Scaling up Flood Forecast-based Action and Learning in Bangladesh

SUFAL II

Final Baseline Report

July 2023

Prepared by Oxford Policy Management

About Oxford Policy Management

Oxford Policy Management is committed to helping low- and middle-income countries achieve growth and reduce poverty and disadvantage through public policy reform.

We seek to bring about lasting positive change using analytical and practical policy expertise. Through our global network of offices, we work in partnership with national decision makers to research, design, implement, and evaluate impactful public policy.

We work in all areas of social and economic policy and governance, including health, finance, education, climate change, and public sector management. We draw on our local and international sector experts to provide the very best evidence-based support.

Acknowledgement

Table of contents

List of tables, figures, and boxes

List of abbreviations

CAPI	Computer Assisted Personal Interviewing
DMC	Disaster Management Committee
EAP	Early Action Protocols
FbA	Forecast based Action
FbF	Forecast based Financing
FGD	Focus Group Discussion
KII	Key Informant Interview
MDE	Minimum Detectable Effect
MEL	Monitoring, Evaluation and Learning
NGO	Non-governmental Organization
PIO	Project Implementation Officer
PPS	Probability Proportional to Size
PwD	Person with Disability
SOP	Standard Operating Procedures
SSNP	Social Safety Net Program
SUFAL	Supporting Flood Forecast Based- Action and Learning in Bangladesh
TOR	Terms of Reference
WASH	Water, Sanitation and Hygiene
SUFAL ll	Scaling up Flood Forecast Based- Action and Learning in Bangladesh

Executive Summary

The project "Scaling up Flood Forecast Based- Action and Learning in Bangladesh (SUFAL) – Phase II", is aimed to strengthen resilience of communities to the impacts of frequent monsoon floods. SUFAL-II is being implemented in the districts of Kurigram and Gaibandha, Jamalpur and Bogura. In each district, two types of interventions (one intervention in one upazila) are being implemented. They are -

- - Full scale implementation – Capacity development and support to communities to implement sector-specific early actions with extended lead times prior to monsoon floods.
- - Partial scale implementation – Technical and capacity building support to the Disaster Management Committees (DMCs) and government officials, with the aim to demonstrate how the FbA mechanism can be operationalized in a district.

The selected areas in each district have 'medium' to 'very high' risk profiles as per INFORM Index on Risk Management. The risk profiles have been calculated based on the modelling of exposure to hazard, vulnerability and coping mechanisms in place.

Methodology

The baseline study uses a mixed method analysis. Thus, both quantitative and qualitative tools were administered to collect relevant data to assess the baseline status. The quantitative tool was administered to a sample of 1500 households, which were distributed across 60 wards. For the qualitative aspect of the study, a total of 28 Key Informant Interviews (KIIs) were conducted with DMCs and local government officials and 30 Focus Group Discussions (FGDs) were conducted with the community members.

Key Findings

Background of respondents

Under the household survey, a total of 1494 interviews were conducted, of which 1394 interviews were conducted in three treatment groups and 100 interviews were conducted in the control group. The majority of respondents were female (74%), Muslim (95.7%), and of Bangali (99.8%) ethnicity. Approximately 79% of households reported a monthly income that exceeded 5000 Taka.

Floods in 2022

Of all the respondents, 78.4% experienced floods in 2022, with the highest occurrence in the month of Ashar - Srabon. Treatment group 1 (64.7%) and the control group (70%) had a lower flood incidence compared to Treatment groups 2 (89.1%) and Treatment group 3 (86.8%).

Early warning

Of all respondents in the three treatment groups who faced floods in 2022, only 36.3% received early warnings. It was observed that a higher percentage of respondents from the treatment group 1 (69.4%) received early warnings as compared to treatment group 3 (35.4%) and treatment group 2 (11.8%). Overall, out of all the respondents who reported receiving early warning, 85.8% reported that they received it 1 to 5 days prior to the floods. Television (40.1%) and friends/relatives (29.7%) were the primary sources of early warning information. Among other sources, only 8.5% of respondents reported receiving early warning via Audio calls, 19.2% reported from community volunteers (miking or household visit) and 1.2% via digital boards. Among those who received early warnings, 60.3% had information about flood intensity/water level, and 52.9% had information about the lead time. However, only 36.2% received guidance

on early actions, 24.7% received livestock advisory, and 13.0% received agromet advisory. This indicates a lack of agromet advisory, flood preparedness advisory, and health awareness across all treatment groups. Overall, 67.8% of respondents found the early warnings timely and understandable, and 98.8% expressed trust in the early warnings.

Early action

Out of all the flood-affected respondents in three treatment groups, only 32.5% actually took early actions. None of the flood-affected respondents from the control group took early action. A significantly positive relationship was observed in getting early warning and taking early action, which indicates an increase in early warning can also lead to increase in people taking early action. The majority (52%) took early action 1 to 2 days before the flood, while 26.8% took action 3-5 days before. A significant relationship exists between lead time and timing of early action. In other words, where people have received warnings quite ahead of time, they also started taking precautionary actions early. Overall, 70.4% of those who took early action believed it reduced post-flood recovery costs. They reported that taking early action helped them in reducing costs averaging around Taka 3500 (EUR 29).

Loss due to floods

The majority of respondents from the three treatment groups (78.2%) and almost all in the control group (95.7%) reported experiencing some form of flood-related loss. The average loss across sectors of crops, livestock, poultry, household damage, and health, was Taka 23,265 (EUR 196). Crop damage was the most significant loss reported by respondents, with an average of around Taka 14,778 (EUR 124). The top four sectors with the highest losses - crop damage, livestock, house damage, and agricultural labour loss - were common across all treatment groups and the control group. Among respondents who reported flood-related losses, 97.6% from the three treatment groups experienced losses in agriculture and livelihood, and 86.1% faced adverse impacts on food and nutritional security. The majority of respondents noted an increase in the prices of cereals (95.2%) and vegetables (92.3%). Women and girls were the most affected household members in all four groups, with waterborne diseases resulting from floods (76.6%) being the major impact, particularly affecting females more than males. Lack of nutrition due to food shortages (56.9%) was another significant issue.

Response to floods

Most respondents did not migrate due to floods (84.1%), and the majority of those who did migrate reported temporary migration (95.7%). Only a small percentage (5.8%) received support through social safety net programs (SSNPs), which was mainly given in the form of rice and dry food packets.

Recovery steps

A significant proportion of respondents (more than 60%) did not take any steps for post-flood evacuation or recovery. Almost 99% of the respondents reported that they required external support to cope with losses due to floods, particularly for food (87.8%), cash (80.8%) and medicine (77%). Close to half (47%) of the respondents reported that they had to take loans for post-flood recovery.

Recommendations

The report assesses the current situation in SUFAL II treatment districts and highlights the challenges faced by both the community and the Government in implementing Forecast based Actions (FbA). Additionally, the report provides recommendations for improving FbA at both community and government levels. At the community level, it is crucial to enhance the lead time, coverage, and information provided in the warnings. Building trust among communities through reliable information and active community engagement is also essential. At the government level, priority should be given to allocating and effectively utilizing funds for FbA, as well as enhancing the capacity of local Disaster Management Committees (DMCs). Additionally, expanding the

coverage and types of social safety net programs (SSNPs) can help in reducing post-flood recovery costs. Overall, the report emphasizes the need for collaborative efforts between the community and the government to strengthen FbA and mitigate the impact of floods.

1   Introduction

1.1   Description of the project

The "Scaling up Flood Forecast-based Action and Learning in Bangladesh (SUFAL II)" project aims to strengthen forecast-based action (FbA) by generating early warning information with longer lead times, developing community-based FbA approaches, and by piloting the linking of FbA to social safety net programmes (SSNPs) for financing early action. The project focuses on reducing human suffering in the flood-prone Brahmaputra-Jamuna River basin areas through the FbA approach and institutionalizing it at a larger scale. SUFAL-II is a consortium managed by Care Deutschland e.V and implemented by Care Bangladesh with Concern Worldwide and their local partners ESDO and SKS, technically supported by the Regional Integrated Multi-Hazard Early Warning System (RIMES) and funded by the European Civil Protection and Humanitarian Aid Operations (ECHO). By keeping communities at the centre and by being participatory in nature, the project assists local government authorities and institutions in taking early action. By strengthening impact-based forecasting through tailored, sector-specific, timely and accurate data, SUFAL-II aims to support communities and institutions in decision-making to act ahead of monsoon flood by utilizing suitable finance mechanisms and resources within the available time.

SUFAL-II is being implemented in the districts of Kurigram and Gaibandha, (which were also a part of SUFAL-I intervention), along with Jamalpur[1] and Bogura (two new districts) (Figure 1). The intervention targets 38,340 unique beneficiaries with more than 50,000 indirect beneficiaries in all the four districts and began in July 2021 with an aim to achieve its objectives by December 2023.

