



Food and Agriculture Organization
of the United Nations

ANALYSING RESILIENCE FOR BETTER TARGETING AND ACTION



RESILIENCE ANALYSIS IN COX'S BAZAR

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**FAO RESILIENCE
ANALYSIS REPORT
R.o.2**

RESILIENCE INDEX MEASUREMENT AND ANALYSIS II **▶ RIMA II**

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ACRONYMS

ABS	Access to Basic Service
AC	Adaptive Capacity
AST	Assets
BBS	Bangladesh Bureau of Statistics
BDT	Bangladeshi Taka
CNG	Compressed Natural Gas
CXB	Cox's Bazar
DAE	Department of Agricultural Extension
FAO	Food and Agriculture Organization of the United Nations
FCS	Food Consumption Score
FDMN	Forcibly Displaced Myanmar Nationals
FGD	Focus Group Discussion
FFS	Farmer Field School
FSS	Food Security Sector
HH	Household
HIES	Household Income and Expenditure Survey
ICT	Information and Communications Technologies
ILO	International Labour Organization
IOM	International Organization for Migration
INGO	International Non-Government Organization
IPC	Integrated Food Security Phase Classification
ISCG	Inter Sector Co-ordination Group
KII	Key Informant Interview
LCSI	Livelihood based Coping Strategy Index
LPG	Liquefied Petroleum Gas
MODA	Mobile Operational Data Acquisition
NGO	Non-Government Organization
NID	National Identification Card
RCI	Resilience Capacity Index
RCS	Resilience Capacity Score
RCSI	Reduced Coping Strategy Index
RSM	Resilience Structure Matrix
REVA	Refugee Influx Emergency Vulnerability Assessment
RIMA	Resilience Index Measurement Analysis
SSN	Social Safety Net
TLU	Tropical Livestock Unit
UNDP	United Nations Development Programme
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations Children's Fund
UN Women	United Nations Entity for Gender Equality and the Empowerment of Women
USD	United States Dollar
WFP	World Food Programme

EXECUTIVE SUMMARY

This report summarizes the results of Resilience Index Measurement Analysis (RIMA) Round-2, which demonstrated a comparative analysis of household resilience capacity between Round-1 and Round-2 with panel samples by identifying key determinants and casual factors influencing resilience. The report outlines the resilience index in different disaggregation like treatment vs control, resilience index by farmer category, sub-district wise resilience index, resilience index based on access to natural resources and exposure to natural shocks. However, a different set of variables were used while measuring resilience capacity index of the Bangladeshi and Rohingya communities due to contextual differences.

The analysis was conducted with data collected from multiple population groups to highlight the diversity of the situation. Within the Bangladeshi community, the study gathered information from 1000 households in four sub-districts (Cox's Bazar Sadar, Ramu, Ukhia, and Teknaf) of Cox's Bazar that received interventions from the Food and Agriculture Organization of the United Nations (FAO) as the treatment group. For comparison, 700 households from the host community that didn't receive support from any humanitarian actors were surveyed in three sub-districts (Ramu, Ukhia, and Chakaria) of Cox's Bazar to act as the control group. Similarly, for the Rohingya community, 400 households who received agriculture support from World Food Program (WFP) were surveyed as the treatment group, while information from an additional 400 Rohingya Nationals that didn't receive any agricultural support from any agency was collected to be the control group. Altogether, these 2500 households' data were collected between November to December 2022.

The study reveals that for the Bangladeshi community, the treatment group has a higher resilience capacity with a score of 39 compared to the control group scored 31. In comparison to 2021, the resilience index of the control group remained the same as 31. However, the index increased from 35 to 39 for the treatment group which indicates the positive impact of the intervention received by the treatment group. The higher resilience index of the treatment group can be characterized by their higher income, savings, and access to loans, increased usage of technology in agricultural production, receipt of capacity building training, and savings of crops for the lean period. Simultaneously, it was seen that the resilience capacity of the farmers from all three categories: marginal, large, and smallholders has slightly increased compared to 2021. However, still, marginal farmers in the treatment group had the lowest resilience among the three groups. The lowest resilience capacity of the marginal farmers can be described by their lower participation in capacity-building training and adoption of technology in agricultural production, lower household income, access to loan and savings for the agricultural lean season, limited ownership of productive and non-productive assets, minimal usage of land and inputs in agricultural production. On the other hand, it was evident that Ramu was the most resilient sub-district followed by Ukhia, Cox's Bazar Sadar and the least one was Teknaf. In comparison to 2021, the resilience index of Ukhia and Teknaf has significantly increased. In contrast, it decreased in Cox's Bazar Sadar. In Ramu, the resilience index remained the same as in 2021. The low resilience of Teknaf can be characterized by the lower adoption of agricultural technology, lower household income and savings for lean season, limited ownership of productive assets, and lower usage of land and inputs in agricultural production. Besides, a negative impact of shock specially landslides and price

hike was observed on the resilience capacity of the Bangladeshi households. The households not affected by shock were found having a higher resilience capacity (37) compared to those affected by shocks (32).

The resilience index of the treated households from the Rohingya community is slightly higher (36) compared to the resilience index of the control group which is 35. The unlikely increase of resilience capacity among the control group can be described by the limited practice of homestead gardening by the treatment group households compared to 2021. The higher resilience capacity of the treatment group can be characterized by their higher income, getting more capacity-building training, usage of input in agricultural production, and better access to the agriculture input market and primary education. Shocks particularly cyclone also adversely impacted the resilience capacity of the Rohingya households with those affected by shocks having lower (32) resilience capacity compared to those not affected by it (38).

Land utilization was found to be highest among large farmers followed by smallholders and marginal farmers both in the control and the treatment groups. However, in the treatment group average amount of land utilized by the large farmers has drastically dropped from 415 decimals to 356 decimals, 194 to 148 decimals for smallholders, and 58 to 29 decimals for marginal farmers in comparison to 2021. In contrast, the amount of land utilized by the large and small-holders of the control group had increased but it was decreased for the marginal farmers. The major share of this land (59 percent from the treatment group and 81 percent from the control group) was used to produce cereal crops like rice, maize, etc. Besides, a remarkable portion of land is also used for vegetable production (23 percent from the treatment group and 10 percent from the control group) Usage of land for cereal crop production has significantly increased both in the control and treatment groups compared to 2021. The most cultivated cereal crop by the Bangladeshi community considering across both groups was Aman and Boro rice, and the most cultivated vegetables were potato, brinjal, tomato, and green chili. However, the productivity of vegetables in the treatment group is comparatively higher than in the control group. In the camp area bottle gourd, sweet gourd, and country bean were the most cultivated vegetables.

According to the survey, around 39 percent of respondents from the Bangladeshi treatment group received cash transfers in the last 12 months, with the average amount being BDT 9,728 which was 39 percent, and BDT 10,863 in 2021. On the other hand, though the percentage of control group households that received formal transfer dropped by 8 percent in 2022 (15 percent in 2021), the average amount increased by BDT 3,324 if compared with 2021. None of the households of the Rohingya community receive cash transfers. In contrast, almost all of the Rohingya community households received in-kind transfers such as food, shelter, medical facilities, agricultural supplies, LPG, and so on in the last 12 months, with an average value of BDT 108,124 (109,709 from the control and 106,539 from the treatment) per household which was BDT 78,520 (82,621 from the control and 74,419 from the intervention) in 2021. Food assistance accounted for most of the in-kind transfers (79 percent), followed by LPG gas (13 percent), and hygiene and dignity kit (4 percent). In contrast, the host community only received a small number of in-kind transfers—on average, BDT 7,518 per household which was 8,637 in 2021. The major share of this assistance was allocated for food (54 percent), agriculture support (21percent), and then shelter (7 percent).

The average monthly income of the households from the host community is BDT 23,076 (BDT 24,862 for the treatment group and BDT 20,525 for the control group) which was BDT 14,694 (BDT 15,596 for treatment and BDT 12,358 for control) in 2021. In both groups, large farmers are the highest income

earners and there is a significant gap in income between the large and the marginal farmers. However, the major share of host community household income is coming from the agricultural sector which is around 36 percent (36 percent from treatment and 37 percent from the control group), which in 2021 was 47 percent (47 percent from treatment and 55 percent from the control group). However, income share from family businesses, private sector wages, and remittances has significantly increased. On the other hand, the average monthly income of the Rohingya community is worth BDT 3,168 (BDT 3,474 for treatment group and BDT 2,863 for control group) which is slightly higher compared to 2021. In 2021, the average income of the households was BDT 2,436 (BDT 2,517 for treatment group and BDT 2,354 for control group). Although the major share of the income, 27 percent is coming from casual labour work, in 2021 the income share from this was 52 percent. On the other hand, income share from business, and remittance have significantly increased.

The study also found that one-third (34 percent) of the households from the Bangladeshi community are suffering from inadequate food consumption (borderline and poor consumption). The inadequate consumption rate increased slightly, compared to 2021 from 31 percent to 34 percent. In contrast, hence 2021, half of the households from the refugee community were found having inadequate consumption in 2022. Besides, around 57 percent of households from the Bangladeshi community and 68 percent of households from the Rohingya community adopted at least one consumption-based coping strategy to cope with the food crisis. Dependence on less preferred or less expensive food is the most used coping strategy in both the Bangladeshi (56 percent) and Rohingya (66 percent) communities. Additionally, almost one-third (28 percent) of the Bangladeshi community households had to adopt at least one crisis or emergency livelihood strategy, while 37 percent have undertaken at least one stress coping technique. The adoption of a livelihood coping strategy for the Bangladeshi community has decreased compared to 2021. On the other hand, one-third (33 percent) of the households from the Rohingya community followed at least one crisis or emergency strategy and 42 percent followed a stress strategy. The tendency of adopting livelihood-based coping decreased compared to 2021.

1. INTRODUCTION

1.1. Background

Cox's Bazar is a disaster-prone district in south-eastern Bangladesh, with a population of 2.98 million people (BBS, 2015), and hosts the world's largest refugee community. Over 925,380 Rohingya refugees reside across 34 congested camps in Ukhia and Teknaf sub-districts (UNHCR, 2022). The geographic context of Cox's Bazar coupled with human pressure and the unsustainable exploitation of natural resources makes this district especially vulnerable to natural hazards and falls under Phase 3 of IPC Chronic Food Insecurity (FAO and WFP, 2022). This huge population created massive pressure on the already dilapidated environment of Cox's Bazar and around 4,300 acres of hills and forests were cut down or cleared of vegetation to make temporary shelters, facilities, and cooking fuel in Ukhia and Teknaf of Cox's Bazar, threatening the biodiversity of the three ecologically critical areas of the country (UNDP and UN WOMEN, 2018). The refugee crisis has significant impacts on the local economy and livelihoods of the host community population at Cox's Bazar, including a highly competitive labour market with reduced wages, inflation of prices for basic goods (including food and transportation), and loss of crop and grazing land. Over a hundred humanitarian actors are working in Cox's Bazar after the influx to improve the living standard of the affected people (ISCG, 2022). However, the humanitarian response to the crisis in Cox's Bazar, Bangladesh is entering a new phase transitioning to the development approach, and the development paradigm is driving to increase the resilience capacity of the vulnerable people.

In Cox's Bazar, FAO supports over 24,000 marginal and smallholder farmers in strengthening resilience to food and climatic shocks while sustaining positive connections between agri-economic growth and socio-ecological restoration. While doing so, it works in close partnership with the Ministry of Agriculture & Ministry of Fisheries and Livestock, Ministry of Environment, Forest and Climate Change and agencies like International Labour Organization (ILO), International Organization for Migration (IOM), United Nations High Commissioner for Refugees (UNHCR), United Nations Children's Fund (UNICEF), World Food Programme (WFP) and International Union for Conservation of Nature (IUCN). The major activities include integrated watershed management, biodiversity conservation, renewable energy-efficient irrigation, plantation, development of early warning systems, promotion of sustainable agriculture, agricultural mechanisation, climate smart agriculture, farmer field school (FFS), market linkage and value chain development, promotion of information and communications technologies (ICT), biological land stabilization, and disaster risk reduction.

As such, FAO has undertaken the second round of Resilience Index Measurement and Analysis (RIMA) in Cox's Bazar to measure the current resilience capacity and its determinants¹ in comparison to the first round in 2021 involving both host and refugee communities to gauge the intervention results.

¹ access to basic services and infrastructure, adaptive capacities, formal and informal social safety nets, social networks, productive and non-productive assets, and shocks as well as livelihoods

1.2. Objective

The study aims to provide evidence to support program monitoring and evaluation while also exploring internal and external factors which contribute to resilience to determine appropriate strategies. It answers questions such as: who is most in need, where should investment focus, which dimensions of resilience must be supported, and to what extent have interventions increased or decreased target populations' resilience. The following are the specific objectives of RIMA round two:

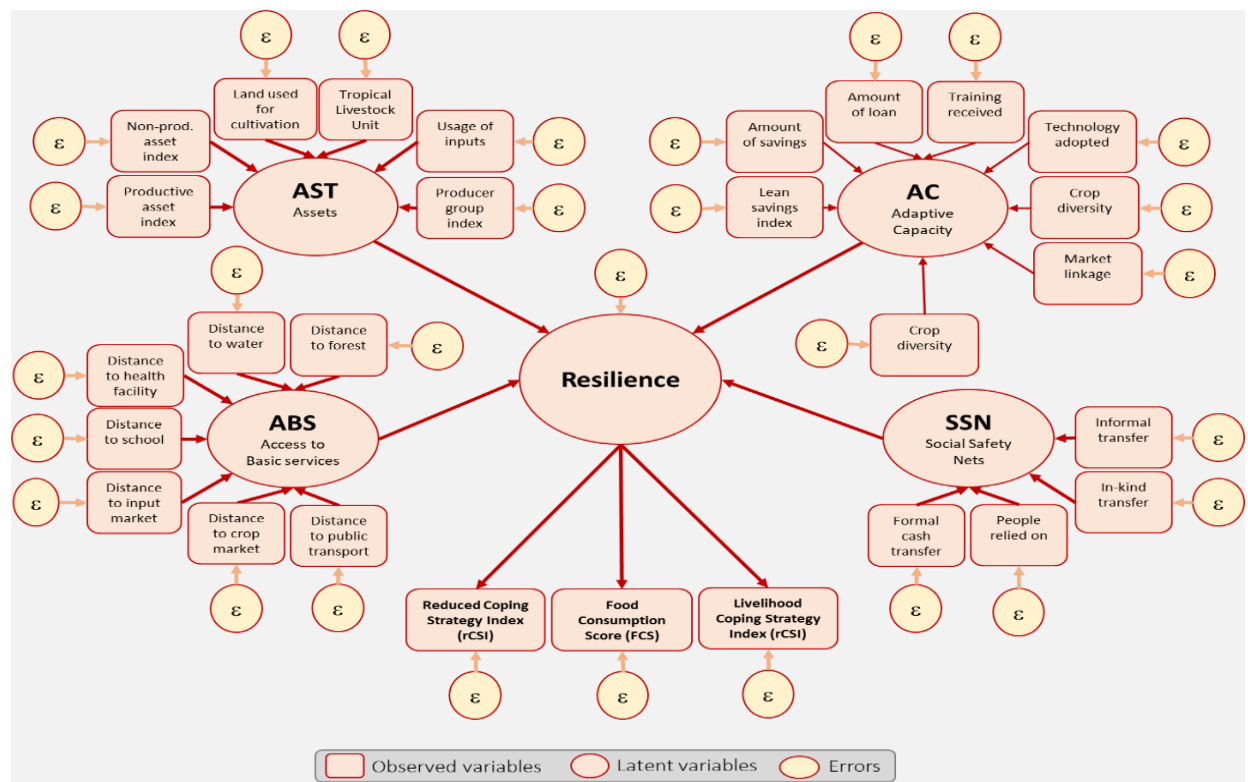
- Measure the resilience capacity of the communities and determine the resilience score.
- Identify the determinants and casual factors that affect the resilience capacity of the community.
- Determine strategies that will yield positive results to increase resilience capacity.

2. RESILIENCE MEASUREMENT APPROACH

RIMA provides a rigorous framework for both humanitarian and development initiatives. Because resilience is a dynamic concept, it necessitates a dynamic analytical framework account for all potential pathways to well-being in the face of shocks (FAO, 2015). It is primarily a quantitative approach to measure the household resilience capacity index (RCI). The resilience capacity index includes shock/stressor (e.g., climate change) and is constructed upon 4 pillars and linked to a specific outcome (e.g., food insecurity). The four traditional pillars are:

- **Access to basic Services (ABS):** shows the ability of a household to meet basic needs, and access effective use of basic services; e.g., access to public transport, and markets;
- **Assets (AST):** comprises both productive and non-productive assets of households and community assets. Examples of indicators include land, livestock, vehicles, durables and access to inputs;
- **Social Safety Nets (SSN):** measures the ability of households to access assistance from relatives and friends, international agencies, charities, and NGOs;
- **Adaptive Capacity (AC):** is the ability of a household to adapt to a new situation and develop new livelihood strategies that includes income, crop diversity, technology adoption, training, access to credit, and savings.

Figure 1. RIMA-II model structure - resilience index and pillars



3. METHODOLOGY AND COVERAGE

3.1. Data collection strategy

The collection of data began in November 2022 and was concluded in December 2022. The customized web-based data collection platform MODA operated by WFP was used to collect the data. FAO and its implementing partner facilitated the selection of twenty enumerators with prior expertise in collecting data in Bangladeshi communities and camps.

