



CGAP Strengthening climate resilience and adaptation through financial services

Qualitative research report - Bangladesh

March, 2023

This work was conceived and funded by CGAP as input to CGAP research on climate change and financial inclusion. It has not been peer-reviewed or edited by CGAP. Any conclusions or viewpoints expressed are those of the authors and may or may not reflect the views of CGAP.

What is this research about?

Motivation



Interventions to mitigate climate impacts have not focused on developing resilience strategies at the individual and household levels of the most vulnerable communities.

The development of the current research study was motivated by CGAP's fundamental belief that financial services can play a vital role in helping these populations reduce the impact of and adapt to specific climatic risks.

Purpose



Conduct a demand-side study in Nigeria and Bangladesh - two countries that are prone to severe weather-related climate impacts such as droughts, floods, and cyclones - to thoroughly understand how these climate disasters affect the lives and livelihoods of their most vulnerable communities and learn what the financial resilience strategies are - if any - that they implement to cope with the effects of these events.

Potential Application



Provide insights into vulnerable populations' experiences and struggles during climate risk events and provide guidance to stakeholders to help build ad-hoc financial services that strengthen these communities' financial resilience to climate impacts.

This comprehensive research was done in four parts



About Decodis and MSC

Decodis and MSC partnered to complete the different components of this research.



Decodis is a social research company that actively gives people the space to express themselves to elevate our understanding of their lived experiences and opinions. We use methods that are high-powered, scalable and low-cost; and have proven to be effective in helping organizations understand and better serve their target populations.



MicroSave Consulting (MSC) is a consulting firm that has pushed the world towards meaningful financial, social, and economic inclusion. With over 300 staff of different nationalities and varied expertise, we are proud to be working in over 68 developing countries. We partner with participants in financial services, enterprise, agriculture and health ecosystems to achieve sustainable performance improvements and unlock enduring value.

The background and the objective of the Bangladesh qualitative study



We know that...

... The southwest region of Bangladesh is exposed to tropical cyclones, storm surges, and resulting salinization of soil and groundwater. Between 2001 and 2021, SW Bangladesh experienced eight cyclones: one in April, four in May, one in September, and two in November. The average wind speed of the summer cyclones was 120 Kmph.

Cyclones have wreaked havoc on the lives and livelihoods of poor communities dwelling in both cities and villages alike.



However, we have limited understanding of...

... The direct and indirect impact of cyclones and associated perils on the lives and livelihoods of poor and vulnerable communities, both rural and urban, is not well understood. We don't understand how they are adapting to the increased intensity and frequency of these events.

We also have a limited understanding of the role of financial services in informing the adaptation strategies of these people and how this role can be strengthened.



What are those...

... Are there adaptation strategies where financial services can play a significant role?

What are the barriers that have stifled the inclusion of financial services in the adaptation strategies of these poor and vulnerable communities, particularly for women?



To answer these questions...

... CGAP commissioned a study to understand the direct and indirect impacts of cyclones and their associated perils on the lives and livelihoods of the affected communities in southwest Bangladesh.

The adaptation strategies of these poor and vulnerable households and the role of financial services in those strategies were also investigated.

The study explored pathways to enhance the role of financial services in adaptation strategies and strengthen the resilience of these communities against climate change.

S= situation. C= complications. Q= questions. A = answers

The key research questions

1 What are the direct and indirect impacts of climate risks on the poor and vulnerable people?



2 What are the strategies (ex-ante and ex-post) that vulnerable people adopt to minimize the effect of such events and recover from such hazards?



3 What are the actual and potential role of formal and informal financial services in impacting the resilience of vulnerable people?



4 What barriers exist to using those services and deriving value from them? Are there specific barriers for women to access these services?



5 What are the gaps and challenges in advancing and strengthening the role of financial services in supporting climate resilience strategies?



6 What are the roles of ecosystem actors in the resilience strategies of vulnerable people?



7 Which variables affected the analysis of the information obtained through the qualitative study?



List of acronyms

SL #	Acronyms	Expanded form
1	BDT	Bangladeshi Taka
2	<u>BMMDP</u>	Bangladesh Microinsurance Market Development Project
3	CAT-DDO	Catastrophe deferred draw-down obligation
4	<u>CGAP</u>	Consultative Group to Assist the Poor
5	CICO	Cash in-cash out
6	FSP	Financial Services Provider
7	<u>GCF</u>	Green Climate Fund
8	MFI	Microfinance institution
9	MT	Metric tonne
10	NAT-CAT	Natural catastrophe
11	<u>NGF</u>	Nowabenki Gonomukhi Foundation- an NGO- MFI
12	NGO	Non-governmental organization
13	<u>PKSF</u>	Palli Karma-Sahayak Foundation- Bangladesh's rural-focused Development Finance Institution
14	UCC	Union Community Clinic
15	UHC	Upazilia Health Complex
16	UTI	Urinary tract infection
17	SW	Southwest



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Summary of findings



Summary of findings (1/4)



RQ1: What are the direct and indirect impacts of climate risks on poor and vulnerable people?

Direct impacts:

- Damage and destruction of households' physical assets, such as houses, shops, and cattle sheds.
- Inundation of saltwater into fields and ponds has made the soil saline and disrupted the freshwater fisheries ecosystem in the region.
- Disruption in the supply of necessities, such as food, water, and sanitation facilities, exacerbates the suffering in addition to the direct damage caused by winds, rain, and storm surges.

Indirect impacts:

- Increase in water-borne and vector-borne diseases, along with long-term health complications such as skin diseases, hypertension, and UTIs due to continued exposure to saline water.
- Continued disruption of the local economy and livelihood sources, pushing people back into poverty and debt traps.

Detailed findings: [CTRL+ Click to go to the slides](#)



RQ2: What are the strategies (ex-ante and ex-post) that vulnerable people adopt to minimize the effect of such events and recover from such hazards?

Ex-ante strategies:

- Risk reduction strategies include using salinity-tolerant rice varieties, applying sugar-mixed water to rice fields, elevating the plinths of houses and toilets, and covering fish ponds with nets to prevent the loss of fish along with the overflow of pond water.
- Risk absorption strategies include arranging cash, dry food, and relocating to public shelters or relatives' places before the cyclone.

Ex-post strategies:

- Borrowing money from MFIs and cooperatives to reconstruct and restart livelihood activities.
- Undertaking seasonal migration to cities to earn money and offset financial losses.

Detailed findings: [CTRL+ Click to go to the slides](#)

Summary of findings (2/4)



RQ3: What are the actual and potential roles of formal and informal financial services in impacting the adaptation of vulnerable people?

Actual role:

- Loans from MFIs and cooperatives help in post-disaster reconstruction and economic recovery.
- Loan moratoriums offered by MFIs in the event of a cyclone prevent overburdening affected people with debts.
- Mobile money services like bKash, Rocket, and Nagad facilitate money transfers between migrating men and their families. Remittances are sent through mobile banking by families with members living abroad.

Potential role:

- Access to the money deposited with MFIs and cooperatives to meet expenditures during and after the crises.
- Lower interest rates on microfinance loans, particularly for borrowings meant for post-disaster reconstructions and recoveries.
- A higher ticket size of post-disaster loans under the PKSF Sahos scheme. Currently, the loan amount is BDT 10,000 (~USD 92.00).

Detailed findings: [CTRL+ Click to go to the slides](#)



RQ4: What barriers exist to using those services and deriving value from them? Are there specific barriers for women to access these services?

Barriers to accessing these services:

- Bank loans are rare in the region due to the perception that banks do not lend to the poor without extensive documentation and collateral. Insurance is poorly understood, with limited knowledge of endowment policies and Islamic takaful insurance. Additionally, agriculture and livestock insurance are either unavailable or unfamiliar.
- There are no specific barriers for women to access microfinance loans. On the contrary, women are the primary target beneficiaries of any microfinance programs in Bangladesh.

Detailed findings: [CTRL+ Click to go to the slides](#)

Summary of findings (3/4)



RQ5: What are the gaps and challenges in advancing and strengthening the role of financial services in supporting climate adaptation strategies?

Deficiencies in existing products:

- MFIs or cooperatives don't offer insurance or risk-pooling products.
- Members of MFIs can't access all their deposits without becoming debt-free or getting their membership revoked.
- Microfinance loans are of low value, costly, and inflexible.

Absence of relevant products:

- Weather-based-index insurance piloted by Green Delta and the current crop and cattle parametric insurance piloted by BMMDP has no presence in southwest Bangladesh.
- There is no evidence of micro-level climate & and disaster risk reduction, absorption, or transfer mechanism or instruments.

Absence of knowledge:

- Despite evidence of the presence of life and takaful insurance, the knowledge of insurance is sparse.

Detailed findings: [CTRL+ Click to go to the slides](#)



RQ6: What are the roles of ecosystem actors in the adaptation strategies of vulnerable people?

Positive role:

- NGOs working in rural areas train farmers on fisheries, livestock, and cropping.
- NGOs provide relief work during disasters and help in post-disaster reconstruction and recovery.
- There was evidence of the Government providing disaster relief in cash and food supplies in rural areas.
- The agriculture department promotes and trains farmers on salinity-tolerant rice cultivation.
- Agri-input dealers sometimes provide inputs in advance.

Neutral role:

- There is no evidence of the roles of CICO agents and schools in informing the adaptation strategies of smallholder farmers and urban petty traders.

Detailed findings: [CTRL+ Click to go to the slides](#)

Summary of findings (4/4)



RQ7: Which variables affected the analysis of the information obtained through the qualitative study?

Design variables:

- The focus on a single high-impact climate hazard limited the nuanced understanding of slow-onset and gradual changes in environmental systems.
- The southwest region of Bangladesh is frequently hit by cyclones; therefore, it was difficult to single out one high-impact event whose effects were conspicuous, and the consequences were long-term.
- It was challenging to establish the actual cause of perennial salinity in the region—some attribute it to Cyclone Sidr, while others attribute it to shrimp farming in the region.

Physical variables during research:

- There were no physical variables that adversely affected the collection, assimilation, and analysis of information.

Detailed findings: [CTRL+ Click to go to the slides](#)

1. The direct and indirect impacts of climate risks on poor and vulnerable people



Frequent and intense cyclones have exacerbated the fragility of livelihoods for rice farmers in southwest Bangladesh



Rice cultivation is the most affected livelihood:

- The frequent and intense cyclones, resulting in storm surges, coastal flooding, and inundating low-lying areas with saline water, have wreaked havoc on paddy cultivation in the region.
- The first order of damage is due to the storms, with the secondary damages being the resulting salinity that has rendered most of the arable lands unsuitable for rice cultivation.
- About 21% (49) of the responses to the question on the direct and indirect impacts of climate change noted that rice cultivation is the most affected livelihood.
- In southwest Bangladesh, cyclones and storm surges, and resulting coastal flooding and salinity, have rendered about 128,000 ha of land, unusable, leaving more than a million people without a livelihood.



The freshwater fishery is the second most affected livelihood:

- The freshwater fishery that supports the livelihoods of small and marginal farmers in southwest Bangladesh is also adversely affected by these frequent cyclones and storm surges.
- The storm surges have inundated local ponds with saline water, killing the freshwater fish. About 10% (23) of responses indicated that the impact of salinity on freshwater fishing has been devastating.

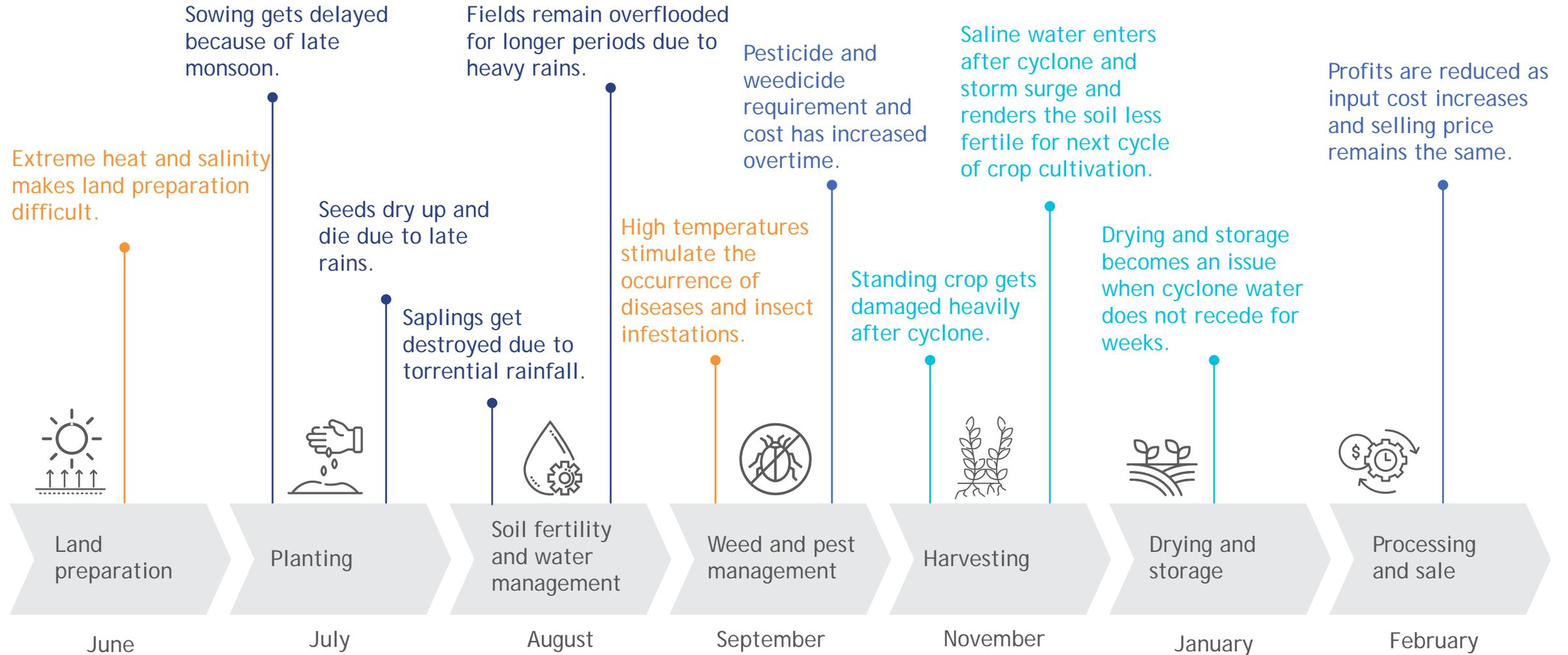


Impact on cattle is also evident:

- Cattle and goats feeding on saline grass frequently fall sick.
- Although not directly attributable to salinity, increased heat and humidity have led to a rise in the incidence of diseases among cattle.
- A few respondents also mentioned that their cattle died during Cyclone Amphan (2020) when the shed collapsed on the animals.
- About 7% (16) of responses indicated that these cyclones and their aftermaths have been detrimental to livestock health and productivity.