In each district, two types of interventions (one intervention in each upazila) are being implemented, which are –

i.   Full scale implementation – Capacity development of and support to communities with implementing sector-specific early

Figure 1: Project location of SUFAL II pilot
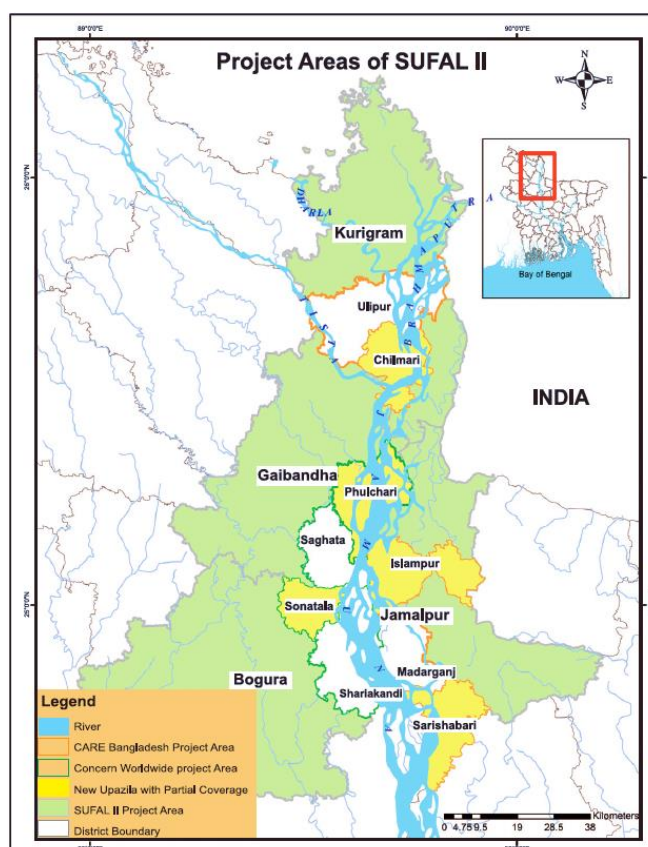
---

actions with extended lead times prior to monsoon floods. This is being implemented in the four upazilas, one each in Kurigram, Gaibandha, Bogura and Jamalpur.

ii.   Partial scale implementation – Technical and capacity development support to the Disaster Management Committees (DMCs) and government officials, with the aim to demonstrate how the FbA mechanism can be operationalized in a district. This is being implemented in four upazilas, one each in the districts of Kurigram, Gaibandha, Bogura and Jamalpur.

Study Area of the baseline

For monitoring and evaluation purposes, the study comprises of three treatment and one control group. The districts of Kurigram and Gaibandha with full-scale intervention have been grouped as **treatment group 1**, where the full-scale intervention started since SUFAL-I; while the districts of Jamalpur and Bogura with full-scale implementation have been grouped as **treatment group 2**, where the full-scale intervention started under SUFAL-II (Table 1). Areas with partial-scale intervention in Kurigram, Gaibandha, Jamalpur and Bogura have been grouped as **treatment group 3** (Table 1). The **control group**, which includes the district of Tangail and Sirajganj, have been selected in regions where the population has similar vulnerabilities as in the treatment group but are not receiving the SUFAL-II intervention (Table 1). The selection was based on secondary information from existing literature on flood vulnerability, after discussion with the implementation partners under the SUFAL-II project[2]. Further, the similarity in socio-economic background of the respondents from the Treatment and Control group is evident from the data collected from the survey, where the treatment and control group show similarities in aspects of religion, ethnicity, economic characteristics etc (For more details please refer to Annex B: Supplementary tables and graphs– Table 7).

Table 1: List of locations under different treatment and control groups

District	Treatment/ Control group	Upazila	Unions	RISK classification[3]
Kurigram	Group 1 – Full scale implementation	Ulipur	Begumganj, Buraburi, Hatia, Shaheber Alga	Very High
	Group 3 – Partial scale intervention	Chilmari[4]	Thanarhat (complete risk map); Raniganj and Noyarhat (partial to generate continuous maps)	Very High
Gaibandha	Group 1 – Full scale implementation	Saghata	Bharatkhali, Saghata, Ghuridaha, Haldia, Jumarbari	Very High
	Group 3 – Partial scale intervention	Phulchari[4]	Gazaria	Very High

---

[2] Uddin K & Martin MA. (2021). Potential flood hazard zonation and flood shelter suitability mapping for disaster risk mitigation in Bangladesh using geospatial technology. Progress in Disaster Science, Vol 13, Pages 100207. https://doi.org/10.1016/j.pdisas.2021.100185

[3] The RISK classification has been provided by INFORM- Index for Risk Management. The Risk classification is calculated based on Exposure to the Hazard, Vulnerability and Coping mechanisms. This secondary source of risk classification has been provided by the CARE team.

[4] *Upazilas where only capacity building and technical support will be provided, such as vulnerability mapping for 1 union, inundation mapping for 1 union, review of flood danger level, training on FbA for Upazila DMCs (triggers, early actions), cross-learning visits and early warning dissemination to government officials. The union will be selected based on further assessment and consultation with Upazila authorities.*

Jamalpur	Group 2 – Full scale implementation	Madarganj	Char Pakerdah, Balizuri, Zorekhali, Gunaritola	High
	Group 3 – Partial scale intervention	Sarishabari[4]	Pingna	Very High
Bogura	Group 2 – Full scale implementation	Shariakandi	Kazla, Kornibari, Chaluabari, Bohail	Very High
	Group 3 – Partial scale intervention	Sonatala[4]	Tekani chukinagar	Medium
Tangail	Control group	Nagarpur	Salimabad	Low
Sirajganj	Control group	Kazipur	Maijbari	Very High

1.2   Objectives of the study

As mentioned in the ToR, SUFAL II has following broad objectives-

1. Ensuring that impact-based forecasts, early warning information with extended lead times, and tailored forecast information for target sectors are available and used by stakeholders and communities.
2. Communities and institutions are able to take timely, appropriate and inclusive early actions to anticipated floods.
3. Standard Operating Procedures (SOP)/Early Action Protocols (EAP) and financing mechanisms are developed to support implementation of early actions at local level.

2   Approach and methodology

2.1   Approach

To assess the impact of SUFAL–II interventions, the approach adopted was to target all four stages of the disaster management (DM) cycle[5], which includes – i) Preparedness, ii) Rescue and response, iii) Recovery and iv) Mitigation (**Figure 2**)[6]. The preparedness stage of the cycle includes accessing and using early warning and forecast information and then taking early action.

In this context, the SUFAL-II interventions focused mainly on the Preparedness stage of DM

Figure 2: Disaster management cycle

cycle, particularly on forecast-based actions (FbA). The impact of these interventions was assessed by analysing the loss and damage caused by floods, as well as the costs associated with post-flood recovery. The effectiveness of the post-flood recovery process is also influenced by the actions of the communities and local government during flood rescue and response, which were considered in the analysis.

2.2   Study methods

The baseline study uses a mixed method analysis. Thus, both quantitative and qualitative tools were administered to collect relevant data to assess the baseline status. The quantitative tool was administered at household level. It aimed to understand the measures of early action taken by households and their perception about it. The qualitative tools, on the other hand, were administered at community level and to Disaster Management Committees (DMCs) and local government officials. It aimed to understand the nuanced details behind the quantitative findings and throw light on the next steps that would be required.

For the quantitative component, a structured questionnaire was administered at the household level and data was collected using Computer Assisted Personal Interviewing (CAPI). The following themes were covered in the questionnaire,

Table 2: Themes covered in quantitative tool.

Themes	Details
Socio-demographic profile	Age, gender, caste, religion, economic background, educational level

---

[5] Vasilescu, Laura & Khan, Himayatullah & Khan, Asmatullah. (2008). Disaster Management CYCLE – a theoretical approach. Management and Marketing Journal. 6. 43-50.
[6] Please refer to the link for details: training.fema.gov/emiweb/downloads/is111_unit%204.pdf

Themes	Details
Economic Status	Living conditions, land ownership
Impact of floods	Loss and damage due to floods
Flood coping strategy	Problems in rescue, cash support, accessibility to shelter homes, post-flood health recovery
Early warning and early actions taken	Information covered in early warning, lead time of warning, type of early actions taken and whether they were beneficial etc.
Gender role and Inclusivity	Impact of floods on vulnerable sections and women

The qualitative tool was a semi-structured questionnaire with potential probes, which was administered to collect responses from study participants. The following themes were covered under the questionnaire.

Table 3: Themes covered in qualitative tool

Tool	Themes
FGD with community	Understanding of early warning and early action, usefulness of early action, what more can be done
KII with DMCs	Trainings given to DMCs on flood management, DMCs' decisions on impact-based forecast, resource allocation by DMCs for FbA, Training given by DMCs to communities, role in flood management
KII with local government institutions	Trainings given to LGIs on flood management, resource allocation by LGIs for FbA

The themes covered in both quantitative and qualitative data helped in an overall understanding about the existing early warning system for floods and early action, effect of floods at community level and existing flood management at community, district and national level. Going forward, this will help in developing better strategies for flood resilience and eventually improve the human development in these flood-affected regions.