RIMA guidance and published reports (FAO, 2015; FAO, 2016), reports produced from Bangladesh Bureau of Statistics (BBS), Food Security Sector (FSS), and Inter Sector Co-ordination Group (ISCG), were reviewed for the study design and triangulation.

3.2. Sampling strategy

The study includes five sub-districts/Upazila and 24 Rohingya camps located in the Cox's Bazar district. Data was collected through surveying those directly involved in agriculture – crop cultivation, livestock rearing, fish culture, fish drying, agroforestry, or applying mixed approaches to produce agricultural products for subsistence or sales. The samples included the following comparison groups.

- **Treated households**, i.e., those who received agricultural support and other intervention one or more times from humanitarian actors specially for the FAO and WFP, and
- **Untreated/control households**, i.e., those who did not receive agricultural intervention from the humanitarian actors.

The respondents were the same household (HH) as surveyed in 2021 – selected through probable sampling procedures. The Bangladeshi respondents of the treatment groups were households supported by FAO from Cox's Bazar Sadar, Ramu, Ukhia, and Teknaf sub-districts; and those supported by WFP in Ukhia and Teknaf. In addition, three untreated and socio-economically similar areas were selected to draw control group representatives from Bangladeshi community² through stratified random sampling: a) Surajpur-Manikpur, Harbang and Dulhajra union under Chakaria sub-district; b) Jalia Palong union of Ukhia sub-district; and c) Khunia Palong union under Ramu sub-district. The Rohingya samples were drawn from households receiving vegetable seeds from WFP³.

It should be noted that the refugee context, geographical features, and other pertinent factors⁴ are heterogenous throughout the country including the sub-districts (Upazilas) across the district. Therefore, separate sampling strategies as well as precision and confidence interval were applied for different strata.

² Six UN agencies including FAO and 32 NGOs are working in Ukhia, Teknaf and surrounding sub-districts i.e Ramu and Cox's Bazar sadar, therefore a separate sub-district was selected for the control group data collection

³ The context of the host communities and Rohingya communities are not alike in terms of the stratification of agricultural groups. The agricultural activities have been initiated inside the camp as homestead gardening since 2021.

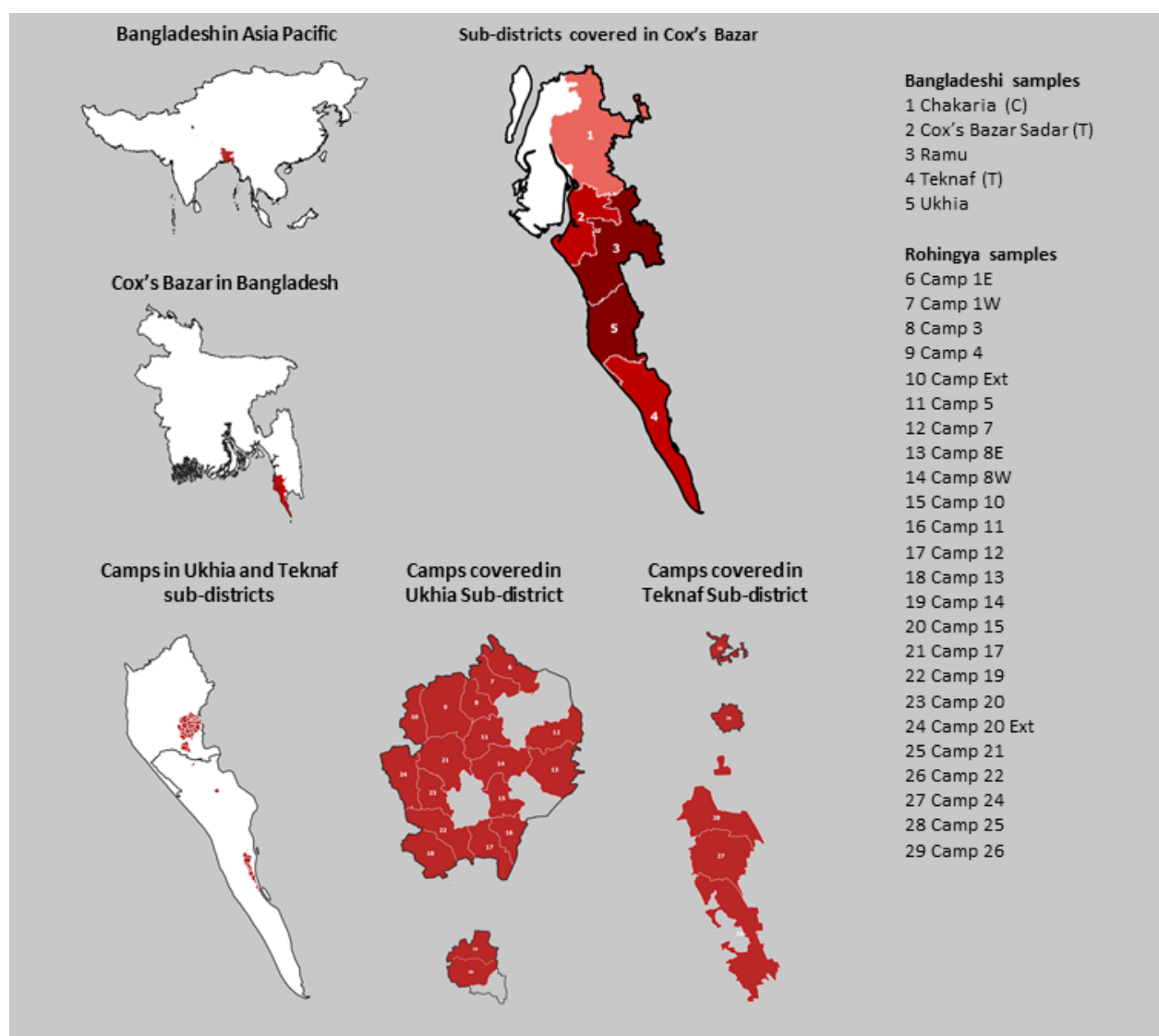
⁴ farm size (i.e., large or smallholders), productivity, income, and food consumption

Table 1. Sample distribution by sub-district and type

Sub-district	Host community		FDMN Community		Total
	Treatment	Control	Treatment	Control	
Chakaria	-	559	-	-	559
Cox's Bazar Sadar	220	-	-	-	220
Ramu	222	91	-	-	313
Teknaf	261	-	71	71	403
Ukhia	297	50	329	329	955
Total	1,000	700	400	400	2,500

Source: Own elaboration

Figure 2. Data collection map



Source: Own elaboration

3.3. Main limitations

- Since the Rohingya influx more than 38 humanitarian agencies are providing support across the Cox's Bazar district because of which, a separate sub-district (Chakaria) was selected for control samples.
- Enumerators had to often visit respondents more than once as per their convenience.
- The respondents had to recall the year-round production data for which the enumerators had to ask several probing questions for help.
- The context of the Rohingya and the host community is different therefore different set of variables were used to determine the resilience index.

4. MAIN FINDINGS

4.1. Resilience capacity

4.1.1. Bangladeshi community

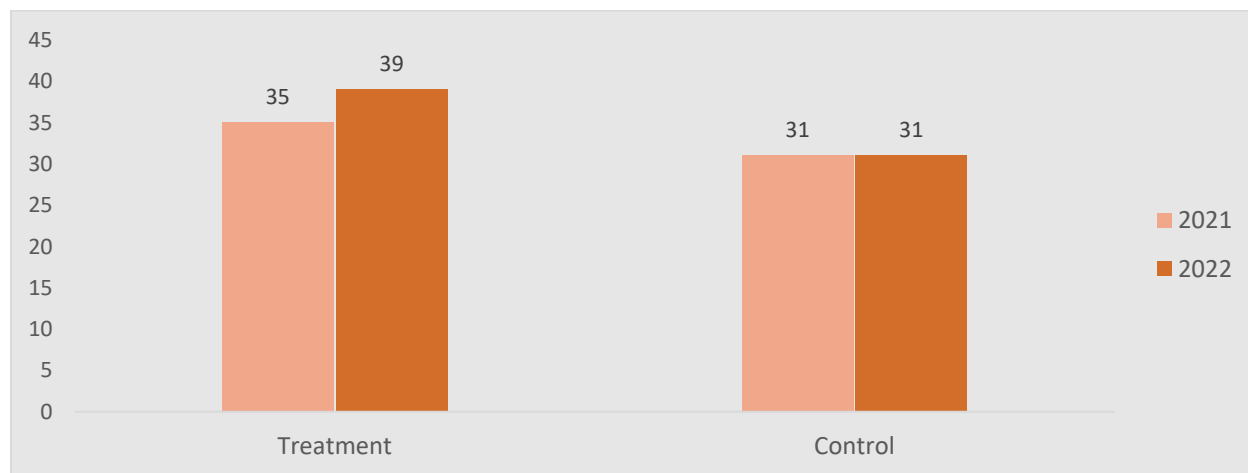
MAIN FINDING 1:

Improvement in Adaptive Capacity (AC) and Asset (AST) can obtain quicker and better results in resilience development of the Bangladeshi communities.

- Overall improving trends among treated households indicates effectiveness of the interventions.
- Adoption of improved technology in agricultural production, crop diversity, household income, capacity building training and access to credit, contribute to the development of AC.
- Ownership of productive assets, producer group asset, usage of agricultural land, and utilization of inputs significantly influence the AST pillar.
- Least resilience outcomes observed in Teknaf; as well as Cox's Bazar Sadar – households reporting deteriorating trends.

A significant gap in the Resilience Capacity Index (RCI) between the Bangladeshi treatment (39) and control (31) groups is observed. Compared to 2021, although the resilience capacity index of the control group remained the same, the index increased for the treatment group (from 35) indicating the positive impact of the intervention received by the treatment group. Adaptive Capacity (AC) and thereafter Asset (AST) ownership are the most influential pillars (Figure 28) that determined the resilience capacity.

Figure 3. Resilience Capacity Index of Bangladeshi community in comparison with control group



Source: Own elaboration

Adoption of improved technology in agricultural production, crop diversity, and access to credit contribute to the development of AC ([Figure 30](#)). Ownership of productive assets, usage of agricultural land, and utilization of inputs such as seeds, fertilizer, and bio pesticides significantly influence the AST pillar ([Figure 32](#)). Long-term investments are required to improve ABS and SSN. The higher resilience index of the treatment group can be characterized by their higher income, savings, and access to loans, increased usage of technology in agricultural production, recipient of capacity building training, and savings of crops considering the agricultural lean period ([Table 11](#)).

The resilience index of Ramu (52) is highest compared to the other sub-districts followed by Ukhia (48), Cox's Bazar Sadar (44), with lowest score found for Teknaf (43). The low resilience of Teknaf can be characterized by their lower adoption of technology in agricultural production, lower household income and savings for the agricultural lean season, limited ownership of productive assets, and minimal usage of land and inputs in agricultural production ([Table 11](#)). Compared to 2021, The resilience index of Ramu remained the same whereas in Cox's Bazar Sadar it dropped from 51 to 44. In contrast, a significant increase was observed for both Ukhia and Teknaf (from 36 to 48 and 43 respectively). Investment in adaptive capacity is likely to improve the resilience capacity of the households from Ukhia followed by Teknaf, Ramu, and Cox's Bazar Sadar as adaptive capacity is influencing these sub-districts sequentially. On the other hand, investment to increase access to asset ownership will better boost the resilience capacity of Ramu, Ukhia, and Teknaf followed by Cox's Bazar Sadar. On the contrary, there is lower influence of Social Safety Net (SSN) and Access to Basic Services (ABS) pillars in determining RCI – indicating long-term investment requirements for these two pillars. Investment in SSN will better boost the resilience capacity of Cox's Bazar Sadar followed by Ramu and Ukhia. Furthermore, investment in ABS will likely improve the resilience capacity of Teknaf followed by Cox's Bazar Sadar, Ukhia, and Ramu. However, Teknaf has no impact of SSN in determining RCI ([Figure 27](#)).

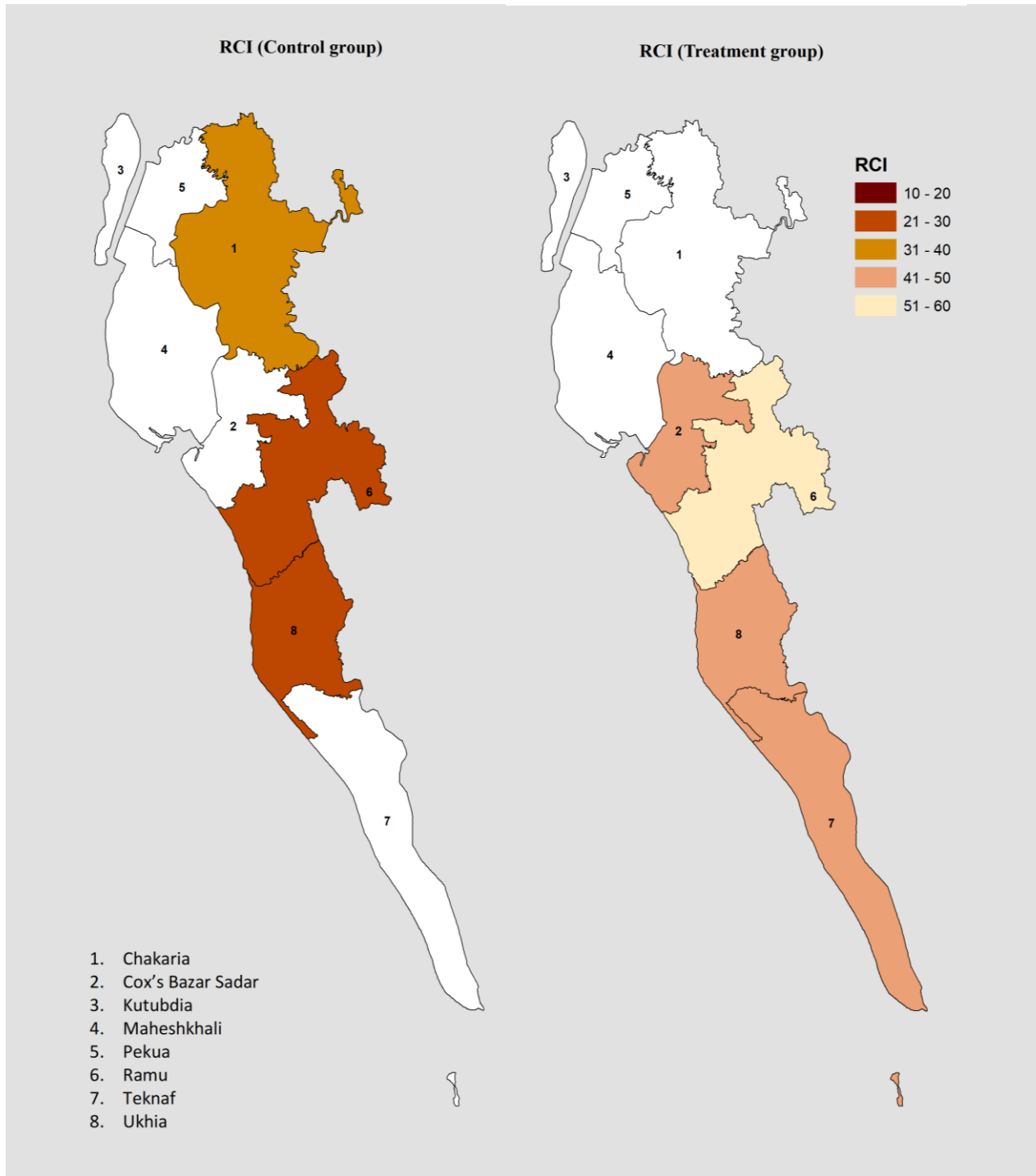
In comparison with Round-1 conducted in 2021 resilience capacity slightly increased in each of the treated farmer categories in 2022. Large farmers were found to be the most resilient (64) followed by smallholders (52), and thereafter the marginal farmers (39)⁵ which was 62, 49 and 37 respectively in 2021. Adaptive Capacity (AC) and access to Asset (AST) ownership are the two most contributing pillars ([Figure 26](#)) in building the resilience referring investment on these for quick and better result. The low resilience of the marginal farmers can be characterized by their lower participation in capacity-building training and adoption of technology in agricultural production, lower household income, access to loans and savings for the agricultural lean season, limited ownership of productive and non-productive assets, minimal usage of land and inputs in agricultural production ([Table 11](#)).

Shocks have significant negative impact on the resilience capacity of the Bangladeshi households ([Table 11](#)). The households affected with shocks have lower resilience index (32) compared to the households not affected with shocks (37). Among the different types of shocks - landslides and price hikes have the most significant negative impact on the Bangladeshi household's resilience capacity whilst cyclone has a significant negative impact on the Rohingya households ([Table 11](#)). Around 22 percent of households from

⁵ According to the Department of Agriculture Extension (DAE), the farmers who have land between 0.05-0.5 acres are considered as marginal farmers, the farmers having ownership of land between 0.5-1.0 acres are recognized as the smallholder farmer, and the farmers having land of more than 1 hectare are considered the large farmer.

the Bangladeshi community were affected by shock in the last 12 months. Out of this 22 percent, 33 percent of households were affected by cyclones followed by salinity (30 percent), plant diseases (12 percent), and price hike (12 percent).