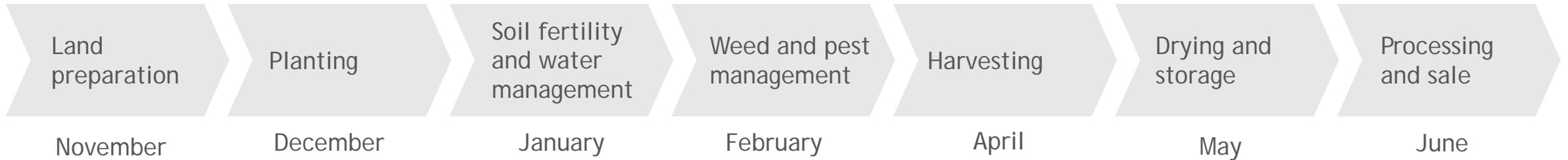
Impact of erratic weather on *Aman* rice cultivation cycle

● Heat and salinity ● Erratic rainfall ● Cyclone and storm surge ● Other impacts



Impact of erratic weather on *Boro* rice cultivation cycle

- Aman rice is planted in mid-July and harvested in mid-November to December, while Boro rice is planted in November and harvested in April. We found limited evidence of farmers cultivating Boro rice in the study areas.
- Due to high levels of salinity in the water from cyclones and storm surges, the soil salinity is high. In places near the coast, groundwater is contaminated, and river water is also saline. This makes the cultivation of Boro rice very challenging.
- Most MFIs also do not provide multiple loans in a year. Since the profits are low to start with for rice farmers from the sale of their produce, they are unable to take a second loan to buy inputs (such as salinity-resistant seeds, weedicides, and pesticides) for the cultivation of *Boro* rice immediately after the harvest of Aman rice.



Farmers are clear about the impact of climate change, however, their voices remain unheard at times

A report by [Ground Truth Solutions](#) highlights that although enhanced early warning systems and temporary humanitarian relief have been helpful for poor and vulnerable residents in SW Bangladesh, the assistance they receive is insufficient and sometimes unjust. Many vulnerable people are excluded from relief due to favoritism, poor management, and opaque decision-making. It is important to value feedback that incorporates community priorities, supported through the use of science.

Farmers in Khulna District note that the rainfall pattern has changed substantially over the past two decades. The number of rainy days and the total rainfall have declined, but the incidence of drought during the three main cropping seasons has increased. ([Kabir et al., 2017](#)). Farmers in Satkhira District ranked the impact of climate change on crop production, as shown in Exhibit 1.1 ([Khan et al., 2022](#)). Only top ten shown.

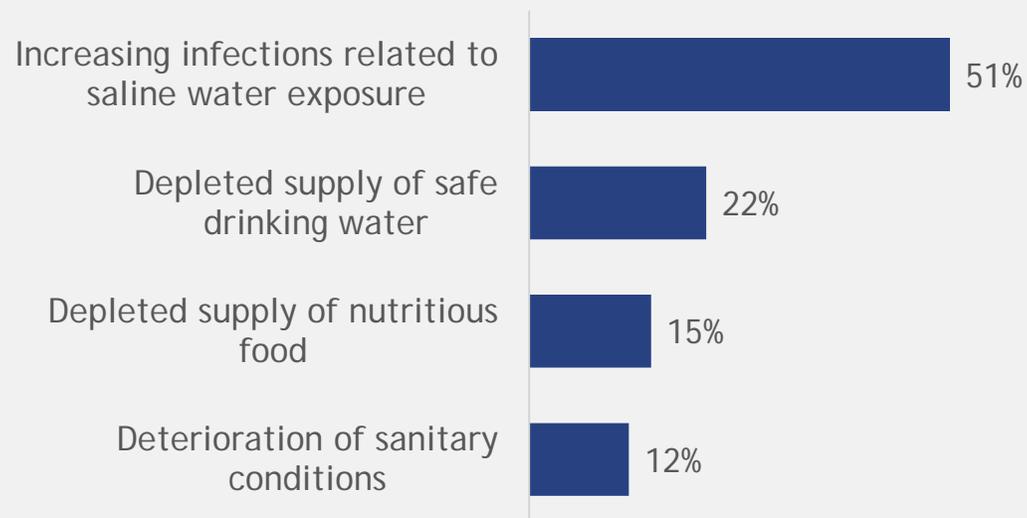
Statements	Perception Score	Perception Index	Rank
Erratic and untimely rainfall hampers crop planting and harvesting	507	0.882	1
Excess rainfall impacts young plants and increases crop pathogens	504	0.875	2
Unexpected and untimely rainfall induces new diseases	493	0.85	3
The need for fertilizer and pesticides is increasing	486	0.835	4
The cost of crop production is increasing	483	0.828	5
Plant diseases are intensifying and insect pest infestations are increasing	468	0.795	6
Increased winter temperature reduces vegetable yields	459	0.775	7
Soil fertility is reduced	452	0.759	8
Delayed and short winter reduces crop production	446	0.746	9
Reduced plant health	443	0.717	10

For a detailed understanding of the methodology of arriving at the indices and perception score, please refer to the study from where this table was derived

The cyclones, storm surges, flooding, and salinity upend physical and financial health of the affected rice farming communities

- Regular exposure to saline water has led to an increase in the incidences of skin infections and urinary tract infections, especially among women.
- Respondents cited a rise in cases of hypertension.
- Cyclonic storm surges and resulting flooding deplete the supply of drinking water, nutritious food, and sanitation facilities for months after the events, as seen particularly after cyclones Aila (2009) and Amphan (2020).
- The financial health of communities deteriorates with these repeated disruptive events. Borrowing and selling productive assets become necessary to arrange money for repairing and reconstructing properties and buying seeds, fertilizers, etc.

Exhibit 1.2: Salinity of water is the major** health hazard resulting in persisting and increasing incidences of skin infections and urinary tracts (among women).



Female members of farming households consider the increased burden of unpaid work, heightened security risks (particularly for women and children living in cyclone shelters), and the lack of access to nutritious food and clean drinking water as the most significant impacts of climate events on their lives.

Next on their list of most significant impacts are the deterioration of financial health, loss of productive assets, deterioration of sanitation facilities, and compromised hygiene.

Their male counterparts also feel that these climate events pose a significant security risk to their wives and children. Lack of access to nutritious food and safe drinking water is also an equally significant impact.

Male members ranked the additional burden of unpaid work, damaged assets, and the increased burden of debts on households below the concerns around security and the availability of food and water.

The data label** in percentage represents the frequency of these responses relative to each other.

The fragile physical structures of houses, toilets, and kitchens, and dependence on tube wells for drinking water exacerbate the climate vulnerability of the rural population in southwest Bangladesh



Exhibit 1.3: In Koyra Upazila, Cyclone Amphan severely damaged a respondent's house made of corrugated tin sheets and bamboo. Two years later she is still unable to finance the reconstruction of her house.



Exhibit 1.4: Leach-pit toilets are the only types that poor households can afford. Storm surges and flooding render these toilets useless, jeopardizing the hygiene, particularly of women.



Exhibit 1.5: Tube wells are the only source of drinking water for households. These tube wells don't have any mechanism to desalinate the water.

"We kept 2 cows in a relative's house for some days... during Aila, the situation was worse...our main house wall crumbled, cattle died as the house collapsed and due to the tidal surge, they couldn't escape....64 mons (~25 MT) of rice was damaged as submerged under water, we also lost 16 pitchers of palm molasses....it was a huge financial loss" - Mushhida Khatun, Female, 35 yrs, Rice farmer, Koyra Upazilla, Khulna

In urban Khulna, cyclones destroy livelihoods and push the affected people deeper into financial crises

- Cyclones Amphan and Aila resulted in physical damage to shops and dwellings.
- Physical damage to shops disrupted the livelihoods of petty traders.
- Most of them borrowed money from MFIs and NGOs to repair the damages to their shops and dwellings and meet daily expenses.
- Heavy rainfall associated with cyclones floods localities, overwhelming the poor drainage systems of Khulna city.
- Flooding disrupts drinking water supply and contaminates water used for washing and sanitation purposes. This contaminated and stagnant water breeds malaria and dengue-causing mosquitoes, and exposure to this water causes skin diseases.
- Flooding disrupts localities, and schools remain closed. Moreover, children exposed to contaminated water fall sick and miss school. This continues for several weeks after the cyclone has struck.

“My husband went to open the shop during the morning when Amphan attacked, the entire shop collapsed on him, became wounded severely...he suffered a lot for 3 months and passed away. Now my family is living on my income only...”

- A female petty trader, member of a focused discussion group in Rupsha Ghat, Khulna

Exhibit 1.6: The cyclone Amphan, disrupted livelihoods of petty traders and urban poor by severely damaging shops and dwellings

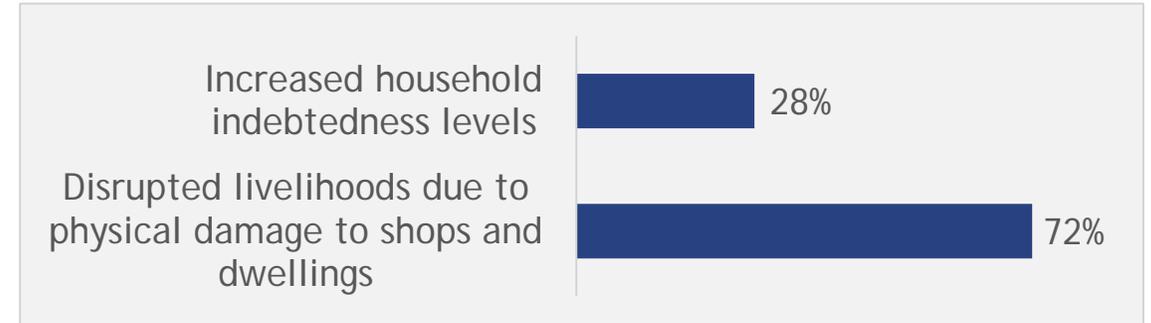
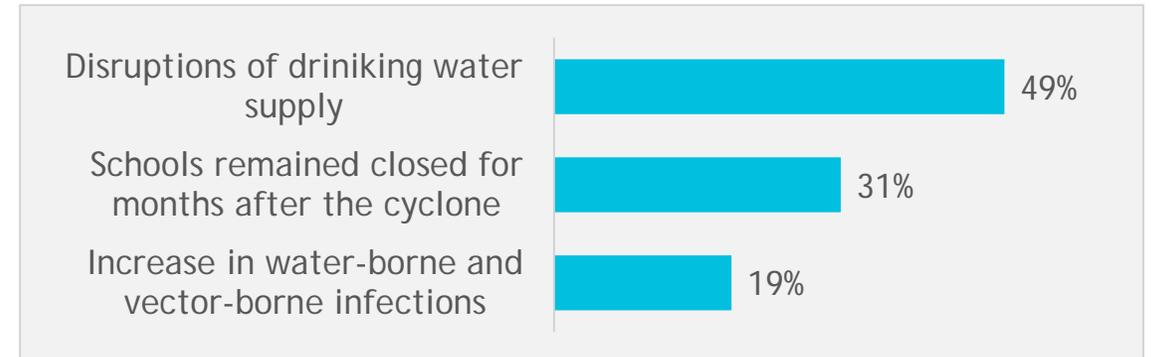


Exhibit 1.7: Due to pluvial flooding caused by the cyclone Amphan, drinking water supply remained disrupted for weeks



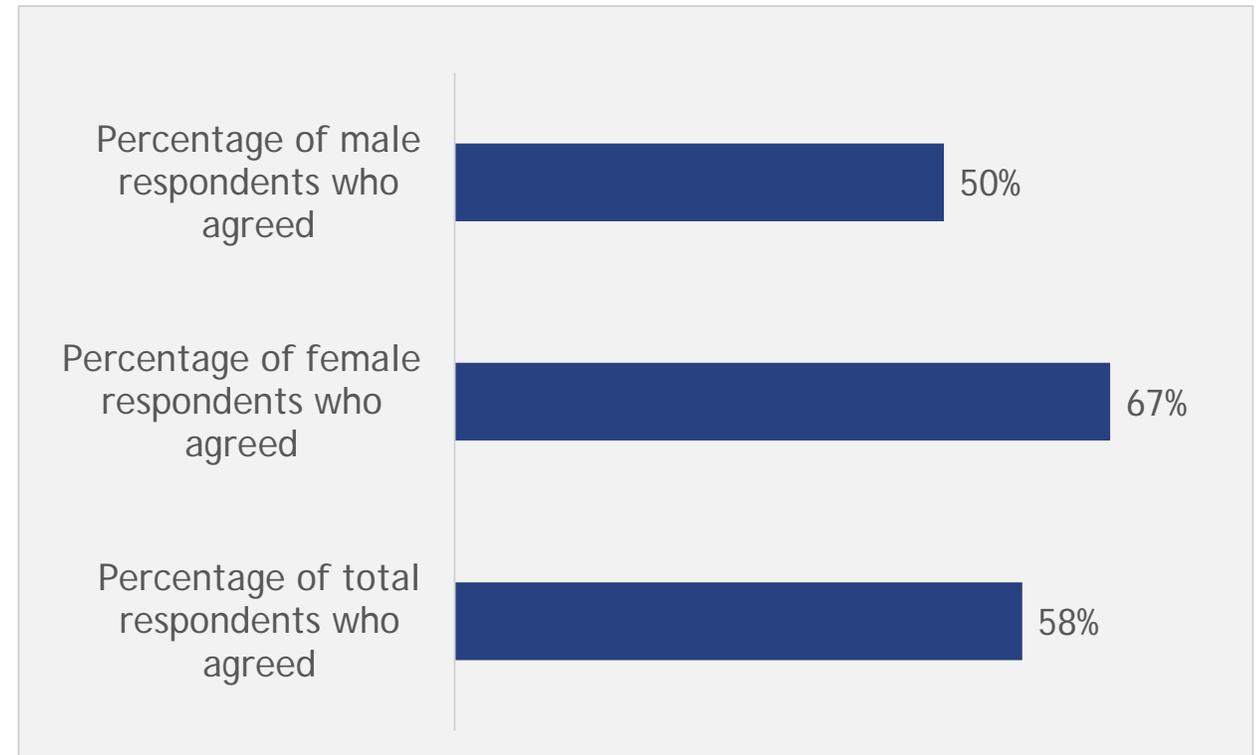
The data label** in percentage represents the frequency of responses relative to each other, against the question- How did the cyclones affected your life and livelihood?

The impact of climate hazards on women is multidimensional and disproportionate

Women in both rural and urban areas reported:

- ▶ Depleted overall physical and mental health.
- ▶ Increased burden of unpaid work, such as drinking water collection, increased cooking time, and caring for infants, elderly, and sick relatives.
- ▶ Increasing instances of fevers, uterine infections, skin diseases, vector-borne diseases, limited access to food (reduced food intake or skipping meals), and higher mortality rates among women, children, and the elderly due to disasters.
- ▶ Lack of mobility due to patriarchal norms and safety concerns, safety considerations in cyclone shelters, safety issues when men leave for seasonal work, women's clothes impeding mobility during disasters, and increased instances of gender-based violence, forced marriages, and child marriage.
- ▶ Limited opportunities for women to participate in adaptation and disaster risk planning, along with limited representation of women in leadership positions.

Exhibit 1.8: At present, female representation in the workforce has improved in rural areas and there is a parity in the price of rice (agricultural produce) fetched by men and women. However, **more than half of the respondents** agreed that women face a disproportionate amount of physical and mental hardships during and after cyclones and its associated perils.



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Salinity is a major second-order climate risk in southwest Bangladesh

A review of the [Delta plan 2100](#) and [GCF salinity project](#) document validated our findings that saline water intrusion has a multi-dimensional impact on communities in southwest Bangladesh

Impact on agriculture

- Over 1 million hectares of cultivable land are already affected by salinity intrusion caused by slow - and rapid-onset events; for example, the net cultivated area in Satkhira decreased by 7% from 1996 to 2008.
- Crop losses due to sea level rise-induced salinity intrusion have been estimated at 200,000 metric tons per annum.
- Farm productivity is estimated to reduce by half for every 0.5% increase in the salinity of irrigation water.