2.3   Data collection methods

2.3.1   Quantitative - Household survey

Sampling

Based on sample size calculations (details on this are provided in Annex A: Sampling), we arrived at a sample of 1500 households, which provided a power of 95%, was spread over 60 clusters (at ward level) and had a cluster size of 25 after accounting for 25% attrition rate. The wards[7] were randomly selected using the probability proportional to size (PPS) sampling method. The

---

[7] Both sampled and replacement wards were selected using PPS method. During data collection, it was found that in few sampled wards people have relocated due to inundation by river. Thus, for these cases the team collected data from the replacement wards.

distribution of wards for each district and the corresponding household sample for the district is given in Table 4.

Table 4: Distribution of wards in each district

District	Number of wards (clusters) sampled in the district	Household sample to be achieved (25 households per ward)
Kurigram	16 (Ulipur – 10; Chilmari – 6)	400
Gaibandha	15 (Saghata – 12; Fulchari – 3)	375
Bogura	11 (Sariakandi – 9; Sonatola – 2)	275
Jamalpur	14 (Madarganj – 12; Sarishbari – 2)	350
Tangail	2 (in Nagarpur)	50
Sirajganj	2 (in Kazipur)	50

2.3.2 Qualitative – Key informant interviews & focus group discussions

Key Informant Interviews (KIIs) were conducted with DMCs and local government officials in the SUFAL-II study area. A total of 28 KIIs were conducted with government officials. The list of stakeholders interviewed has been provided in Annex D: Details of FGDs and KIIs- Table 22.

Focus group discussions (FGD) were conducted with beneficiaries of SUFAL II intervention. A total of 30 FGDs were conducted with the community members in five districts. The list of FGDs conducted is provided in the Annex D: Details of FGDs and KIIs- Table 23.

The evaluation team took utmost care to comply with the standard protocol of primary data collection, such as: explaining clearly the purpose of the evaluation study to the stakeholders; ensuring consent and voluntary participation in the interviews; and maintaining confidentiality of the participant's details, if so desired.

Both the quantitative and qualitative questionnaires are provided in Annex E: Questionnaires.

2.3.3 Data analysis

At the baseline stage, descriptive analysis has been undertaken using STATA (version 17) software, with an aim to understand the overall status of outcome indicators, primarily focusing on measuring the baseline values of output and outcome indicators, as outlined in the Monitoring and Evaluation (MEL) framework.

The analysis focused on the following themes:

- access to early warning systems (including means to access information),
- knowledge about early warnings and early action
- percentage of target population taking early action,
- loss/damage due to floods,

- response and recovery measures taken by communities and government,
- access to social safety net programmes meant for flood management and flood resilience

3   Baseline findings

This section gives details on the descriptive findings from the household survey tool and qualitative findings from the FGDs and KIIs conducted at the baseline.

3.1   Background of the respondents

The household survey, comprised of a total of 1494 interviews[8], out of which 1394 interviews were conducted in three treatment groups and 100 interviews were conducted in the control group. Out of all the respondents, 74% were females and majority of the respondents belonged to the 31-40 years of age group (35.4%). Majority of the respondents were Muslim (95.7%). Almost all respondents reported that they are original inhabitants of the village (98.7%) and of Bangali ethnicity (99.8%). Out of the total respondents, 17% reported that they had some kind of physical disability (Figure 4). The detailed district wise distribution of the respondents interviewed is provided in Annex B: Supplementary tables and graphs - Table 7.

Figure 3: District- wise distribution of respondents

---
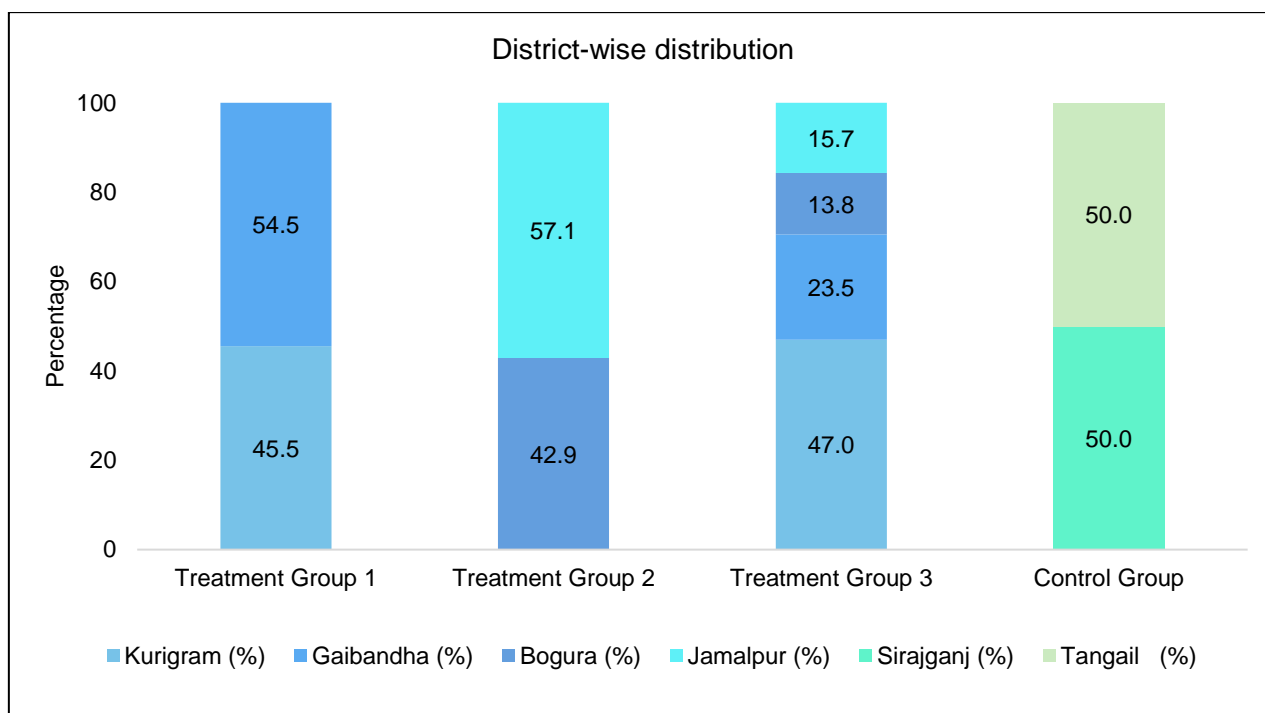
[8] There was shortfall of 6 interviews in the district of Bogura.

Figure 4: Socio-demographic profile of respondents
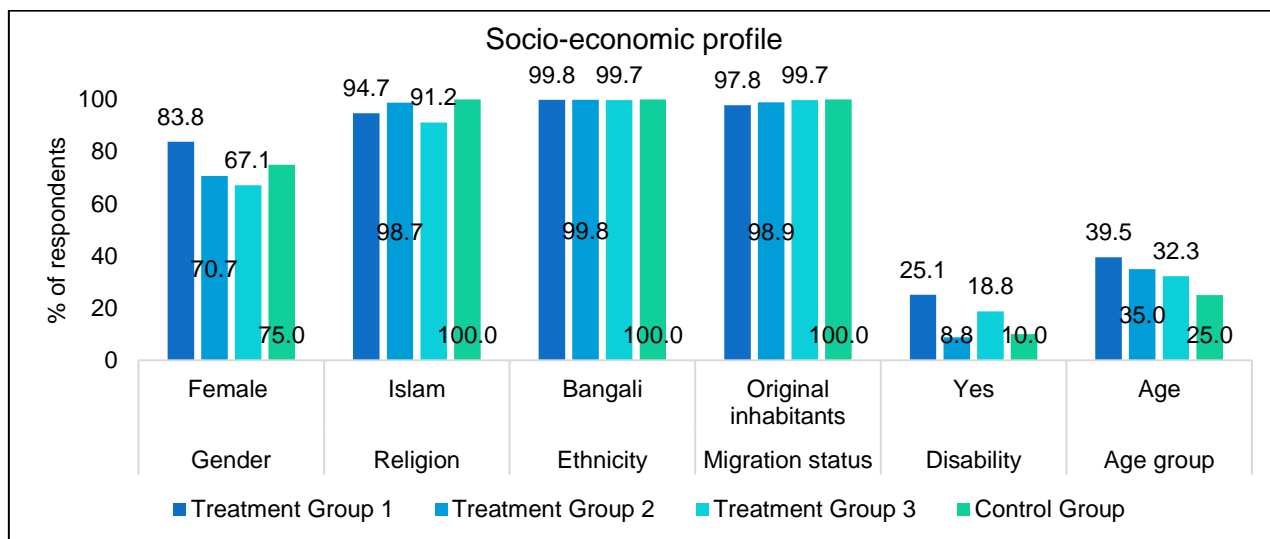
Majority of the respondents (78.9%) from both treatment and control groups reported that the monthly income of their household was more than Taka 5000 (EUR 42). 51.6% , 39.4% and 56.1%of the respondents from the treatment group 1, 2 and 3 respectively and 48% of respondents from the control group reported that their monthly income was between 5000 to 10000 Taka (EUR 42 – 84). In the treatment group 77.4% respondents and in the control group 93% reported that the female household members do not earn income and 13.7% respondents from the treatment group reported that the female household members earned less than Taka 3000 (EUR 25) per month. In the treatment group 81.7% of respondents and 92% of respondents in the control group reported that they lived in a house that they owned (Figure 5). In almost all the cases, land and house ownership was reported to be in the name of male household members.

