant and maternal nutrition and nutrition for adolescent girls. Training for the LSPs included nutrition, homestead gardening and the importance of small fish cultivation and consumption. WF recognized the need to support LSPs in this training:

> *LSPs … are not very much comfortable to discuss nutrition and gender issues because they are the businessmen, so they are more comfortable to discuss the agricultural issues. — (WF3.1)*

Hence the need for appropriate training materials to be developed for use in all the project intervention areas. These included videos, posters and festoons. Prior to release of materials, discussions were held with nutritionists, the NGO teams and LSPs to get feedback on the design and ease of use.

Novel areas in the messaging focused on micronutrients and achieving a diverse diet, emphasizing the importance of preparing, cooking and eating small fish, including the heads and eyes, and encouraging the cultivation of nutritious vegetables on pond edges. A local fisheries officer remarked on the influence the project was having:

> *… what happens if we eat small fish, we get whole nutrients as we get the whole body parts of these small fish. In this regard, they have also inspired the fish farmers in the village, and the households. The different types of households that need the supply of nutrients …, have been encouraged. Small fish farmers have [been] given importance — (Gov 1)*

Channels through which these messages were disseminated included LSPs training sessions, display of information in LSP’s shops, training forums held by NGOs, courtyard meetings to disseminate nutrition information, ‘demonstration’ plates and bowls of food

illustrating portions of different foods for dietary diversity of a young child, and cooking demonstrations. To overcome unwillingness to feed small fish containing bones to young children, the project produced a video showing the preparation and cooking method. Other media included local television, SMS, five video clips for showing on local TV, a Facebook platform (11,000 registered) and a website (2000 registered).

Private sector companies played a role in nutrition communication with support from WF. Apon Wellbeing's shops and factories shared nutrition information through video, SMS, banners, posters and leaflets. Factory floor managers gave direct advice to workers, and advice was given to customers. Bengal Meat provided nutrition information through their social media channels, video, SMS messaging and displays in their shops.

- Evidence of changes in knowledge and consumption behavior

Key informants were cautious about claiming any nutritional changes as a result of the program at a relatively early stage but were confident from interactions during monitoring visits that there had been an increase in knowledge relating to the importance of fish and its role in dietary diversity. " … *they are not only thinking about profit generation but also having the nutrition/ nutritious food on their plate. So, this introduction of small fish cultivation was (I think) one of the achievements from our intervention*". (NGO 1.3) The WF nutrition specialist indicated the long timeframe needed to see significant behavior change and nutritional outcomes and that a change in knowledge does not automatically lead to behavioral change unless people perceive they have the means to make the actual change

In addition, the issue of distribution of food within the household was highlighted, which depends on the power structure of the household. This was recognized as important, but it is not clear how comprehensively this aspect was covered in training. Food preparation practices which the project had tried to influence, (e.g. cutting vegetables larger to avoid nutrient loss, taking time to feed children under 2 years) were not always taken into regular practice.

- Spreading nutrition messages beyond the aquaculture project

The nutrition messages are being included in the rest of the NGO's programs, including health programs and children's programs. The NGO community health workers are covering non fish farming households in their nutrition work and the private sector partners are disseminating messages through their retail shops, largely in urban areas, largely to non- farming households.

4.7.2 Farmers & community perspectives on implementation and changes – outcome 4

- Nutrition messages or recommended practices under IDEA that farmers received.

Male and female focus group respondents from the selected villages of Rangpur and Rajshahi, shared the nutrition-related messages conveyed by the IDEA project staff and LSPs. The respondents were initially informed about the importance of consuming a diversity of nutritious foods, such as vegetables, fish, eggs, milk, chicken, and beef, with an emphasis on maintaining a varied and balanced diet. Despite many participants claiming prior knowledge of these foods, there was a recognition of gaps in understanding the specific quantities required for optimal nutrition.

A female respondent from a T1 village of Rangpur mentioned being informed about the consumption of nutritious foods such as vegetables, fish (including Mola and Dhela fish), eggs, milk, chicken, and beef. They were informed about the benefits of small fish, such as their high content of vitamins, calcium, and iron, contributing to disease resistance, improved memory, and eye health.

While some female respondents from T1 villages in Rangpur asserted that they were already adhering to a diverse diet, the information provided through the project significantly increased their awareness. The primary focus was on comprehending and rectifying any mistakes in their dietary practices. Interestingly, female respondents reported little difficulty in implementing the nutrition-related messages, underlining the necessity of daily food intake for survival.

- Practices incorporated and changes in behavior

A male respondent from a T1 village of Rangpur mentioned that they heard about cultivating vegetables on the pond bank before the World Fish (WF) project. He adds, *"I heard it before, I got message before, and at the same time an NGO called 'Samakal' " came, gave us the seed, we're cultivating now. It has motivated us to do that since we got a message, it has already had an effect." (FGD_GN-M)*

Some female respondents from a T2 village in Rangpur mentioned that after receiving additional information on nutritional practices, they now feed Mola fish to their children, which they didn't do earlier. There has been an increase in the consumption of small fish types like Mola after the training, attributing the rise to the nutritional value of these fish. Another female respondent adds her aversion to meat and preference for fish, stating, "*There is so many problems in meat, it creates allergy, increases blood pressure, creates gastric issues, but fish do not have any problem, it is good than meat. So, we prefer fish over meat*." (FGD_AQ)

- Is uptake of these practices more difficult for certain types of households?

The uptake of nutritional practices can indeed be more challenging for some households compared to others.

> **Income levels**: Households with lower income levels may struggle to afford nutritious foods like fish, meat, milk, and vegetables, which are often perceived as expensive. Financial limitations can hinder the ability to buy these foods regularly, leading to nutritional deficiencies, especially in children. [T1]
>
> **Cost of ingredients:** High prices of essential ingredients, such as cooking oil, further exacerbate the problem. For instance, the cost of oil can consume a significant portion of the household budget, leaving little for other nutritious foods.
>
> **Lack of Knowledge**: Some households may not be aware of the nutritional value of certain foods, such as taro leaves or spinach, which can be grown at home at low cost. This lack of knowledge can prevent families from utilizing available resources effectively.

- Changes in frequency and amount of consumption of fish and fish products - SIS and non SIS species. (T1 T2, Control)

Cultivation and Consumption of Fish: The respondents from a T1 village in Rangpur actively cultivate and consume various types of fish, including Mola, Daika *[small type of Mola],* Rohu, and Tilapia. These fish are not only a part of their diet but also a source of income and social exchange. Small fish like Mola and Daika are highlighted as particularly nutritious, also improve eyesight and are cultivated in their ponds. The seasonal availability of the fish also plays a role, for instance, Mola fish are more abundant during the rainy season.

Rohu and Tilapia are cultivated in larger quantities, with substantial weight increases noted over time (e.g., 10 kg of Rohu fingerlings becoming 40 kg). The respondents also eat and sell these fish and distribute them to relatives.

Nutritional Awareness: The respondents demonstrated a significant awareness of the nutritional benefits associated with fish consumption. Mola and Daika were recognized as more nutritious compared to other fish, containing essential vitamins and minerals such as calcium and protein. Fish is considered important for everyone, especially for small children, pregnant women, and lactating mothers due to its nutritional content, which supports physical growth and replenishes nutritional deficiencies.

Challenges: While the respondents know about nutritious foods, economic limitations hinder their access to a diverse diet. This is illustrated by their reliance on affordable foods like "panta" (water-rice) with onion during special occasions when more affluent options are inaccessible. Among these economic limitations are:

- **The cost of fish,** which is a notable concern, impacting both consumption and the type of fish eaten:
- **Market Price:** The price of fish like Mola and Dhela can be high (e.g., 80 to 100 taka/BDT per 250 grams), making them less accessible, especially when sourced from the market rather than their ponds.
- **Impact of the pandemic:** During the pandemic, the price of nutritious foods, including fish, increased, further straining the respondents' ability to maintain a nutritious diet.

- Comparison of nutritional knowledge and behavior of T1 and T2 groups with Control group.

Respondents from the **Control villages** of Rangpur and Rajshahi consume a variety of fish, both small and large, as a staple in their diet. Fish is eaten almost daily, often more frequently than meat due to its cost-effectiveness. Many households cultivate fish in ponds, ensuring a consistent supply. Commonly cultivated species include Rui, Katla, and Tilapia. Indigenous fish are also consumed, and their importance is acknowledged. Mola fish, for instance, is recognized for its nutritional value and taste, and participants in the discussion noted that its consumption should be increased.

Respondents mentioned various fish preparations, with specific fish species preferred for different age groups and purposes. For example, the consumption of small fish, and especially small fish heads, was considered to be important for young children, contributing to their growth and nutritional needs, while larger fish are preferred for the elderly.