Figure 4. Resilience Capacity Index (RCI) map – Bangladeshi Community



Source: Own elaboration

4.1.2. Rohingya community

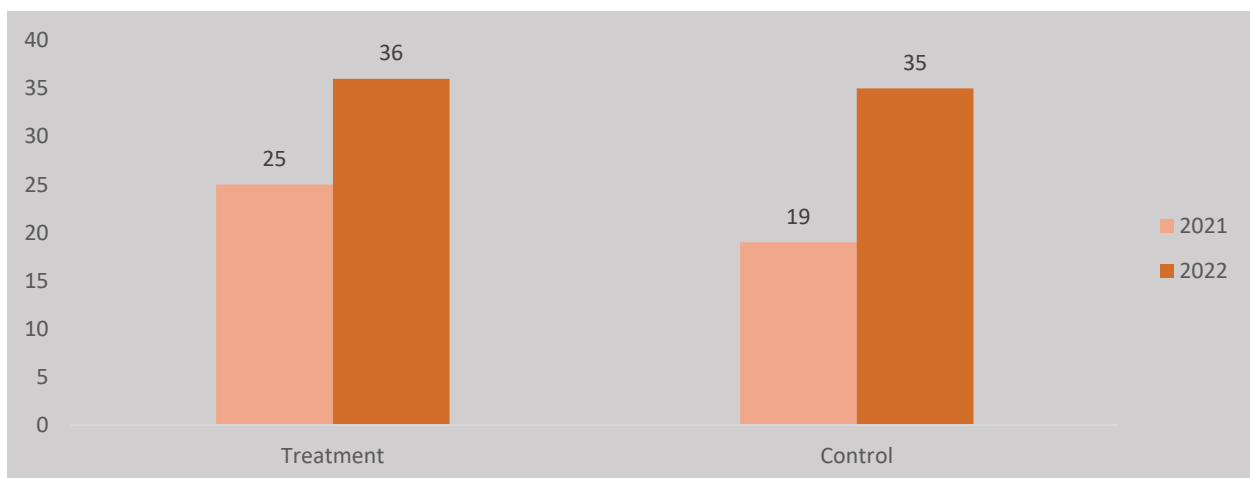
MAIN FINDING 2:

Adaptive Capacity (AC) and Access to Basic Service (ABS) are the most influential pillars that can contribute to the resilience capacity of the Rohingya households.

- Overall improving trends in resilience capacity among treated households indicates effectiveness of the interventions although with narrowing gap among control households in absence of continued intervention.
- Crop diversity, adoption of technology in agricultural production, and capacity-building training are the key drivers contributing to the AC pillar.
- Access to the agriculture input market, crop market to sell agricultural products, and access to primary school are the key factors influencing the ABS pillars.

The resilience capacity index of the treated households from the Rohingya community is slightly higher (36) compared to the resilience index of the control group (35). Compared to 2021, the resilience capacity of both the treatment and control groups has increased significantly and the gap between these two groups has significantly reduced in 2022. It indicates that the resilience capacity of the control group increased more compared to the treatment group. This can be described by the limited practice of homestead gardening by the treatment group households compared to 2021. In 2021, 100 percent of the households received homestead intervention which has been dropped to 50 percent in 2022.

Figure 5. Resilience Capacity Index of Rohingya community in comparison with control group



Source: Own elaboration

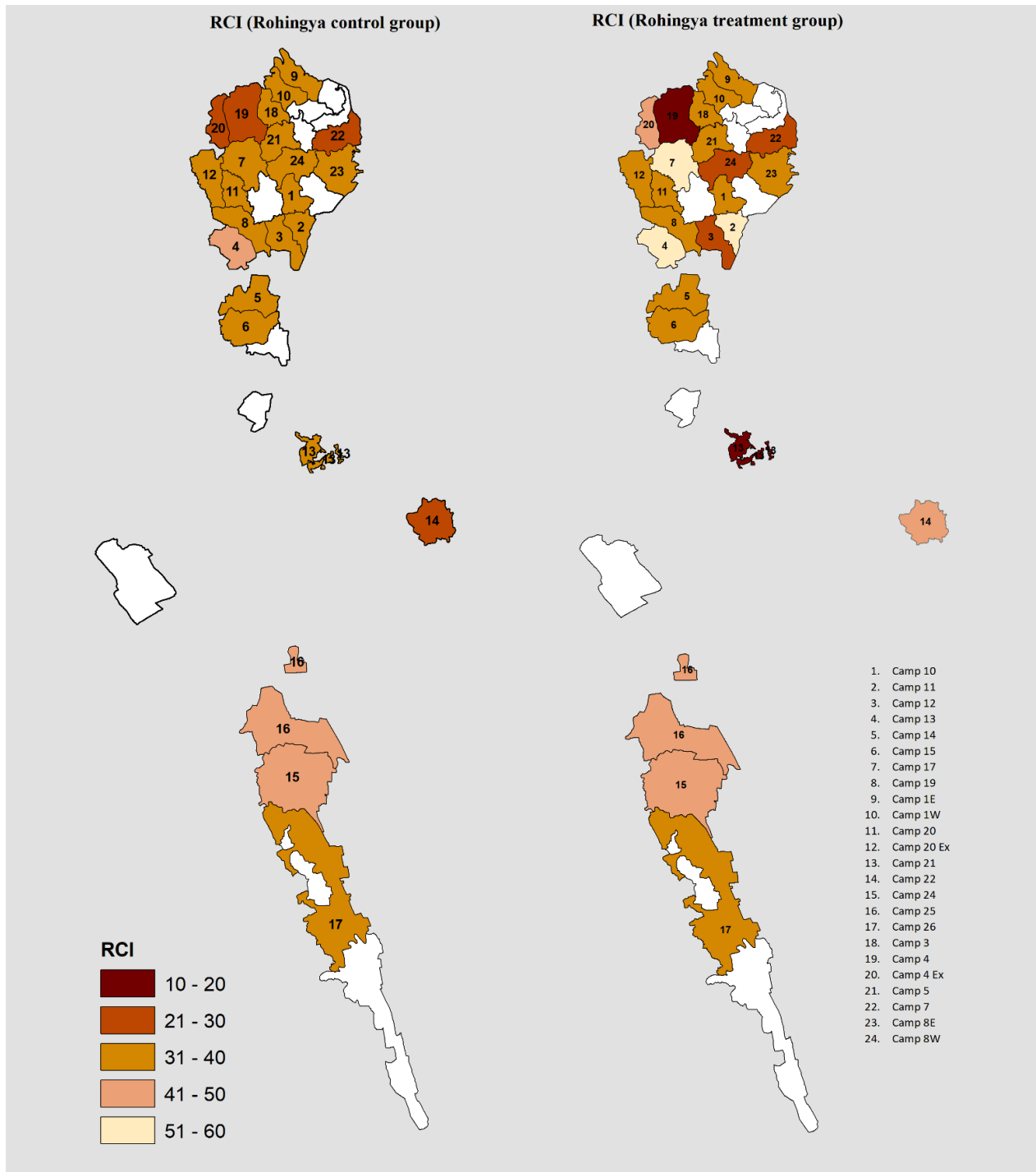
Adaptive Capacity (AC), and thereafter Access to Basic Service (ABS) are the most influential pillars ([Figure 29](#)) contributing to the resilience capacity of the Rohingya households. AC pillar has a similar impact on both the treatment and control group in determining RCI. Crop diversity, adoption of technology in agricultural production, and capacity-building training are the key drivers ([Figure 31](#)) contributing to the AC pillar which indicates these key drivers should be considered for the investment on adaptive capacity. In contrast, the treatment group will be benefited more if the investment is made on the ABS pillar. Access to the agriculture input market, crop market to sell agricultural products, and access to primary school are the key factors ([Figure 35](#)) influencing the ABS pillars which indicates the inclusion of these factors for the investment. The higher resilience capacity of the treatment group can be characterized by their higher income, getting more capacity-building training, usage of input in agricultural production, and better access to the agriculture input market and primary school ([Table 11](#)).

In the Rohingya camps, 34 percent of households reported facing shocks in the last 12 months. Out of this 34 percent of households were exposed to shocks, and 88 percent were affected by price hike followed by cyclone (49 percent), Stormy wind (42 percent), and landslides (29 percent). The resilience capacity of the shock affected households is lower (32) compared to the households not affected with shocks (38).



Mohammad Selim, a Rohingya refugee volunteer, is watering plants inside a refugee camp in Cox's Bazar. He has been engaged with FAO's plantation activities since 2018.

Figure 6. Resilience Capacity Index (RCI) map – Rohingya Community



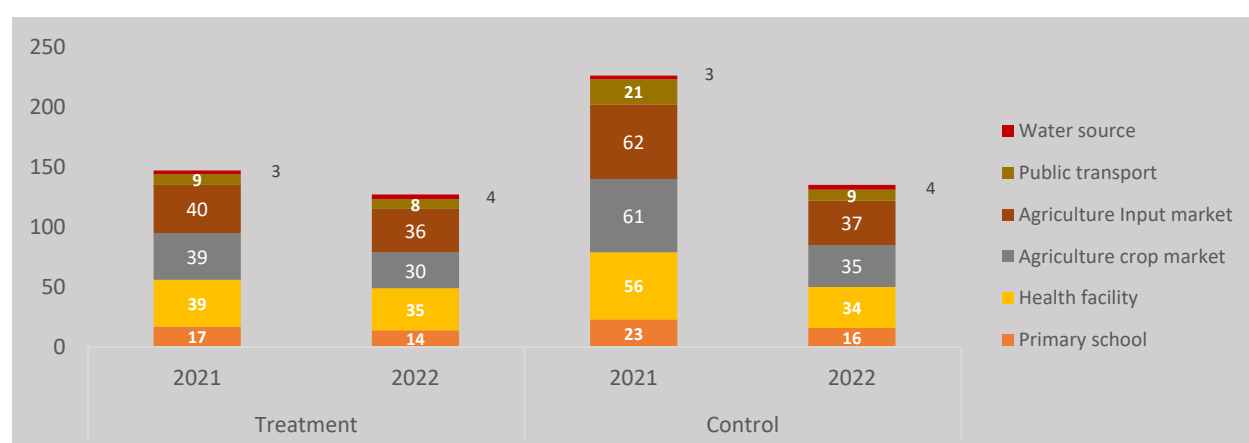
Source: Own elaboration

4.2. Access to Basic Services (ABS)

4.2.1. Distance to basic services

One-way walking time to reach to the basic services for the Bangladeshi treatment group is slightly lower compared to the control group - ranging between 1 to 5 minutes. The longest time required was to reach the agriculture input market where the treated households need 36 minutes and control group needs 37 minutes. Moreover, to reach the agriculture crop market to sell the agricultural product treatment group requires 30 minutes which is 35 minutes for the control group. In comparison with 2021, the proximity to the basic services has improved both for the treatment and the control group. However, it has significantly improved for the control group compared to the treatment group.

Figure 7. One-way walking distance to basic services for the Bangladeshi community (minutes)



Source: Own elaboration

On the other hand, no significant difference in proximity to basic services was found between treatment and the control groups for the Rohingya community. It is because the Rohingya community is not allowed to go outside of the camp area to avail of any service, rather it is offered from a fixed point which is accessible for both the treatment and control group. However, compared to 2021, proximity to reach basic services has improved a slightly except for the agriculture crop market and public transport.

Table 2. One-way walking distance (min) to the basic services of Rohingya community (average)

Service type	Treatment		Control	
	2021	2022	2021	2022
e-Voucher outlet	20	20	23	23
LPG Distribution point	26	24	26	28
Primary school	8	7	8	8
Health facility	18	17	20	18
Agriculture crop market	25	26	25	27
Agriculture Input market	39	36	39	38
Public transport	12	15	13	14

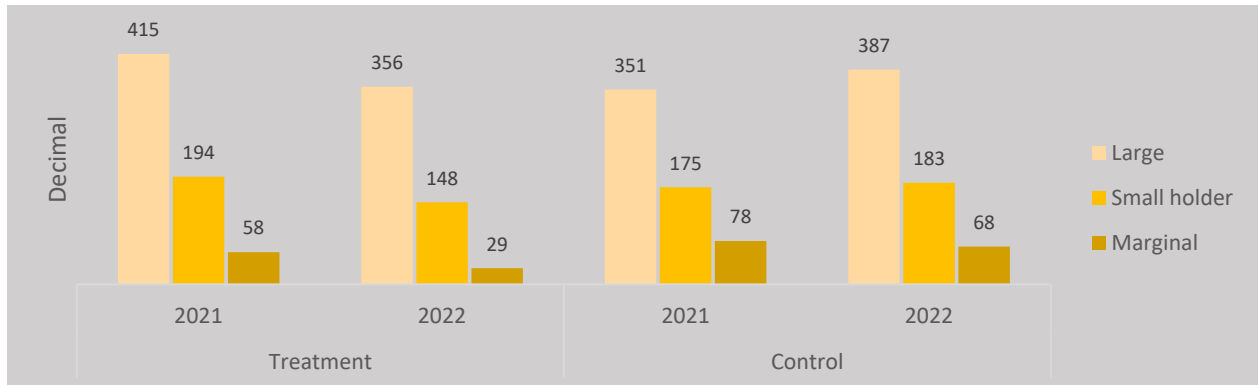
Source: Own elaboration

4.3. Asset (AST)

4.3.1. Land utilization for agricultural production

Across treatment group farmers, the average land utilized has drastically dropped - from 415 to 356 decimals for large farmers, 194 to 148 decimals for smallholders, and 58 to 29 decimals for the marginal farmers. On the contrary, among control farmers the average land utilization was found to have increased by 36 decimals among large, 8 decimals among smallholders and 10 decimals among marginal farmers.

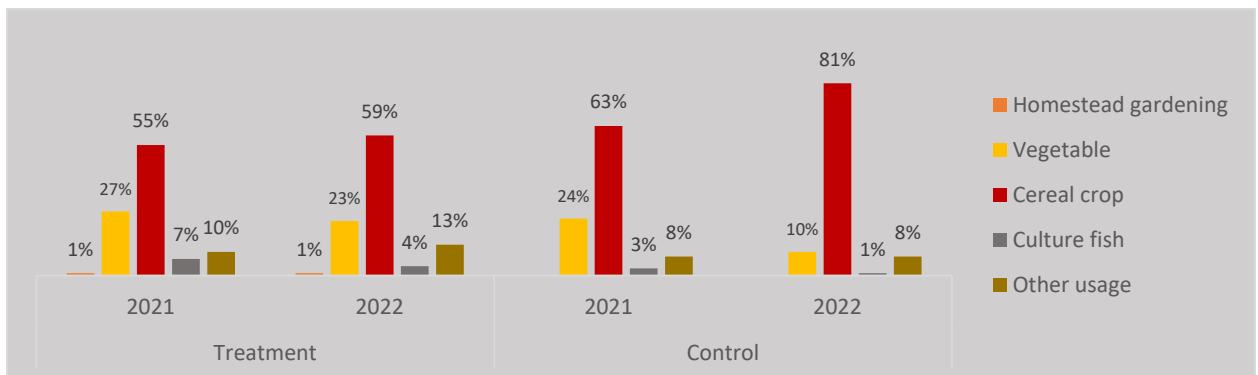
Figure 8. Land utilization (Amount in decimal) for agricultural production by the Bangladeshi community



Source: Own elaboration

The major share of land was utilized mainly for cereal crop production followed by vegetable production, culture fish production and homestead gardening. Among the treatment group, 59 percent of the total land utilized was for cereal crop production which shows an increase of 4 percent compared to 2021. Around 23 percent of the land was utilized for vegetable production which was 27 percent in 2021 and 1 percent of the land was utilized for homestead gardening which remained the same as 2021. However, land utilization share dropped from 7 percent to 4 percent for fish culture in 2022. On the other hand, land utilization pattern significantly changed within the control group especially for cereals that increased from 63 percent to 81 percent and for vegetables declining from 24 percent to 10 percent between 2021 and 2022.

Figure 9. Land utilization pattern of Bangladeshi community in agricultural production



Source: Own elaboration

4.3.2. Ownership of productive assets

Although each household currently owning at least one type of productive asset, the average number of productive assets owned by the households has reduced from five to four among the treatment farmers and from four to three among control farmers from 2021. Among major productive assets, water pump ownership was highest (19 percent) and has increased by 8 percent compared to 2021 among treated farmers. However, ownership of micro gardening kits drastically dropped from 39 percent to 7 percent followed by fishing tools reducing from 35 percent to 16 percent in comparison with 2021. The ownership of sewing machines, bicycles, and motorbikes also decreased. On the other hand, in the control group except for a slight increase in tractors and tom-toms, ownership of all other assets has decreased, especially micro gardening kit, followed by the bicycle and water pump.