Figure 5: Economic profile of respondents
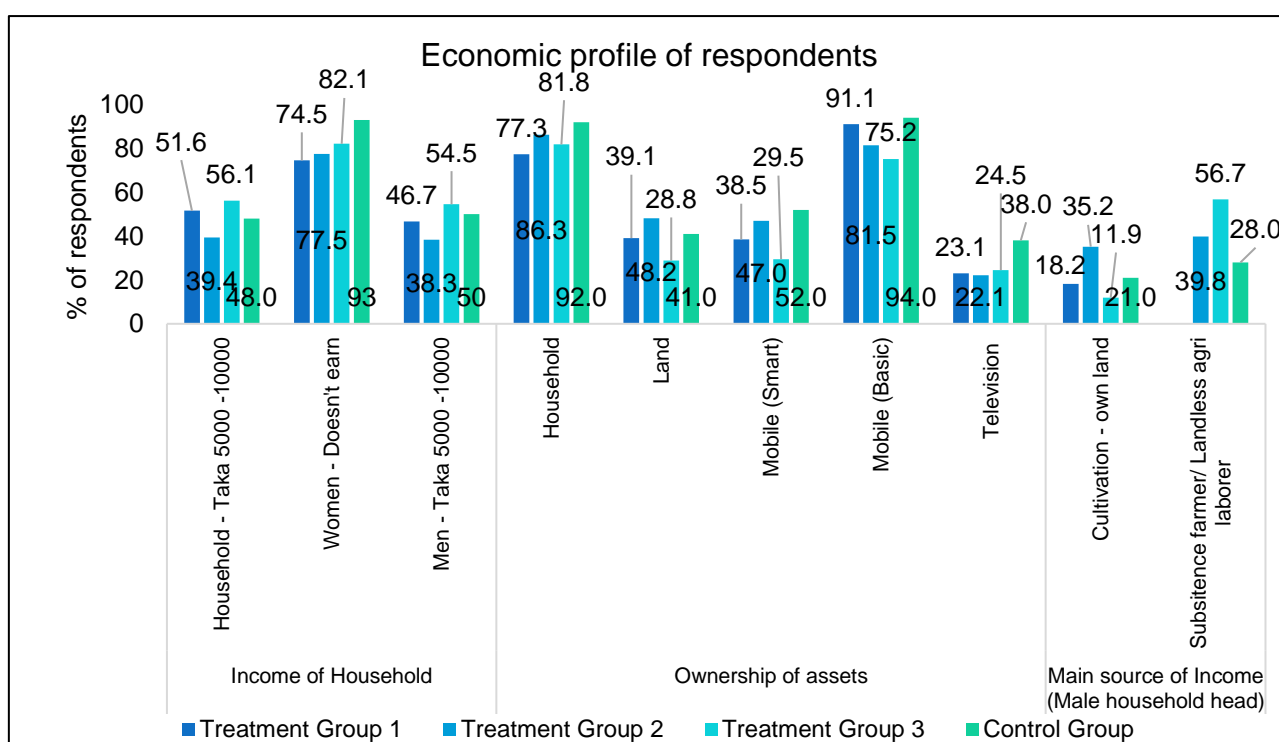
The main occupation of the male household head[9] was working as landless agricultural labourer or subsistence farmer in treatment group 1 (42%), treatment group 2 (39.8%), treatment group 3 (56.7%) and control group (28%), followed by in cultivation of their own land in treatment group 1 (18.2%), treatment group 2 (35.2%) and treatment group 3 (11.9%) and control group (21%). Thus, in all the three treatment groups 67.8% and in control group 49% of the households reported dependency on agriculture. The qualitative findings also corroborate the result that majority of males are engaged as agriculture labourers and during non-agricultural seasons, they migrate to cities for temporary work as auto-rickshaw drivers, rickshaw pullers, garment industry workers, construction workers, etc.

3.2 Key findings from the household survey

Of all the respondents, 78.4% reported that they had faced floods in 2022. While 89.1% of respondents from treatment group 2 and 86.8% of respondents from treatment group 3 reported facing floods, almost one-third of the respondents from treatment group 1 (35.3%) and control group (30%) reported that they did not face any floods in 2022 (Figure 6).

Figure 6: Respondents who faced floods in 2022.
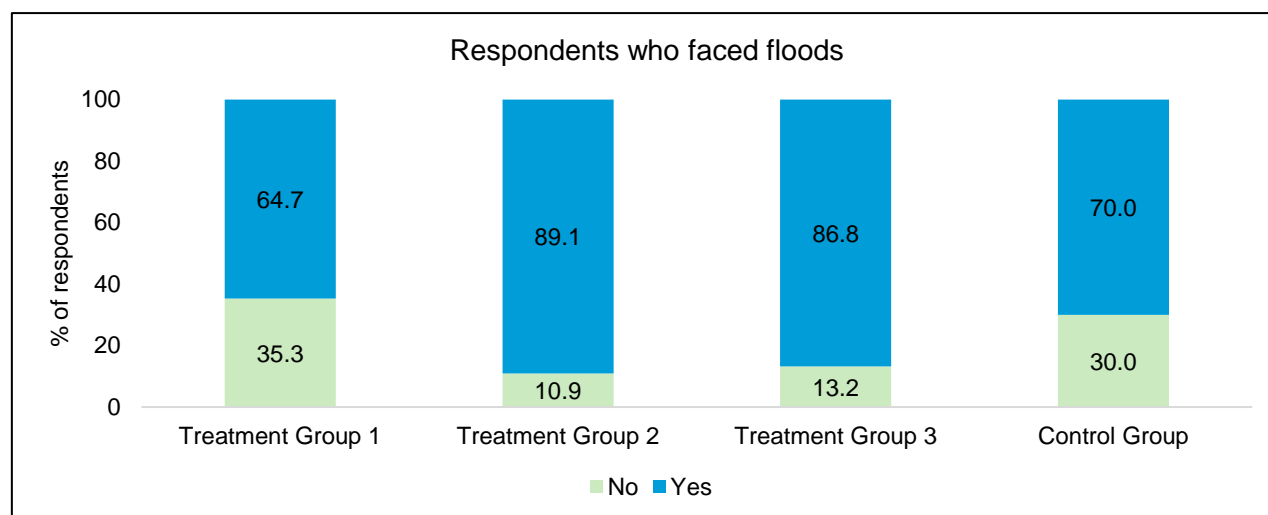
Of all the respondents who faced floods in each treatment and control group, the majority reported that they faced floods during the month of **Ashar – Srabon**[10] (Figure 7). In treatment group 1 and 3, the second highest reported month of flooding was Srabon - Bhadro, while it was Joishto – Ashar in treatment group 2 and control group.

---

[9] Almost 93% of the households had a male household head.
[10] As per the hydrograph information obtained from Bahadurabad station, the floods were triggered in the month of June.

Figure 7: Month of flooding in 2022
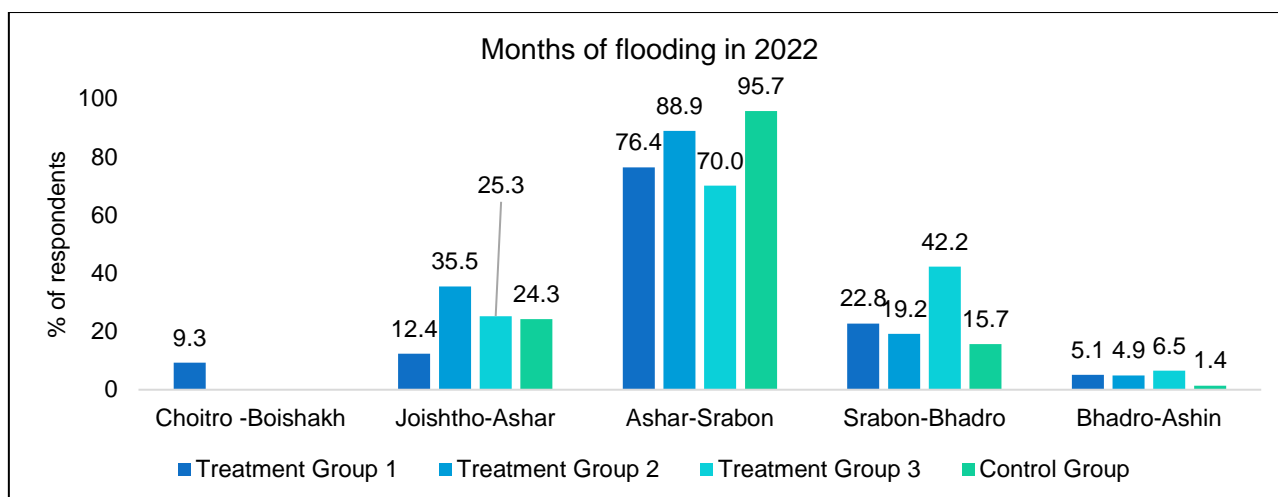
In the following section, the preparatory steps that were taken to reduce the loss due to floods are discussed.