The control group discussion highlighted their awareness of the nutritional benefits of small fish, such as the higher vitamin content, including Vitamin A and Vitamin D, which are beneficial for children. A female respondent from Rangpur stated, "*Small fish have more vitamins for kids, including Vitamin A and Vitamin D. So, they need to be fed with small fish*." Fish is also considered essential for addressing deficiencies such as iodine deficiency and is believed to benefit eyesight. Fish is valued for its high protein content and its role in meeting human protein needs. There is an awareness of the need to reduce fat intake, with fish being a preferred low-fat protein source.

There is limited formal advice on fish and nutrition; most knowledge is passed down through family and community practices. Pregnant and sick individuals receive special attention in diet planning, with a focus on providing affordable, nutritious food like vegetables and fish.

Awareness of the nutritional value of fish and small fish among participants in the project and the control group appeared to be similar. However, project participants gave more examples of actual behavior change, for example, increasing small fish consumption and feeding them to children,

- Impact of IDEA project training

The training provided by the IDEA project has significantly deepened the respondents' understanding of the importance of fish and encouraged its consumption. They have learned about the nutritional benefits of various fish species like Mola and Dhela, leading to increased consumption. One respondent mentioned, *"After World Fish (WF) training, I realized that fish is also a good food. Among different types of fish, there are 'Mola', and 'Dhela'.*" This indicates an increased awareness and appreciation of the nutritional value of small indigenous fish.

4.7.3 Synthesis of findings on outcome 4.

Training on nutrition was delivered by WF and the NGOs to LSPs, NGO field staff, community health workers (BRAC), Health Clinic staff (TMSS) and private sector partners, who in turn trained farmers, household members, nursery owners and seed dealers. Appropriate training materials were developed in consultation with partners, for use in the project intervention areas. The content drew on nutritional guidelines from the government and WHO. Novel areas in the messaging focused on micronutrients and achieving a diverse diet, emphasizing the importance of preparing, cooking and eating small fish, and encouraging the cultivation of nutritious vegetables on pond edges. Nutritional information was displayed in LSP's shops, private sector shops and factories, and shared through different media.

The project has increased awareness of nutritional value of fish - small fish in particular, and the importance of consuming a diversity of nutritious foods. Knowledge of the nutritional value of fish and small fish already existed to some extent among project participants and non-participants, however, the former gave more examples of actual behavior change, such as increasing small fish consumption and feeding them to children, which had not been done previously. In some areas, people were familiar with the recommended practices on nutrition and vegetable gardening, but the project brought encouragement to implement change. Key informants were confident from their

monitoring visits that there had been an increase in knowledge relating to the importance of fish and its role in dietary diversity. However, they were conscious that a longer timeframe is needed to see significant behavior change and nutritional outcomes. Economic factors influence uptake; access to nutritious foods can be more challenging for households with lower incomes. Appropriate distribution of food within the household is also important for nutritional outcomes.

The nutrition messages are being included in the NGO's other programs, including health programs and children's programs.

4.8 Primary Outcome 5: Empowerment of women engaged in aquaculture production and fish value chains increased.

4.8.1 WF & NGO perspectives on implementation and changes – outcome 5.

- Gender strategy

The gender scoping study conducted at the project outset informed the design of gender related activities and was a benchmark against which subsequent findings and developments were compared. The women's empowerment component aimed to involve more women as fish farmers and entrepreneurs, to contribute to their empowerment and their nutritional status and that of their families. Women's income generation was seen as enhancing their decision-making role within the household. *Basically, when women can earn, they will have the power to take decisions in the family (NGO 2.3).*

The project developed a good understanding of women's roles in aquaculture, and good awareness of the social norms influencing women's activities outside the home and affecting perceptions of activities such as market engagement. This scenario discourages women, particularly younger women, from taking up training opportunities. Few women have ownership of ponds.

The approach developed both gender inclusive and gender targeted activities. The project supported the capacity strengthening of women as fish farmers, as LSPs and potential change agents and entrepreneurs. It sought to stimulate gender transformative change by encouraging reflection and discussion on gender norms, gender and decision-making power and access to resources.

Gender has been regarded as a cross-cutting issue within the project interventions and is also now mainstreamed within NGO partner programs, with a commitment to improve inclusion of women and children. Perspectives on the gender empowerment component from the key informant interviews are discussed below, focusing on how the project addressed the challenge of reaching women - in LSP recruitment, farmer training and participation in aquaculture, and the actions taken to bring about more transformative change for women's empowerment

- Recruitment of women LSPs

Of the total of 2120 LSPs reported by WF for the project, 30 are women. The reported numbers of female LSPs in 2021 were WF 6, BRAC 16, and TMSS 6. Identifying potential women LSPs was not easy, as many women working in aquaculture, despite having all the knowledge about fish-farming, did not consider themselves to be running a business.

Sales, income and profits are often managed by male members of the family. Nearly all the women LSPs have nursery businesses rather than being feed retailers or dealers, "*because this job they can do with their other household chores. But the feed selling or the medicine selling, they will not go that far. So, these are the culture and norms [that] restrict them from going for those type of activities. (NGO1.1.5)*

There was a high level of agreement on the challenges faced in recruitment of women LSPs, and strategies to overcome them.

Challenges to recruitment of female LSPs

- Lack of interest in fish farming business or fish farming. Some women operate small businesses e.g. grocery stores, less so in aquaculture
- Aquaculture is a male dominated activity and perceived as a men's job.
- Limited education and knowledge of business operation and linkages to aquaculture businesses
- Women active in aquaculture tend to see their contribution in aquaculture as part of their household activities rather than as a business.
- LSP selection criteria specified that applicants must be a fingerlings trader, a fish feed trader, a fish feed retailer, or a fish trader, running their own business. Few women met this stipulation - they did not do every job in the process and often husband and wife worked together.
- Traditional (familial and societal) beliefs and attitudes discourage women from working in aquaculture business, particularly from within the household.
- Issues around travelling for residential training and the suitable facilities
- Social restrictions on women's mobility in public, e.g. for marketing or group training.

To encourage women in the fish business

- Staff discussed the issue with the community members, to identify who are interested
- Supported women's initiatives and assisted financially or technically.
- Building awareness of benefits of women working in aquaculture business – earning money, benefiting the family and increasing her social acceptance.
- The project modified the LSP selection criteria to be more flexible.
- To change attitudes within the household, project staff talked to the family, building awareness on the benefits of women's participation.
- Provision of appropriate training arrangements and support, e.g. training venue near homes, flexible attendance, coaching, digital connectivity and Couples workshops.
- Promoting women entrepreneurs on the ground and introducing gender transformative approaches at community level.

- Gender training

Sessions on gender were included in LSP training from WF and the NGOs, covering gender roles, decision making and access to and control over resources, benefits of women's involvement in fish farming and how to increase participation. Gender training for LSPs had to be practically designed:

LSPs are not the development worker or gender worker, they are business persons who deeply understand the business like how to make profit, how to serve the people by selling things. So, we had to design this so that they get to know what they should do in order to ensure women's participation … — (WF4)

The LSPs in turn passed on the gender related knowledge to men and women farmers. Gender training materials were given to the LSPs for sharing with farmers. The training helped to counteract negative views of women's participation in aquaculture – "… *where the farmer training has been done, the participation of female farmers was more*". (NGO2.2). In addition, the NGO's nutrition and health workers were given a gender orientation session to cover food access and distribution issues within the households: The health and nutrition workers were not only covering fish farming households but targeting all women at household level, additionally through courtyard meetings, and cooking demonstrations.

Similar challenges to those listed above for LSPs applied to women attending training, with the additional difficulty for LSPs to contact female farmers who don't have access to a mobile phone. The LSPs went physically to invite them or contacted them through the husband or local health worker.

LSPs formed groups of fish farmers in order to deliver training. Some were mixed groups, some for women only and some only men. The proportions varied across the project. Training approaches to encourage women entrepreneurs, such as the Couples workshops (see 5.2.1) overcame social barriers by working with women together with their husbands.

- Gender transformative approaches

Gender transformative approaches were designed to address harmful norms and practices which are creating barriers to women's involvement in income generating activities and accessing resources.

Gender transformative approaches included exercises involving aquaculture households, their neighbors and community people, for example, the Forum theatre which raised awareness and stimulating discussion on gender transformative change and the board game LUDO, which communicated disadvantages of child marriage and advantages of women selling fish. Posters and videos were also shown. A consultant supported the development of the Forum theatre. WF staff member explained the unique characteristics of forum theatre:

Forum theatre actually identifies the problem, and the solution comes from the community … if we identify the problem associated with women's decision making or women's access to finance or women's involvement with aquaculture … then, the audience will come up with the solution, and based on that the performer will again perform their theatre. This is how it will work and this is interactive, connecting, and, at the same, time this is more like bottom-up approach. That's why we have chosen forum theatre. — (WF 4).

Forum theatres were held in public spaces, followed by question-and-answer sessions. 27 forum theatre events were held in the project areas, (20 in T1 and 7 in T2). 44 were held in

the ‘open’ areas. There were limitations in coverage relating to resource availability.

Other initiatives included a training workshop for Women Leads in Government, and live sessions and discussion on the Facebook page “Right Fish”.