Table 3. Productive assets ownership by the households of Bangladeshi community

Asset ownership	Treatment		Control	
	2021	2022	2021	2022
Water pump	11%	19%	18%	14%
Fishing tool	35%	16%	18%	15%
Sewing machine	17%	13%	9%	6%
Micro gardening kit	39%	7%	33%	8%
Tomtom	3%	4%	2%	3%
Bicycle	10%	3%	10%	1%
Motorbike	4%	3%	3%	1%
Power tiller	2%	2%	4%	2%
Rickshaw	2%	2%	3%	1%
CNG	2%	2%	1%	1%
Power thresher	1%	1%	1%	1%
Tractor	0%	1%	0%	1%

Source: Own elaboration

The scope of having ownership of productive assets by the Rohingya households is very limited as there is no sustainable livelihood/income-generating opportunities are allowed within the camp areas. Micro gardening kits and sewing machines were the only productive assets found. Three percent treated Rohingya households own sewing machines in their households which was eight percent in 2021. Ownership of the sewing machine was found a bit higher in the control group which was four percent, and this percentage remained the same as 2021. However, ownership of micro gardening kits has significantly dropped from 39 percent to seven percent in 2022 within the treatment households.

4.3.3. Ownership of non-productive assets

Around 93 percent of households from the treatment group own at least one piece of gold jewellery or an average 11 gm of gold which was 9.33 gm in 2021. The second most owned non-productive asset item was a smartphone which is owned by 65 percent of households followed by fridges owned by 33 percent of households. The ownership of both smartphones and fridges increased by four and five percent respectively compared to 2021. In the control group, 92 percent households' own jewellery made of gold,

and the average amount of gold owned by the households was seven gm which was five gm in 2021. The ownership of smartphones, fridge, and television also increased compared to 2021.

Table 4. Types of productive assets owned by the households of Bangladeshi community

Asset ownership	Treatment		Control	
	2021	2022	2021	2022
Jewellery	83%	93%	80%	92%
Smartphone	65%	69%	50%	52%
Fridge	28%	33%	19%	21%
TV	12%	15%	5%	7%
Laptop	1%	1%	0%	0%

Source: Own elaboration

In the Rohingya community, 80 percent of households from the treatment group have at least one piece of jewellery made of gold - on average three gm which was two gm in 2021. On the other hand, 53 percent of households from the control group own jewellery which is equivalent to two gm on average. Moreover, 24 percent of households from the treatment group and 25 percent from the control group reported having ownership of smartphone, which was 22 percent and 23 percent respectively in 2021. None of the households either from treatment or from control group own fridge and television.

4.4. Social Safety Net (SSN)

4.4.1. Formal transfer

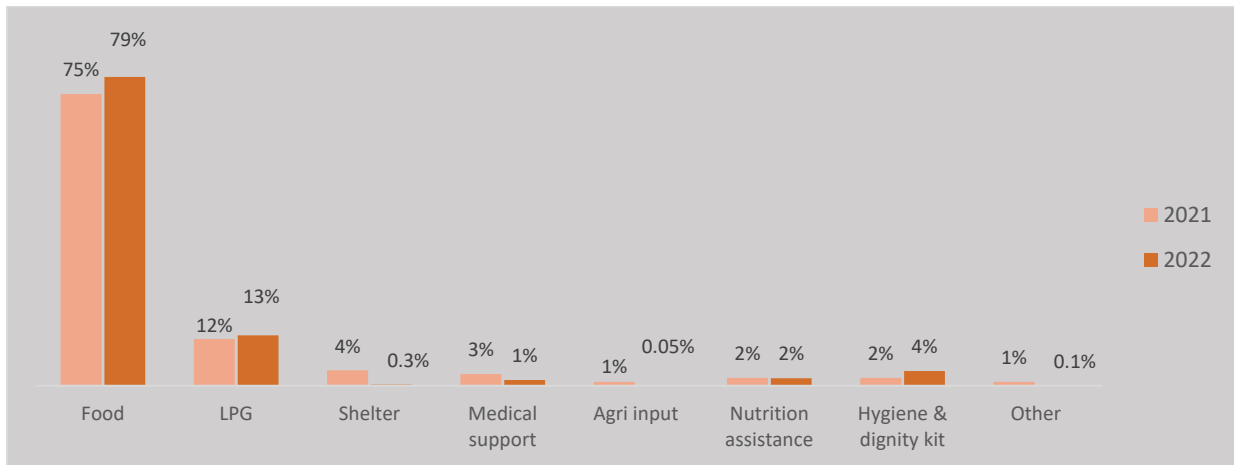
Like 2021, around 39 percent of households from the treatment group reported that they received formal transfer in the last 12 months. The amount received by 39 percent household is worth BDT 9,728, on an average which decreased by BDT 1,135 compared to 2021. In contrast, only seven percent of households from the control received formal transfers on an average worth of BDT 7,504. Though the percentage of control group households that received formal transfer dropped by 8 percent, the average amount of formal transfers increased by BDT 3,324 compared to 2021.

None of the households from the Rohingya community received any formal cash transfer as there is a restriction to provide any cash assistance in the Rohingya camps.

4.4.2. In-kind transfer

The Rohingya households are solely dependent on the assistance provided by the humanitarian actors. The average monetary value of the assistance received by the Rohingya households in the last 12 months considering both the control and the treatment group was worth BDT 108,124. The monetary value of the assistance of the control group was found bit higher (BDT 109,709) compared to the treatment group which was (BDT 106,539). Around 79 percent of this assistance was allocated for food which was 75 percent in 2021. The second largest share of assistance was for LPG distribution which was 13 percent in 2022 and 12 percent in 2021. A share of four percent came from hygiene and dignity kits which was two percent in 2021. The assistance share for shelter, medical facilities, and agricultural input has notably decreased in 2022 compared to 2021.

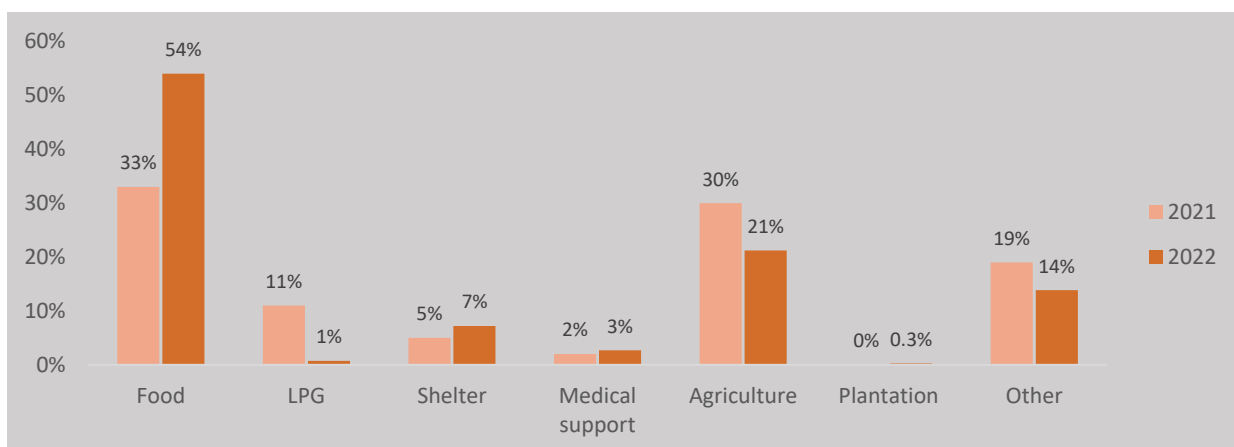
Figure 10. Distribution of in-kind transfers received by the Rohingya community across sectors



Source: Own elaboration

From the Bangladeshi treatment group, 86 percent of households received at least one type of in-kind assistance – on an average equivalent to BDT 8,030 which was 95 percent and equivalent to BDT 12,053 in 2021. In the control group though the outreach decreased but the monetary value of the assistance package received has increased. It was 41 percent worth BDT 3,342 in 2021. In contrast, in 2022 it was found 24 percent only, but the monetary value was worth BDT 4,849. The in-kind assistance received by the control group was mainly the assistance under the government’s social safety net program. Considering both the control and treatment group, the significant share of this assistance package was for food (54 percent), which was 33 percent in 2021. The assistance shares for agricultural inputs dropped drastically from 30 percent to 21 percent. Another significant drop was found in LPG distribution which has dropped from 11 percent to 1 percent. However, Assistance share in shelter has increased from 5 percent to 7 percent.

Figure 11. In-kind transfer share in different sector received by the Bangladeshi community



Source: Own elaboration

4.5. Adaptive Capacity (AC)

4.5.1. Income and livelihood

The average monthly income has increased by BDT 8,382 for each of the surveyed households considering both the control and the treatment households. The average income of the treatment group increased by BDT 9,266 whereas for the control group, the average increase was BDT 8,167 compared to 2021. Though income has increased for both the control and treatment households, the average household income (BDT 23,076) is significantly below the national average⁶.

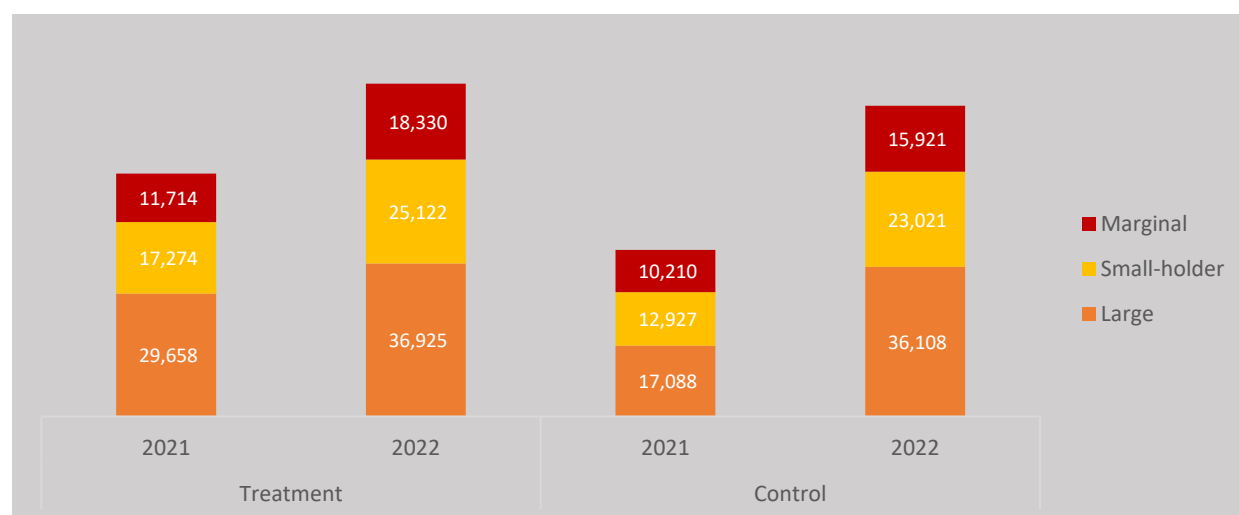
Table 5. Distribution of average monthly income of the Bangladeshi community

Sample type	2021	2022
Treatment group	BDT 15,596	BDT 24,862
Control group	BDT 12,358	BDT 20,525
Overall	BDT 14,694	BDT 23,076

Source: Own elaboration

The monthly average income across all farmers and sample categories has increased compared to 2021, however, with large farmers reporting almost two times higher than the marginal farmers.

Figure 12. Average monthly income of the households from Bangladeshi community by farmer group



Source: Own elaboration

A significant drop was evident in the income share from the agricultural sector. Considering both treatment and control groups, 36 percent of the total monthly income was coming from the agricultural sector which was 49 percent in 2021. Income share from day labour activities also declined from 18 percent to 14 percent. On the other hand, a remarkable rise from three to nine percent was reported from remittance.

⁶ According to the Household Income and Expenditure Survey (HIES) 2022 conducted by BBS the average monthly household income is BDT 32,422.

Moreover, a three percent increase in private service wage and a six percent increase in other income sources like driving light motorized vehicles, handicrafts, and house rent was observed compared to 2021.

Table 6. Income share of the Bangladeshi community from different sectors

Sector of income	2021			2022		
	Treatment	Control	Overall	Treatment	Control	Overall
Agriculture	47%	55%	49%	36%	37%	36%
Day labour	16%	23%	18%	9%	23%	14%
Family Business	14%	7%	12%	15%	10%	13%
Other (Driving, handicraft, rent)	8%	6%	7%	14%	11%	13%
Private sector wage	8%	5%	8%	10%	11%	11%
Social assistance and transfers	3%	1%	3%	4%	1%	3%
Remittance	3%	3%	3%	11%	5%	9%
Government Wage	1%	0%	1%	1%	2%	1%

Source: Own elaboration

In the Rohingya camp, there is very limited opportunity to adopt any sustainable income-generating activity. Therefore, the monthly average income of Rohingya households was found to be incredibly low, though both the control and treatment farmers experienced an increase in income from BDT 2,436 in 2021 to BDT 3,168. Likewise, in 2021, the major share of this income came from day labour activities. Nonetheless, the income share from day labour activities significantly dropped from 52 percent to 27 percent. A significant rise in income share was observed from business, remittance, and other sectors, for instance driving light motorized vehicle within camp area, informal business, handicraft etc.

Table 7. Average monthly income of the Rohingya community

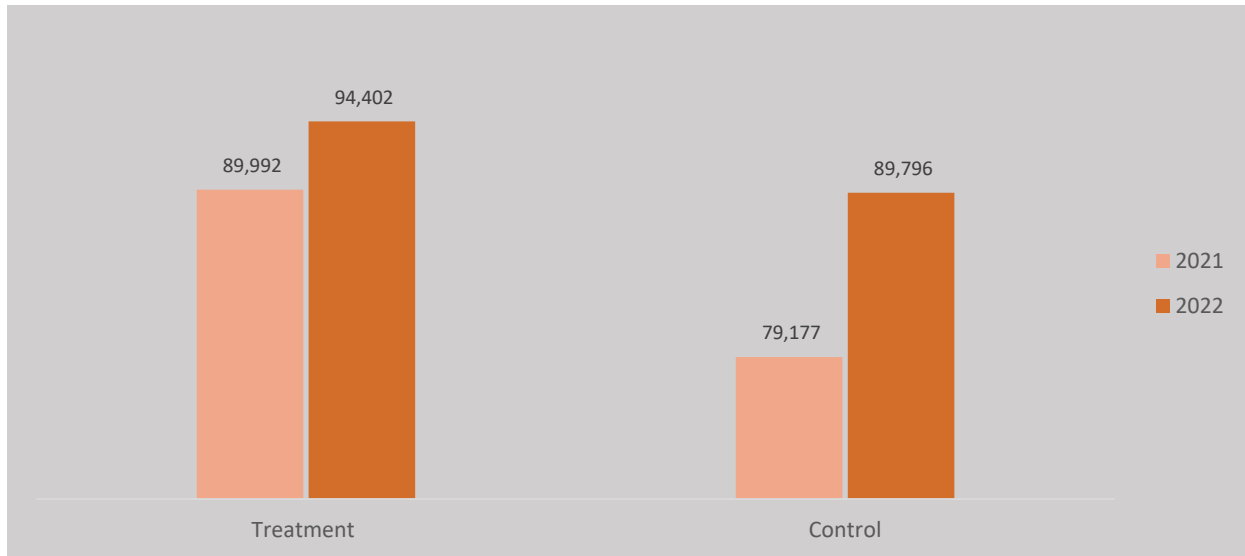
Sample type	2021	2022
Treatment	BDT 2,517	BDT 3,474
Control	BDT 2,354	BDT 2,863
Overall	BDT 2,436	BDT 3,168

Source: Own elaboration

4.5.2. Loan and savings

The control group households (63 percent) have better access to loans compared to the treatment group (56 percent). However, the amount of loans taken by the treated households (BDT 94,402) in the last 12 months is higher than the control group (BDT 89,796). Compared to 2021, overall access to the loan has increased from 50 percent to 59 percent considering both control and treatment households. However, particularly in the control group, household access to loans dropped from 69 percent to 63 percent. In contrast, the average amount of loans taken has increased from BDT 79,177 to 89,796. Among the treatment households, access and the average amount of loan, both increased by 14 percent and BDT 4,410 respectively. Among the treatment households, large farmers withdrew the highest amount of loan (BDT 117,244) followed by smallholders (BDT 99,993) and marginal farmers (BDT 85,071) in 2022.

Figure 13. Average amount of loan taken in the last 12 months by Bangladeshi households



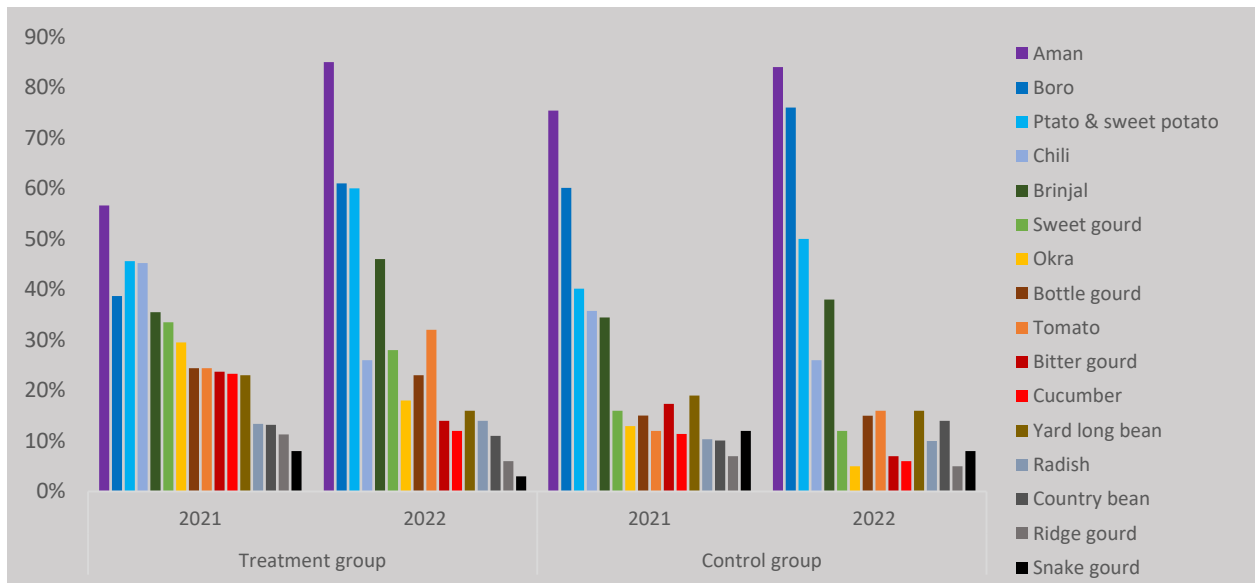
Source: Own elaboration

The average amount of savings is higher for the treated households (BDT 32,655) compared to the control households (BDT 21,784). The savings amount notably increased along with income compared to 2021 (BDT 17,265 and BDT 6,763 respectively). The increase rate is slightly higher among the treatment group than in the control if compared between 2022 and 2021. Among the treated households, large farmers were found having the highest amount of savings (BDT 68,038) followed by smallholders (BDT 37,221) and marginal farmers (BDT 18,127) in this round.