Impact on drinking water

- Groundwater salinity levels in several key coastal districts are beyond the tolerable limit (>2500 uS/cm) for drinking and for irrigation. In Satkhira district and parts of Khulna district, even the groundwater is unfit for human consumption and irrigation.

Impact on livelihood options

- Khulna and Satkhira have experienced a shift from agricultural land to shrimp farms, partly related to increasing soil salinity levels due to inundation after cyclones Sidr in 2007 and Aila in 2009. Shrimp farming is considered one of the key contributor to the increasing salinity levels of surrounding lands. It has benefited middle-class and wealthy landowners and large-scale enterprises, affecting the labor and income opportunities of the poor, especially women.
- There is a lack of livelihood diversification options in these areas beyond agriculture or freshwater homestead fish and vegetable farming. Limited on-farm improvement activities, underdeveloped ag value chains, cultural barriers to employment in the industry, a lack of SME job opportunities, and insufficient skills and education for the most vulnerable contribute to the challenges.

Cyclones and storm surges are not the only reason for increasing salinity. Evidence suggests slow-onset events linked to climate change are also contributing to salinity

- ▶ Farming households in Gabura, Budi Gowalini, Munshigonj, and Koyra in Satkhira district mentioned that the monsoon has become erratic, winter has become wetter and warmer, and tidal waves have become higher. However, they feel that shrimp cultivation must stop for the soil to desalinate and restore its fertility.
- ▶ Researchers have established links between salinity levels in agricultural systems where brackish water shrimp culture is non-existent. The salinity level in the dry season (pre-monsoon) in agricultural systems comprising shrimp farming and those without it has increased over the last decade. This indicates that other environmental factors are contributing to salinization in the coastal region—reduction in upstream freshwater flows, saline water intrusion, erratic rainfall patterns, and tidal flooding. (Kabir et al, 2015)



Photo: MSC research team. February-March 2023

Exhibit 1.9: Shrimp “ghers” (ponds surrounded by protective nets), like this, are intercropped with rice. Respondents feel that shrimp cultivation is the main reason for an increase in salinity in the locality. However, studies suggest, that higher tidal waves, gradually reducing and more erratic monsoon rainfall are also significant contributors to increasing soil salinity in southwest Bangladesh.

“The height of tidal waves have gone up from seven feet to about 10-12 feet”

- Female respondents from Sheikh Sardar Para, Uttar Beatkashi. Koyra, Satkhira.

Years of Climate Change Induced Migration in Bangladesh

✦ About 13.3 million people may become internal migrants by 2050 due to climate impacts in Bangladesh, with higher impacts on women according to the World Bank. Migration-related concerns encompass uncertainty about the future, the difficulty for female migrants using their rural talents (such as cattle rearing and homestead gardening) in urban professions (such as house help), physical injuries, and mental distress. Skill, knowledge, and social connections are also lost due to migration.

✦ Causes of migration and displacement are complex and myriad. But there are increasing links between climate change and migration, with slower onset events (droughts, salinity, etc) causing more migration, than fast onset extreme events. Every city has a carrying capacity and climate refugees are putting additional stress on existing low-income settlements and urban service providers.

✦ Recent evidence shows that migration can be a coping mechanism and an adaptation strategy for slow-onset of climatic events. But climate-induced migration to cities can cause deepening vulnerabilities, further improvements and accelerate poverty. Climate migrants often lack funds for adequate housing and begin residing in dense, informal areas. They have limited access to social services, education, healthcare, and water and sanitation.

✦ Riverine erosion and flooding are the major causes for loss of land and often causing permanent displacement. People can be trapped in a cycle of poverty—either borrow funds often at high interest rates to buy new land, or migrate to urban areas.

In SW Bangladesh, internal migration for sustainable economic opportunities is common. However, we did not find evidence of internally displaced people from the coastal region settled in Khulna

Internal migration in southwestern Bangladesh

Most migration in the coastal region of southwestern Bangladesh is seasonal or temporary. Dhaka and Chittagong attract most migrants. Limited livelihood opportunities and infrastructure in Khulna make it less attractive. But Khulna City has seen increased migration following cyclones Sidr and Aila. In the last decade alone, the population in the city increased by more than 20% due to migration from nearby climate-vulnerable districts.

Generally, least well off migrate seasonally as agriculture laborers. More well off send children to school in urban areas and then migrate slowly, or men migrate abroad for work.

A study by Solidarity Center offers additional economic reasons for migration, especially in Khulna. It says people migrate for a host of reasons, most of which may be related to economic opportunities rather than environmental concerns.

2. Ex-ante and ex-post adaptation strategies adopted by the affected communities



Ex-ante risk mitigation strategies have become more informed after Aila but are still inadequate to avert losses and damages

Reducing risk to lives

- After Aila (2009), people act quickly on cyclone alerts and news. The higher usage of mobile phones has allowed authorities to send Early Warning Signals (EWS).
- Cyclone shelters offer refuge to communities residing in the path of cyclones.
- People arrange cash and dry rations and prepare for a longer stay inside storm shelters.
- We observed that urban slum dwellers are particularly ill-prepared to reduce the risk. We heard stories of cyclones destroying shops and dwellings, leaving them in rubble and causing fatalities in Khulna, but no such incidents were reported in rural Satkhira.

Protecting livelihood

- Adoption of salt-tolerant rice varieties such as Shakti-2, 1203, Bina-10, Fathema-69, and BRRI-47 has increased.
- We found evidence of mal-adaptation by farmers applying sugar and saccharine in their fields to neutralize the salt in the soil.
- Pond owners erect fences around their ponds to prevent fish from flowing away along with water run-off.
- The Agriculture department promotes rice-fish/shrimp cultivation to offset the negative return on rice mono-cropping.
- We found no evidence of the ability of urban petty traders to protect their livelihoods.

Investments on infrastructure

- At the individual/ household level people who could afford to elevate the plinth of their houses, did so
- Urban slum dwellers live in rented dwellings. We observed that they don't have the ability to invest in cyclone and flood-resilient dwellings

"Farmers have started using mulching paper to absorb salt from soil. They use rainwater for irrigation. They till their land frequently to expose and remove the saline soil"

- Mr. Jiam Bablu, M, 48 years, Assistant Agriculture Officer, Kaliganj, Satkhira.

Vulnerable farmers have shifted to salt-tolerant high-yielding rice varieties. However, the sustainability of this adaptive strategy remains doubtful.

- Respondents mentioned that the use of salt-tolerant rice varieties such as Shakti-2, 1203, Bina-10, Fathema-69, and BRRI-47 has increased. A study conducted by [Al-Amin et al.](#) in 2019 involving 360 farming households reported that most respondents (29%) preferred short-duration and drought-tolerant rice varieties (e.g., BRRI dhan-56 and BRRI dhan-57) as their prime adaptation strategy. Cultivating these varieties requires supplementary irrigation and more fertilizers. A study by [Khan et al.](#) in 2022, observed that the “application of fertilizer and pesticides” was the most frequently adopted strategy to combat the reduced yield due to salinity. Therefore, the increase in income from the higher yield is almost negated by the increase in the cost of production.
- Moreover, to make an informed decision about the application of fertilizer, farmers must test the nutrient content of their soil. For smallholders, testing the soil in a laboratory to determine the required fertilizer doses on their own is expensive, and they can barely afford that ([Manoj Misra, 2017](#)).
- Lastly, the intense nature of irrigated rice monoculture rapidly depletes soil nutrient reserves and decays the topsoil, leading to declining soil productivity. Subsequently, smallholders feel compelled to rely heavily on synthetic fertilizers without any expert guidance ([Manoj Misra, 2017](#)).



Photo: MSC research team. February-March 2023

Exhibit 2.1: Male rice farmers in Budi Gowalini, Ward #8, Satkhira discussing their adaptive livelihood strategies focused on salt-tolerant high-yielding rice varieties.

“Overall cost of cultivation has increased disproportionately”

...members of a focus discussion group of male rice farmers in Budi Gowalini, Ward # 8, Satkhira

Farmers use a wide range of adaptation strategies, some are credit-dependent

- Exhibit 2.2 from [Khan et al. \(2022\)](#) highlights how farmers have adapted (only top 10 adaptation strategies are presented) to climate change by increasing inputs, introducing fish and shrimp farming, changing the timing of agricultural cycles, and diversifying crops to align with the changed weather conditions.
- Further, farmers have raised their seed beds to higher levels to avoid flood waters and use deep tube well irrigation pumps to flush out the salt from their fields.
- [Alam et al. \(2017\)](#) also identified 15 adaptation strategies based on affected people’s long-term knowledge and perceptions of climate change and “planned adaptation” supported by the government and nongovernmental organizations (NGOs).
- Perhaps unsurprisingly, these adaptation strategies vary according to the affluence or farm size of the respondents. In particular, access to credit affects the ability of households to adapt to climate change—especially during rapid onset events, such as floods or river erosion.

Adaptation practices	Frequently adopted	Occasionally adopted	Rarely adopted	Not adopted	Weighted average adopted index	Rank
Application of fertilisers and pesticides	84	26	2	0	2.72	1
Fish farming followed by rice cultivation	80	24	6	2	2.62	2
Planting date adjustment	78	25	7	2	2.60	3
Crop intensification	64	32	12	4	2.38	4
Crop rotation and mixed cropping	56	37	14	5	2.29	5
Rice fish farming	52	33	24	3	2.20	6
Raised seedbed	42	36	25	8	2.02	7
High value cash crop with intercropping	40	39	23	10	1.96	8
Short duration crop	28	54	23	7	1.91	9
Agroforestry	14	49	34	15	1.54	10

Strategies such as dams and embankments prevent flooding; however, these interventions are also a reason for increasing salinity in southwest Bangladesh.

- As the government is focused more on flood management to protect the population and agricultural land, it has built dams and embankments across the country to prevent rivers from overflowing into the adjacent areas (Manoj Misra, 2017). Therefore, the arable land remains deprived of nutrient-rich floods. Previously, once every couple of years, seasonal floods deposited nutrient-rich sediment over large tracts of land. The floods also helped leach off excess salt from the flooded areas. This natural replenishment helped the soil regain productivity and minimized the need for artificial fertilization.
- In a 2018 [article](#), the International Center for Climate Change and Development claimed that “Polders” or islands protected from riverbank erosion through the construction of embankments on all sides are one of the reasons for soil salinity in southwest Bangladesh. These polders force tidal flows to squeeze into narrower channels between them, resulting in the inland movement of saline water carrying tidal flows.
- Rice farmers in Satkhira consider these embankments necessary to prevent the kind of storm surge they experienced during cyclone Aila in 2009. However, they also feel that regular dredging is required to keep the channels flowing freely. Some farmers opined that old and fragile sluice gates are incapable of preventing high tidal waves due to storm surges.



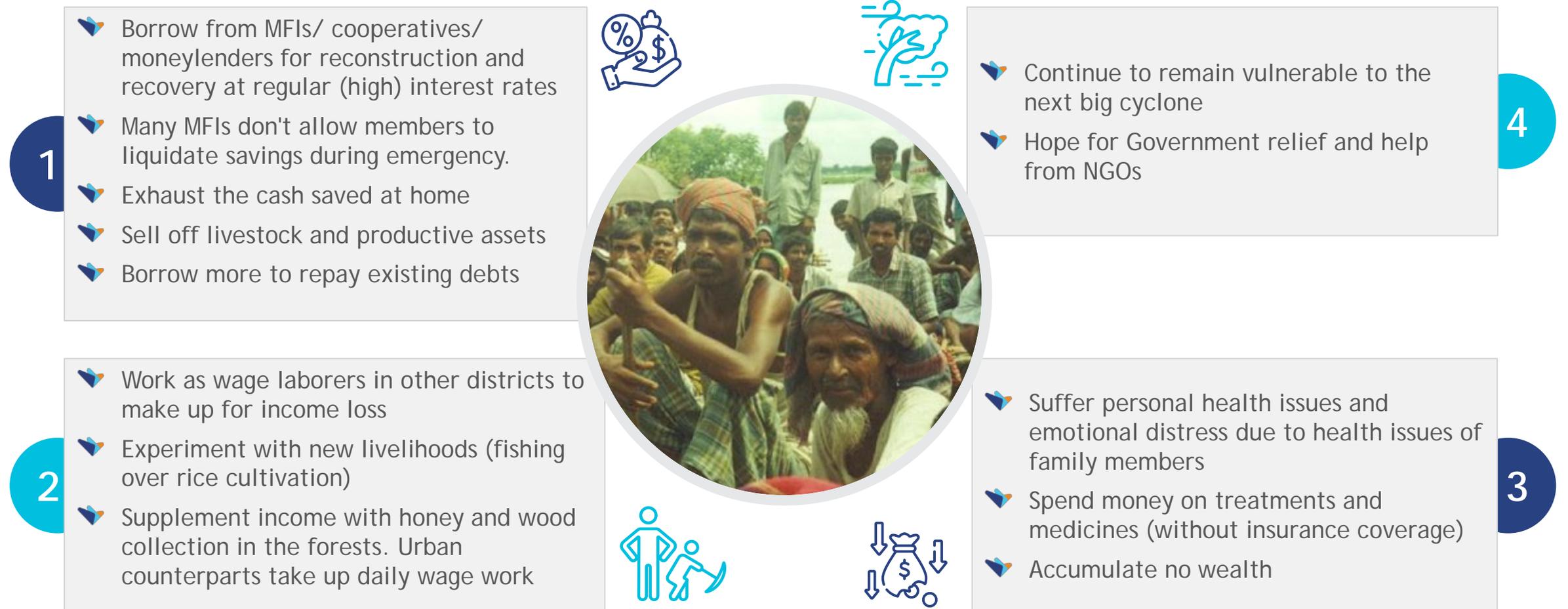
Exhibit 2.3: Embankments like these made with sandbags are the only barrier that stands between the 10-12 feet tides (during storm surges) and the villages along the river’s bank

“Damaged sluice gates are not being repaired as a result water logging during monsoon has become common”

... members of a focus discussion group of male rice farmers in Budi Gowalini, Ward # 8, Satkhira

Ex-post strategies are really a set of desperate measures

Exhibit 2.4: The cycle of distress for the poor affected by cyclones, storm surges, and flooding. This cycle can at best be termed as a coping mechanism comprising a host of desperate measures pushing the poor deeper into poverty.



The level of adoption of the identified climate adaptation strategies varies by gender...

	Least adopted	Regularly adopted
Formal financial	<ul style="list-style-type: none"> ➤ Credit from aggregators ➤ Loan from banks ➤ Savings in banks ➤ Life insurance with endowment benefits ➤ Takaful insurance 	<ul style="list-style-type: none"> ➤ Grants from the government ➤ Savings with MFIs ➤ Borrowing from MFIs
Informal financial	<ul style="list-style-type: none"> ➤ Credit (loan) from money lenders 	<ul style="list-style-type: none"> ➤ Savings at home and with cooperatives ➤ Loan from friends and neighbours ➤ Loan from relatives
Non financial	<ul style="list-style-type: none"> ➤ Training and skill development for homestead gardening and livestock rearing provided by MFIs. ➤ Combined farming of rice and fish. 	<ul style="list-style-type: none"> ➤ Seasonal migration for income during non-cropping and hazard-struck seasons. ➤ Livestock rearing. ➤ Building houses and toilets raised on plinths. ➤ Rainwater harvesting to ensure safe drinking water during hazards. ➤ Using salinity-tolerant crop species. ➤ Homestead gardening - sometimes on raised land.