- Increased decision-making power over productive assets, increased financial empowerment.

This was considered a more challenging area.

> *Maybe access to and control over resources is the most difficult thing for the people to accept in most of the cases. … people sometimes have a kind of insecurity feeling, like if my wife has the control over the resources then what would be the future of this property or she might ignore me or my social standard would be hampered. (WF4)*
>
> An interesting example of an initiative to support pond acquisition by a group of women was given:
>
> *…I would like to talk about one specific group which we formed in the beginning of this year. After a year-long negotiation with the government, we got a pond in Rangpur area. … we found 22 families are living there, so we formed a group with poor women from those 22 families. The group … was provided with technical training on aquaculture related issues and nutrition. Once the group had formed … with a president, secretary, and everything, then [they] initiated their activity with aquaculture. They themselves prepared the pond for aquaculture. That pond is seasonal, it does not have water all the year around. As a result, they had to manage external sources for water. They themselves bought fingerlings and stocked the fingerlings in the pond. They have bought feed; they are taking care of the fingerlings. Once they stocked 36 kg of different kinds of fingerlings, then …WorldFish gave them 5 kg small fish as a source of nutrition as a contribution. So, this group is being trained and provided support by our WF team and the group itself is growing fish. Hopefully in the next one to one and half months this fish will be grown up and the group will be starting to sell the fish. … If we have success with this group, we have identified two more ponds in that locality, so we will replicate this model in those two ponds as well, if it is successful. And of course, we will have different kind of learning from this pond - … based on this learning we will replicate this thing in other ponds. — (WF4)*

The project aimed to increase women’s access to credit but there were challenges for women to retain control of loans.

> *… we are really struggling to address this part, especially how to ensure 100 percent control of women of this loan amount. Because sometimes a woman’s husband decides that he needs to buy a van or start new business. Then, he pushes his wife to get a loan ... Then, she gets the loan, and the man actually goes ahead with his own purpose. — (WF4).*

Bank Asia were advising their field level officers to encourage female customers. 62% of Bank Asia’s customers are female because the bank disburses social allowances and

11% of customers taking loans are women. However, limited numbers took loans for aquaculture activities.

4.8.2 Farmers & community perspectives on implementation and changes – outcome 5

- Aquaculture activities in which men and women play important roles. Women's decision making over pond management.

In Rangpur, women's roles in fish farming primarily involve feeding the fish. They emphasized the importance of providing food on time for the proper growth of the fish; a respondent in the selected villages of Rangpur said, "*You need to give food according to the time, if food is not given on time, the fish will not grow."* In cases where men are not available, women take on the responsibility of feeding the fish. Men, on the other hand, are involved in tasks like cleaning and preparing the pond, as well as other labor-intensive activities.

Men are responsible for tasks such as collecting fingerlings, collecting, and maintaining the supply of fish feed, pulling the net, catching fish, and certain heavy-duty work. Women are involved in activities like feeding the fish, applying fertilizer, and lime, as well as taking care of household tasks related to fish farming.

- Main challenges women face if they want to become more involved in aquaculture-related work.

The main obstacles for women's increased participation in fish farming appear to be social and societal norms. There is concern about social criticism or gossip if women are seen doing certain tasks typically associated with men. A male respondent from Rangpur adds that, "*Socially, you are the head of the household, I saw your wife is cleaning. Then he might tell his wife- you should not go here, why did you go*?" (FGD_GN-M)

In the selected villages of Rangpur, a female respondent shared some obstacles women face in aquaculture. She said, "*The problem is, suppose we will pick up fish to eat from the pond today, Men is[are] not in the house, so we can't pick it up, that's a problem*." (FGD_GN-F) Another female respondent added that they need the men to release the fish in the pond, otherwise they can't do it. The need for separate meetings or training sessions for women to overcome potential obstacles in Muslim communities was also mentioned.

Women in aquaculture often have difficulty accessing finance/capital to purchase inputs such as fingerlings and feed. This can be a major barrier to entering the sector and to scaling up production.

- *Women's preferences* - agriculture (livestock, field crops, horticulture) or aquaculture, or other productive activities

In Rangpur, there is a consensus that women prefer to participate in aquaculture related activities rather than in livestock rearing or other burdensome activities. A female respondent from Rangpur mentioned, "*We prefer aquaculture more than agriculture. Besides, we are interested in gardening."*

The women have also received training on dyke cultivation, i.e., cultivating vegetables on the perimeter of the ponds. The respondent went on to add, "*Rearing livestock is challenging; it needs constant care. But for fish, there is no such burden*." Convenience and proximity to their homes seem to be a significant factor influencing women's preference for aquaculture.

They mentioned that aquaculture is close to their homes, allowing for easy involvement without the need to travel outside. A female respondent added, "*Since it is very near to our home, we can get involved in this easily. We do not need to go outside. We receive training related to this easily."*

There's a recurring theme of women in the community showing an interest in diversifying their income sources. Activities mentioned include raising livestock (cows, goats, ducks, chickens), gardening, and agricultural activities, demonstrating a willingness to explore alternatives to aquaculture. A female respondent from one of the selected villages of Rangpur added, "We cultivate fish, and we also have goats, cows, ducks, and chickens….".

The role of women in agricultural activities is prominent. Another female respondent mentioned that vegetable selling is primarily done by women. She further explained that they sell vegetables either from the school or directly from home, with wholesalers and neighbors being their customer base. (FGD_GN-F)

Several female respondents in Rajshahi mentioned that they prefer certain income-generating activities, such as cow farming, because they find them more profitable or convenient. The profitability of cow and cattle farming during Eid was specifically noted, as middlemen come to buy the animals from their homes. (FGD_GN-F)

- Access and control of productive assets**:**

Although there are cases where we see women do have ownership of ponds, often inherited, or acquired through familial connections, there is a recurring theme that most property ownership, including ponds, is generally in the name of husbands. A female respondent from a T1 village of Rangpur shares that she and her sister both own land.

The discussion around women's ownership of ponds indicates that some women have ponds registered in their names. Male respondents from a T1 village of Rangpur mention instances where women have rights to land suitable for pond construction, albeit the percentage is much less than men in village holding ownership.

However, there is no clear ownership of ponds by women in the village in the T1 village of Rangpur. Wealthy individuals, particularly men, have greater access to ponds). In certain cases, women in families share pond ownership, sometimes jointly with other family members. While some ponds are government-controlled, access is limited due to factional divisions.

Female respondents from a T2 village of Rangpur share that there are limited instances of women having ponds in their names; often given by husbands. No clear information was given on women's access to land for pond construction.

One male respondent from a T1 village in Rajshahi mentions the rare instances of women owning ponds, usually when husbands are absent. He adds, "*It is very rare [to own*

ponds]. Otherwise, women whose husbands migrate abroad, or other places (not present at home) do aquaculture by themselves. There are some women like this, around 4-5, in this IDEA project. " (FGD_GN-M)

Female respondents from a T2 village in Rajshahi share that there has been no evidence of women owning ponds; all property ownership, including ponds, is attributed to husbands. One of them mentions "*Such a thing is not in our possession. All ownership of any property, including a house, or pond, belongs to our husband*." (FGD_GN-F) . While the male respondents from a T2 village in Rajshahi share instances where their mothers have inherited ponds.

A respondent added, "*my mother is also an owner of our pond, by inheritance… yes, there are a number of examples. Mostly, they got it by inheritance." (FGD_GN-M)*

A female respondent from a T1 village in Rajshahi shared that, although she has ownership of land (a pond), she doesn't know exactly how much it is. This might indicate that, even though women have access to the land, they don't necessarily control it, as indicated by her uncertainty about the extent of land owned in her name.

- Financial empowerment, women's access to credit and challenges faced

The discussion focused on women's access to credit and the challenges they face in obtaining loans. In some of the selected T1 villages of Rangpur, it was observed that there was limited evidence of women obtaining loans. A female respondent mentioned attempting to secure a loan from Bank Asia but with no success, "*I have tried in [Bank] Asia, I would have benefited a lot if I got it, I was hoping but I didn't get it*." (FGD_GN-F)

Female respondents from a T1 village of Rangpur mentioned that they have been able to take loans from banks, sometimes from NGOs, etc. One respondent mentioned accessing a loan from Grameen Bank at a 10% interest rate, which is the standard rate. The loans are mostly taken for fisheries. Another female respondent noted that the amount taken as a loan, if invested, would be beneficial for them, as it would help in repaying the money within a year. She adds,

> *"No, no, but something has to be said. We cannot just take a loan; we have to repay it. Within 1 year we have to pay. It takes installments. As such, we do have a debt we have to pay, if we take it only it will not be effective and if I could invest this money, I think it would be to our advantage." — (FGD_GN-F)*

It is also highlighted that women who have an income source (e.g. Teacher) access loans.

Respondents from a T2 village in Rangpur indicate certain challenges of obtaining loans from banks and other institutions. These challenges include a high rate of interest and the risk of losing money or even having fish stolen from the pond, which would lead to an inability to repay the loan.