3.2.1 Preparatory stage

Having advance notice through early warnings about the timing of floods and knowledge of early actions that can be taken to minimize loss and damage can significantly mitigate the impact of floods.[11]

Early warning

Of all respondents in the three treatment groups who faced floods in 2022, only 36.3% received early warnings. Around 70.3% of these respondents reported that adult male members of the family were first to receive the early warnings.

Further the trends of early warning were analysed by treatment/ control group (Figure 8). Expectedly, it was observed that a higher percentage of respondents from the treatment group 1 (69.4%, SUFAL-I district) received early warnings as compared to Treatment group 3 (35.4%, partial intervention districts) and treatment group 2 (11.8%, Only SUFAL II districts). On the other hand, none of the respondents from control districts reported receiving early warnings. The FGDs with community groups also substantiate these trends, where respondents from Saghata, Gaibandha (treatment group 1) and Madarganj, Jamalpur (treatment group 2) reported receiving early warnings. On the other hand, respondents from Sariakandi, Bogura (treatment group 2) reported that they never received early warning. Respondents from Sirajganj (Control group) highlighted that they neither received early warning nor have much information regarding the concept of early warning.

---

[11] Perera, D., Seidou, O., Agnihotri, J., Rasmy, M., Smakhtin, V., Coulibaly, P., & Mehmood, H. (2019). Flood early warning systems: a review of benefits, challenges and prospects. UNU-INWEH, Hamilton.

Figure 8: Percentage of respondents who received early warning
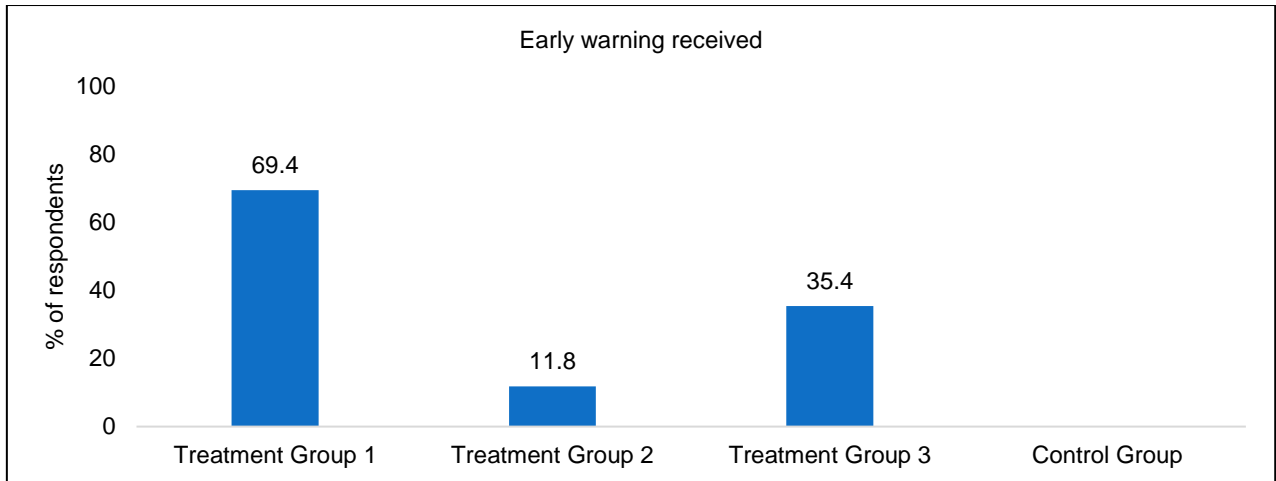
While only 11.8% respondents from treatment group 2 received early warning, of them 34% of the respondents reported that they received early warning 6 to 10 days prior to the floods. On the other hand, 79.8% respondents (out of those who received early warning) from treatment group 1 reported receiving early warning around 3 to 5 days before the flood (Figure 9). In treatment group 3 of all the respondents who received early warning, 66.7% reported receiving early warnings only 1 to 2 days prior to the floods. Overall, of all the respondents who reported receiving early warning, 85.8% reported that they received it 1 to 5 days prior to the floods (61.1% received the warning 3-5 days earlier and 24.7% received 1-2 days earlier). This is important as it indicates that most of the respondents from all three groups had less than 5 days to take any action.

Figure 9: Days before flood early warning was received.
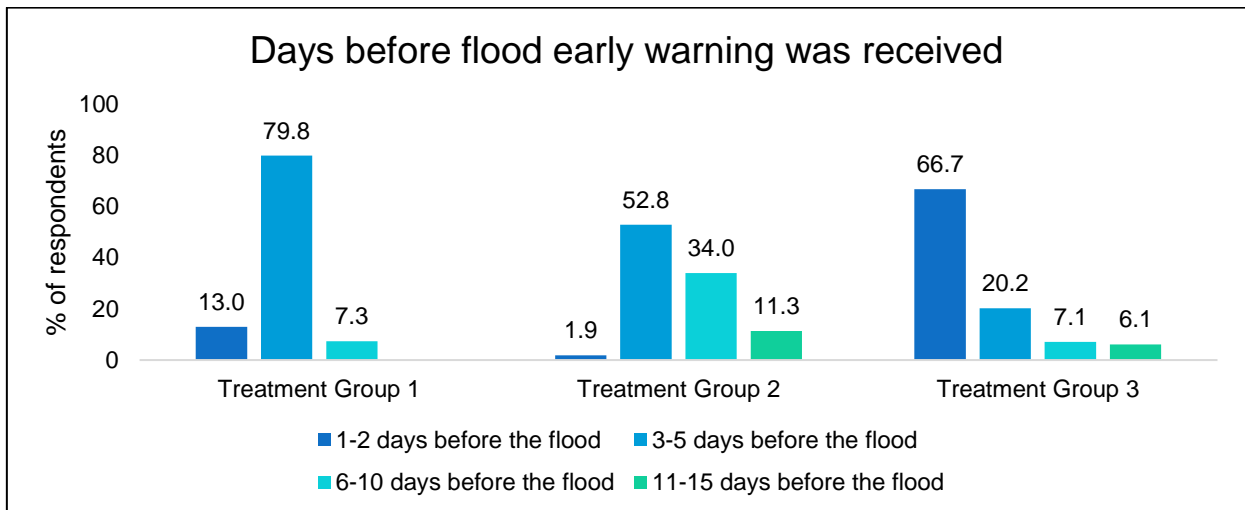
Among the three treatment groups, 40.1% of the respondents received early warning information via television and 29.7% received it from friends or relatives. Among other sources, only 8.5% respondents reported receiving early warning via audio calls, 19.2% reported from community volunteers (miking or household visit) and 1.2% via digital boards.

Majority of respondents (30.4%) from treatment group 1 reported receiving early warnings via friends or relatives, which was followed by television (~27.9%) and miking/household visit by

community volunteers (26.3%) (Figure 10). In both treatment group 2 and 3, majority of respondents (72.7% and 52.5% respectively) reported receiving early warning via television.

Only a small percentage of respondents from the district of treatment group 1 and 3 reported receiving early warning via SUFAL-II interventions of audio call[12] and digital boards. None of the respondents from treatment group 2 reported receiving early warning from any SUFAL II intervention sources (Figure 10) as in treatment group 2 the SUFAL II intervention had not started during the 2022 monsoon.

Figure 10: Source of early warning
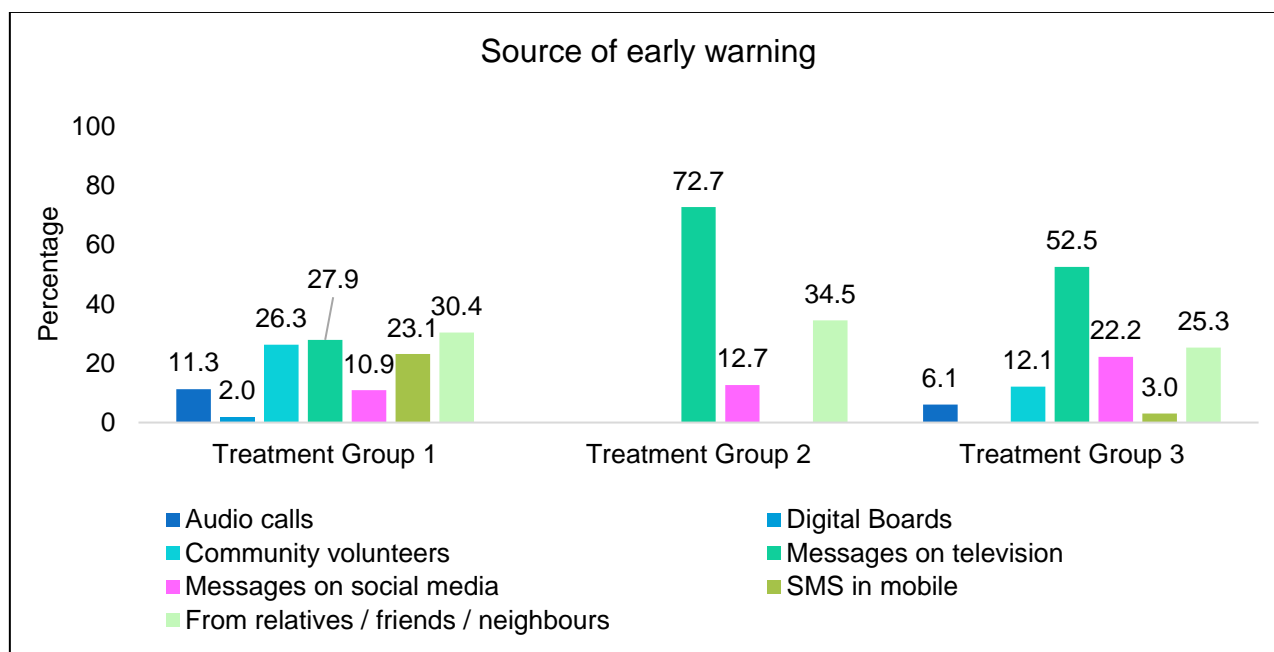
The **qualitative findings** on source and information contained in early warnings also furnished similar results. The FGDs with community members from Gaibandha (treatment group 1) reported receiving early warnings from miking by union parishad officials and community volunteers. Regional differences were reported in Gaibandha, where respondents from Holdia received no early warnings and for respondents in Jumarbari, the warnings were mostly received through television. In Bharatkhali, respondents reported that courtyard sessions were conducted which provided useful information on agriculture and livestock management.