4.5.3. Crop diversity and productivity

On average four types of crops are produced by the households of the treatment group compared to three types produced by the control group which were six and five respectively in 2021. Among cereal crops, cultivation of Aman rice was found prevalent both in the treatment and control households followed by Boro. Potato and brinjal was found to be the most cultivated vegetables among the treated and control households. However, the practice of cultivating green chili, okra, and cucumber dropped significantly ranging from 11 to 19 percent. In contrast, the tendency of cultivating potato, brinjal, and tomato increased significantly ranging from 8 to 14 percent among treated households. In the control group, a significant drop was found for green chili, okra, and bitter gourd ranging from eight to ten percent whereas a noteworthy increase was found in potato, brinjal, and country bean cultivation ranging from 4 to 10 percent. Cultivation of cereal crops i.e., Aman increased by 28 percent and Boro by 22 percent in the treatment group which is 9 percent and 16 percent respectively within the control group.

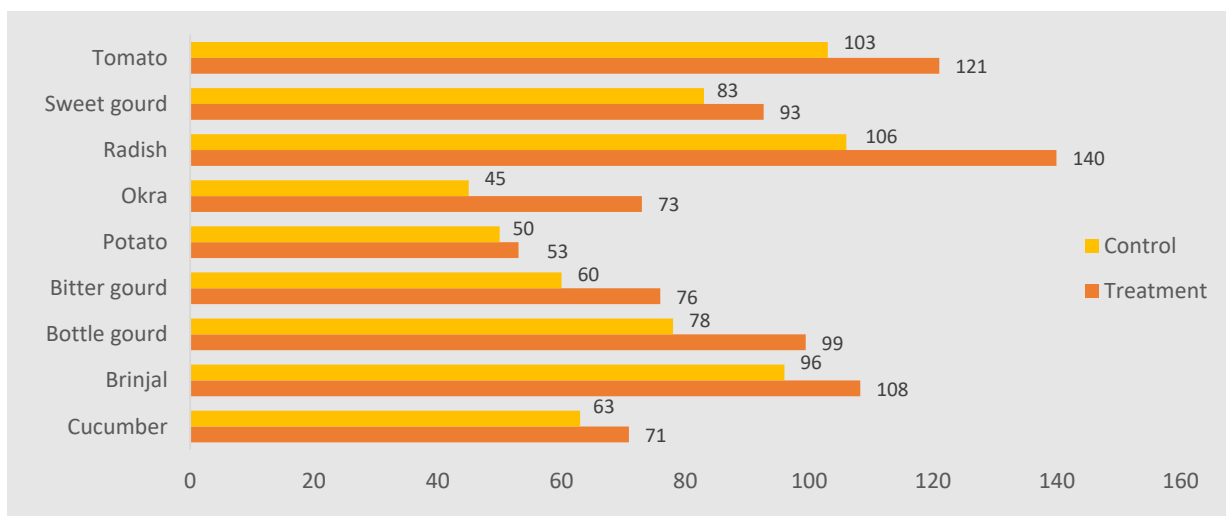
Figure 14. Distribution of households cultivating different types of crops in the Bangladeshi community



Source: Own elaboration

Per decimal production of the potato was found to be 53 kg among the treatment group which bit lower - 50 kg in the control group. The productivity of brinjal was found also higher - 108 kg in the treatment group, which is 96 kg in the control group. Per decimal tomato production was measured at 121 kg whereas it was 103 kg in the control group. A remarkable difference in per decimal production was also found for all vegetables – bottle gourd, okra, and Radish when compared between the treatment and the control group.

Figure 15. Crop productivity (per decimal production) in the Bangladeshi community

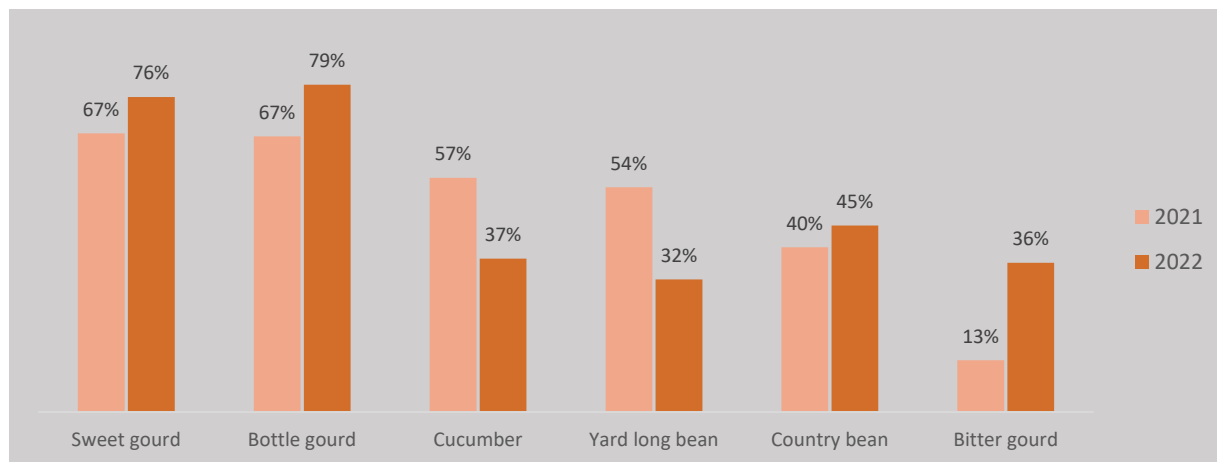


Source: Own elaboration

In the Rohingya camps, the percentage of treated households practicing homestead gardening was 100 percent in 2021 which has dropped to 50 percent in 2022. Out of these households practicing homestead

gardening, the tendency of cultivating sweet gourd, bottle gourd, and bitter gourd has increased by 9 percent, 13 percent, and 24 percent respectively compared to 2021. On the other hand, cultivation of cucumber and yard-long bean has significantly fallen by 20 percent and 22 percent respectively.

Figure 16. Distribution of households cultivating crops in the Rohingya community

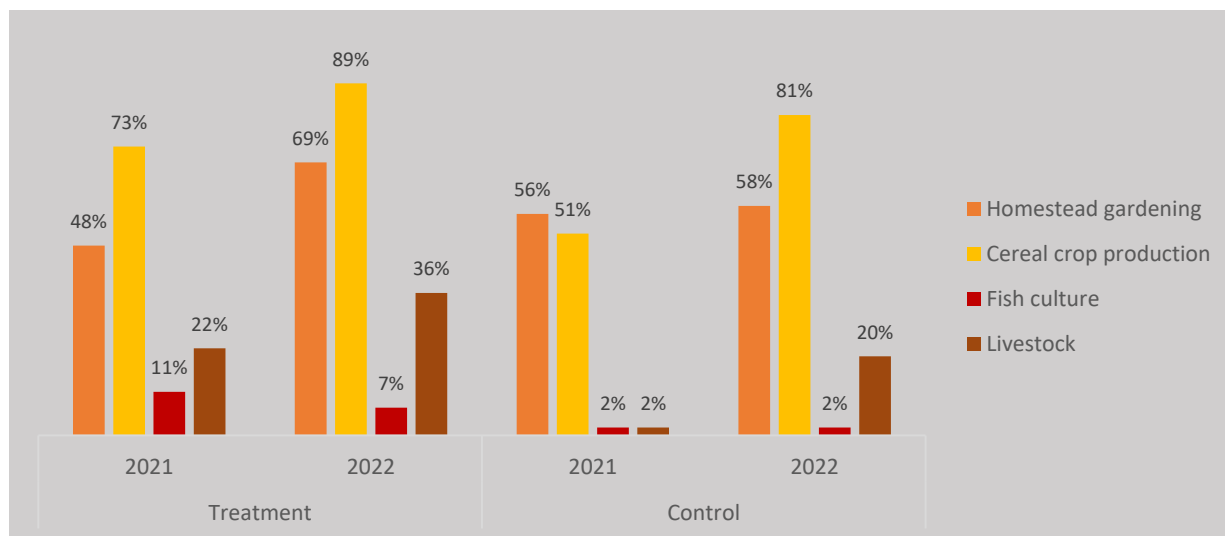


Source: Own elaboration

4.5.4. Technology adoption in agricultural activities

Adoption of technology in agricultural production among treated households (84 percent) was found higher compared to the control group (73 percent) among Bangladeshi households. Technology usage across different agricultural activities i.e., homestead gardening, field crop production, fish culture, and livestock has increased especially within the treatment group compared to the previous round. Adoption of technology particularly in homestead gardening increased by 21 percent in the treatment group, whereas the increase rate is only two percent among the control group. Technology usage also increased in cereal crop production by 16 percent in the treatment group compared to 28 percent in the control group. A rise in technology adoption in the livestock sector was identified in the control group (18 percent) which is 14 percent in the treatment group. However, in fish culture, technology usage dropped by 4 percent in the treatment group with no change in the control group.

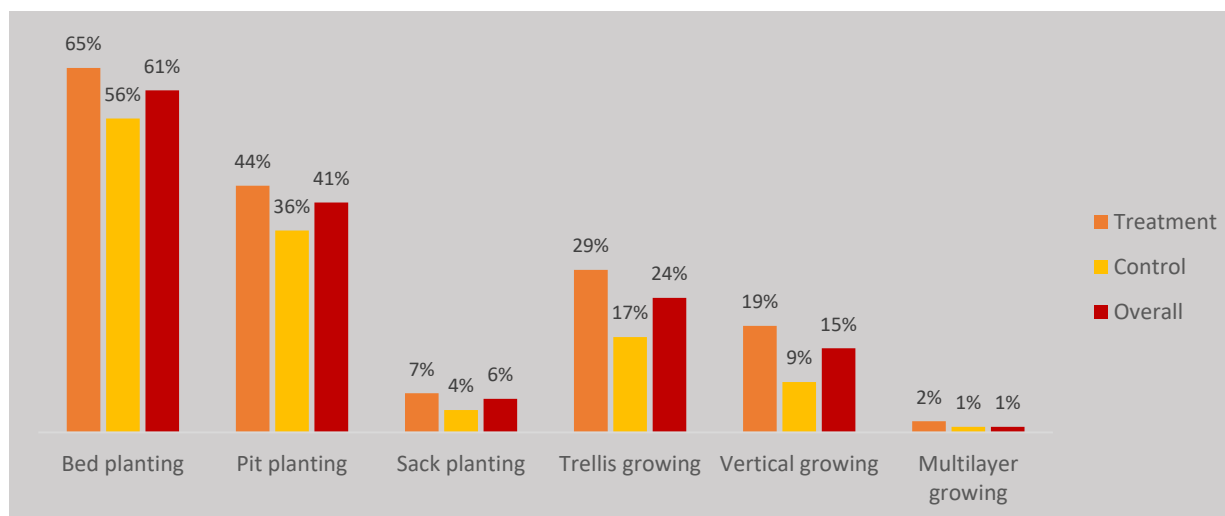
Figure 17. Technology adoption by the Bangladeshi households in agricultural production



Source: Own elaboration

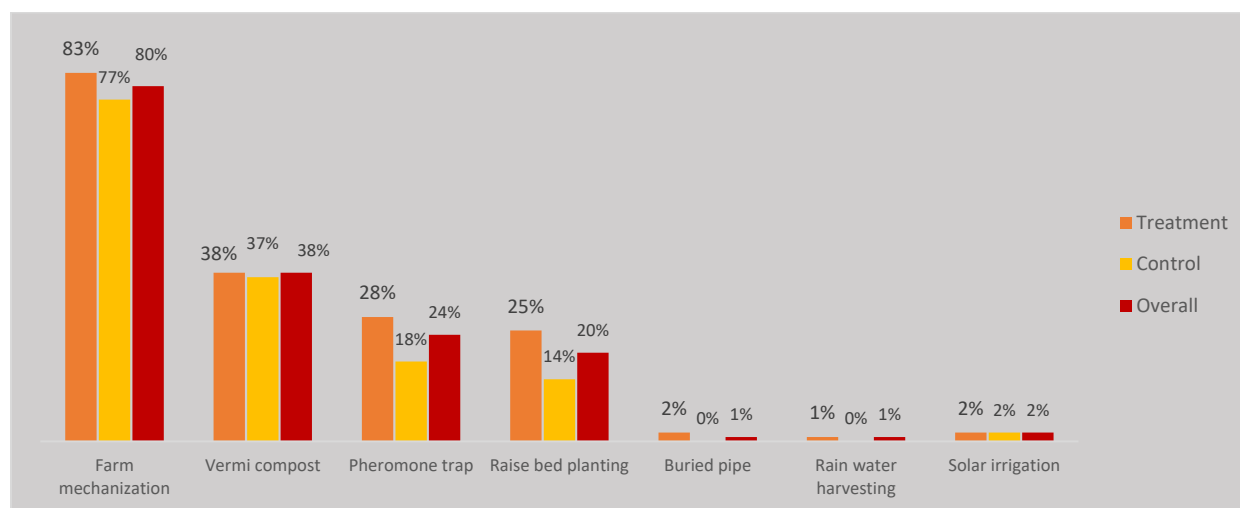
Bed planting was identified as the most adopted technology in homestead gardening both in the control and treatment groups followed by pit planting, trellis growing, and vertical growing. In contrast, sack planting and multi-layer growing were found to be the least practiced technology both in the control and the treatment group.

Figure 18. Technology adoption by Bangladeshi households in homestead gardening



Source: Own elaboration

In cereal crop production farm mechanization was found to be already adopted, followed by vermicompost and pheromone trap among both control and treatment group. However, rainwater harvesting, buried pipes, and solar irrigation system was found as the least adopted technology in cereal production.

Figure 19. Technology adoption by Bangladeshi households in cereal crop production

Source: Own elaboration

In the Rohingya community technology adoption among the treatment group has significantly dropped from 63 percent to 36 percent. This happened because of lower involvement in homestead gardening practices. In 2021, 100 percent of the treated households were involved in homestead gardening which dropped to 50 percent in 2022. Consequently, the adoption of technology has also decreased significantly. Of the households involved in homestead gardening, 79 percent opted sack planting followed by trellis growing (52 percent), vertical growing (44 percent), and pit planting (29 percent).

Table 8. Technology adoption in homestead gardening by treated Rohingya households

Technology adopted	Treatment
Sack planting	79%
Trellis growing	52%
Vertical growing	44%
Pit planting	29%
Bed planting	4%
Multilayer growing	2%

Source: Own elaboration

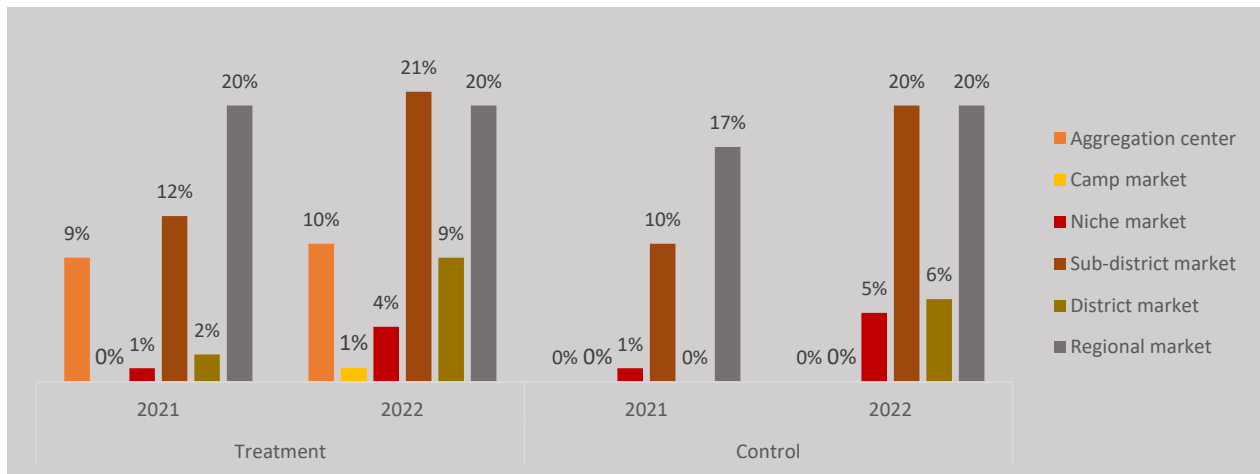
4.5.5. Market linkage

The treatment group households have slightly higher linkage with improved markets⁷ with 41 percent reported having linkage compared to 39 percent in the control group. The market linkage status has improved especially in the control group by 11 percent and three percent within the treatment group compared to 2021. A significant rise was observed especially in linkage with the sub-district market both in the control and the treatment group that is ten percent and nine percent respectively. Access to the district market increased by seven percent for the treatment group and six percent for the control group.