In Rajshahi, women avail loans through various institutions. A male respondent from a T1 village in Rajshahi mentioned that "BRAC, Caritas they give loans to women for vegetable cultivation, poultry rearing, goat rearing."

Female respondents from a T2 village in Rajshahi stated that women in the community have the opportunity to access credit from various NGOs, with a notable preference for NGOs over banks, especially when seeking smaller loans. The interest rates mentioned in these transactions are approximately 25 per 1000 taka (BDT). These loans are utilized for diverse purposes, including investments in aquaculture, showcasing the usefulness of the financial support provided by these organizations.

- *Communication of behavioral change*: messages received from project on household decision making, women's role in aquaculture, men's role in nutrition.

The discussion focused on men's responsibilities in nutritional decisions within families. There was a focus on men understanding nutrition-related matters, such as cooking and providing the right food during illnesses or pregnancy.

The female respondents from a T1 village of Rangpur expressed a lack of specific messages from the World Fish project regarding men's roles in nutrition-related tasks.

The male respondents from a T1 village of Rangpur discussed the positive aspects of women's participation in various activities. The benefits included easing the workload, strengthening relationships, and communal support. They also observed that religious and community factors played a role in accepting women's participation positively.

Further discussions revolved around joint decision-making between husbands and wives, with an emphasis on respecting each other's opinions. While the male respondents mentioned that they hadn't received any training or SMS from the IDEA project on working together in the house, they noted that this message has been spread by the missionary in their community. Limited awareness of specific messages from the World Fish project is noted, indicating that some changes were already occurring before the project.

Men's roles in ensuring nutrition, helping with household chores, and respecting women's decisions were explored. A female respondent from a T2 village of Rangpur mentioned:

> *"… during Ramadan, I was preparing many items for Iftar, my husband willingly lent his hand to my work. Then, say, our children do not have a certain seasonal fruit this time, I ask him to bring that, and we feed our children."*

There has been a positive change in men's behavior, as another female respondent stated,

"*Earlier, men and women did not have meal(s) together. But it* [was] *advised during the training to have meals together. What happened earlier is men had more; they weren't aware of women. Now, when we take our meal together, he notices what I am eating, he shares his meal (e.g. a piece of egg) with me. We have learned these things here in the training*." The acceptance of women's participation is discussed in the context of the community, with variations based on religious and cultural factors. External factors, like NGO initiatives and awareness programs, contribute to changing perceptions.

Male respondents from a T1 village in Rajshahi noted changes in behavior, such as increased support for women in household chores and providing care during pregnancy. These changes were often attributed to the influence of the training or project.

Challenges in implementing certain changes were acknowledged, with resistance noted in some families. Criticism of women working outside the home was mentioned as a significant barrier to acceptance. A female respondent from the T2 village in Rajshahi shared, "*Not all families accept it [men assisting women in household chores] with a positive outlook*." Another female respondent added, "*People could be critical of women who go to work. This is the main reason*."

Messages or recommended practices on household decision-making that have been given by the project and provided to farmers.

Joint Decision-Making:

- There is a recurring theme across the villages of Rangpur and Rajshahi of encouraging joint decision-making between husbands and wives. This involves deciding on nutritious food purchases, provision, and ensuring a balanced diet for family members.
- The IDEA project emphasizes the importance of husbands and wives consulting each other on matters related to food choices.

Men's Involvement in Nutrition:

- The project also highlights the role of men as guardians of the family, responsible for ensuring better nutrition. This includes activities such as helping pregnant and lactating mothers, actively participating in household chores, and being involved in decisions related to nutritious food.
- Men are encouraged to be aware of women, girls, and mothers' eating habits and to play an active role in providing nutritious food during pregnancy.

- Gender transformative approaches and communication channels. Forum theatre, video shows, online platforms etc.

The primary channel for communicating gender-transformative approaches was through structured training sessions in T1 and T2 villages of Rangpur. These sessions covered various topics such as aquaculture, nutrition, and the roles women could play in these activities. Topics like joint decision-making, shared responsibilities in aquaculture, and women's empowerment through economic activities were discussed in these sessions.

Games and interactive sessions were used to demonstrate and practice shared responsibilities between men and women in a T1 village of Rajshahi. For example, games showed both men and women performing the same tasks, such as operating sewing machines.

Visual aids or posters were used to communicate roles and tasks that could be shared by men and women. These aids showcased visual depictions of men and women performing the same activities, emphasizing gender equality.

Video shows have been shown in some areas of Rangpur and Rajshahi.

- Changes in attitudes and changes in women's and men's roles in the household and household decision making.

Several respondents noted a positive change in men's involvement in household chores. Examples included preparing items for Iftar during Ramadan, sharing responsibilities such as shopping, and helping with various tasks.

Changes in mealtime practices are highlighted, such as the encouragement for men and women to have meals together. This shift is associated with increased awareness of each other's eating habits and sharing meals, reflecting a more collaborative approach.

The excerpts reveal mixed responses regarding whether changes in behavior were directly linked to project training. While some mention training as a source of knowledge, others indicate that changes occurred over time, with training reinforcing existing practices.

4.8.3 Synthesis of findings on outcome 5.

The gender empowerment component was designed to encourage women's participation in aquaculture production and fish value chains, and to increase women's decision making power and financial autonomy. The project developed a good understanding of women's roles in aquaculture, the scope of their decision making, and awareness of the social norms influencing women's activities and affecting their participation in fish farming and fish related businesses. The approach involved both gender inclusive and gender targeted activities. The main obstacles for women's increased participation in fish farming appear to be social and societal norms. There is concern about social criticism or gossip if women are seen doing certain tasks typically associated with men. Choices were also influenced by women's own preferences, with some women expressing a preference for vegetable production or cattle rearing, while others preferred aquaculture. Convenience and proximity to their homes and profitability appear to be significant factors influencing women's preferences.

The project supported the capacity strengthening of women as fish farmers, as LSPs and potential change agents and entrepreneurs. Recruiting women LSPs was challenging because of limited experience and interest in business roles beyond the homestead, the initial selection criteria and family and social norms. The project raised awareness of the benefits of women working in aquaculture, modified the LSP selection criteria, engaged with families, and introduced appropriate training arrangements. A number (30) of women LSPs were successfully recruited. Training sessions on gender were provided for LSPs, and NGO's nutrition and health workers. LSPs trained groups of fish farmers – single sex and mixed groups. Support for women entrepreneurs was given through "couples' workshops".

Gender transformative approaches were introduced at community level to address norms and practices creating barriers to women's involvement. These raised awareness and stimulated discussion. Coverage of behavioral change communication varied across project intervention areas. Some changes in men's behavior were reported, (joint decision making on food choices, help with household chores), however, there were mixed responses regarding whether such changes in behavior were directly linked to project training. This was highlighted by some farmers, while others indicated that the changes were occurring anyway over time, with training reinforcing the changes underway. Initiatives to enhance women's access to assets, such as ponds and credit, had some success, although the project was aware that accessing an asset does not necessarily mean that women retain control of the land or credit.

There were also gender-related organizational outcomes, for example, an increased emphasis on gender mainstreaming within NGO partner programs, with a commitment to improve inclusion of women and children.

5. Outcomes

5.1 WF, NGO and partners view on outcomes

- Theory of change and progress toward outcomes

The theory of change and assumptions relating to productivity enhancing interventions held to a moderate extent. Smallholders found feed and seed input provision accessible and acceptable although not all were able to afford it (assumption 1). The extent of women's uptake was not clear, given their low participation in the practice groups. While there was a good uptake of banking services, only a small number accessed credit through Bank Asia. Gaps in farmers' knowledge of management practices (assumption 3) were addressed through training, but not all were taking up the recommendations and realizing productivity gains (assumption 4). WF had sufficient stakeholder support to conduct policy studies and organize workshops to inform and influence policies towards nutrition sensitive aquaculture (assumption 5).

The pathway to implementing effective extension services which support all the impact pathways, depended on LSPs understanding and engaging in gender-inclusive training and service delivery to smallholder aquaculture farmers. This was to be done through the groups that they trained, with enhanced business justifying this effort (assumption 2). Data is not yet available on the degree to which the LSPs businesses expanded during and after the project, or their profitability. Feedback from farmers and project staff indicates that LSP's training has improved farmers' knowledge of aquaculture management practices. Achieving gender inclusivity of groups was more challenging. Of 1731 farmers' groups listed in WF monitoring data, 40% were men only, 57% mixed and 3% women only. Overall, women made up 18% of the total group membership (7,882).

Marketing interventions to increase the value of marketed fish and products and increase market margins (assumption 6) and encourage responsible investment and business standards (assumption 7) were mainly associated with two private sector companies, Apon Wellbeing and Bengal Meat. Both companies showed signs of expanding business, with Bengal meat investing in additional processing facilities. Farmers (71) from WF groups were signed up, however, the number of farmers from the project area actually supplying fish is relatively small. The economic incentives for development of fish products (assumption 9) appeared to be positive for these two companies.