But in the district of Kurigram (treatment group 1) the early warning trends were not as promising as the warnings received via miking were not in the local language and thus was not easy to understand and the information received via television was not accurate. Further, in a KII with Union Chairman of Begumganj, they reported that early warnings by the union were spread through miking, but were able to cover only about 30% of the total union population due to lack of finances. In Jamalpur (treatment group 2) as well, the respondents reported that the warnings were received by few people from 1090, but due to poor mobile connectivity they could not hear the message clearly.

---

[12] The voice messages were received via SUFAL II intervention and are not the same as calling 1090.

Perceptions on Early Warning interventions[13]

- **Almost 96% of the respondents from treatment group 1 and 83% respondents from treatment group 3 found the audio calls beneficial.[14]**

- **All the respondents (only 5 respondents) from treatment group 1 who saw the digital boards, reported taking early action based on these digital boards and found them beneficial.[15]**

- **All the respondents from treatment groups 1 and 3 who reported that community volunteers visited their households, found the visits beneficial.**

- **Almost 90% of the respondents reported that women in their households found the gender-responsive early actions beneficial.**

Overall, of the people who reported receiving early warning (in the three treatment groups), 60.3% reported that the early warning contained information on intensity of flood/ water level and 52.9% reported that it contained lead time of flood. Only 36.2% respondents reported that the early warnings contained information on what early actions can be taken, 24.7% contained livestock advisory and 13.0% contained agromet advisory.

Among the respondents from treatment group 1, more than 50% reported that they received information on lead time (66.4%), intensity (66.8%), and duration of flood (56.7%), and 49.4% respondents reported they received information on what early action should be taken. On the other hand, less than one-fifth of respondents received information on agromet advisory (15.4%), flood preparedness advisory (12.1%) and health awareness (8.9%) (Figure 11).

Among the respondents from treatment group 2, it was observed that 63.6% of respondents reported having been informed about the lead time and around 47.3% reported being informed about the flood intensity. On the other hand, less than 15% of respondents reported being informed about any other information, including, what early actions can be taken (5.5%), agromet advisory (14.5%), livestock advisory (3.6%) etc (Figure 11).

Among the respondents from treatment group 3, it was observed that 51.4% respondents received information on intensity of floods, but only about 13.1% of respondents were informed about the lead time of floods. Also, less than one-tenth of respondents reported receiving information on agromet advisory (6.1%) and livestock advisory (8.1%) (Figure 11).

Thus, it can be concluded that all treatment groups lagged in aspects of agromet advisory, flood preparedness advisory and health awareness.

---

[13] These are perceptions of respondents who reported that they received early warning via sources of either audio calls or digital boards or by community volunteers.

[14] Corresponds to Output 1.5.2 - % of people who benefitted from audio calls – of MEL framework.

[15] Corresponds to Output 1.5.5 - # of people who took early actions based on information on digital boards – of MEL framework.

Figure 11: Information covered in early warning messages
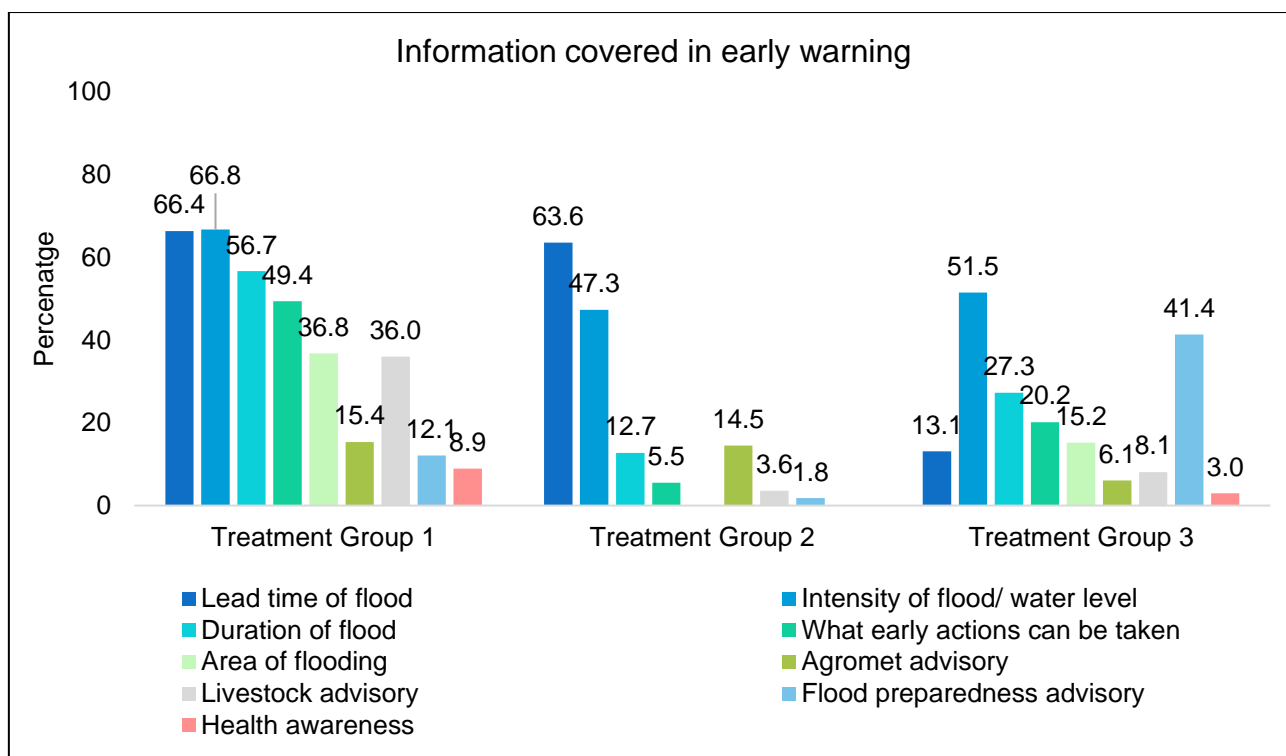
Perceptions on early warning[16]

Overall, in the three treatment groups, close to two-third of the respondents (67.8%) reported that the early warnings were timely, and they could understand these warning, and 98.8% of respondents reported that they trusted the early warnings.

While more than 98% respondents from all treatment groups reported that they had trust in early warnings (Annex B: Supplementary tables and graphs- Figure 26), treatment group 1 performed better than the other two treatment groups regarding perception on timeliness (Annex B: Supplementary tables and graphs- Figure 24) and understanding of messages (Annex B: Supplementary tables and graphs- Figure 25), with almost 30% more respondents reporting a positive perception in treatment group 1 as compared to the others.

The qualitative findings also showed the limited reach of early warning messages. Generally, early messages were primarily received through television. Few FGD participants from the youth groups reported of receiving information through social media, however they shared concerns about the authenticity of this information.

Early action

Of all the respondents who faced floods in 2022 (78.0%), more than 85% of respondents from both treatment and control groups reported that they trusted that taking early action would be beneficial, while only 32.5% reported taking early actions in the three treatment groups and none of the respondents from control group reported taking early action. In the discussion on what

---

[16] This section corresponds to Output 1.5.3 – 'Perception of people on effectiveness of early warning' in the MEL framework.

early action should be taken, it was dominated by participation of adult male members (91%) as compared to the female ones (65%) (Annex B: Supplementary tables and graphs- Table 8). The percentage of people taking early actions was higher in treatment group 1 (67.4%) (SUFAL I intervention districts) as compared to treatment group 3 (~30.7%) and treatment group 2 (7.1%). In the control group, none of the respondents reported taking any early action (Figure 12). A significantly positive relationship was observed in getting early warning and taking early action, which indicates an increase in early warning can also lead to increase in people taking early action.