Legends

- Women-focused
- Men-focused
- Gender neutral

...and fits within the gender norms set by the society

A study (Tanjeela, M., & Rutherford, S. 2018), undertaken to understand the level of women's participation in climate adaptation programs in Bangladesh revealed that the participation of women as community volunteers has increased. Participation of women in these community planning programs resulted in a positive impact on women, adolescent girls, and children who move into cyclone shelters. Women are less hesitant to relocate to cyclone shelters, resulting in fewer deaths of women, girls, and children due to cyclones.

“Women would go to (the) field only if she does not have a husband”

- Female members of a farming community in Dumuria village, Gabura- Satkhira

“Men face more hardships than women as they have to manage everything on their own”

- Female members of a farming community in Sheikh Sardar Para, Uttar Beatkashi, Koyra- Khulna

Women are mostly at the receiving end of the impact, exercising their choices within acceptable societal norms.

- Women are mostly at the receiving end of the impact, exercising their choices within acceptable societal norms.
- Rear livestock (ducks, chickens, goats, cattle) to supplement income.
- Women have found employment in brackish water shrimp farms, and recently, crab farms.
- Manage household finances and resources when husbands migrate to cities/other districts to earn a wage.
- Gender parity in the labor market has offered them jobs, but not wage parity (reason: “they lack the physical strength to put in more labor”).
- In urban locations, men and women equally participate in livelihood decisions. However, societal norms prevent women from overtly displaying independence.

Men play the role of providers, a responsibility bestowed upon them by societal norms

- Men actively participate in reconstruction and recovery
- In farming households in Bangladesh, men are the farmers deciding the principal livelihoods of the family
- In urban locations men play the same role as in rural communities

[Back to summary of findings](#) 

3. Actual and potential roles of formal and informal financial services in impacting the resilience of vulnerable people



At present, the role of formal and informal microcredit is limited to offering ex-post-disaster liquidity support

Type of financial product	Role in disaster risk reduction	Role in ex-post risk absorption	Role in risk transfer
Microcredit from MF-NGOs, Cooperatives, and Banks	●	●	●
Deposits with MF-NGOs and Cooperatives	●	●	●
Informal credit	●	●	●
Life insurance	●	●	●
Remittance	●	●	●

- Blue = positive role.
- Sky blue = no role.
- Orange = negative role.
- Dark grey = no evidence

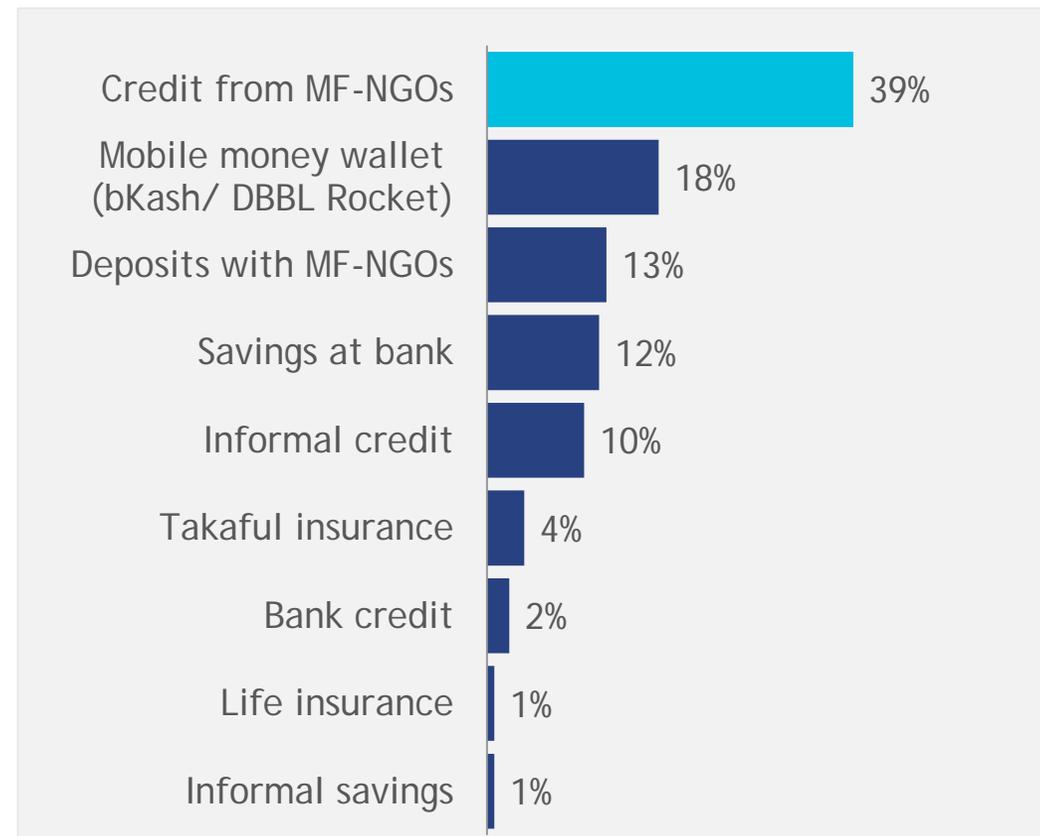


Exhibit 3.1: Microfinance loans and MFIs are ubiquitous in Bangladesh. Microcredit is used by households for income generation and meeting expenses. The latter is the most used case after a disaster.

Informal sources of money is a dependable source of ex-post liquidity

Type of financial product	Nature of products	Observations
Own savings	Small scaling savings at home	<ul style="list-style-type: none"> High levels of poverty mean savings are limited. People do not consider saving small sums as savings. Often used for smoothing consumption - meeting immediate and emergency needs.
Loan from local money lenders	Daily repayment with high interest rates	<ul style="list-style-type: none"> More flexibility despite high-interest rates. Helps smooth consumption during a shock and can be used for on and off-farm investments.
Loan from friends, family, and cooperatives	Context dependant - interest free or high interest.	<ul style="list-style-type: none"> Respondents depend on informal loan more than formal credit (Fenton, A et al., 2016). After severe floods, the typical response from villagers is to seek social and economic support from friends and local institutions before they approach NGOs (Benjamin, S., 2018).
Remittance from migrant family members		<ul style="list-style-type: none"> In Satkhira, seasonal migration to cities and towns for wage labor and petty trade is common. These domestic remittance allows women members of the household manage expenses, but the small value of these remittances render them useless to inform a stronger adaptation strategy. While we found evidence of international migration to the Gulf nations, we did not find evidence of high value international remittance from family members. Respondents did not mention that they depend on remittances to inform their ex-ante or ex-post climate risk mitigation strategies.

“During that time, I had no income or savings to rely on. My son fell ill and I was not able to afford medical care for him. I had to reach out to an acquaintance and borrow money in order to take him to see a doctor”

- Amzad Kazi, M, 35 yrs, Utility store owner, Rupsha Ghat, Khulna

“After Amphan, people sent money back home to families. Transaction levels were high”

- Md Oaniduzzuman, M, 30 years, Sher-e-Bangla Road, Amtola, Khulna Sadar

MFIs play a dominant role in ex-post reconstruction and recovery

Type of financial product	Products offered	Observations
G2P payments	Cash transfers and food aid for most vulnerable	<p>le in strengthening climate adaptation of smallholder farmers</p> <ul style="list-style-type: none"> Respondents complained of politicking with disaster reliefs Bangladesh does not yet have access to instruments such as NAT-CAT bonds, CAT-DDOs, and Sovereign Risk pools.
MFIs and Microfinance-NGOs (MF-NGOs)	<ul style="list-style-type: none"> Microloans- group and individual Compulsory and voluntary deposits Credit life insurance 	<ul style="list-style-type: none"> NGOs/MFIs provide credit mostly to women in Bangladesh. Women may take multiple, simultaneous loans from different service providers, and sometimes to repay older loans. Some MF-NGOs offer cheap loans for reconstruction and recovery. We observed that <u>Nowabanki Gonomukhi Foundation</u> an NGO-MF borrow from <u>PKSF</u>, to offer loans up to BDT 10,000 (~ USD 92) at 4% flat interest rate to disaster affected people. Commercial MFIs such as BRAC claimed to have offered BDT 3,800 (~ USD 35) relief to Amphan victims using <u>bKash</u> Borrowers cannot withdraw the deposits made with MFIs (voluntary or compulsory) before repaying her loan in full. However, she can offset the loan outstanding against the deposit.
Loans from banks	Agricultural loans from public (or private) banks	<ul style="list-style-type: none"> Can be difficult to access, require paperwork, and collateral. Major agriculture finance banks have reduced their credit flow to southwest Bangladesh due to high <u>rate of loan defaults</u>. Only 3 out of 126 responses alluded to bank credit.
Insurance	Life insurance, agricultural insurance	<ul style="list-style-type: none"> Very limited use of insurance to transfer risks. Some evidence of the purchase of life insurance among interviewees. Branch officer of a local BRAC branch mentioned that they don't offer agriculture insurance because farmers will damage their crops themselves and claim insurance.

Role of mobile money in climate adaptation

- Mobile money services like bKash, Rocket, and Nagad ease the transfer of money from the male members who migrate, to their family members who stay back.
- Some families also have members living in other countries who send remittances through mobile banking.
- There are instances of petty traders in Khulna using mobile banking for their trade but higher instances of use in rural areas.
- Some respondents received G2P payments during the Covid pandemic through mobile banking.
- A BRAC MFI staff claimed that BRAC remitted BDT 3,800 (~ USD 35) to cyclone Amphan-affected customers, through bKash.

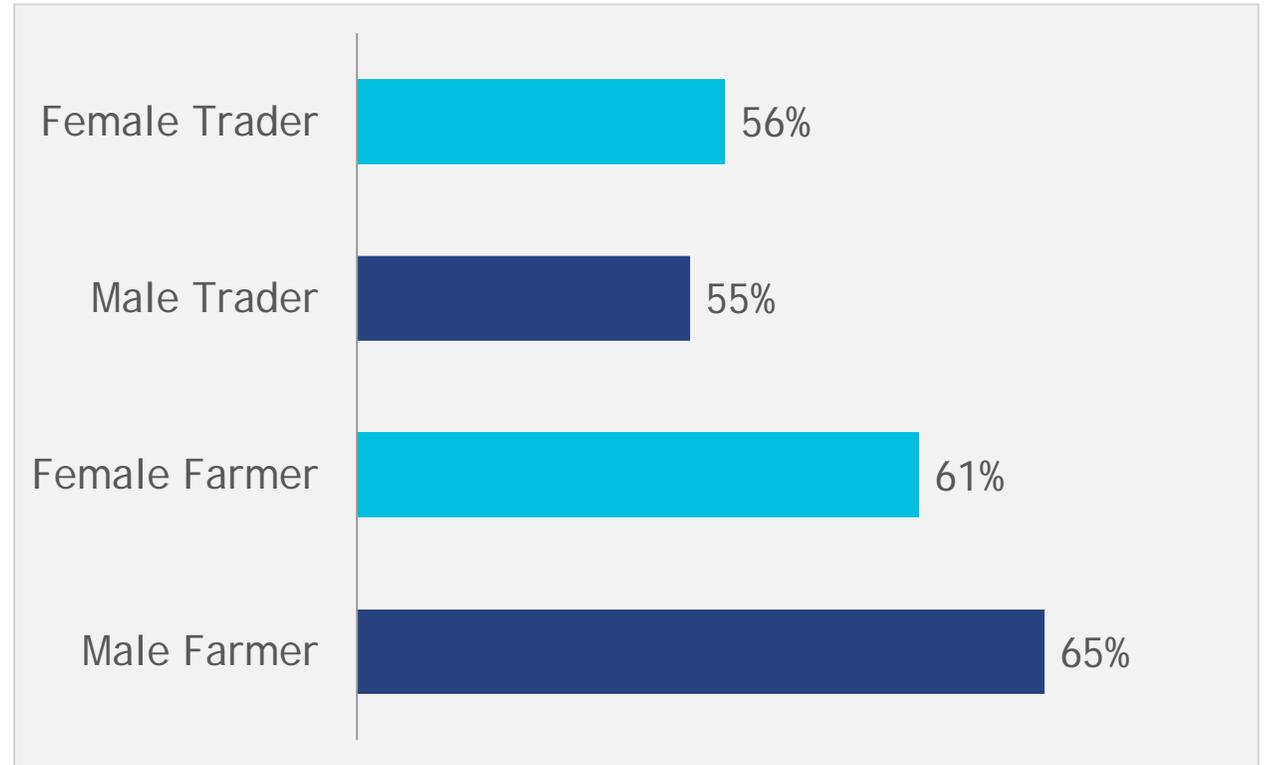
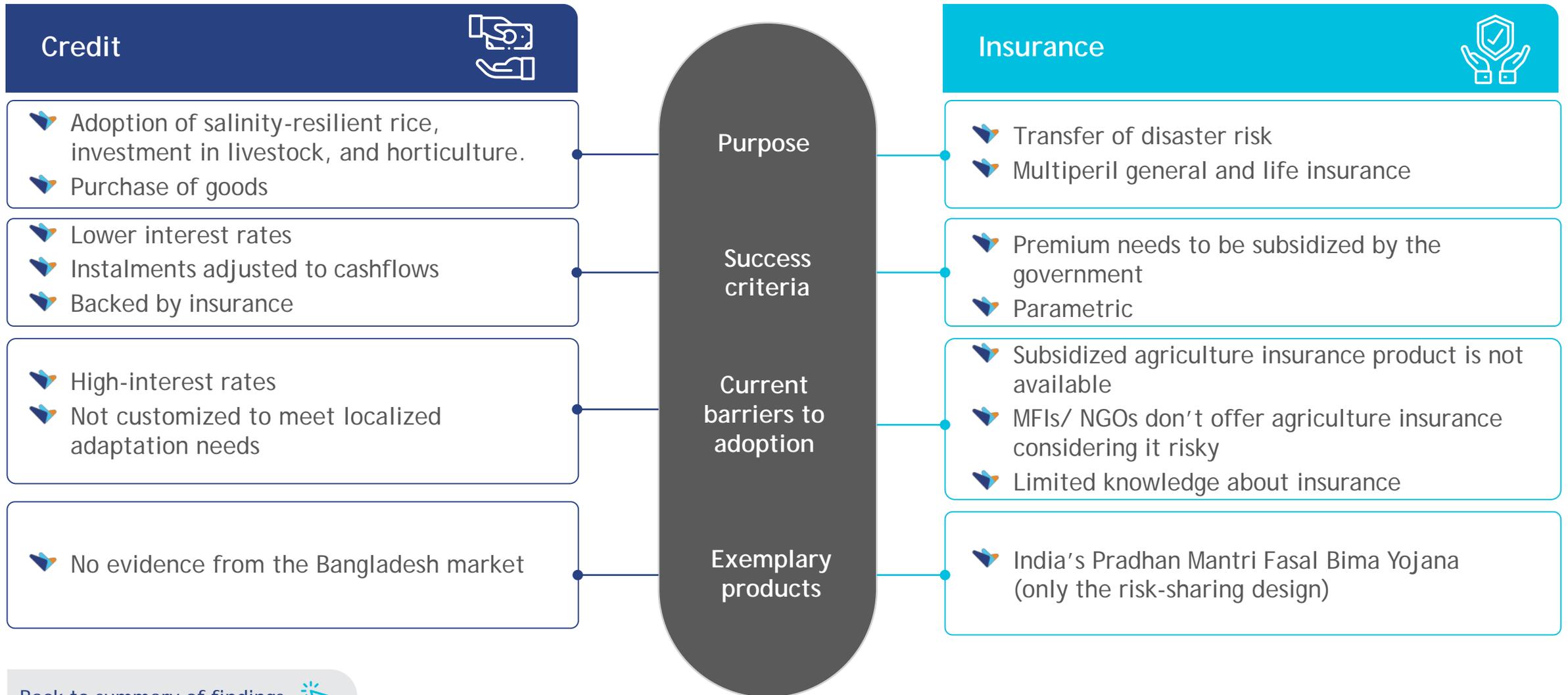


Exhibit 3.2: Our study elicited that usage of mobile money services is higher in rural areas because male members of rural households in southwest Bangladesh migrate to cities for temporary wage work and hence send remittances. Urban petty traders usually live in cities with their immediate families. That can be the reason for the lower usage of mobile money than their rural counterparts.