The pathway towards increasing consumption of nutrient rich food, particularly fish, required that nutritional SBCC, including digital and mass media, reached their intended audience and are effective (assumption 8). Nutrition messages were shared with households by LSPs, and additionally, in T2 areas, community nutrition volunteers in phase 1, and community health workers and government health clinic workers in phase 2. There was less sharing of nutritional information by digital means. The process evaluation did not have access data on price relationships and whether these remained favorable to increased consumption of fish and other nutritious food (assumption 10), nor was there available evidence on whether commercialization and stronger price incentives, has a negative effect by reducing the volume of home fish consumption compared with that sold (assumption 15). Women who participated in the practice groups had good knowledge of the nutritional importance of fish, but there was no consistent message that their choices and consumption of fish had changed as a result (assumption 14).

The LSPs were less confident with gender related messaging. WF therefore contracted alternative service providers for gender-related training at community level. Information on whether or not women's participation in aquaculture increased and with what effect on their work (assumption 12), will be available from the final evaluation survey. Key informants expressed the view that the project's work to influence gender norms had a positive effect on women's participation but shifts in women's decision-making control are more complex to identify (assumptions 11 and 13). A separate study on gender norms will enhance understanding of this area.

In the WF ToC, the pathway towards women's empowerment relies on groundwork at the policy level, stakeholder engagement at different levels, and advocating for an enabling environment for private sector investment in women oriented and nutrition sensitive aquaculture. WF engagement in discussions on fisheries policy is focusing on nutrition in aquaculture. However, the issue of women's access to land for aquaculture was also raised in policy workshops.

Assumptions concerning the stability of external conditions - climate, input supplies, political stability, held. COVID 19 was the major unforeseen factor affecting the project which required adaptation.

- WF, NGO and partners perspectives on sustainability of operations

Key informants were asked their views on the sustainability of the project interventions. The project was building capacity through training operatives and sharing good quality information with the private sector as a more sustainable option than recruiting staff as extension agents.

> *If we can develop the LSPs, if they are capable enough to provide the embedded service to the farmers, then they will be available in that locality, and farmers will benefit in future. … they have access to Facebook … they can communicate whenever they need with World Fish professionals and we are connecting them with Upazila Fisheries Officers also. … [LSPs] are not only selling inputs, but also providing needed advice and technical support. He will get more buyers, more customers, and will be able to grow his business … — (WF 5)*

The need for periodic retraining or refreshing from time to time, was considered important for sustainability.

WF considered that involvement of larger scale private sector partners is a mechanism that can deliver change at greater scale.

> *I think initially, we started with our focus on small size village places like small businesses. Within the past few years … we have also engaged with feed companies [and] hatchery operators and utilizing our own networks. I really like this network approach and working through the private sector … whatever information you can share with the private sector partners through the project, means that when we'll be gone, the partners can still read and utilize them and move forward and hopefully [in] the sort of direction we give them, … and this seems to be working … — (WF1)*

For influencing gender norms and women's empowerment and drawing on experience from the Forum theatre, the project plans to develop dramas for screening on national TV to repeat messages and continue their influence (WF 4)

Private sector partners were generally optimistic about the sustainability of their activities after the project. Apon Wellbeing has established perishable products as a channel in eight shops and intend to find new resources to invest in establishing 50 new shops working with perishable products and nutrition led initiatives. Bengal Meat is already selling fish in 50 shops. They mentioned the critical factors of proper pricing when purchasing from farmers and accurate estimation of market demand as very important for sustainability.

> *… our demand is for a quality product and WF farmers are providing quality, but if they go to the regular market with their quality product, they have to compete with the general product and they will lose their money. …we are giving … a premium price. Our bottleneck is product quality, and this is the root of this relationship, so I am definitely very confident that this project will sustain [whether] WF run or not. (PS 2)*

The partner hatchery wants to expand its business in selling quality seeds or fingerlings and continue to benefit from WF advice and collaboration.

> *We are doing this with the help of WF. Without the help of WF we could not get G3 Rohu… and if WF continues this will be good. It is not that without WF the hatchery will stop … but to accelerate the progress of the hatchery, WF's help must be continued and we are expecting to continue with them, WF told us the activities may end one day, but our relationship will remain forever. So, I can tell you that we will have communication, support mechanism, with WF and this R&D will continue. We can also increase the number training farmers, or any other fish varieties can come, and we are expecting to keep in touch with them. (PS 3)*

Bank Asia' views about the future were also positive, anticipating that their new customers will continue with them. Their experience with the project has encouraged them to be in the aquaculture sector: "… when we participated in the program, we had an exclusive focus on these aquacultural farmers, we got to know about their lifestyles, we got to know about their needs, their unmet desire [for] financial transactions, financial products, so definitely we will penetrate in the market in future times. (F1)

Several entrepreneurs who received training and capacity development from the training partner, Light Castle, have received investment in the businesses from another project.

The project's digital partner considered that the platform would continue with or without funding, but without financial support it may not be able to create new content or grow its membership above the current 11,000. However, the current content (50 items) could be recycled for another year or two. Farmers posts and responses do not create a cost.

> *We are very much sustainable. In terms of income, it has started rolling in, but not enough. That is why we are looking into external funding in terms of more grant and also investment. We're also thinking of opening up to impact investors … once we get a bit more revenue. — (DG)*

The digital marketing potential of Right Haat is a new concept for many companies.

> *Most of them do not have Facebook or a digital media wing. … So when we spoke to them, it was kind of a new concept. Five companies came on board …so right now in our website and our Facebook group, they advertise their products for a fee, so we get some money. …it's not enough but I think it's a start ... So we broke the ice, we broke the ceiling in a way. Then there's a lot more to do, especially because this industry is very traditional.*

5.2 Farmers & community perspectives on outcomes

- Farmers' perspectives on sustainability of relationships with LSPs, service providers, project partners.

The impending ending of the project prompts reflections on the sustainability of relationships between participants and Local Service Providers (LSPs) or other project partners.

In one instance a respondent from selected T1 villages in Rangpur acknowledges the enduring support from a local representative associated with the project, emphasizing the ongoing advice and assistance received. This sentiment is repeated in other discussions where respondents' express confidence in the sustained support from LSPs even after the project's closure.

On the contrary, there are divergent opinions; some respondent's express concerns about the potential cessation of support once the project concludes. One male respondent from a T2 respondent highlights the project's instrumental role in maintaining a relationship with Mr. Mamun, emphasizing the uncertainty of continued support without the project framework.

Some respondents foresee enduring connections due to shared learning and mutual benefits like a respondent from a T1 village in Rajshahi stated that, "*Of course, it will stay [relationship with Kalam bhai or LSP]. See I did a training 20 years ago I still remember that. And we will keep practicing aquaculture we are not agricultural farmers, so no matter how much the prices of feed rise we will still practice aquaculture*." (FGD_AQ)
The importance of the shared learning experience is emphasized in discussions, suggesting that the acquired knowledge will stay, contributing to the continuity of relationships.

ome male and female respondents' expressed ambitions to expand their aquaculture ventures and overcome financial constraints. A female respondent mentioned that her goal is to become a big farmer and achieve recognition or self-sufficiency.

They considered whether the relationships with local service providers (LSPs) will persist beyond the project's timeline. There is an acknowledgment of the value of ongoing support and guidance from these sources.

Some of the male respondents in Rangpur expressed a desire for more frequent trainings, with one of them commenting, "*I forget [about the training] if the time gap is high*."

Multiple respondents expressed a desire for continuous improvement and progress in their lives. This suggests a forward-looking mindset and a commitment to enhancing their economic situations.

A male respondent_ from Rangpur mentioned that everyone around him aims for improvement and enhances their income. He said,

> *"At present I have an income of 10,000 taka, in the next 5 years I can earn another 10/20 thousand tk. How to do it [thinking of how to do it]." (FGD_GN-M)*

Another respondent from the same village (T2) mentioned the need for financial resources to improve fish farming. There's a recognition of the challenges, including the cost of fish food and pond maintenance.

In another instance, a male respondent from one of the selected villages in Rangpur (T2) discussed involving family members, specifically wives, in business activities. Another male respondent from Rangpur, expresses a plan to establish a cow farm alongside aquaculture, indicating a family-centric approach to business development.

From another selected village in Rangpur (T2), several female respondents highlight financial goals such as financial solvency, leasing more ponds, and seeking financial help to repair ponds and increase production. One of them stated, "*We want financial solvency*" while another female respondent mentioned, "*I want financial help so that we could repair our pond and increase the production. Due to financial crisis, we couldn't do that*." (FGD_GN-F)This indicates a strong awareness of the role of finances in achieving their aspirations

While there's a vision for success in the future, a female respondent from Rangpur also acknowledged the income constraints she faces. Participants engaged in discussions about their collective aspirations, expressing a shared desire for self-sufficiency and improvement. This collective vision extends beyond fish farming to encompass broader goals, including land ownership, housing construction, and cultivating fish at a greater scale.