Figure 12: Percentage of respondents who received early warning vs who took early action.
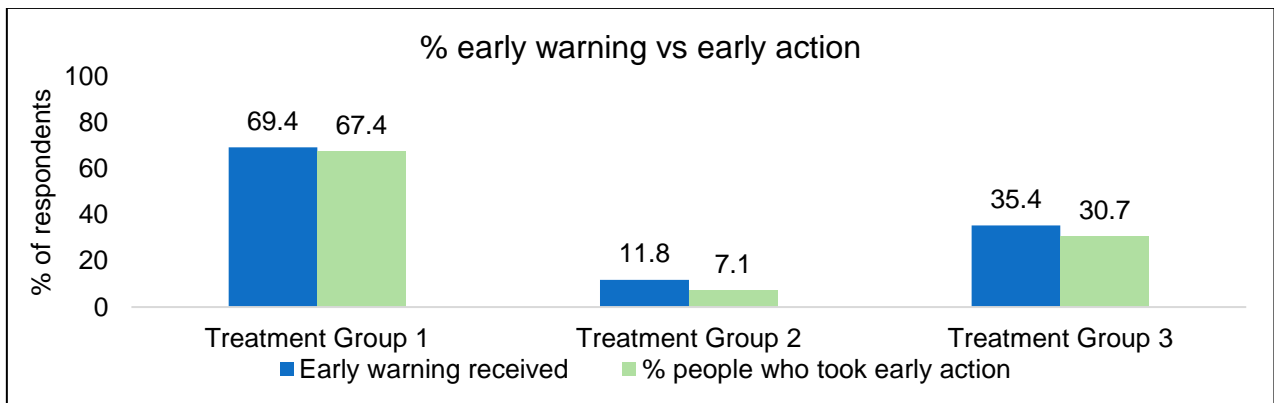
In all the treatment groups, majority of respondents (>85%) reported that they 'completely trust' or 'trust' that taking early actions will be beneficial (Figure 13). Few of the KII respondents from the Upazila Parishad and DMCs shared that there is reservation among the people, particularly the aged ones, to take early actions as they believe that they have seen enough number of floods to know which action to take at what time. Also, people are often reluctant to leave their houses and take shelter in other places.

Figure 13: Trust that early actions will be beneficial.
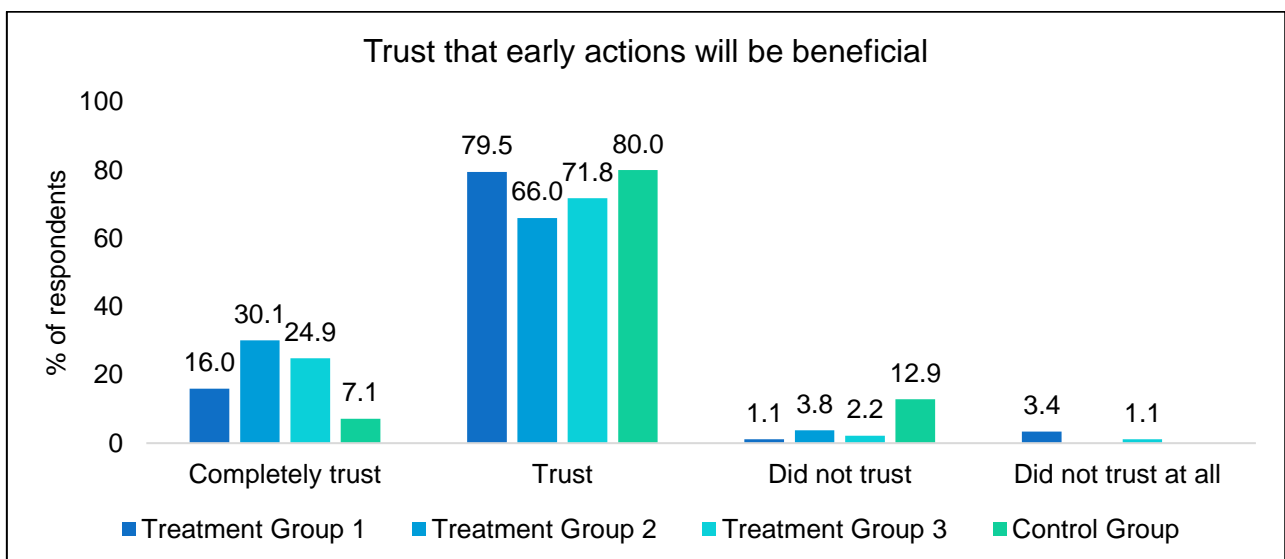
Of all the people who reported taking early action, majority (52%) reported that they took early action 1 to 2 days before the flood, followed by 26.8% who took early action 3-5 days before the flood.

At the district level, it was observed that majority of the respondents (of those who reported taking early action) from the treatment group 1 (65.1%) and treatment group 3 (83.5%) reported that they took early action 0-2 days prior to the floods. In treatment group 2, 24.2% of the respondents reported taking early action 6-10 days prior to the floods, and 60.6% took early action 1-5 days prior to the floods (Figure 14). Thus, it is evident from the findings that most respondents from all treatment groups took early action 1 to 5 days prior to the floods.

Figure 14: Days prior to the flood early action was taken
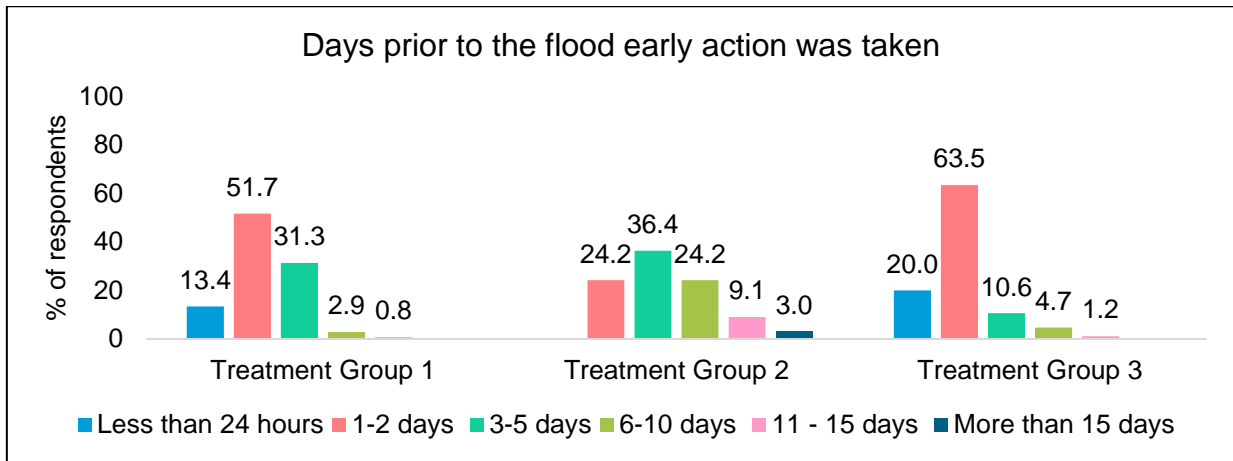
A statistically significant[17] relationship was observed between the lead time of early warning and the timing of early action taken by respondents. In other words, where people have received warning quite ahead of time, there they started taking precautionary actions also early. Figure 15 displays the relationship between time of early warning and early action separately for the three treatment groups. For treatment group 1, it is observed that majority of the respondents (who reported facing floods) received early warning 3-5 days before the floods and also took early action 3 to 5 days before the floods. Similarly for treatment group 3, majority of the respondents (who reported facing floods) received early warning 1 to 2 days before the floods and also took early action 1 to 2 days before the floods.

---

[17] Significant by chi-square test.

Figure 15: Early action vs Early warning.