Farmers and traders need suitable credit and insurance products and trustworthy delivery of these services

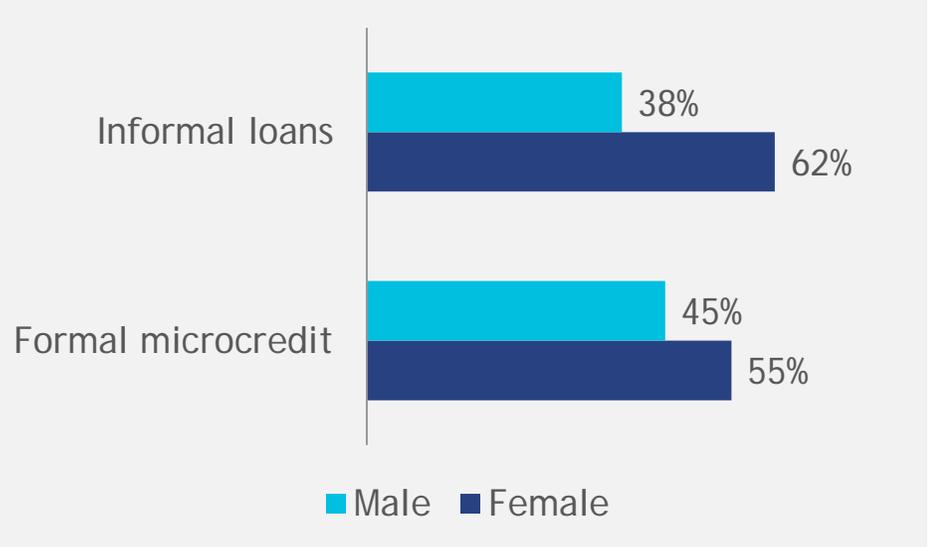


4. Barriers to accessing the existing financial services, particularly by women



Microcredit is readily available for meeting ex-post reconstruction and economic recovery

Exhibit 4.1: Women have relatively higher access to both formal and informal microcredit in Bangladesh. Most NGO-MFIs target only women borrowers. Women-led cooperatives are a common informal source of financing.



The total number of responses alluding to formal loans (N_f) = 60. The total number of responses alluding to informal loans (N_{if}) = 13. Therefore, 55% of formal microcredit indicates 33 of 60 responses that alluded to formal microcredit are from women respondents.

Barriers to accessing other formal financial services

- ▶ Bank loans are essentially unheard of in the region. The general understanding is that banks don't lend to poor people and ask for many documents and collateral.
- ▶ There is a sparse understanding of insurance as a risk management product. We found a few endowment policies (guaranteed money back plus life cover) and Islamic takaful insurance, but respondents could not define the benefits clearly. It was evident that the respondents, all of them female, were not responsible for the purchase decision.
- ▶ Agriculture and livestock insurance are unavailable in the region, or respondents have never heard of these products. MFIs like BRAC feel it is risky to offer agricultural insurance.
- ▶ There is a significant level of expectation for NGO-led microfinance to be a tool for all financial needs, but most opined that interest rates must be lowered.

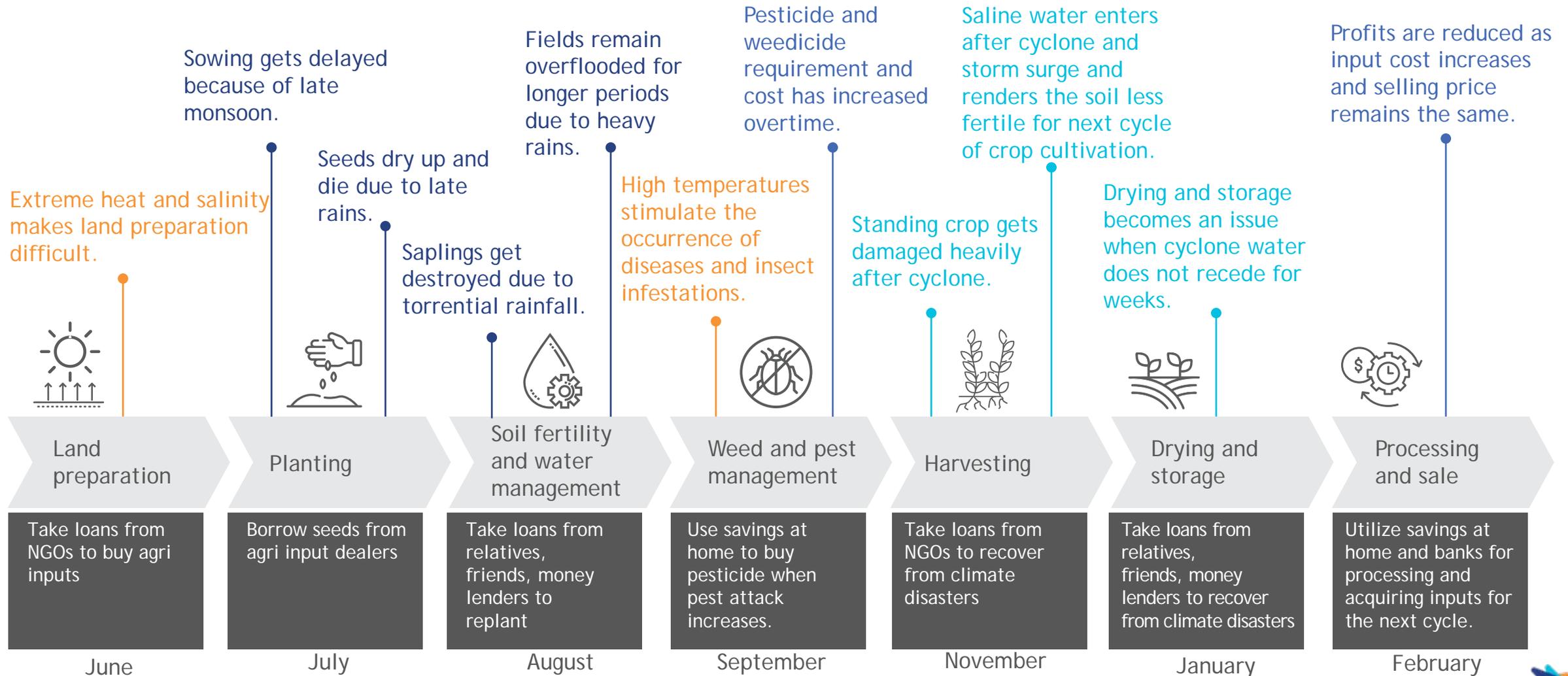
“People become victims of insurance fraud. The insurance company promises to return double the amount however returned only 20%-30% more”
- A male petty trader during a group interview session in Khulna Sadar, Khulna

5. Gaps and challenges in advancing and strengthening the role of financial services in supporting climate resilience strategies



Availability of financial services & the impact of climate variability and change on *Aman* rice cultivation cycle

● Heat and salinity ● Erratic rainfall ● Cyclone and storm surge ● Other impacts



Systemic challenges and design level barriers have prohibited the adoption of climate adaptation finance by the vulnerable communities

Design level barriers

- Most commercial MFIs do not have products that finance post-disaster reconstruction and recovery. Their business models focus on working capital needs with small, regular repayments. These are ill-suited to large-scale investments required for adaptation.
- MFI models in Bangladesh (and also globally) depend on regimented repayment schedules to enforce credit discipline among borrowers. There is little appetite for experimenting with grace periods, tenure, frequency, or moratoria. The digital transformation of MFIs in Bangladesh may change this status quo.
- PKSE offers flexible loans to the members of NGOs to meet their emergency needs for pre-disaster preparation, during a disaster, and post-disaster reconstruction and rehabilitation works. However, the amount is limited to BDT 10,000 (~ USD 92), which is insufficient for its aim.
- Training MFI staff to deliver complex loan products is difficult. The experience of the industry with SME loans has not been successful.

“Incremental adaptations facilitated by access to microfinance were not sufficient to offset the ongoing effects of flooding on agriculture, the most important household income generating activity.”

Fenton, A et al., (2016)

Systemic challenges

- Commercial banks find it risky to offer credit in southwest Bangladesh due to the continued exposure of this region to cyclones and storm surges.
- A few agriculture finance banks such as Bangladesh Krishi Bank and Agrani Bank have exposure in this region and their portfolio at risk (PAR) levels are significant.
- Bangladesh Government has not yet accessed sovereign climate and disaster risks transfer instruments such as NAT-CAT bonds, CAT-DDOs, and sovereign risk pools and therefore is unable to play a role in the market-making of climate adaptation instruments, such as offering climate risk insurance at a subsidized rate.

“We take loans from an NGO, then to repay the money weekly we take another loan from another NGO...it’s a vicious cycle...we couldn’t recover properly...”

- A female petty trader in a group interview session in Rupsha Ghat, Khulna

6. Role of system-level actors in strengthening climate adaptation



NGOs are instrumental to support coping strategies of affected people

- NGOs, particularly the ones providing microfinance, support communities by offering moratoria and top-up loans. Many NGOs originally focused on health or agriculture have started to lend both in response to demand from their members and to generate income to sustain their operations.
- The NGOs provide training to farmers on improved cultivation and livestock management practices
- NGOs provided rice, fertilizers, pesticides, ducks, and concessional loans for ex-post recovery of financial health
- They also have installed drinking water tanks in areas such as the one in Budi Gawalini, Ward #8, Satkhira that provides free drinking water to locals
- In urban areas the role of NGOs is limited to lending microcredit
- These NGOs also employ a significant number of female employees. In one of their branches in Munshigonj, we observed that there were 60% female Program Officers.
- NGOs like Nowabenki Gonomukhi Foundation (NGF) have established a lead farmer scheme, creating a linked network of these lead (progressive) farmers.



Exhibit 6.1: NGOs such as NGF advises farmers on undertaking integrated farming. The one in the picture comprises vegetables, intercropped with fruit trees.

“Need loans for enterprise development, need to create backward and forward linkages (for rural MSMEs), and Microcredit funding should increase from Government (PKSF)”

- Md. Alamgir Kabir, M, 53 years, Director, Microfinance, Nowabenki Gonomukhi Foundation, Shyamnagar, Satkhira

Other system level actors did not seem to inform the adaptation strategies of the vulnerable people

- Government agricultural extension officers train farmers on adaptive cultivation practices. The focus of their training is on the cultivation of salinity-tolerant high-yielding rice varieties. In areas where salinity levels are lower, they train farmers on hybrid and pest-tolerant vegetable cultivation.
- Although agriculture extension officers offer solutions available to them, these solutions are not sustainable. In a study, titled Smallholder Agriculture and climate change adaptation in Bangladesh: questioning the technological optimism, Manoj Misra observed that farmers have been using the advised mix of fertilizers. However, the requirement for fertilizers keeps increasing.
- Veterinarians and livestock extension officers have observed a scarcity of veterinary hospitals. While there is a hospital under the Livestock Resources Department in the sub-district (Shyamnagar), it faces challenges due to a shortage of trained veterinarians. As a result, some farmers turn to veterinary medicine shops for advice and medicines. Additionally, there is a shortage in the supply of affordable government medicines.



“We need insurance for cattle not cash grants. Insurance on bulls is not viable. Government will introduce insurance (optimistic). (I heard that) BRAC is coming up with (cattle) insurance”

- Dr. Md Mamun Ar-Rashid, Livestock Resources Extension Officer, Digholia, Khulna

“We stay at home only during cyclones. Then it is duty as usual”
- Purnima Rani Deb Roy, F, 52 years, Primary Healthcare worker, Koyra

Healthcare workers fulfil their duties, more so during calamities

The Upazilia Health Complex is inaccessible to the most affected people in the coastal southwest Bangladesh

- The healthcare infrastructure experiences electricity failure for hours, even days, during cyclones.
- The Upazila Health Complex (UHC) prepares a team of emergency responders during cyclone Amphan.
- After a cyclone, the patient count falls as roads to the UHC are flooded. However, there are higher percentages of patients with physical injuries and diarrhea.
- The UHC is unable to cater to severely affected regions such as Koyra and Dacope. These are remote locations, and affected people can't afford transportation to reach the UHC. Therefore, the UHC's role in providing ex-post-disaster relief to the affected population is limited.

“Majority of the people visited HC for emergency care during any natural catastrophe. Such as - broken limbs, cuts (flesh wound) diarrhea, accident etc”

- Dr. Abhijit Mallick, Male, 29, Registered Medical Officer, Upazilia Health Complex (UHC), Batiaghata, Khulna

Service of primary healthcare centers at the union levels face disruptions due to cyclones

- The Union Community Clinic (UCC), Munshiganj, Satkhira premises were flooded during cyclone Amphan (2020).
- During cyclone Aila in 2009, the clinic was inundated for 15 days.
- During cyclones and floods, the number of patients increases from a daily average of 30 to up to 50 patients.

“During cyclone people came to the UCC (for delivery) in hand carts...it is very risky”

- Sandhya Rani, Female, 36, Primary Healthcare Worker, Union Community Clinic (UCC), Munshiganj, Satkhira



Exhibit 6.2: Primary healthcare workers like Sandhya Rani (second from the right) must brave natural calamities to ensure safe delivery and postnatal care

Schools are the primary shelters against calamities for locals in southwest Bangladesh



Exhibit 6.3: School buildings like the 24 No. *Munsiganj* Government Primary School, made of concrete with enough rooms, are natural choices for cyclone shelters.

Accommodating the affected people and relief work takes precedence over education after a cyclone

- ✦ The cyclone Aila in 2009 affected the students the most.
- ✦ As a policy, schools inform students of the imminent cyclone, declare holidays, and send emergency responders to inform students if early warning was not provided.
- ✦ Due to Covid-19, the trend of online schooling has increased.
- ✦ Schools support communities by providing shelter, offering voluntary reconstruction work (mostly by students), and setting up classes in camps for affected students.
- ✦ The school authority prioritizes the reconstruction of sanitation facilities for girls/female students.
- ✦ The school authority allows girls/female students to stay home longer until the situation normalizes and is safe for them to attend their classes.