Respondents articulate their individual visions for fish farming over the next five years, revealing a spectrum of goals and ambitions.

Amidst these aspirations, there is a notable expectation of support from external entities, such as feed companies and the government. Participants describe interactions with feed companies, and anticipate additional assistance, including training sessions. However, there is also a recognition of the lack of government incentives in certain areas. This sentiment is expressed in the words of a participant who highlights the lack of support for essentials like nets and calls for more practical training and demonstrations in aquaculture.

> *"Yes, most of the feed companies come to us. But in our areas, there is no government incentives, supports or donations, for instance- there is a high demand for nets in our area, government could arrange a demo regarding netting, but nothing is there. As we expect a good training, we are expecting more demo and practical session, so that our people can learn aquaculture, but there were no such demos in past,"*

Respondents from selected T2 villages of Rangpur stated, "*Yeah, it will be good. There are some other supports also from feed companies, suppose- they ask us to form a group of 20-25 farmers, I shall arrange a training on behalf of Safety Feed Company. They come to us, request ask to sell their feed, if they request then I arrange training for them*." (FGD_AQ)

They also express a common desire for progress and expansion in their aquaculture activities over the next five years. This includes increasing the scale of operations, cultivating more fish, and improving overall productivity.

Small-scale farmers voice concerns about their ability to compete with larger farmers who might have more resources. They highlight disparities in prices received for their fish compared to larger farmers and express the need for external support to level the playing field.

> *"We all have expectations to expand our business, but we as a small farmers cannot expand that much but big farmers can. Small farmers cannot move forward in this business; they get the double price, but we don't, for example, if I sell fish of Tk. 200,000, they sell the same fish for Tk 500,000, they just continue to feed during rainy reason,"*

> *"If you go to the Arot, you will see the differences, there are some people (middle men) who target the farmers, they identify who is strong and who is weak, if the size of your fish is bad like -it is not good looking; the shape distribution is not good, then they will consider you as a weak farmer, then they will automatically offer you a lower price. If your product size is good and the shape of the fish is attractive, they will consider you as a strong farmer, you will have a good position there and will have a good price. If a small farmer and big farmer go to Arot at the same time, the wholesale buyer will run after big farmers, as there will be huge differences in quality of fish. Even though we lose during weighing, and after that we also get a lower price than them because of fish quality."*

5.2.1 Responses from the control groups:

Respondents from the control village in Rangpur expressed their desire to engage in multiple activities alongside aquaculture, such as poultry farming and cattle farming. This diversification is seen as a strategy to improve financial stability and overall well-being.

A male respondent from a control village in Rangpur shared - "*If we had money and proper guidelines, we could have thought of all these in a better way. Earlier, my forefathers cultivated fish for home consumption; but now we are trying to get back the expenditure from the total sales. So, we hope that we could have made a profit from that in the next 5 years"*

> *"We stated that in addition to aquaculture, we can also do poultry farms and cow farms. Therefore, we require more funds. We also have additional land nearby that could be used for a hatchery in the future. These are our thoughts, hopes and dreams."*

There is a recurring theme of wanting to expand aquaculture infrastructure, including the construction of larger ponds and hatcheries. This expansion is viewed as a means to

increase fish production and enhance the overall business. There is also a common desire to increase fish and vegetable production. This emphasis on production growth reflects an economic goal of improving livelihoods through enhanced agricultural activities.

A female respondent from a control village in Rajshahi shared, “My husband and I want to make a bigger pond; I will cultivate good fish in that pond. I will produce fish in the same way that eight/ten other people do. And I like to try to grow vegetables around the house, but it doesn't work.”

Another female respondent from the same village added that financial constraints emerge as a significant barrier to realizing future ambitions. They express difficulties in affording additional land, constructing larger ponds, and investing in other ventures like cattle farming.

> *“I wish my husband would build a large pond with plenty of fish. The fish that I am feeding will grow if they are properly fed. I have such efforts, but we do not have such ability. That’s why we can’t get it. I'll build a large pond or cultivate fish properly. I can't grow vegetables right now due to financial problems. Cows are currently very expensive. Due to the financial crisis, I am unable to buy a cow or a goat. My family is quite small. We can't find a cow with the money we earned from the pond. It is seen that the percentage of the comparative profit of what I am spending is not coming, then my wish is not being fulfilled. So, I could sell these and buy a cow but after selling it, it is seen that there is a loss or the amount, I am spending is being spent. Then I won't be able to raise a cow or a goat on my own. I want to raise a cow or a goat in my house, or my husband wants to build a large pond or cultivate fish on the side, but I can't do it because of my financial situation.”*

6. Lessons and recommendations

6.1 Smallholder farmers

The project has improved farmers’ knowledge in areas such as pond preparation, feed management, and species selection and also on nutrition and dietary diversity. There were reports of smallholder farmers realizing benefits such as increased production of fish for consumption and sale, and increased profits, arising from better planning, feeding and other improved management practices. However, there were some limitations from which lessons can be drawn.

Improved knowledge but limited adoption of new practices: farmers and households did not necessarily implement these practices and uptake remains inconsistent. This was partly attributed to the short duration of the project, and farmers’ reluctance to adopt new practices due to past losses, natural disasters, and the lack of time or essential tools promised during training. In some cases, farmers have not changed their aquaculture methods since the training.

Socio-economic differences: the project's outcomes appear uneven and are related to the particular position of poorer households and how their circumstances and resource constraints limit their capacity for action and investment. Farmers from lower socio-

economic backgrounds are often unable to afford the recommended practices. This factor could explain at least part of the difference between knowledge and action. It suggests that the project's impact is not uniform across all households and highlights the need for tailored support based on respondents' economic capacities.

Challenges for small-scale farmers: due to limited resources, small-scale farmers face significant challenges in implementing the advice provided by WF during training. The effectiveness of the training depends on the scale of operation; it becomes difficult for small-scale farmers because, unlike large-scale farmers, they normally cultivate for household consumption.

Unchanged production trends: In some areas, the project has not increased the number or types of fish cultivated or the number of farms. This lack of change reflects the limited project impact in these regions.

Challenges with introduced practices: Some farmers, particularly those cultivating indigenous Puti fish, reported storage issues due to the fish's rapid growth and high feed consumption rates. This highlights challenges in aligning training recommendations with practical realities.

Overall, these lessons emphasize the need to address resource disparities, provide access to technical tools, and customize support for different social groups to enhance the project's impact and ensure broader adoption of new practices.

6.2 LSPs, extension and information access

The focus on LSPs as an important actor for farmer training and input provision, as part of WF and NGOs program activity had some positive results and generated some important lessons. The initial recruitment of LSPs was from small-scale independent entrepreneurs serving aquaculture farmers. The project learned the value of mobilizing local people serving their community as a means to draw on local talent and ensure sustainability in the area after the project ends.

Limited scale of individual LSP operations: because of the limited scale of the initial approach, and delay in recruiting the desired number of LSPs, a pure private sector model was introduced in 'open' areas, working with large-scale feed and hatchery companies and their supply networks. Two interesting questions for further exploration are whether the NGOs were better able to reach and influence a wider range of households on the nutrition and gender dimensions as well as supporting small-scale aquaculture, and whether the purely private sector actors achieved more efficient coverage and sales, and for which client groups – small, medium or larger scale farmers.

Qualities of successful LSPs: project staff learned that the role of LSP requires specific qualities - presentation skills, good interpersonal skills, honesty, as well as technical knowledge of aquaculture, and motivation to take on the LSP role. Some LSPs performed successfully in their advisory and training role and some less so, but the reasons for these differences were poorly understood. Their performance was monitored, but there was a need for more systematic assessment which could have informed the program.

Digital access and information: The development of digital platforms was supported as

a way to reach LSPs and farmers with information and advice on a large scale. The Right Fish Facebook platform signed up 10,000 active farmers. Lessons relating to how farmers respond to digital content were that short digital content is more appropriate than videos of longer duration, as farmers buy internet access in small top-ups; and that online information was more understandable for LSPs and farmers following face-to-face training (farmers' preference). The digital partner started to address the issue of sustainability by recruiting private company sponsors and creating the facility to advertise products.

6.3 Markets

Market approaches: The two private sector partners selling fish in their outlets both commented on the advantages expressed by consumers of buying a high-quality product from a shop rather than visiting the wet market. If price and quality can be balanced, then large volumes can be sold. The market system approach does not rely on direct delivery by a project and doesn't stop when the project ends. This enhances prospects for sustainability.

Selection of effective market actors is the basis for market approaches that will work for a long time and get the desired results. Training for rural entrepreneurs and Couples training for women entrepreneurs enhanced business skills and market awareness, but more time was needed to engage with market partners to add value to the entrepreneur's efforts. On-boarding market access partners early on during the training phase would build rapport and connection as a foundation for practical results.

Financial inclusion: uptake of loans was relatively small compared to the number of account holders. Disbursement of loans was delayed by farmers' lack of documentation and alternative approaches to speed this up are required.