⁷ Improved market refers to the regional, district, subdistrict, and niche market.

Connection of the farmers with FAO-supported aggregation centres has increased by one percent compared to 2021 among the treatment group.

Figure 20. Distribution of households with improved market linkages

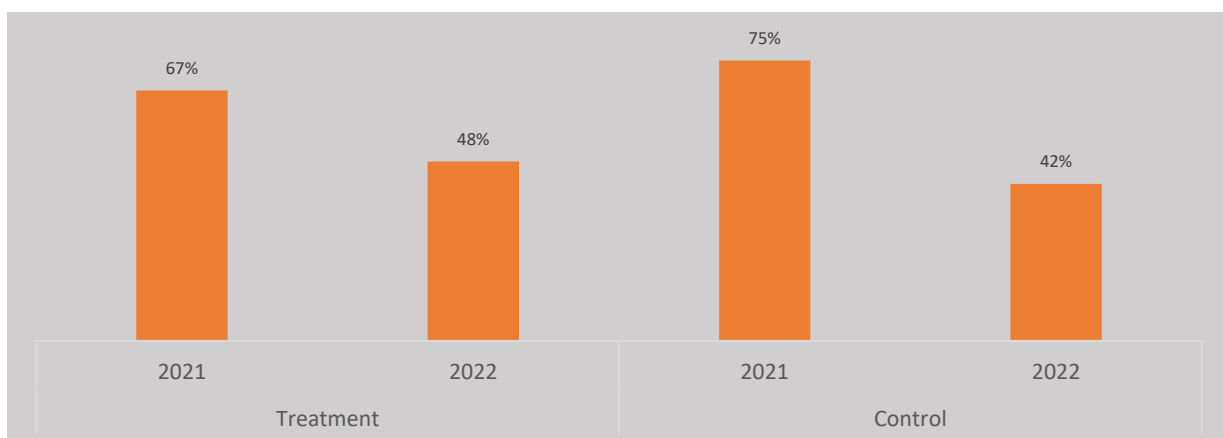


Source: Own elaboration

4.5.6. Storage of crops for the lean period

To cope with agricultural lean season 48 percent of the farming households from the treatment group saved at least one agricultural commodity, compared to 42 percent in the control group. However, in comparison to 2021, the tendency of saving for the lean season has dropped significantly by 19 percent within the treatment group and 33 percent within the control group. Rice was the most saved item and on average 287 kg of rice was saved by each household of the treatment group which - a bit higher, 318 kg in the control group. However, the average amount of savings of rice dropped by 12 kg within treatment and 158 kg within the control group, compared to 2022. It was also evident that the households saved small amounts of dry chili, potato, and sweet gourd both in the treatment and control households for the lean period.

Figure 21. Distribution of household have crop storage for the lean period



Source: Own elaboration

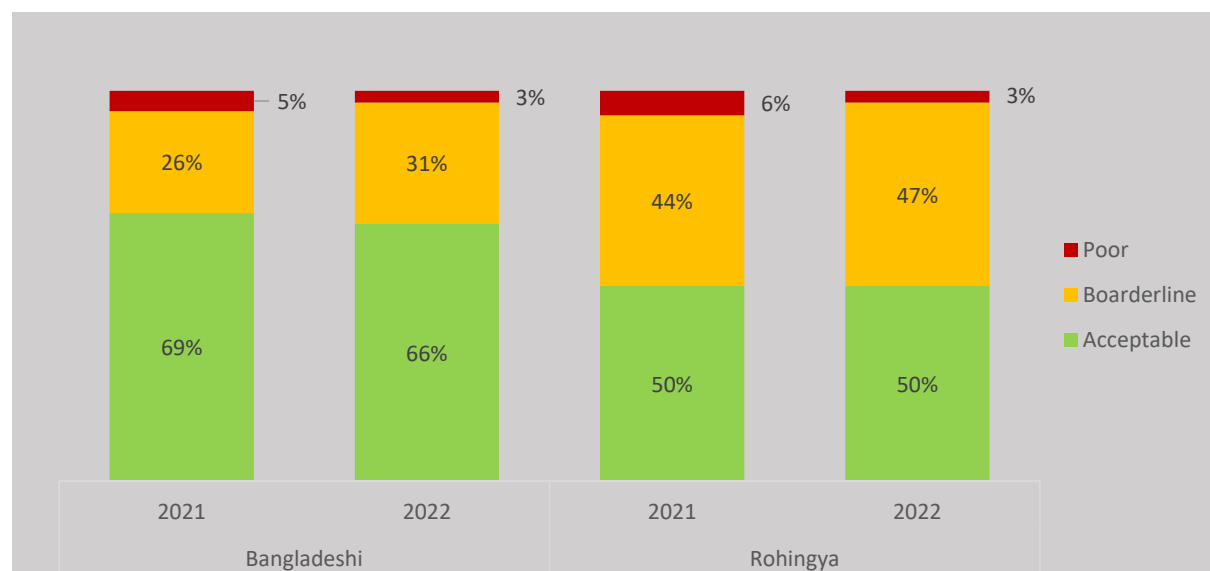
4.6. Food consumption and coping

4.6.1. Food consumption

In 2022, a slight drop in acceptable food consumption status was observed among the Bangladeshi community. In 2021, 69 percent of households had acceptable food consumption status which fell slightly to 66 percent in 2022. Though the income of the households increased compared to 2021, the buying capacity decreased because of inflation and price hikes⁸ which can be considered as the key reason behind this drop in the acceptable food consumption status. The prevalence of inadequate (borderline and poor) food consumption status is higher in the control group (39 percent) compared to the treatment group (32 percent). Marginal farmers are suffering from inadequate food consumption status most where 41 percent of households fall under the insufficient food consumption category, followed by 28 percent of the smallholders, and 21 percent of the large farmers. Household income, amount of agricultural crop storage for the lean period, ownership of non-productive assets, usage of agricultural inputs, and technology have a significant positive influence on the food consumption score of the Bangladeshi community. On the other hand, shock has a significant negative impact on the food resilience capacity of households.

The acceptable food consumption status of the Rohingya households remained the same as 2021 which is 50 percent. The remaining 50 percent are suffering from inadequate food consumption. The prevalence of food insecurity is higher among the control group where 53 percent of households are suffering from inadequate food consumption. On the other hand, in the treatment group, 47 percent are suffering from inadequate food consumption. Crop diversity, access to agricultural input, receipt of capacity-building training, and informal assistance was found having a significant positive impact on food security.

Figure 22. Food consumption score of Bangladeshi and Rohingya community



Source: Own elaboration

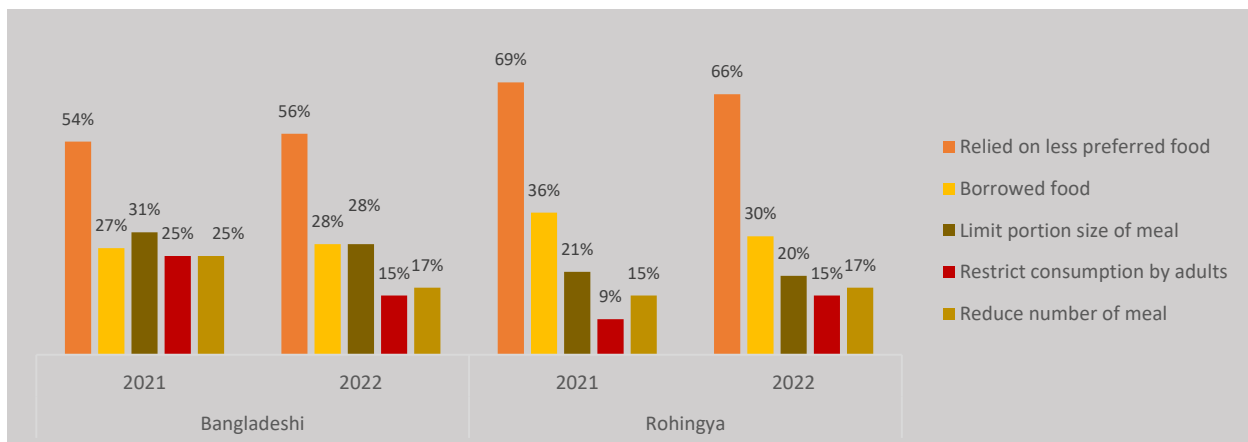
⁸ According to BBS Consumer Price Index, the food inflation rate reached nearly eight percent in October 2022 from six percent in October 2021

4.6.2. Coping mechanism

Over half of both the Rohingya and Bangladeshi community opted food-based coping strategy to meet their food need. More than half of the households (56 percent) from the Bangladeshi community had to rely on less expensive or less preferred food as the most frequently adopted strategy. The extent of adopting this coping strategy had slightly increased compared to 2021. Moreover, borrowing food to meet the food need has also slightly increased from 27 percent to 28 percent in 2022. However, the adoption of coping strategies such as limiting the portion size of meals, restriction on adult consumption to feed the child, and limiting the number of meals decreased compared to 2021. The adoption of coping strategy is higher among the control group households compared to the treatment group.

In Rohingya camps also, reliance on less preferred food is still the most frequently adopted coping strategy followed by more than two-thirds of the households. But the trend of adopting this coping method has decreased from 69 percent to 66 percent followed by borrowing food from 36 percent to 30 percent compared to the year 2021. However, the coping mechanism such as limiting the number of meals, and especially restriction on adult consumption to feed children, has increased compared to 2021.

Figure 23. Consumption-based coping strategy followed by the households



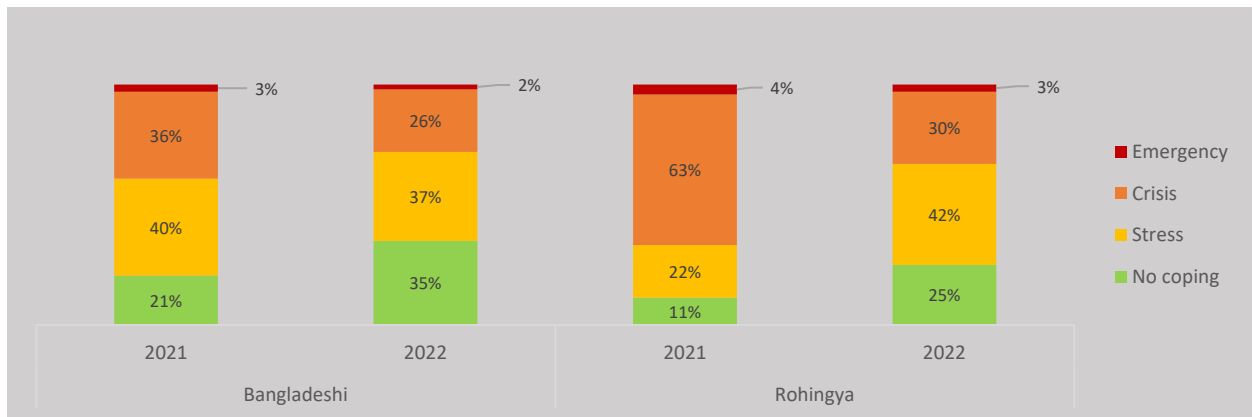
Source: Own elaboration

Around 28 percent of households from the Bangladeshi community had to follow at least one crisis or emergency livelihood strategy which was 39 percent in 2021. The most adopted crisis strategy identified was reducing non-food item expenditure which decreased from 26 percent to 18 percent followed by sales of productive assets, which also decreased from 9 percent to 8 percent. Around 37 percent of the Bangladeshi households adopted a stress coping strategy which decreased by 3 percent compared to 2021. The most applied stress-coping behaviour was- borrowing money to meet the essential need (12 percent decreased) followed by buying food on credit (36 percent decreased).

In the Rohingya community, around 33 percent of households adopted at least one crisis or emergency coping strategy which was 67 percent in 2021. The most applied crisis coping strategy was reducing non-food item expenses. On the other hand, the adoption of stress strategy increased by 20 percent compared to 2021. Borrowing money to meet essential needs is the most adopted stress strategy followed by 45

percent of households which was 31 percent before. However, the tendency of selling food assistance decreased by 8 percent in 2022.

Figure 24. Livelihood coping strategy followed by the households

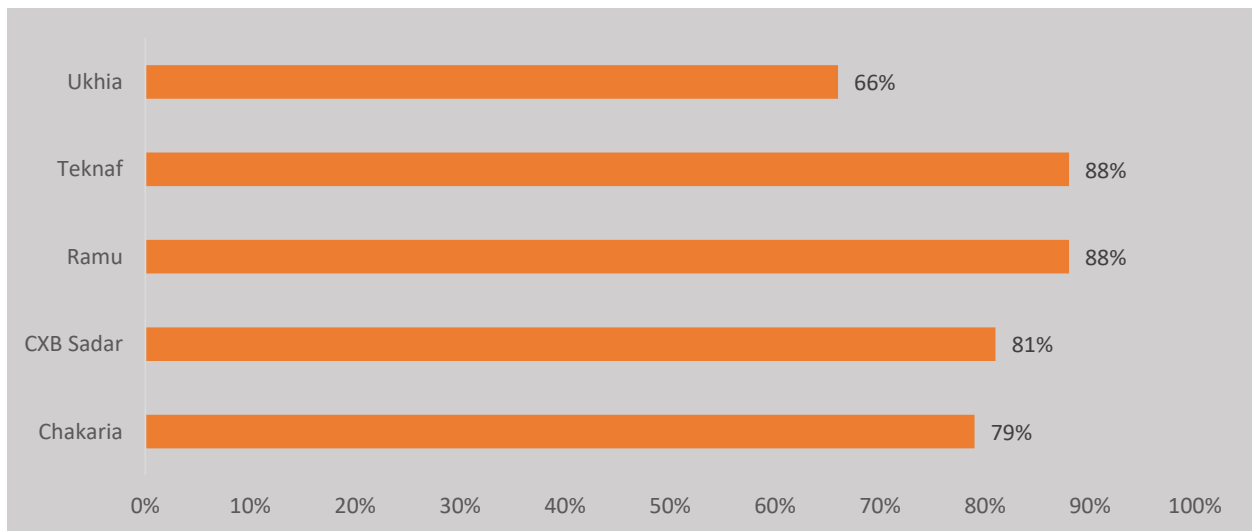


Source: Own elaboration

4.7. Access to the Natural Resources

Nearly 80 percent of the households from the Bangladeshi community have access to at least one type of natural resource. Although it is not significant, slight differences exist between the households that have access to natural resources and the households who don't have access to natural resources in terms of resilience. The resilience capacity index of the households with access to natural resources is 36 which is 35 for the households who don't have access to the natural resource. Households from Teknaf and Ramu have the highest access to natural resources (88 percent), followed by Cox's Bazar Sadar (81 percent), Chakaria (79 percent) and Ukhia (66 percent).

Figure 25. Distribution of households having access to natural resources disaggregated by sub-districts



Source: Own elaboration

The analysis showed that an overwhelming majority of the people (68 percent) are connected to natural streams and the average distance to access the nearby stream is 0.79 km. Around 69 percent of the households out of this 68 percent with access to natural streams said that their livelihoods depend on the streams mostly for irrigation, agricultural production, and fishing. In addition, 51 percent of households reported that they have knowledge regarding the usage of these natural resources. Secondly, 23 percent of the households were found with access to the protected forest, with an average distance of 2 km. Out of this 23 percent of households, 34 percent reported their livelihood reliance for collecting firewood, and timber, and grazing their livestock. Furthermore, 12 percent of households were found connected to the Bakkhali River with an average distance of 1 km. Out of these 12 percent households, 65 percent of households' livelihood rely on this natural resource for fishing. Nearly 37 percent of the households reported having knowledge regarding the judicial usage of Bakkhali river water. The access, usage, and dependency of all other natural resources have been elaborated below.

Table 9. Access, Average distance, Dependency to natural resources

Natural resources	Households having access	Average distance (km)	Dependency for livelihood of household with access	Awareness on usage policy of household with access	Key dependency
Rejukhal	2%	0.9	40%	57%	Fishing, Irrigation
Naf river	8%	2.5	23%	42%	Fishing, Irrigation
Bakkhali River	12%	1.0	65%	37%	Irrigation, Fishing
Natural Stream	68%	0.7	69%	51%	Irrigation, Fishing
Protected forest	23%	1.7	34%	69%	Fuel wood & timber collection
Reserved forest	8%	2.5	80%	86%	Fuel wood & timber collection
Bay of Bengal	6%	1.5	91%	96%	Fishing, Collecting salt, oyster & snail

Source: Own elaboration

5. MAIN CONCLUSIONS AND NEXT STEPS

The prime feature of the RIMA is to measure resilience in a quantitative approach as well as to identify the factors affecting the resilience capacity of households. It has been perceived from the study that the resilience capacity of the treated households has increased in comparison to 2021 whereas it remained the same for the control group which undoubtedly refers the positive impact of the ongoing interventions. Within the treatment group, resilience capacity of all three category farmers - large, marginal and smallholders have slightly increased compared to 2021. However, according to the result of 2022, a significant gap exists in resilience capacity between the large and marginal farmers. Marginal farmers still have the least resilience capacity compared to large and smallholders. On the other hand, the treated Rohingya households demonstrated a higher resilience capacity than the control group. In comparison to 2021, both the control and treatment groups' resilience capacity has increased significantly.