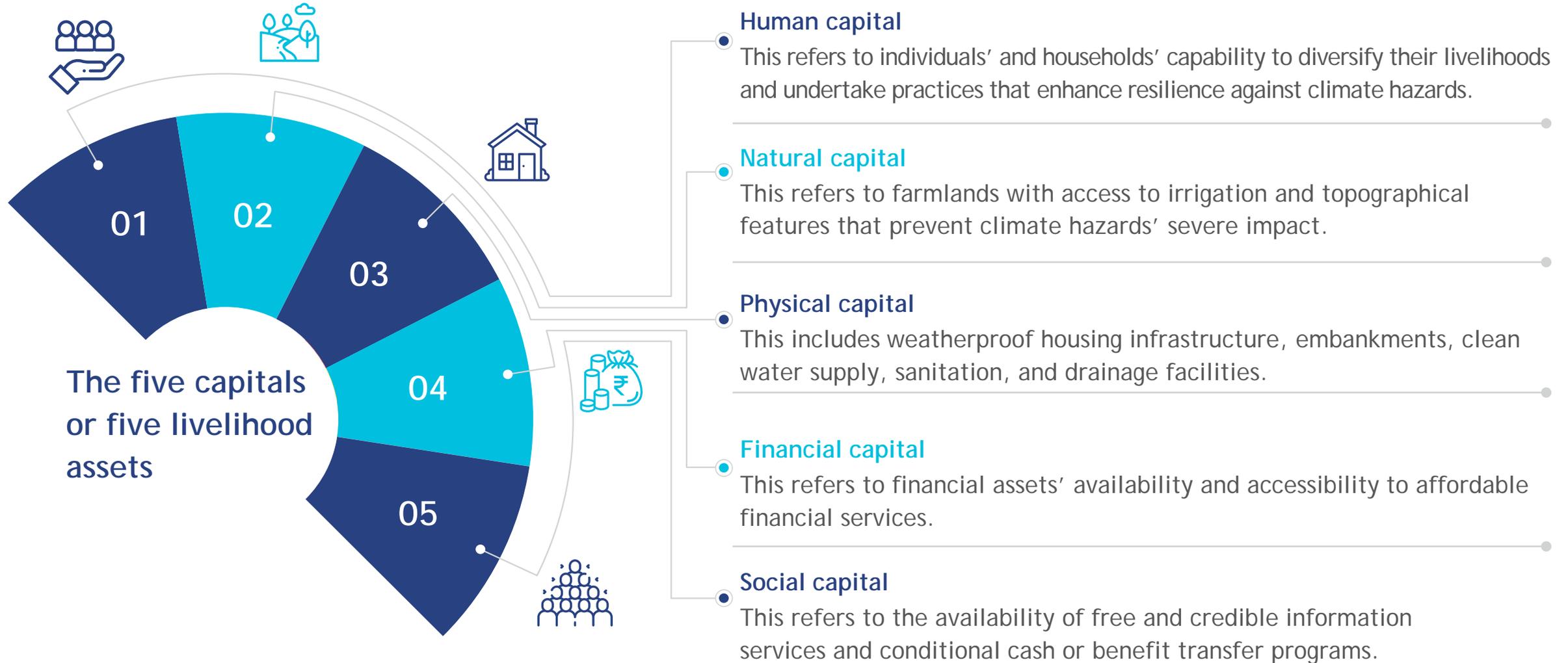
“Visiting homes and motivating parents will reduce the dropout rates observed in students in grades 3,4, and 5 (after a major calamity)”
- Maksuda Parvin, Female, 38, Teacher, 24 No Munshiganj Government Primary School

7. The five capitals framework for explaining the climate resilience of rice farming and urban petty trading livelihoods in SW Bangladesh

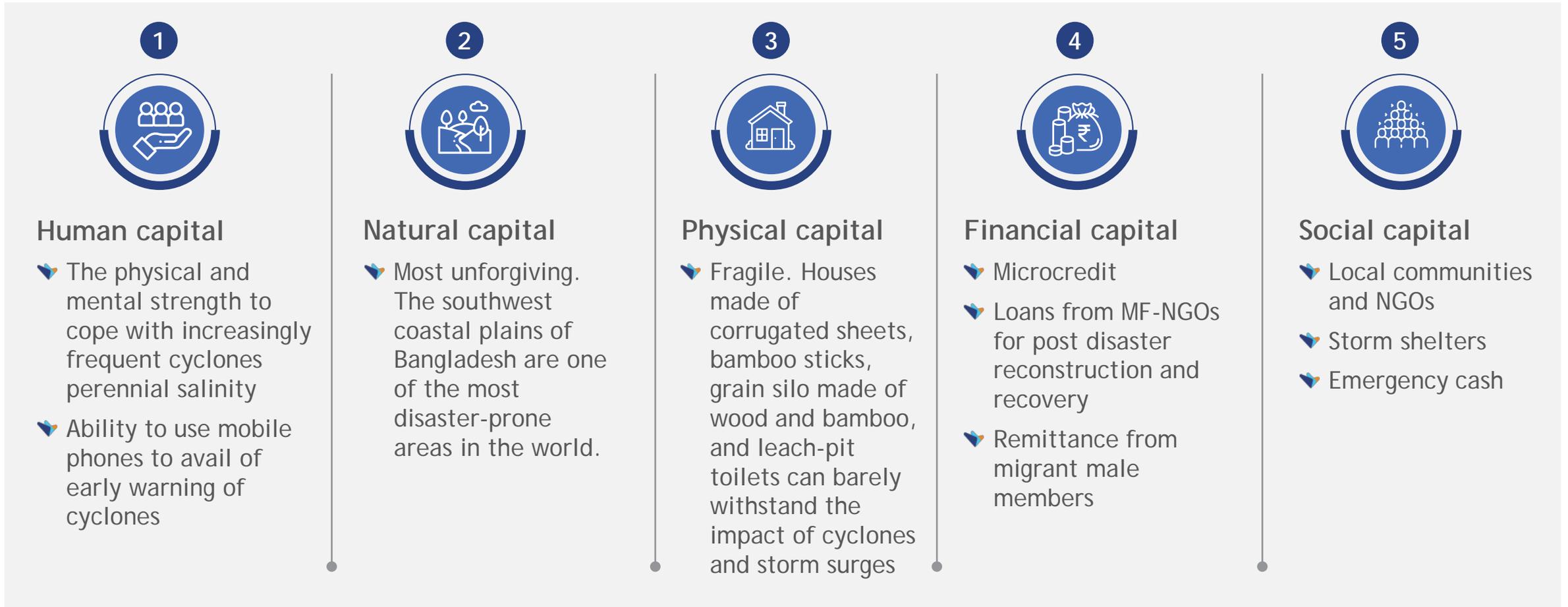


The five capitals framework

Our in-depth qualitative research revealed that the following five capitals drive sustainable livelihoods and enhance households' ability to cope with shocks induced by climate hazards.



For poor communities in southwest Bangladesh, social bonding, NGOs, and microcredit are the most significant capitals ensuring sustainability of their livelihood



Analysis of select capitals with evidence from literature review

Southwest Bangladesh is disaster-prone, making sustainability of livelihoods extremely difficult (Natural capital):

Bangladesh sits at the intersection of three major river basins and features flat deltaic topography with low elevation, it is prone to a multitude of climate-related events such as floods, droughts, tropical cyclones, and storm surges. Annual floods inundate between 20% and 70% of the country's landmass each year (Mirza, 2002). Temperature increases will likely raise sea levels; increase river water levels, water logging, erosion, and flooding during the monsoon season; and exacerbate saltwater intrusion and shortages of water for irrigation and agriculture during the winter (Ahmed & Alam, 2010).

People (Human capital) look forward to NGOs and CSOs (social capital) to help them cope with this harsh eco-system using a variety of adaptation measures:

The local people are fighting a continuous but increasingly difficult-to-win battle, against periodic cyclones, storm surges, and salinity. They are adapting their livelihoods based on information provided by the Government and NGOs. The adaptation level of most households (88.4%) in Satkhira was medium (Khan et al., 2022). Farmers in Satkhira are using more fertilizers and pesticides, farming fish along with rice using integrated farming methods, adjusting their timing of planting rice, and cultivating cash crops with rice. Most of these adaptive strategies are informed by NGOs and agriculture department officials.

Microfinance is the key to the coping mechanism of these vulnerable communities against the impacts of climate change:

Keeping the effect of other variables constant, the likelihood of taking adaptation decisions is 2.7 times greater for the farmers who had credit facilities than the farmers who did not have such facilities (Al-Amin et al. 2019).

8. Variables that affected the analysis of the information obtained through the qualitative study



Inclusion of policymakers and more extensive discussion with FSPs would have provided nuanced insights into all the aspects

Impact of the choice of design variables on the findings and analysis of the findings

- The focus on a single high-impact climate hazard limited the nuanced understanding of slow-onset and gradual changes in environmental systems.
- The southwest region of Bangladesh is frequently hit by cyclones; therefore, it was difficult to single out one high-impact event whose effects were conspicuous, and the consequences were long-term.
- It was difficult to establish the actual cause of perennial salinity in the region—some attribute it to Cyclone Sidr, while others attribute it to shrimp farming in the region.

The inclusion of financial institutions and policymakers would have elicited nuanced insights into all the aspects

- We were unable to consult with public officials, so we did not fully capture the public sector response to climate impacts.
- The research was focused on the impacts of climate change on individuals and households, as well as their coping and adaptation strategies. Their understanding of climate change and its increasing impacts on their livelihood is not nuanced.
- Limited engagement with other climate adaptation projects and programs in the area.
- Given the scope of our work, we had limited discussions with banks, insurance companies, and large NGO-MFIs, which are better placed to comment on why their products are not aimed at strengthening the climate adaptation/resilience of the affected population.

Annexure- I: Vellum layers over livelihood portfolios

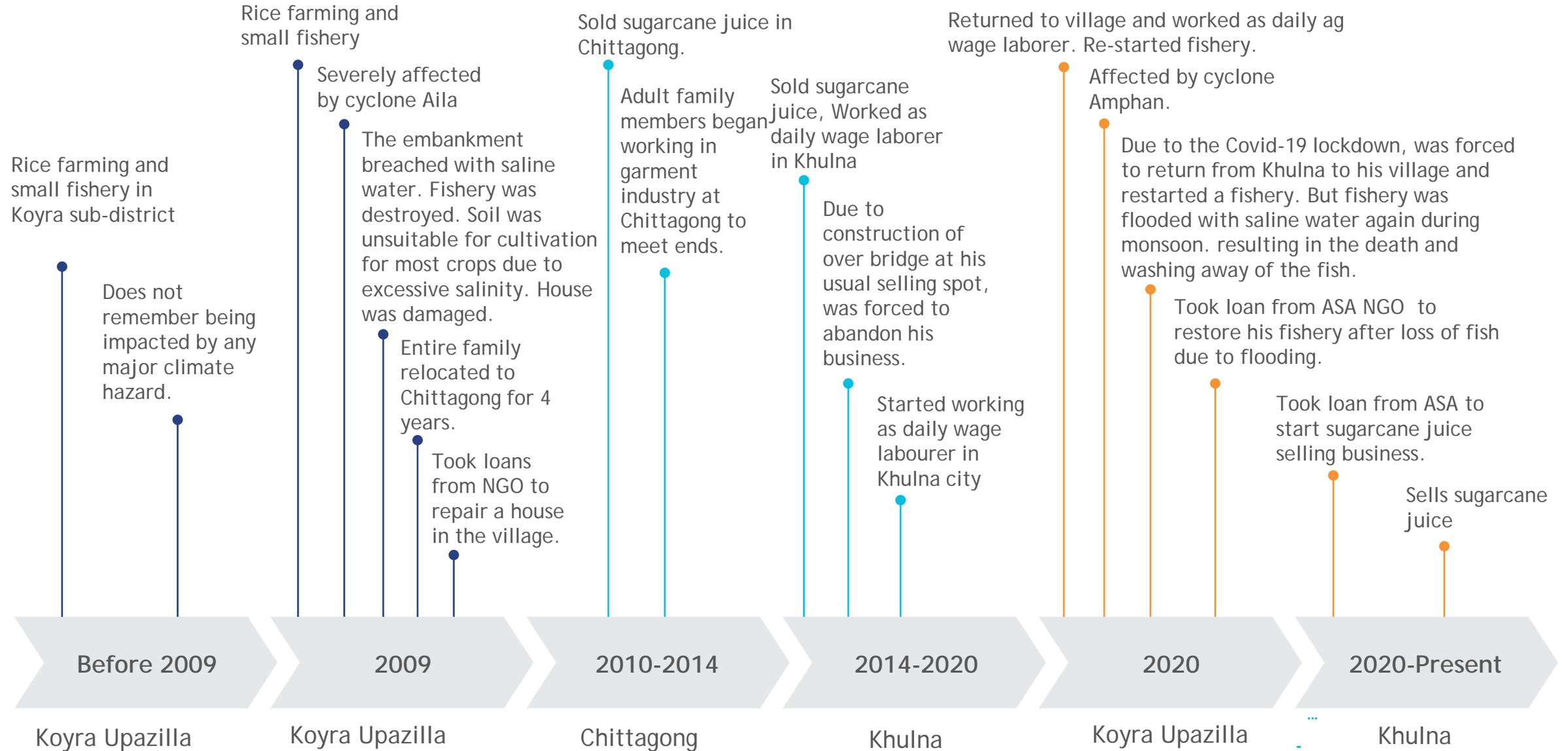


Masum Sheikh - has been on a journey - in many senses

- ✈ Age: 25 years
- ✈ Gender: Male
- ✈ Origin: Sub-district- Koyra, Distrit- Khulna
- ✈ Family: Wife- 20 years, Son- 6 years, Daughter- 4 years
- ✈ Current occupation: Sugarcane juice vendor at Iracha Bazar, Khulna Sadar, Khulna. No other occupation.
- ✈ Education: Primary drop-out (grade- 5)
- ✈ Access to financial services:
 - Loan from ASA Microfinance for purchasing the cart from where he vends. He borrowed the money while he was in his village in Koyra.
 - Uses mobile banking
- ✈ Access to mobile phones: He has two phones- a smartphone and a feature phone



Overview: Masum Sheikh - has been on a journey - in many senses



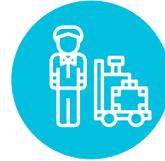
Masum Sheikh- Vellum 1: Livelihood portfolios over time

Pre-read note

In rural southwest Bangladesh, rice cultivation and fishing/ shrimp farming are the two most important occupations. Temporary migration is common. But internal displacement is not a huge issue.



Went back to village in 2020 due to Covid-19 and invested in their fish pond



Due to construction of over bridge at his usual selling spot, was forced to move to Khulna and act as a porter

The fish pond is repaired now. However, he has not invested in fishing this year

Affected by cyclone Aila, his family migrated to Chittagong and started working in readymade garments sector



Masum operated a sugarcane vending cart between 2010-2014



Back to selling sugarcane juice in Khulna after suffering loss in fishing due to Amphan



Rice paddies and fish ponds were Masum's family's main source of income

Childhood
C- 2009

Young married
C- 2019

Now
C- 2023

Masum Sheikh- Vellum 2: Ex-ante resilience strategy

“We did not go to the (Cyclone) shelter...it was far away from our place”

- Masum Sheikh

Pre-read note

The household level ex-ante strategy is to save whatever is possible and continue with rice cropping. It yields better return than keeping the land fallow.