6.4 Social and behavioral change

Gender and transformative change: the project's intention to implement gender transformative approaches proved to be difficult to achieve through private sector LSPs, and with limited time and financial and human capacity. The project decided to involve specialist gender service providers who introduced some promising approaches (forum theatre, game-based approaches), designed to raise awareness and stimulate debate on social norms, but resources were lacking for their wider scale implementation. Gender responsiveness is a more accurate description of the project's general approach, with attempts to increase women's inclusion as LSPs, in farmer training and in business development. However, there were positive examples of changes in attitudes and behavior relating to gender reported by field staff.

Nutrition and social behavior change: the nutrition component was initially community and household level oriented but faced a challenge of cost and limited scale. In the second phase it was mainstreamed into the NGO's health program and government clinics. There may be trade-offs between the effectiveness of frequent messaging to a smaller group in the first strategy and the more occasional but wider spread coverage in the second.

6.5 Multi sectoral and interdisciplinary approaches

Benefits of a multisectoral approach: multi sectoral approaches create synergies among the benefits from different sectors. The nutrition and aquaculture messaging are both emphasizing small indigenous fish cultivation. Aquacultural activities were promoting women's participation and gender training was emphasizing shared household decision making, including on diet and nutrition. There was important learning on household dynamics, including the influence of other family members beyond husband and wife and intra household distribution of food.

Thematic training for project staff would support collaboration and interdisciplinary working across components, and foster understanding of the interconnections between aquaculture, gender and nutrition activities. This would support communication in planning meetings.

6.6 Relations with partners and stakeholders

Adaptive and supportive management: there was on-going reflection within the project particularly when confronted with challenges such as COVID 19. The project was flexible enough to make adaptations to program implementation, both on partner relations and for other areas requiring adjustment. Experience from other projects on partnerships and finance was useful. The NGOs and other project partners were positive about the level of advice and supportive feedback from WF in solving problems.

Relationship with government: the project recognized the importance of building good relationships with local and national government bodies and benefited from these partnerships. At local level, time was taken by project staff to fully explain the approach, particularly the integration of aquaculture, gender, and nutrition, to ensure consistency of messages and to encourage cooperation and support. At national level there was high level dialogue with national government policy makers.

Appendix A: Checklist for interviews and focus group discussions

Bangladesh Aquaculture Process Evaluation

Template checklist for key informant interviews

Introduction

- Could you tell us about your roles and responsibilities in [your organization] and specifically under the IDEA project?

1. Could you give us some insights into how far you have got with the implementation process?

1.1 Field staff and LSP selection

- Project and field staff selection and recruitment
- LSP selection process and any changes introduced
- What number/proportion of LSPs are female? Constraints and measures taken?

1.2 Training and capacity building

- How effectively has the capacity building component of the program been implemented?
- Who has received training from the project? What modes of training?
- What topics in the training and who has provided them?
- What kind of training materials have been provided to LSPs, farmers and others?
- What is the extent of collaboration in the production of dissemination materials?
- Appropriateness of the training materials for small scale aquaculture farmers?
- Have LSPs already adopted some of the training messages into their normal practice?

1.3 LSP field activities

- Do the LSPs work with aquaculture farmer groups? Are these male/female/mixed?
- Have you taken any measures to mobilise more female aquaculture farmers?
- How effective have the farmer training approaches been? Changes as a result of COVID?
- Measures taken to implement the gender-transformative and nutrition components?
- How will information from the training on aquaculture, nutrition and GTA be shared beyond the selected farmers?

1.4 Online learning and information

- How effectively are online learning options being leveraged and utilised for the program?
- What online/digital training and information has been developed for LSPs and farmers?
- Are online messages reaching their intended audience? How are you evaluating this?

2. **Adjustments/changes to implementation**

- How far has implementation followed the planned activities and outputs?
- What were the implementation targets for 2019-2021 and have these targets been met?
- Have there been any adjustments made to these targets, and if so, why?
- What are the major implementation challenges and what have you done to address them?
- Has the Covid pandemic led you to make any adjustments to implementation? If so, how?
- Have you had to leverage any resources from other programs that you are running?
- Have there been any changes in the strategy, interventions or implementation plans?
- Are there any region-specific challenges you have faced during implementation?

3. **Programme design**

- Have you been informed about the 'control' areas under this program? How has this influenced your approach?
- Have you taken measures to ensure there are no spill-overs into the control areas?
- Do you know of any parallel programs in the study areas (own organisation, gov., NGOs)
- Have the new messages promoted by the project been integrated into your ongoing programs or into government health or social programmes?

4. **How do you supervise, monitor and evaluate your programme implementation?**

- How do you support, manage and monitor the work of your field staff and LSPs?
- How effective has the roll-out of the program been in reaching the target population?
- How do you monitor the response of farmers to the messages shared?
- How are field level challenges communicated to NGO management?

5. **Relationship with [other partners]**

- What are the support and advisory mechanisms and processes that have been established? Is there adequate communication and information sharing?
- Have there been changes in the relative emphasis placed on different project objectives.]

6. Are there any emerging lessons from the project experience to date? Have these influenced plans? Have they informed wider stakeholders?

FGD FOR DISCUSSION WITH PARTICIPATING SMALL AND MEDIUM-SCALE AQUACULTURE FARMERS

- After introductions, inform participants of the purpose and topic of the meeting, the right to participate or not, the right to withdraw, confidentiality of information, data protection and contacts.
- Follow up questions by asking, **why/why not, how, what, when, where** etc. as relevant.
- Record: Date, venue and location - where meeting held, village, union, district etc. Whether T1, T2 BRAC/TMSS. Number of men and women present, number of men and women under 30, number that dropped out or joined after the start of the meeting, duration of the meeting. (Maximum 2 hours); whether the group worked well or whether there were any adverse group dynamics, or disruptions.

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1. FGD participants and involvement in the project.

1. Have you heard about the WF/IDEA project? When was the WF/IDEA project first introduced to this village and by whom?
2. What is your understanding of what the project is trying to achieve?
3. Looking back over the time since the project started, do you think you have experienced any changes as a result of this project?

2. Experience with training

4. When were you first contacted by the WF/NGO LSP? Was the LSP already known in the village?
5. How were aquaculture farmers selected for training by the project? What did you understand to be the criteria for participation?
6. How many of you have been involved in the training provided?
7. Were you members of an existing aquaculture group? If not, were you formed into a group for training by the LSP? How many men and women are there in the group?
8. How many in-person training events on aquaculture have been held, when, and by whom? e.g. LSP, WF/NGO staff, other? Who was invited to attend?
9. What topics were covered in the in-person training? How was the training done Were there demonstrations on ponds?
10. Have you, as individuals or as a group, received any information materials (booklets, manuals, posters etc) from your LSPs or WF/TMSS/BRAC staff?
11. Are you accessing training or information from the WF/ IDEA project via internet platforms, e.g. Facebook, Right Fish, WhatsApp, SMS etc? What information?
12. Did you face any challenges in accessing and using these platforms and materials?
13. Did you receive follow-up advice and support from LSPs/WF or NGO staff after these trainings?

3. Aquaculture practices

14. How do farmers like yourselves decide what types of fish to cultivate?
15. How do the number and types of fish varieties you grow now compare to before the project? Have you made any changes in the amount or the type of small

indigenous species you grow?

16. What is the importance of fish in the diet? For whom is fish particularly important? Which fish are most nutritious?
17. Have you made any changes in your household fish consumption based on nutrition messages promoted in these trainings?
18. What are the common challenges you face in pond cultivation that can affect your productivity? Does the WF/IDEA project help you to address any of these challenges?
19. What are the recommended practices given in the training from the LSPs WF or NGO staff? Did you know about these practices before the project?
20. Have you made any changes in your aquaculture and pond management practices following training received from the LSPs/WF or NGO staff? What changes and why?
21. Which recommended practices have not been taken up, or taken up and discontinued? What are the reasons?
22. Have you noticed any changes after adopting these aquaculture practices]
23. Have people started up, or increased vegetable cultivation on dykes? With what results?
24. Are there differences in uptake of the practices by households with different levels of resources, scale of operation, or particular social characteristics?

4. Aquaculture inputs:

25. What were your main sources of aquaculture inputs *before* the project? What were the main constraints on accessing quality seed and feed?
26. What are your main sources of aquaculture inputs now? How much do you rely on the project LSPs and partners and how much on other service providers? Does your LSP provide a broad range of inputs or specialize in a few items?
27. What type of inputs have you accessed under the project, and from whom?
28. How do services and products of the LSPs compare with other input sources unrelated to the project? What value do LSPs add? Are you able to negotiate prices for inputs?
29. Do you have signed agreements with LSPs for input purchase? Are these agreements made with individual farmers or with the group?
30. Are there any challenges you face in purchasing quality feed and seed from LSPs /IDEA project partners?
31. Has the WF/ IDEA project helped you to overcome the constraints?