The study depicted that one-third of the households from the host community and half of the households from the Rohingya community are suffering from inadequate food consumption. Moreover, a remarkable portion has to follow consumption-based as well as a livelihood-based coping strategy. It was also evident that the Bangladeshi community households from the treatment group earn more than the control group and both groups' income increased significantly in 2022 compared to 2021. A major share of this income comes from the agricultural sector. However, income share from the agricultural sector has decreased significantly compared to 2021. On the other hand, in the Rohingya community, the income is very limited, and comes primarily from day labour activities. The treatment group of the Bangladeshi community is located near basic services, possess better market linkage, higher ownership of land, and savings than the control group. On the other hand, access to social safety net especially in-kind transfer (assistance of relief food, shelter, medical facilities, agricultural inputs, fuel subsidies) received by Rohingya households is higher than that of the Bangladeshi community households. In contrast, the Bangladeshi community has better access to cash grants than the Rohingya community.

5.1. Recommendations for the Bangladeshi community

- Resilience index of around 52 percent households from the Bangladeshi community falls under the average resilience index (39) indicating these households should be prioritized while designing the intervention.
- Adaptive Capacity and Asset ownership are the most influential pillars driving the resilience capacity of the treatment group households, referring that investment to reinforce these will better boost the resilience capacity of the treated households. It also indicates that for short-spanned projects, investment should be made in these two pillars for faster and better results. On the other hand, if programs are designed to focus on other two pillars - Access to Basic Services and Social Safety Net then long-term investment will be required as they have a lower influence on resilience.
- Adoption of technology in agricultural production, crop diversity, and access to credit are the key drivers that influence the Adaptive Capacity the most. This refers while designing an intervention to reinforce the Adaptive Capacity, particularly interventions should be considered.

- Ownership of productive assets, usage of agricultural land, and usage of inputs such as seeds, fertilizer, and biopesticides are the key factors those influence the Asset pillar most. This means that these should be considered to improve the Asset ownership capacity of the households.
- Intervention should be designed with special attention to the marginal farmers as a significant gap exists in between the resilience capacity of large and marginal farmers. Intervention for the marginal farmers can be complemented by an emphasis on technology adoption, enhancing crop diversity and household income, capacity building, amplifying usage of land, and access to agricultural group assets.
- Special attention should be given to improve households' adaptive capacity and asset ownership to resilience capacity in Teknaf due to its lower resilience capacity overall. Adaptive Capacity can be complemented by intensifying crop diversity, adoption of technology in agricultural production, and enhancing access to loans. On the other hand, access to asset ownership can be complemented by enhancing ownership of productive assets, agricultural group assets and enhancing land utilization.
- Around one-third of the households from the Bangladeshi community are suffering from food insecurity. Household income, crop storage for the lean period, ownership of non-productive assets, usage of agricultural inputs, and technology were found having a significant positive influence and so should be considered to improve the food security status of the Bangladeshi households.

5.2. Recommendations for the Rohingya community

- Adaptive Capacity and Access to Basic Service are the most influential pillars to determine the resilience capacity of the treatment group households which refers that investment to reinforce these two pillars will have better return in resilience capacity. It also indicates that short-duration projects should invest in these two pillars to get quick and better results. On the other hand, programs designed to focus Access to the basic service and Social Safety Net will require long-term investments as they have a lower influence on resilience capacity.
- Crop diversity, adoption of technology in agricultural production, and capacity-building training are the key drivers contributing to the AC pillar which indicates these should be considered for the investment on adaptive capacity.
- Access to the agricultural input market, crop market to sell agricultural products, and access to primary school are the key factors influencing the Access to Basic Services pillar which indicate the need to include these while designing interventions.
- Homestead gardening support should be continued for the Rohingya households for better resilience and food security as the households practicing this were found having a better resilience capacity compared to the control group.

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APPENDICES

Annex 1 - Variables description

The variables used to measure the resilience capacity of the Bangladeshi and Rohingya community were slightly different. The reason for this is that the Bangladeshi community has a different setting and context compared to the Rohingyas. For example, the variables those are crucial for the Bangladeshi community includes access to land, amount of savings, amount of loan, savings for the lean period are not significant for the Rohingya community. The Rohingyas are fully dependent on humanitarian assistance for not being allowed to own land. They rather do homestead gardening in smaller spaces adjacent to their temporary shelter in the camp. Because of the limited livelihood opportunity, their monthly incomes are lower which tends to limit savings and access to loans.

Table 10. Variables employed to determine resilience

PILLAR	VARIABLES	DEFINITION	BANGLADESHI	ROHINGYA
Access to Basic Services (ABS): The ability of a household to meet basic needs, by accessing and effectively using basic services, such as sending children to school, accessing water, electricity sanitation, public health facilities, and selling products at the market.	Distance to agriculture crop market	Variable indicating one-way walking distance in minutes to reach the market from the households where agricultural products like vegetables, cereal crops, etc. are sold.	Yes	Yes
	Distance to agriculture input market	This variable indicates the one-way walking distance in minutes to reach the market from the households where agricultural inputs like seeds, fertilizers, and pesticides are sold.	Yes	Yes
	Distance to primary school	One-way walking distance in minutes to reach the nearby primary school.	Yes	Yes
	Distance to the public health facility	One-way walking distance in minutes to reach the nearby public hospital.	Yes	Yes
	Distance to get into the public transport	One-way walking distance in minutes to get into the public transport	Yes	No
	Distance to reach to the nearby forest	One-way walking distance in minutes to reach the nearby forest.	Yes	No
	Distance to reach to the drinking water	One-way walking distance in minutes to reach the drinking water source.	Yes	No
Assets (AST): Assets, both productive and non-productive, are the key elements of a livelihood since they enable households to produce and consume goods.	Productive asset index	The productive asset index standardizes different types of productive assets into a single unit of measurement. .	Yes	Yes
	Non-productive asset index	The Non- productive asset index standardizes different types of non-productive assets into a single unit of measurement.	Yes	Yes
	Land	Total area (hectares) employed for crop production.	Yes	No
	Usage of input	The total number of inputs i.e.- Seed, fertilizer, bio-pesticides used for agricultural production.	Yes	Yes
	Tropical Livestock Unit.	Number of poultry like chicken/duck/turkey owned by the households.	No	No
	Agricultural group asset index	The total monetary value of all agricultural productive assets i.e., power tiller, thresher, reaper etc.	Yes	No
Social Safety Nets (SSN): Capacity of	Formal transfer received	Total amount (USD) of formal transfers received in the last year including cash for	Yes	Yes

PILLAR	VARIABLES	DEFINITION	BANGLADESHI	ROHINGYA
the household to access formal and informal assistance from institutions, as well as from relatives and friends.		work programmes, unconditional cash grant support, by the government/non-governmental organizations (NGOs).		
	In-kind transfer received	Total amount (USD) in-kind transfer (assistance of relief food, shelter, medical facilities, agricultural inputs, fuel subsidies, etc.) received in last year.	Yes	Yes
	Informal transfer received	Total amount (USD) informal transfer (gift from relatives/neighbors) received in last year.	Yes	Yes
	Can rely on, the number of people in need	The total number of people whom the respondents can rely on in any emergency need.	Yes	Yes
Adaptive Capacity (AC): Ability to adapt to a new situation and develop new livelihood strategies.	Saved for the lean period index	Saved for the lean period index standardizes different types of items saved for the lean period into a single unit of measurement.	Yes	No
	Number of technologies adopted in different agricultural sub-sectors	The number of technology (vermicompost, pheromone trap, sack gardening, etc.) adopted in different agricultural sub-sectors like homestead gardening, cereal production, and fish culture.	Yes	Yes
	Amount of savings	Per capita amount (USD) saved last year.	Yes	No
	Amount of loan received	Per capita amount (USD) of loan taken in last year.	Yes	No
	Crop diversity	Total number of different agricultural crop including vegetable and cereal crops produced in last year	Yes	Yes
	Number of trainings received	Total number of trainings received in the last year.	Yes	Yes
	Household income	Per capita income (USD) from different sectors.	Yes	Yes
	Market linkage	Household connected with total number of markets to sell their agricultural crops.	Yes	No
	Food Security: According to the 1996 World Food Summit, "food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life" (FAO, 1996)	Food consumption score (FCS)	FCS measures household's access to consumption of diverse food, weighted by nutrient density. The score calculated using the frequency of consumption of different food groups during the 7 days before the survey.	Yes
Reduced coping strategy index (RCSI)		RCSI considers both the frequency and severity of five pre-selected coping strategies that the household used in the seven days prior to the survey when they did not have enough food or money to purchase food.	Yes	Yes
Livelihood coping strategy index (LCSI)		The livelihoods-based coping strategies module is used to better understand longer-term coping capacity of the households. The module includes stress, crisis and emergency strategies.	Yes	No

Annex 2 - Regression analysis results

Table 11. Regression analysis of variables with RCI and FCS by nationality

Variable name	Bangladeshi (Treatment & control)		Bangladeshi (Treatment only)	Rohingya	
	Resilience Capacity Index (RCI)	Food Consumption Score (FCS)	Resilience Capacity Index (RCI)	Resilience Capacity Index (RCI)	Food Consumption Score (FCS)
Technology adoption	0.951284*** (0.110819)	0.818175*** (0.107713)	0.966286 *** (0.137381)	0.45538 (0.51757)	-0.241083 (0.243884)
Household income	0.104593*** 0.009352	0.061645*** (0.009090)	0.070226 *** (0.011525)	0.70738*** (0.08477)	0.061645*** (0.009090)
Number of trainings received	1.557450*** (0.164854)	0.751976*** (0.160233)	1.196675 *** (0.181672)	3.82548*** (0.75948)	1.048875** (0.357878)
Crop diversity	0.048988 (0.120785)	-0.231594 (0.117399)	-0.093947 (0.153221)	0.71603 (0.48746)	0.876989*** (0.229696)
Amount of formal assistance received	0.045825* (0.028106)	0.023486 (0.024811)	0.045825 (0.028106)	-0.08752 (0.05777)	0.042582 (0.027222)
Amount of informal assistance received	-0.012307 (0.016312)	-0.031666 (0.015855)	-0.001561 (0.019156)	0.01647 (0.03130)	0.041930** (0.014747)
Number of people on whom respondent can rely on	0.791365*** (0.234281)	1.146227*** (0.227714)	0.761289* (0.335336)	0.06836 (0.54516)	-0.403114 (0.256888)
Amount of in-kind assistance received	0.022979 (0.015029)	0.005789 (0.014608)	0.024019 (0.016736)	-0.02906. (0.01640)	-0.002385 (0.007729)
Productive asset index	37.871176*** (4.467071)	6.077201 (4.341872)	26.629609*** (5.944168)	13.87148** (4.80681)	1.736563 (2.265033)
Non-productive asset index	1.914490*** (0.200622)	1.641889*** (0.194999)	1.601080*** (0.238053)	3.54849* (1.78871)	1.136014 (0.842864)
Productive group asset index	-2.110724 (1.953165)	-2.006037 (1.898423)	1.071599 (2.077017)	-2.110724 (1.953165)	-2.006037 (1.898423)
Total number of inputs used for agricultural production	0.890971*** (0.195718)	0.917981*** (0.190233)	1.207745*** (0.244454)	-1.59002* (0.75043)	-1.574504*** (0.353612)
Primary school	4.755284 (3.928619)	3.530566 (3.818511)	8.760205* (4.827754)	14.53132 (2.60006)	5.121963 (1.225186)
Health facility	6.173755 (4.551463)	3.438330 (4.423899)	8.640485 (6.158280)	-1.30474 (6.97081)	1.533712 (3.284741)
Agricultural crop market	27.914519* (13.341313)	12.975309 (12.967395)	28.732964* (15.174873)	-12.58838 (16.97645)	-18.290732 (7.999539)
Agriculture input market	15.825696 (13.055529)	4.551596 (12.689620)	21.796966 (14.525768)	58.61460*** (17.40038)	29.313759*** (8.199300)
Affected with shocks	-3.241665*** (0.942867)	-1.772142* (0.916442)	-	-3.36333 (2.78674)	0.532214 (1.313152)
Flash flood	2.369362 (1.377570)	5.010517 (1.338960)	-	2.07533 (2.88045)	0.837950 (1.357310)
Landslide	-9.612158*** (4.430334)	-8.961410* (4.306165)	-	4.08451. (2.33960)	0.528492 (1.102454)
Cyclone	0.292306 (1.240264)	0.534863 (1.205503)	-	-3.88867* (1.83887)	-0.832079 (0.866500)

Variable name	Bangladeshi (Treatment & control)		Bangladeshi (Treatment only)	Rohingya	
	Resilience Capacity Index (RCI)	Food Consumption Score (FCS)	Resilience Capacity Index (RCI)	Resilience Capacity Index (RCI)	Food Consumption Score (FCS)
Salinity	1.410926 (1.259628)	1.313518 (1.224324)	-	1.19735 (3.72804)	1.321333 (1.756703)
Price hike	-4.091659* (1.792752)	-1.338054 (1.742507)	-	0.33776 (2.85881)	-0.006053 (1.347112)
Public transport	3.430180** (1.329488)	3.288415* (1.292226)	-	-	-
Forest	3.869533 (2.366998)	-3.838649 (2.300657)	-	-	-
Water	0.180127 (0.919974)	-0.343262 (0.894190)	-	-	-
Tropical Livestock Unit (TLU)	1.047347*** (0.260061)	0.461838. (0.252772)	-	-	-
Amount of land used for agricultural production	3.685563*** (0.593694)	0.337597 (0.577054)	-	-	-
Savings	0.008836* (0.004499)	-0.009604 (0.004373)	-0.001097 (0.005517)	-	-
Save for the lean period	1.535754*** (0.292484)	1.574982*** (0.284286)	2.251282 *** (0.446446)	-	-
Amount of loan taken per capita	0.061503 (0.025527)	-0.001136 (0.001657)	0.012978 *** (0.002110)	-	-
Total number of markets connected with	-1.096329 (0.255203)	-1.739897 (0.248051)	-1.176391 (0.327920)	-	-

N.B: Variable coefficient with ***, **, *, * are the most significant and influencing RCI & FS most.

Source: Own elaboration

Annex 3 - Descriptive statistics

Table 12. Descriptive statistics of food consumption and coping strategy by nationality

Attribute		Bangladeshi				Rohingya			
		Treatment		Control		Treatment		Control	
		2021	2022	2021	2022	2021	2022	2021	2022
Reduced Coping Strategy Index (RCSI)	Relied on less preferred/expensive food	52%	54%	56%	58%	62%	61%	76%	72%
	Borrowed food/relied on help	24%	23.4%	30%	34.9%	30%	23%	42%	37%
	Reduced number of meals	12%	15.8%	18%	18.7%	10%	14.8%	20%	19%
	Reduced portion size of meal	9%	22%	15%	36.9%	10%	15%	23%	24%
Livelihood based Coping Strategy Index (LCSI)	Restrict consumption by adults/young	4%	11%	10%	19.7%	5%	11.8%	11%	18.5%
	No coping	24%	37%	18%	31%	14%	34%	8%	16%
	Stress	36%	35%	44%	40%	20%	37%	24%	47%
	Crisis	38%	26%	34%	27%	60%	26%	66%	33%
Food Consumption Score (FCS)	Emergency	2%	2%	4%	3%	2%	3%	6%	4%
	Acceptable	69%	68%	69%	62%	54%	48%	46%	47%
	Borderline	25%	29%	30%	35%	40%	48%	48%	52%
	Poor	7%	3%	1%	4%	6%	1%	7%	1%

Source: Own elaboration

Table 13. Access to basic services, asset and adaptive capacity by nationality and comparison groups