Wage labor



Cultivates rice but no other crop



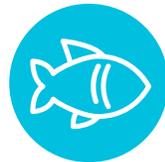
Vending cart



“I do save money to manage household expenses during the rainy season when I can't sell sugarcane juice. But my savings are at home. It is meagre”



Rice



Fish

Childhood
C- 2009

Young married
C- 2020

Now
C- 2020

Masum Sheikh- Vellum 3: What went wrong

“For the first time, the embankments were overrun by tidal waves (associated with storm surge)”

- Masum Sheikh

- In the year 2009, severe cyclonic storm Aila struck their village.
- His family’s fields, homes, fishing ponds (*ghers*) got flooded with saline (sea) water and remained flooded for 15 days.
- His family migrated to Chittagong and his elders started working in the readymade garments industry

Pre-read note

As salinity and flooding became a reality, the willingness to invest in fishing (high-investment business) disappeared, even with borrowing

- In 2020, he returned to his village due to Covid-19 related lockdowns.
- The cyclone Amphan struck his village in May 2020.
- Storm surge flooded his fish pond (*gher*)
- Since rice was not planted yet (The Kharif rice is usually sown after June), there was no impact on the rice
- There were no food shortages in the market
- Masum was emotionally stressed due to such a huge loss to his fish pond



Childhood
C- 2009



Young married
C- 2020

Masum Sheikh- Vellum 4: Ex-post reactions

“The embankments that were damaged during Aila has never been repaired (to its fullest strength), as a result, the region has become risky (due to climate risk)”

- Masum Sheikh

Affected by cyclone Aila, his family migrated to Chittagong and started working in readymade garments sector

Borrowed BDT 40,000 (~USD 373) to repair the fish pond damaged by Amphan

Pre-read note

For poor and vulnerable people in southwestern Bangladesh borrowing from MFIs is the most important ex-post recovery instrument



Childhood
C- 2009



Young married
C- 2020

Did not
reattempt
in 2023

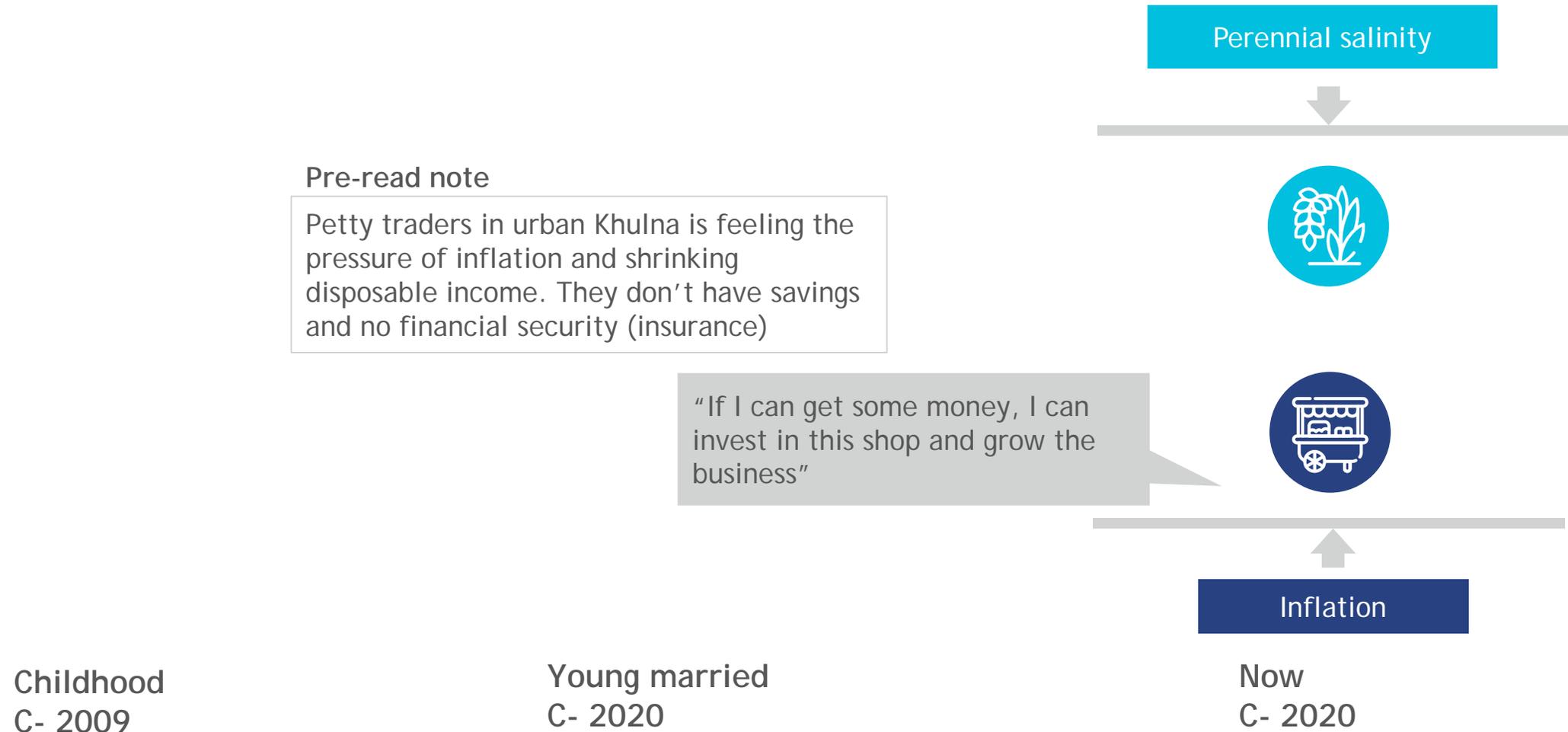
Back to selling sugarcane juice in Khulna after borrowing from ASA MFI. Her wife borrowed the money on his behalf

Now
C- 2020

Masum Sheikh- Vellum 5: The squeeze of second-order macro factors

“The condition of my business is not good. The price of sugarcane is very high”

- Masum Sheikh



But most respondents, like Rasheda Khatun have not moved ...

Age: 40
Gender: Female
Marital status: Married
Family size: 2 members
Education: Uneducated
Occupation: Farmer and has small business

Landholding: 0.62 acres
Type of land: Unirrigated
Livestock: 5 ducks, 3 hens

Type of house: Kuchcha
Access to phone: Feature phone



Influential people (in the village) promised rice and flattened rice (but they did not provide). NGOs provided (rice)



Personality traits



- She is uneducated and has the burden of caregiving to her family as husband is suffering from Asthma.
- Has to toggle between livelihood income sources to meet daily needs.
- Has exhausted all the financial resources known to her but does not have an extensive knowledge about all the available products.
- Rasheda and her family remain committed to their livelihood and are determined to persevere through any difficulties that come their way.

Access to financial products



- Takes loan from local MFI.
- Has savings with the local MFI-Noabenki Gonomukhi Foundation. The group-leader collects BDT 100 fortnightly (USD 0.92)
- Takes informal private loans from moneylenders.
- Receives financial aid from MFIs and government during climate hazards.

Effects of climate hazards on life and livelihood



- Cyclone Aila (May, 2009) had major impact on her livelihood as standing crops in her field were destroyed, fruit trees got uprooted, cattle were lost, house got destroyed forcing them to temporarily stay on an elevated bamboo platform. Saline water entered her house and field causing sanitation issues, skin diseases and rendering the field uncultivable for a long time.
- Her family was again hit by cyclone Amphan in May, 2020, when her house was waterlogged for several weeks.
- A few of her crops were damaged during cyclone Bulbul in November, 2019.

Adaptation to climate change



- Ventured into other income related activities along with farming like making bamboo made fish catching nets.
- Built house and toilet on height.
- Family reduced consumption of food.
- Borrowed BDT 25,000 from NGO to meet reconstruction expenses post disaster.
- Husband migrated to neighboring districts to work as daily laborer. He remits money through bKash.

After all, as Dibosh Sarker notes, “Where would we go?”

Age: 36
Gender: Male
Marital status: Married
Family size: 5 members
Education: Till class 10
Occupation: Farmer,
Poultry

Landholding: 1.85 acres
Type of land: Irrigated
Livestock: 1 cow, 3 goats, 500 hens

Type of house: Pucca
Access to phone: Feature phone



Our awareness level is very low regarding the adaptation and coping mechanism of extreme weather.



Personality traits



- Has to undertake multiple activities to earn livelihood.
- With a family size of 5 members, he has increased burden of caregiving after a hazard strikes.
- Has knowledge and awareness about improved crop varieties.
- Has awareness of the various financial products that are available
- Even after facing considerable damage from recurring climate hazards, Dibosh is not willing to migrate or change occupation.

Access to financial products



- Has a bank account in Krishi Bank.
- Takes loan from MFI-BRAC.
- Takes informal loans from friends and relative.
- Skeptical of insurance and associates it with fraudulent activities.

Effects of climate hazards on life and livelihood



- Cyclone Aila (May, 2009) had a severe impact on his household, destroying his house and poultry house also. In addition, the flood caused by the cyclone led to overflow of saline water in his crop land, leading to the complete destruction of all his crops.
- During Amphan (May, 2020) also heavy rainfall that accompanied the cyclone caused flooding, leading to destruction of crops, many water-borne diseases also came with it. His house was affected and the poultry with a capacity of 300 hens were also affected.
- The flood in 2021 has also affected them severely as the saline water entered the area destroying their crops.

Adaptation to climate change



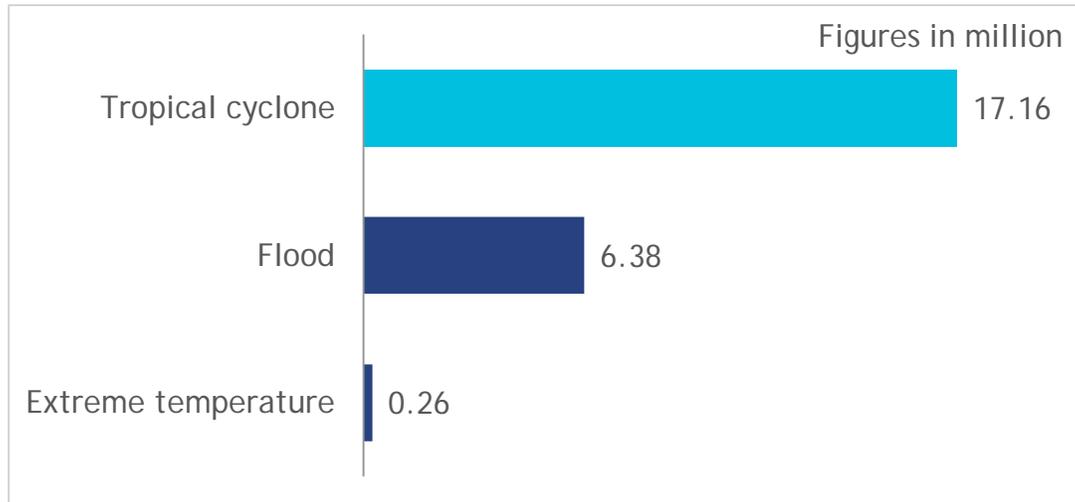
- Took loan from NGO to build back better.
- Built house and toilet on height.
- Store food in advance and harvest rainwater for use during hazards and dry spells.
- Believes comprehensive training regarding crop selection, planting techniques, pest management and soil health management will help prepare him for future hazards.

Annexure-II: Research design considerations



For our study, we identified cyclones as the most impactful manifestation of climate change in southwest Bangladesh

Exhibit II.1: In the last two decades, tropical cyclones have affected the largest number of people in southwest Bangladesh



The most significant manifestation of climate change in study sites	Rank*
Cyclone and resulting storm surge	1
Erratic rainfall pattern	2
Soil salinity	3
Increased heat & humidity	4
Warmer winter	5
Intermittent drought	6
Increase in insect and pest infestation of crops	7
Flooding	8
Increase in vector borne diseases in humans	9

Exhibit II.2: Cyclone Aila affected 56% fewer people (3.9 million) as compared to cyclone Sidr (8.9 million). However, cyclone Aila’s devastation is imprinted on the affected people’s minds.



*Rank = based on aggregate scores respondents ascribed to these manifestations of climate change

Research methodology



Research methodology

The research exercise involved qualitative primary research in southwest Bangladesh to understand:

- ▶ The direct and indirect impacts of Cyclones and their associated perils on the lives and livelihoods of the affected communities in southwest Bangladesh.
- ▶ The adaptation strategies of these poor and vulnerable households and the role of financial services in those strategies.
- ▶ The pathways to enhance the role of financial services in the adaptation strategies and strengthen the resilience of these communities against climate change.

The research used research tools like Participatory Research Appraisal (PRA), In-Depth interviews (IDI), affinity mapping, product attribute ranking, Game Based Discussion, Focus Discussion Groups (FDG), and many others to develop insights and findings.



Research elements:

Sample size: 69

Location: Satkhira (rural) and Khulna Sadar (urban)

Respondent type: Male and female members from agricultural households and male and female urban petty traders

We interviewed a total of 72 respondents including 17 system-level actors

Exhibit II.2: We interviewed 55 respondents affected by the identified climate hazard in Satkhira (rural) and Khuna (Urban). 49% of the respondents were female

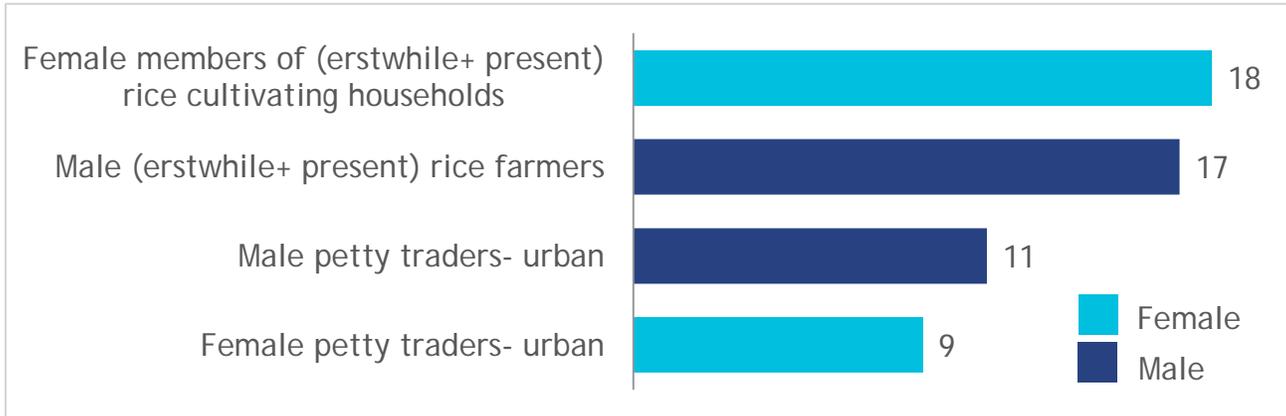


Exhibit II.3: We interviewed eight agriculture and livestock resources officials at the division and sub-district level to elicit their perspective of climate change and impact on agriculture and livestock in southwester Bangladesh

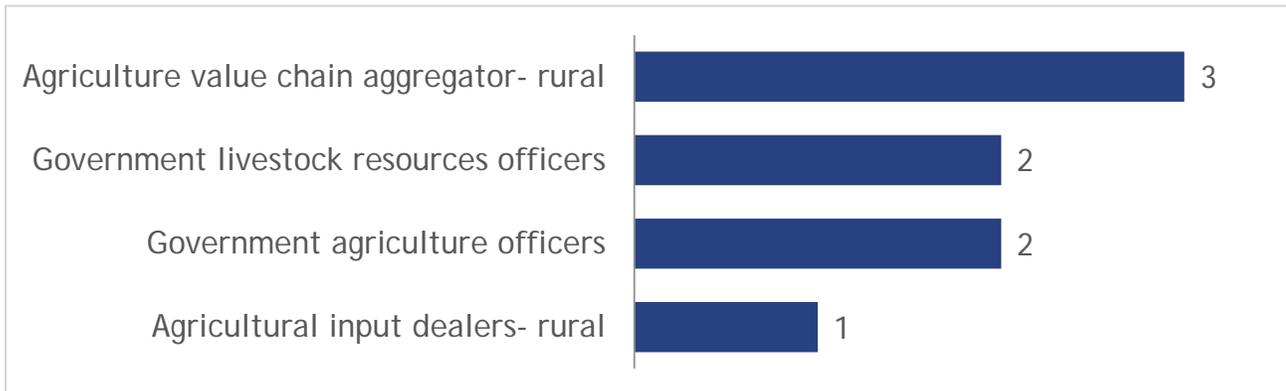


Exhibit II.4: We interviewed two Urban CICO agents like Mr. Debosh Sarkar (48 years), operating from his shop in Jorakal Bazar, Tutpara, Khulna Sadar