5. Relationship with LSPs - access to information and advice

32. What are your main sources of aquaculture information and advice in your area?
33. How often do you communicate with LSPs and through what means? How accessible do you find the LSPs?
34. What types of advice and other services have you received from LSPs? What advice/services have you received from WF/TMSS/BRAC staff.
35. How do you rate the quality of aquaculture advice given from the different sources?

6. Market linkages

36. Have you received any kind of fish marketing support under the IDEA project? What kind and how effective has this support been?

37. Has there been any change in the quantity of fish you sell since before the project? If so, what are the reasons?
38. Has there been any change in your margins on fish sales compared to pre-project? Any change in your overall income from fish?
39. Have you made fish selling agreements (informal or formal contracts) with new buyers/ traders since the start of the project? Are you able to negotiate fish prices?
40. Are you (or farmers in this location) selling fish to WF project partners, Bengal Meat, Apon Wellbeing? If so, what arrangements are in place for managing supply, delivery and payments?
41. Are there benefits of selling to these partners? Do you face any challenges selling fish to them? How are you and /or the project addressing these?

7. Access and sources of credit.

42. What are the main sources of credit for small-holder aquaculture farmers in your area? Can you access inputs on credit/short term loan from trusted suppliers? Can you get cash advances on understanding that you will sell to traders?
43. Have you taken any loans from Bank Asia, BRAC Bank or TMSS credit channels under the IDEA project? At what rate of interest?
44. Do you see any benefits in accessing loans through the WF/IDEA project linked credit channels compared to other sources?
45. Have there been any challenges while seeking credit though Bank Asia/ TMSS or BRAC credit sources? Has the project helped you to overcome these?

8. Sustainability and future ambition.

46. Do you think your relationships with the LSPs and other project partners will continue in future after the end of the project? Why/why not?
47. What vision do you have for your aquaculture in 5 years' time? Would it be different? How? (e.g. scale of operation, specialization/diversification, profitability etc.)

FGD CHECKLIST: Gender & nutrition – women / men (interviewed separately) from participating households and community

- Select women from participating (T1 & T2) households, include some with children (0-3 years).
- After introductions, inform participants of the purpose and topic of the meeting, the right to participate or not, the right to withdraw, confidentiality of information, data protection and contacts.
- Follow up questions by asking, **why/why not, how, what, when, where** etc. as relevant.
- Record: date, venue and location, village, union, district etc. Whether T1, T2 BRAC/TMSS. Number of men and women present, number of men and women under 30, number that dropped out or joined after the start of the meeting, duration of the meeting. (Maximum 2 hours); whether the group worked well, whether there were adverse group dynamics, or disruptions.

Questions in blue – for women's FGD only. Questions in green for men's FGD only.

1. **FGD participants and involvement in the project**
    1. Have you heard about the WF/ IDEA project?
    2. What is your understanding of what the project is trying to achieve?
    3. Looking back over the time since the project started, do you think you have experienced any changes as a result of this project? What have been the most important?

2. **Access to information and advice**
    4. What are your main sources of information and advice on a) aquaculture and b) on nutrition? Which is the most important source for each?
    5. Did any of you receive in-person training as members of an aquaculture group trained by the LSP?
    6. What topics were covered in the information or training you accessed?
    7. Were there any barriers to women's inclusion in the groups formed for training by LSPs
       Were women included in the groups formed for training by LSPs? Are there any barriers to women's participation?
    8. Did any of you attend other training sessions run by the LSP or WF, TMSS or BRAC staff? On what topics?
    9. Through what other channels have you received training, advice or information from the project? What information or advice did you receive?]
    10. Have you accessed information online
    11. Do you own or have regular access to a mobile phone? How do you feel about information received by SMS in general? Do you feel that it is trustworthy? Why / Why not?.
    12. Do you receive SMS messages relating to nutrition, health or other issues? From what sources? How frequently do you receive SMS nutrition messages from the WF/IDEA project? How do you know that the messages come from the project?
    13. Do you read the SMS messages from the project? If no, what are the reasons? Do you trust WF/Idea SMS messages?
    14. Do you think the SMS messages influence your behavior? How?
    15. Did you face any challenges accessing and using online platforms (Facebook, Whatsapp, using SMS?
    16. Have you or any women from this village received training in entrepreneurship? With what result? Have any of you been involved in the business incubation program?
       Have you received training in entrepreneurship? With what result? Have any of you been involved in the business incubation program?
    17. Did you receive follow-up advice and support (formal or informal) from LSPs/WF or NGO staff/CHWs? On what topics? Where did you receive this advice? (home, village, LSP shop, other etc)

3. **Fish consumption and nutrition**
    18. How would you define what a "good diet" is?
    19. Do you face challenges in ensuring your family has a good diet? What are they?
    20. What is the importance of fish in the diet?
    21. For whom in the household is fish consumption particularly important? Why is it

important for these groups?

22. What are the species of fish you consume most frequently in your households? What are the reasons for the preference? Which of these fish are considered the most nutritious and for what reasons?
23. Are there some fish species which you are now consuming more frequently compared to the start of the project? Are there some you are consuming less frequently? What are the reasons?
24. If consumption of small fish species [*e.g. mola*] has increased, is this mostly from your own production or from the market?

4. Nutritional practices

25. What information and recommended practices on nutrition have you received from the project, via LSPs, WF/NGO staff and CHWs, online, written materials etc. (*fill the table)*

Nutrition messages/ recommended practice	Were any of these messages or practices new to you? Which ones?	Which of these practices did you incorporate and why? How did you change your behavior?	Were there practices you tried and then discontinued? Which ones, and why?	Which practices have you not tried? Why?	Have you faced challenges following these practices? How addressed?	Have you experienced any benefits? Have there been any disadvantages?

What information and recommended practices on nutrition have you received from the project, via LSPs, WF/NGO staff and CHWs, online, written materials etc.

26. Did you incorporate any of these recommendations into your household practices? Which and why?
27. Do you think the uptake of nutritional practices might be more difficult for some households compared to others? e.g. depending on their level of resources and income, or social characteristics? What type of households might be less likely to take up the practices?
28. Have you ever shared nutrition messages from the project with your friends/ relatives / neighbors in the village? Have you shared nutrition messages with friend/relatives beyond the village?

5. Women empowerment and aquaculture

29. Which aquaculture activities (from production to market) are men mainly responsible for? Which are women mainly responsible for?
30. In which aquaculture activities (from production to market) do women / men spend more time?
31. In which aquaculture decisions do women have more influence
32. Has there been any increase in women's participation in these decisions since the start of the project?

    If so, have there been benefits from these changes? Are there any negative outcomes?

    Do women prefer to participate in agriculture (livestock, field crops, horticulture) or in aquaculture? What are the reasons? Are there other productive activities women prefer to both aquaculture and agriculture? What are they and what would facilitate their engagement in these areas?

33. Is aquaculture more important for certain types of women than others or for minority groups? How attractive is aquaculture to young men and young women? Why/ why not?
34. What are the main challenges women face if they want to become more involved in aquaculture-related work? Are these challenges more pronounced for particular tasks or segments of the aquaculture value chain? If so, which and why?
35. Do women face challenges in relation to access to fish inputs and markets for fish sales?
36. How has the WF/IDEA project approached the challenges to encourage women in aquaculture? What are the strengths and limitations of WF/IDEA project approaches?
37. Have there been any changes in women's roles and in the extent of their participation in aquaculture since the start of the WF/IDEA project? What changes and why, or why not?
38. If so, what are your views about the increase of women's participation in aquaculture? Have there been benefits from these changes? Are there any negative outcomes?
39. What needs to change in order to address any barriers to women's greater participation in aquaculture?

6. Communication of behavioral change.

40. Are you aware of the messages and advice on household decision making that have been given by the project?*]*

    Are you aware of the messages and advice on household nutrition decision making and men's role that have been given by the project? What are they? Any other changes made? (fill the table)

Messages/ recommended practice	Which of these messages do you agree with and why?	Which ones have influenced changes in your behaviour? Why and how?	Which messages do you not agree with, or are difficult to follow and why?	If you have made changes, have there been any benefits?	Have there been any disadvantages of the changes?

41. How have men and women in aquaculture households received these messages? Have there been any changes in men's roles in the household? Which areas have not changed and why?

    If you have made changes, what has been the reaction of your wife and other household members, neighbors and friends? Have they been supportive? Have they been critical?

7. Access and control of productive assets

42. Do women have ownership of ponds? Can women access land on which ponds could be constructed? Have there been recent changes in women's access to ponds on government owned land, either individually or in groups?
43. Have any of you taken any loans from Bank Asia, BRAC or TMSS Microfinance under the IDEA project? Can women access credit? Do women face any constraints on accessing loans from these sources?

44. Can women control their own income and loans? Can they decide how to spend their income or decide for themselves which businesses to start/expand?

8. Future

45. What would you like your productive activities - whether aquaculture, agriculture or other work and enterprises - to be like in 5 years' time?

    What would you like your wife's activities to be in 5 years' time?

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