Attribute		Bangladeshi				Rohingya			
		Treatment		Control		Treatment		Control	
		2021	2022	2021	2022	2021	2022	2021	2022
Average Household size		6.0	5.6	5.8	5.7	5.3	5.4	4.8	5.3
Distance from basic service (minute)	Primary school	17	14	23	16	8	7	8	8
	Health facility	39	35	56	34	18	17	20	18
	Public means of transport	9	8	21	9	12	15	13	14
	Agriculture crop market	39	30	61	35	25	26	25	27
	Agriculture input market	40	36	62	37	39	36	39	33
	Water source	3	4	3	4	-	-	-	-
	e-Voucher outlet	-	-	-	-	20	20	23	23
	LPG distribution point	-	-	-	-	26	24	26	28
Amount of land utilized for agricultural production (decimal)	Large	415	356	351	387	-	-	-	-
	Small holder	194	148	175	183	-	-	-	-
	Marginal	58	29	78	68	-	-	-	-
Land utilization pattern in agricultural production (decimal)	Homestead gardening	1%	1%	0%	0%				
	Vegetable	27%	27%	24%	11%				
	Cereal crop	55%	68%	63%	88%				
	Culture fish	7%	4%	3%	2%				
	Other	10%	16%	8%	8%				
Household ownership of productive asset	Sewing machine	17%	13%	9%	6%	8%	3%	4%	4%
	Tractor	0%	1%	0%	1%	-	-	-	-
	Power tiller	2%	2%	4%	2%	-	-	-	-
	Micro gardening kit	39%	7%	33%	8%	87%	4%	1%	3%
	Water pump	11%	19%	18%	14%	-	-	-	-
	Fishing tool	35%	16%	18%	15%	-	-	-	-
	Power thresher	1%	1%	1%	1%	-	-	-	-
	Tom-tom	3%	4%	2%	3%	-	-	-	-
	Rickshaw	2%	2%	3%	1%	-	-	-	-
	CNG	2%	2%	1%	1%	-	-	-	-
	Bicycle	10%	3%	10%	1%	-	-	-	-
	Motorbike	4%	3%	3%	1%	-	-	-	-
Household's ownership of non-productive asset	Mobile	65%	69%	50%	52%	22%	24%	23%	25%
	Jewelry	83%	93%	80%	92%	46%	80%	42%	53%
	Fridge	28%	33%	19%	21%	0%	0%	0%	0%
	TV	12%	15%	5%	7%	0%	0%	0%	0%
	Laptop	1%	1%	0%	0%				
Income share from different sector	Agriculture	47%	36%	55%	37%				
	Family Business	14%	15%	7%	10%				
	Government Wage	1%	1%	0%	2%				
	Private sector wage	8%	10%	5%	11%				
	Transfers Social Assistance	3%	4%	1%	1%				
	Day labor	16%	9%	23%	23%				
	Remittance	3%	11%	3%	5%				
	Other	8%	14%	6%	11%				
Crop diversity (% of households cultivated different types of crops)	Aman	57%	85%	75%	84%	-	-	-	-
	Boro	39%	61%	60%	76%	-	-	-	-
	Potato & sweet potato	46%	60%	40%	50%	-	-	-	-
	Chili	45%	26%	36%	26%	-	-	-	-
	Brinjal	36%	46%	34%	38%	-	-	-	-
	Sweet gourd	34%	28%	16%	12%	67%	76%	-	-

Attribute		Bangladeshi				Rohingya			
		Treatment		Control		Treatment		Control	
		2021	2022	2021	2022	2021	2022	2021	2022
	Okra	30%	18%	13%	5%			-	-
	Bottle gourd	24%	23%	15%	15%	67%	79%	-	-
	Tomato	24%	32%	12%	16%			-	-
	Bitter gourd	24%	14%	17%	7%	13%	36%	-	-
	Cucumber	23%	12%	11%	6%	57%	37%	-	-
	Yard long bean	23%	16%	19%	16%	54%	32%	-	-
	Radish	13%	14%	10%	10%			-	-
	Country bean	13%	11%	10%	14%	40%	45%	-	-
	Ridge gourd	11%	6%	7%	5%	-	-	-	-
	Snake gourd	8%	3%	12%	8%	-	-	-	-
Technology adoption (% of farmers)	Homestead gardening	48%	69%	56%	58%	63%	36%	0%	0%
	Cereal crop production	73%	89%	51%	81%	-	-	-	-
	Fish culture	11%	7%	2%	2%	-	-	-	-
	Livestock	22%	36%	2%	20%	-	-	-	-
Amount (Kg) saved for the lean period	Rice	299	287	476	318	-	-	-	-
	Dry chili	4	5	2	4	-	-	-	-
	Potato	11	34	12	27	-	-	-	-
	Sweet gourd	0	19	0	7	-	-	-	-
	Dry fish	0	2	0	3	-	-	-	-
	seed	0	11	0	8	-	-	-	-
Household's savings	Yes	67%	48%	75%	42%	0%	0%	0%	0%
Market linkage	Linkage with improved market	37%	41%	27%	39%	-	-	-	-
Market linkage with different market (% of farmers)	Aggregation centre	9%	10%	0%	0%				
	WFP market	0%	1%	0%	0%				
	Niche market	1%	4%	1%	5%				
	Sub-district market	12%	21%	10%	20%				
	District market	2%	9%	0%	6%				
	Regional market	20%	20%	17%	20%				

Source: Own elaboration

Annex 4 - Estimation of Resilience Structure Matrix (RSM)

Figure 26. Resilience structure matrix of Bangladeshi treatment by farmer category

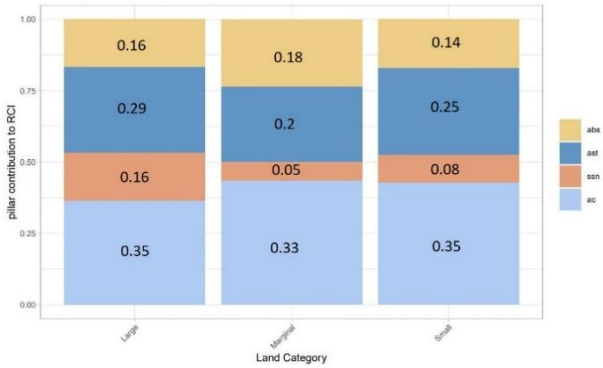


Figure 27. Resilience structure matrix of Bangladeshi treatment by sub-district

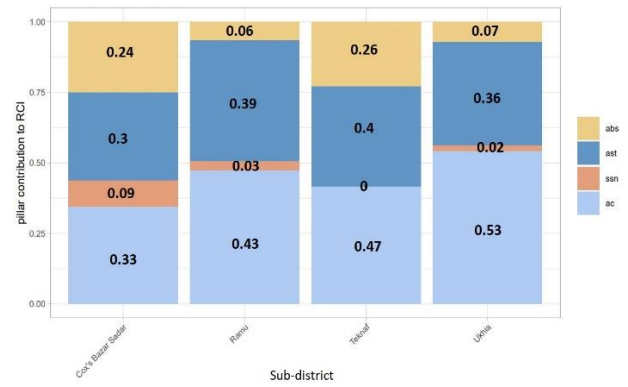


Figure 28. Resilience structure matrix of Bangladeshi community by sample type

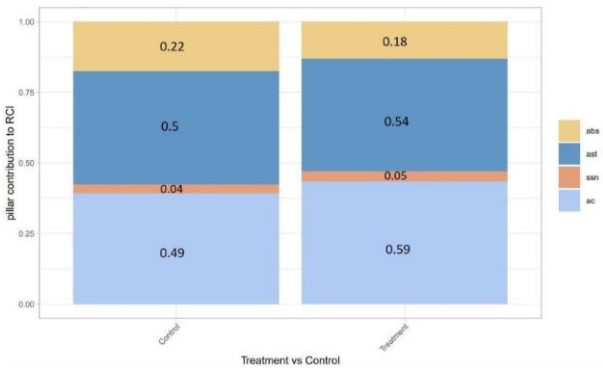
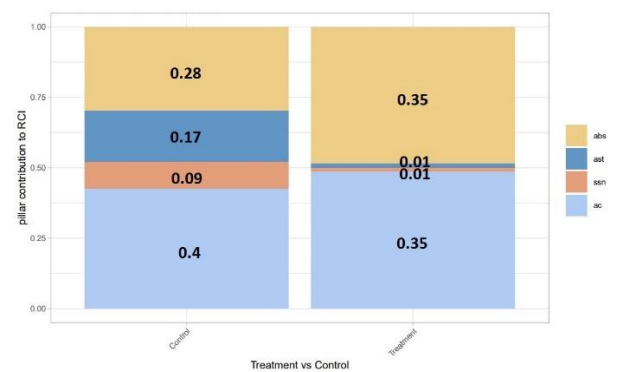


Figure 29. Resilience structure matrix of Rohingya community by sample type



Source: Own elaboration

Annex 5 - Estimation of variable correlation across resilience pillars

Figure 30. AC pillar – Bangladeshi (treatment & control)

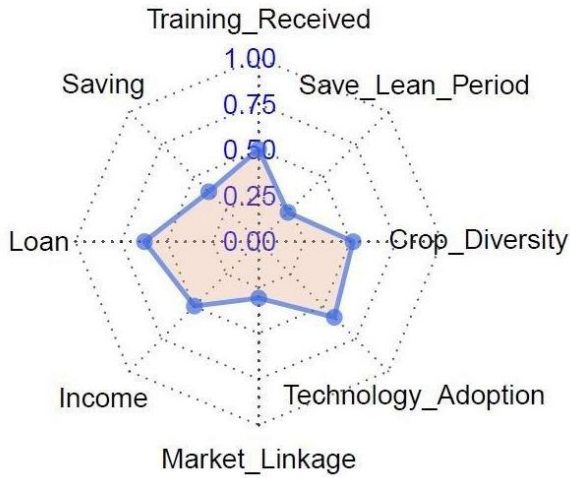


Figure 31. AC pillar – Rohingya (treatment & control)

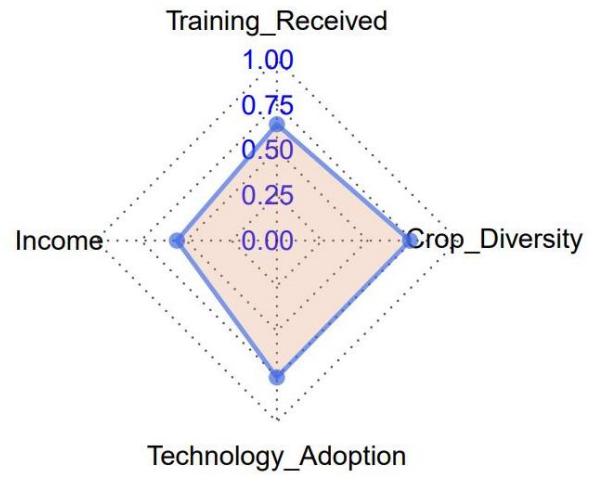


Figure 32. AST pillar – Bangladeshi (treatment & control)

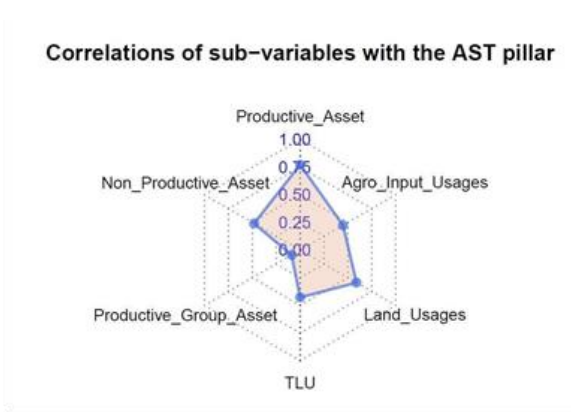


Figure 33. AST pillar – Rohingya (treatment & control)

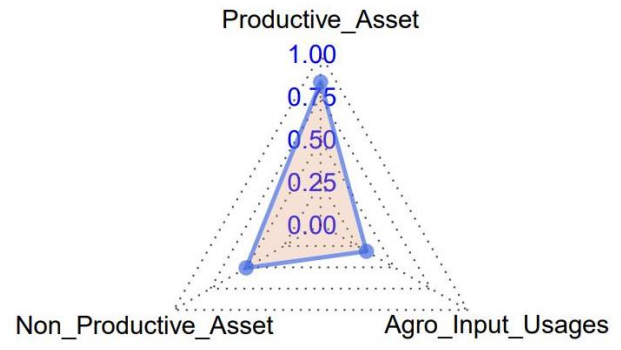


Figure 34. ABS pillar – Bangladeshi (treatment & control)

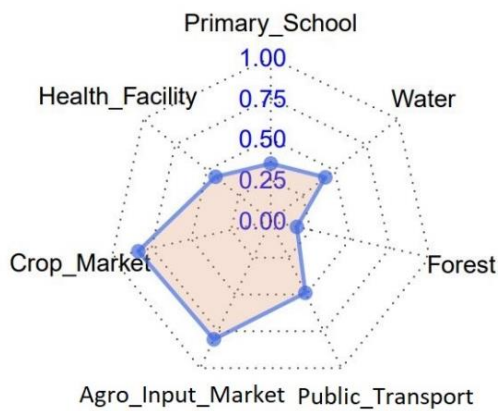


Figure 35. ABS pillar – Rohingya (treatment & control)

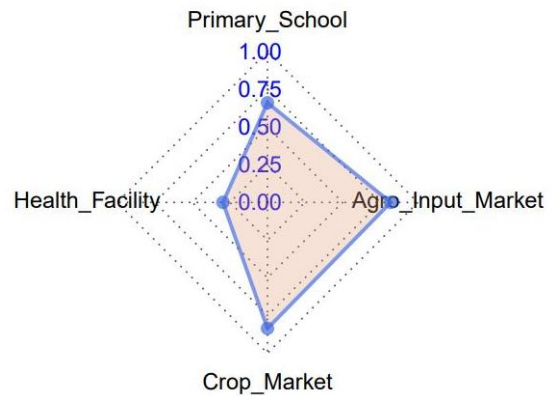


Figure 36. SSN pillar – Bangladeshi (treatment & control)

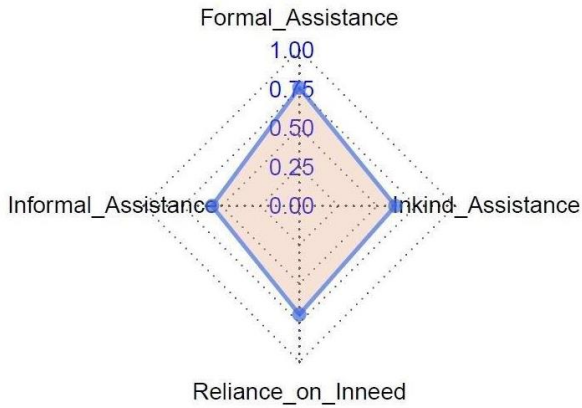


Figure 37. SSN pillar – Rohingya (treatment & control)

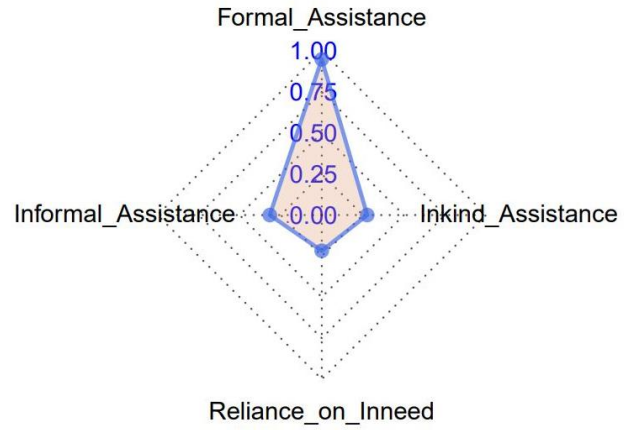


Figure 38. AC pillar – Bangladeshi (treatment only)

Correlations of sub-variables with the AC pillar

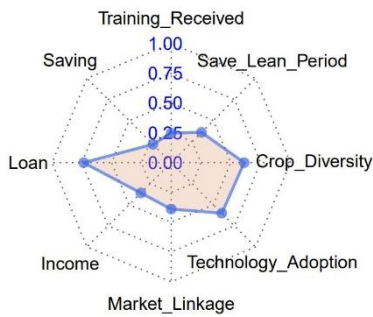


Figure 39. AST pillar – Bangladeshi (treatment only)

Correlations of sub-variables with the AST pillar

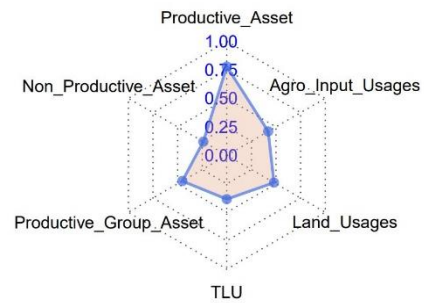


Figure 40. ABS pillar- Bangladeshi (treatment only)

Correlations of sub-variables with the ABS pillar

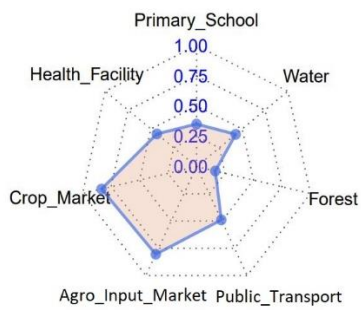
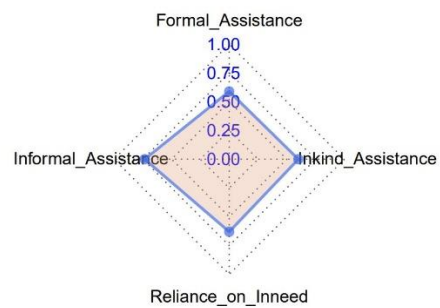


Figure 41. SSN pillar- Bangladeshi (treatment only)

Correlations of sub-variables with the SSN pillar



Source: Own elaboration

This report forms part of a series of country level analysis prepared through the common effort of WFP, FSS and FAO. The series aims at providing programming and policy guidance to policy-makers, practitioners, United Nations agencies, non-governmental organizations and other stakeholders on shocks, and vulnerability by identifying the key factors that contribute to the resilience of households in food insecure countries and regions.

The analysis is largely based on the use of the FAO Resilience Index Measurement and Analysis (RIMA) tool.



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