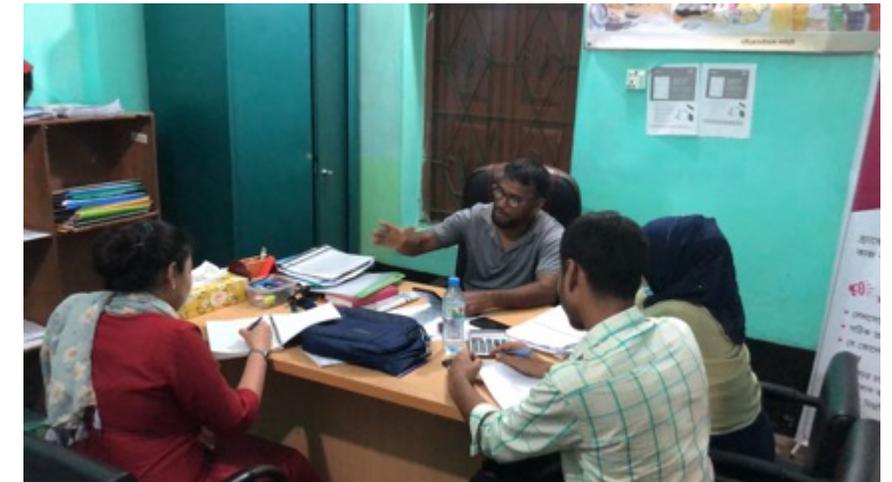
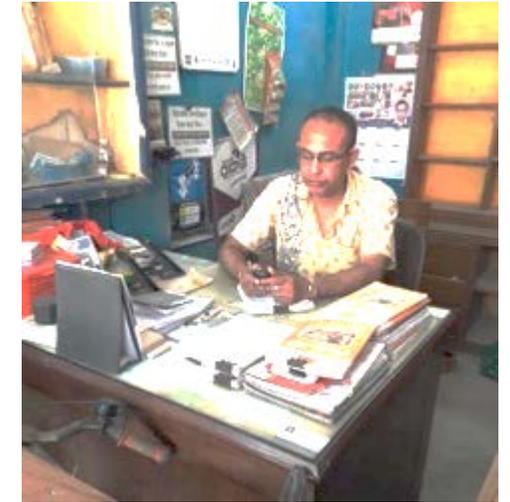


Exhibit II.5: We interviewed three branch managers. One of them was Mr. Kamal Hossain Milon (48 years), Branch Manager BRAC, Munshiganj

Choice of study locations

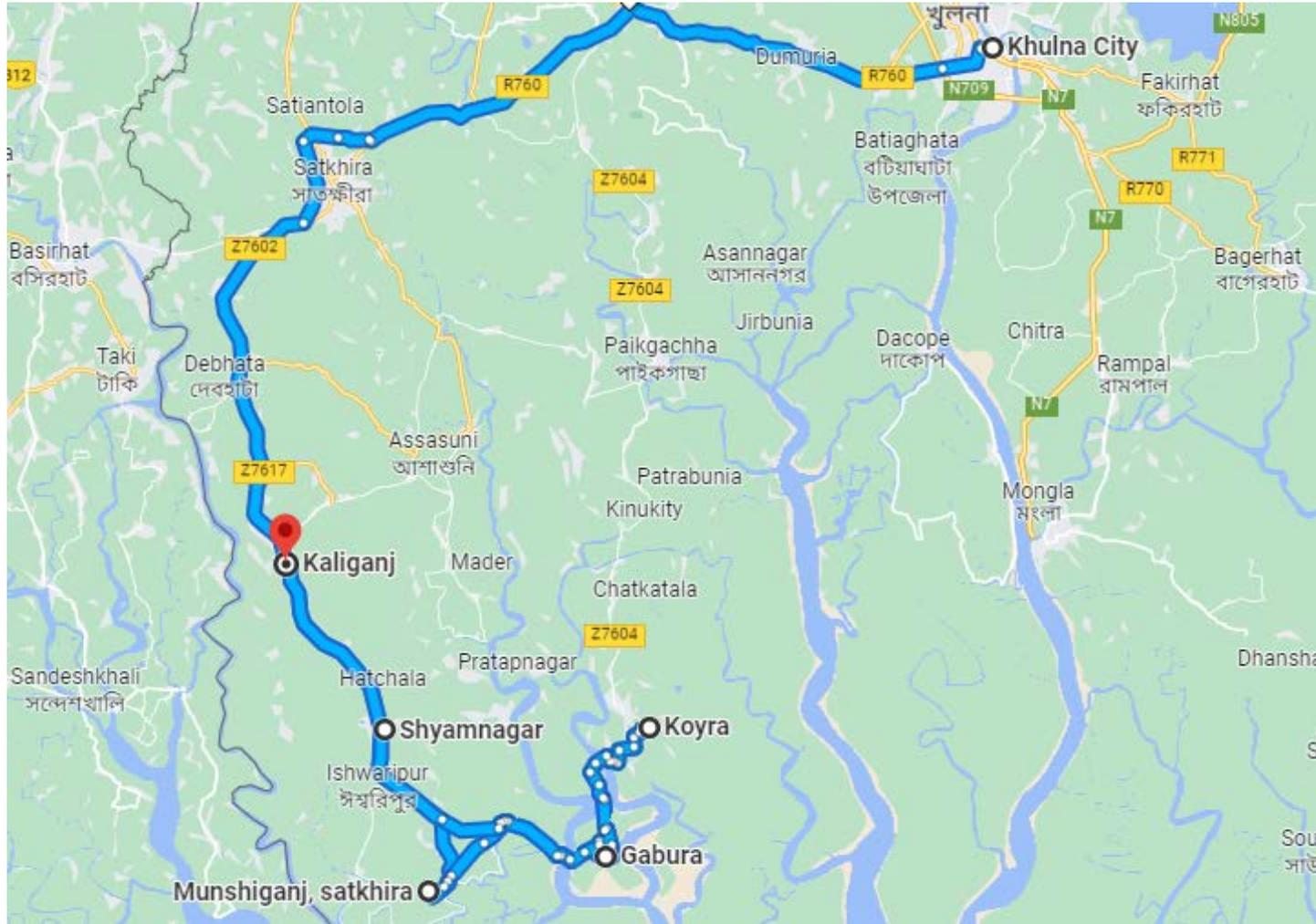
Physical and socio-economic considerations

- ▶ The Ganges' Tidal Floodplain (AEZ 13) covers almost all of southwest Bangladesh and is highly influenced by the daily occurrence of tidal intrusion.
- ▶ The region is prone to natural extremes, such as salinity intensification, riverine flooding, drainage congestion, waterlogging, and cyclones.
- ▶ While the country's landmass constitutes only 7 percent of the combined catchment area of the Ganges-Brahmaputra-Meghna river basin system, this region must drain over 92 percent of rainfall-runoff generated in the combined GBM catchment within a period of four and a half months (June to mid-October).
- ▶ Bangladesh is one of the most disaster-prone countries in the world, affected by floods, tropical cyclones, storm surges, and droughts. It is highly vulnerable to cyclonic disasters, with coastal areas frequently hit by cyclones. Floods remain a key natural disaster; approximately 25 percent of the country is flooded each year, and a severe flood occurs every 4-5 years, sometimes inundating up to 60 percent of the country.
- ▶ During the winter season, increased salinity poses stress on groundwater irrigation ([Amir and Ahmed 2013](#)), while shortage or lack of rainfall hampers rainfed rice production (grown from March to June) in the pre-monsoon season.
- ▶ During the monsoon, heavy rainfall causes inundation and waterlogged conditions due to drainage congestion. Overall, a decreasing trend of rainfall is more likely to intensify the risks of salinity due to decreasing upstream flow and sedimentation on a riverbed and consequent poor drainage and waterlogging([Kabir and Golder 2017](#)).
- ▶ For a quick overview of the literature related to the impact of climate change and how people have responded to it, please see: [Bangladesh and climate change—lessons from the frontline](#)

Research location context

- **Temperature rise:** Mean temperature changes within the range of 1.4 to 1.9°C for BAU and around 2°C for EXT by 2050 are expected to be observed.
- **Sea Level Rise (SLR):** Sea Level Rise can have significant implications for Bangladesh. According to a study by the Department of Environment, the average sea-level rise in the coastal zone of Bangladesh has been around 3.8 - 5.8 mm/year over the last 30 years. It is further estimated that around 12.34% - 17.95% of the coastal area will be submerged by the end of this century. The findings highlight a subsequent decline of 5.8% - 9.1% in rice production due to SLR.
- **Salinity intrusion:** Salinity intrusion into freshwater resources is a major concern. Salinity varies by season, with the dry season experiencing higher salinity. Salinity levels are increasing not just along the coast but also further inland. Projections suggest that in the base (2005) condition, about 10% of the area is under 1 ppt salinity and 16% under 5 ppt salinity; these areas will increase to 17.5% (1 ppt) and 24% (5 ppt) by 2050 in the extreme scenario. Currently, 6 million people are impacted by salinity, expected to rise to 13.6 million by 2050.
- **Rainfall:** The rainfall pattern in Bangladesh is expected to be variable and erratic in the future, with indications that pre-monsoon and monsoon rainfall will further increase. The rainfall is projected to increase in most regions by 2030. However, by 2050, the southern parts of the country along the eastern hills may experience a reduction in rainfall.
- **Cyclones and storm surges:** Nearly every year, cyclones hit the country's coastal region, and a severe cyclone strikes the country every three years, on average. From 1961 to 2013, Bangladesh was hit by 61 cyclones, 28% of which were in the SW region. The IPCC reports that future cyclonic storm surges and related coastal floods in Bangladesh will likely become more severe as future tropical cyclones increase in intensity.
- **River erosion and flooding:** On average, an estimated 20-25% of the country becomes inundated due to river spilling and drainage congestion. An extreme situation arises when the three major rivers (the Ganges, the Brahmaputra, and the Meghna) reach their flood peak at a similar time. In general, 55-60% of the country is inundated during extreme flood events. The dynamic nature of the rivers also causes river erosion, due to the volume of discharge from the bigger rivers.

Research locations- visual representations



Sectors we work in

Providing impact-oriented business consulting services



Banking, financial services, and insurance (BFSI)



Water, sanitation, and hygiene (WASH)



Government and regulators



Micro, small, and medium enterprise (MSME)



Social payments and refugees



Youth



Gender equality and social inclusion (GESI)



Education and skills



Digital and FinTech



Agriculture and food systems



Climate change and sustainability



Health and nutrition

Multi-faceted expertise

Advisory that helps you succeed in a rapidly evolving market



Policy and strategy



Products and channels



Research and analytics



Organizational transformation



Digital technology and channels



Catalytic finance



Design thinking and innovation



Marketing and communication



Training



Government and regulations and policy



Data Insight



Customer protection and engagement for responsible finance

MSC is recognized as the world's local expert in economic, social and financial inclusion



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>300 staff in **10** offices around the world



Projects in **~68** developing countries

Our impact so far

>550
clients

>1,400
publications

Assisted development of digital G2P services used by **>875 million** people

Implemented **>950 DFS** projects

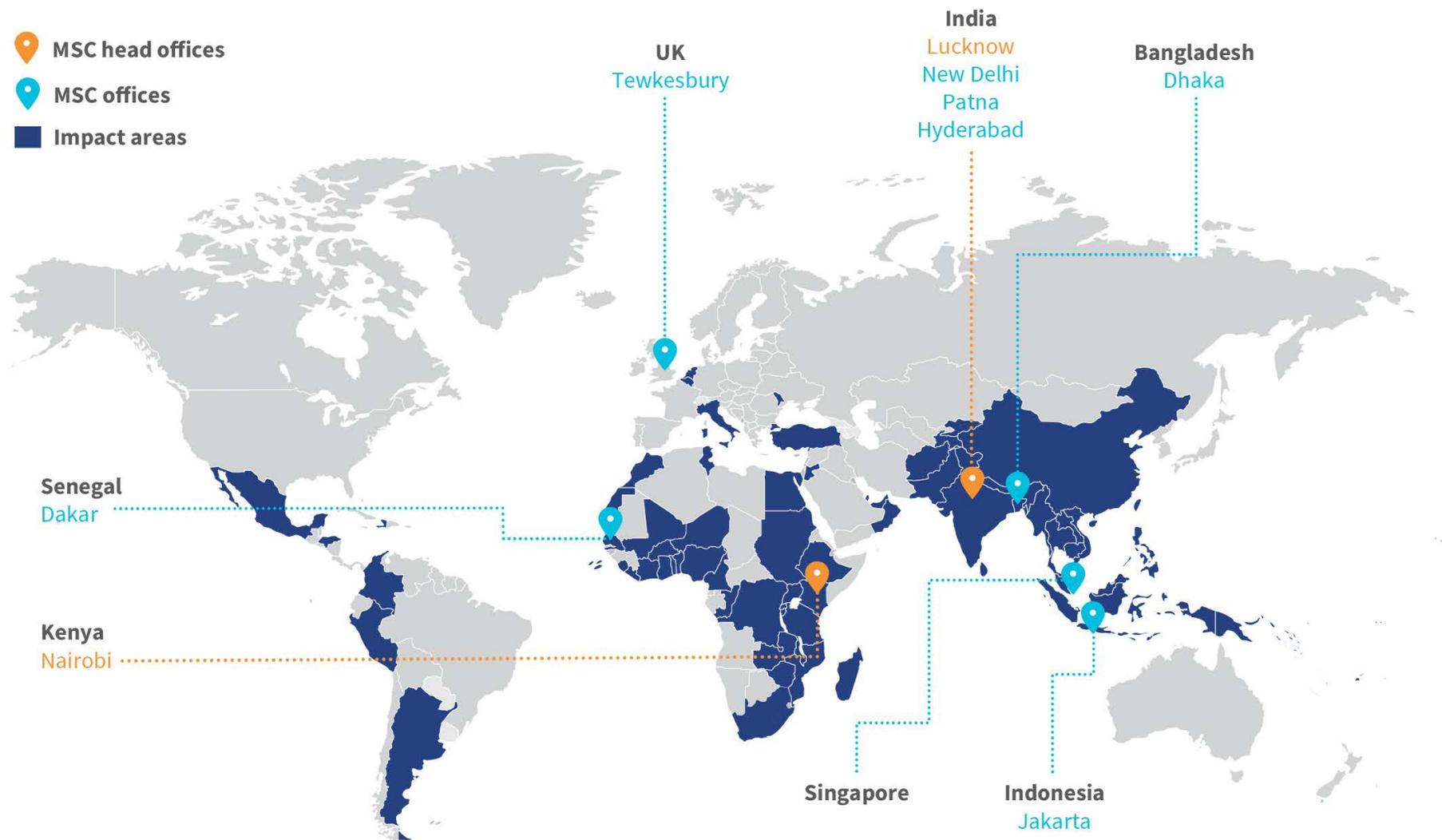
Developed **>300 FI products** and channels now used by **>1.7 billion** people

Trained **>11,100** leading FI specialists globally

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