Early warning vs early action - TG 1

Early warning vs early action - TG 2

Early warning vs early action - TG 3
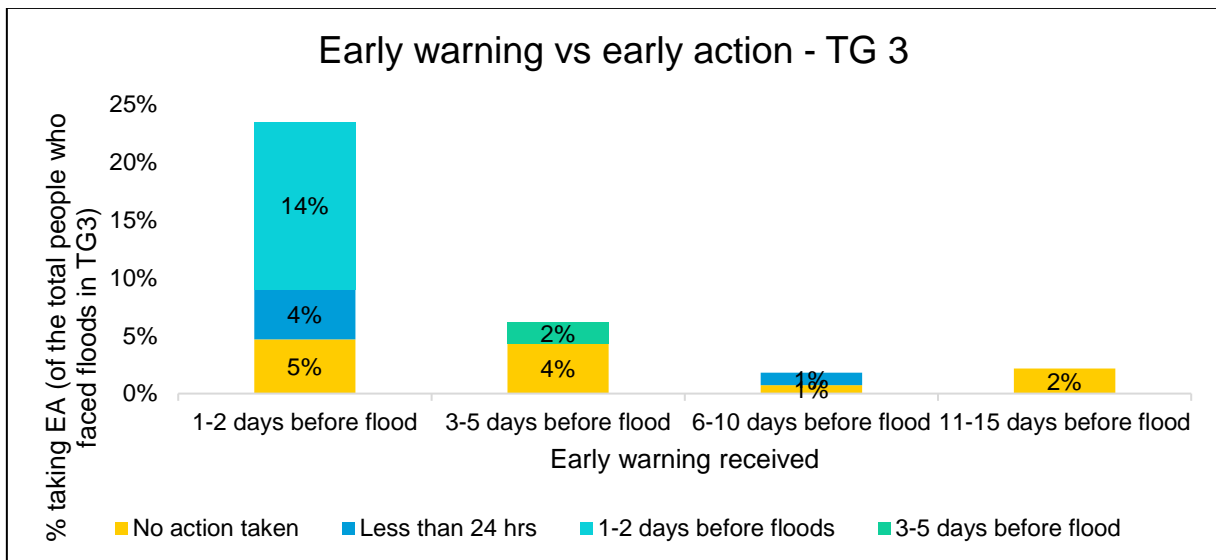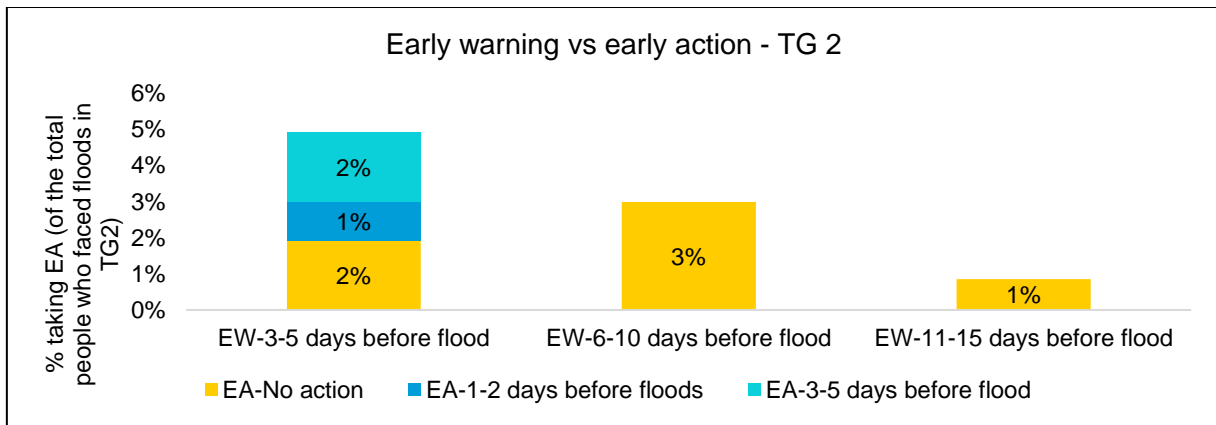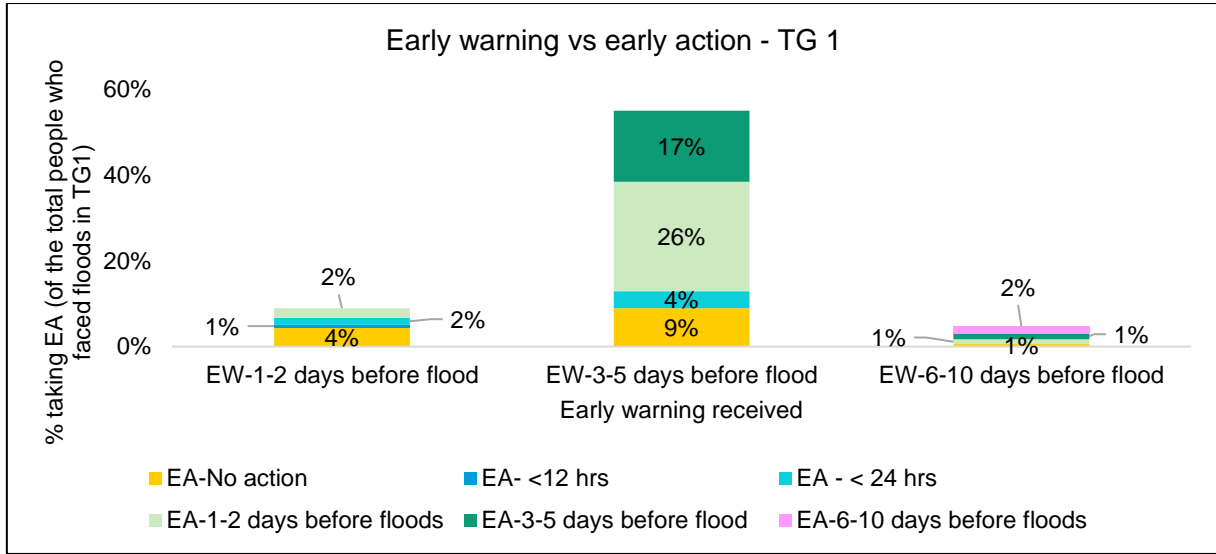
Majority of the respondents reported that they took early action regarding preserving dry food, cooking fuel, firewood and portable stove (87.7%), followed by packing important documents and valuables (51.7%). The details of early action taken by respondents from each district is provided in Annex B: Supplementary tables and graphs- Table 10.

The **FGDs** conducted with the communities, helped in further detailed understanding of the early actions taken by the communities. In all the treatment group 1 and 2 areas, it was reported that people took early action regarding food items, like arranging dry rations, keeping food on high land and preparing cooking stoves and fuel. In Gaibandha and Jamalpur, respondents also reported that they elevated their houses/ settlements before floods. In Kurigram, respondents shared that they created small dams made of bamboo and mud that helped in protecting their crops. The major challenges reported by the respondents from Jamalpur was regarding disruption of electricity supply, which made their televisions non-functional, and they were unable to get any information regarding floods.

Figure 16 below displays the percentage of households who packed items for children, elderly and person with disability (PwD). In the treatment group 3, of all the respondents who took early action, 70.6% reported that they packed items for children and PwD. In the treatment group 1, around half of the respondents reported they packed things for children (51.2%) and PwD (48.3%), but only around 29.2% packed items for the elderly. In the treatment group 2, less than one-third of respondents reported packing items for either of the three. Of all the respondents who reported taking early action, 82.1% reported that the decision on items that need to be packed was taken by adult male members, while 67.9% reported that adult females were also involved in the decision. More than two-third of the respondents reported that the packing was done by both adult male (72.1%) and adult females (71.8%) (Annex B: Supplementary tables and graphs- Table 11).

Figure 16: Household packed things necessary for children/aged/PwD

Packed things for vulnerable
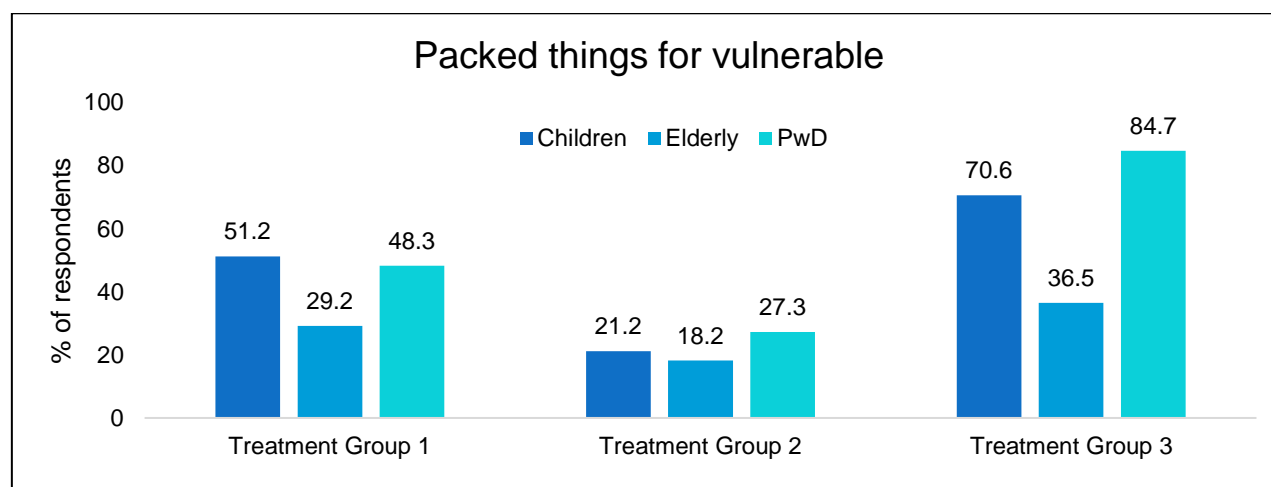
Overall perception on early actions

Overall, of all the respondents who reported taking early action 70.4% felt that early action helped them in reducing post flood recovery costs. A higher percentage of respondents from the districts of treatment group 1 reported that they were able to reduce post-flood losses as compared to other treatment groups (Figure 17). On average, the respondents reported that they were able to reduce the post flood recovery by around Taka 3500 (EUR 29) by taking early actions.

Figure 17: Did early action help in reducing post flood recovery cost
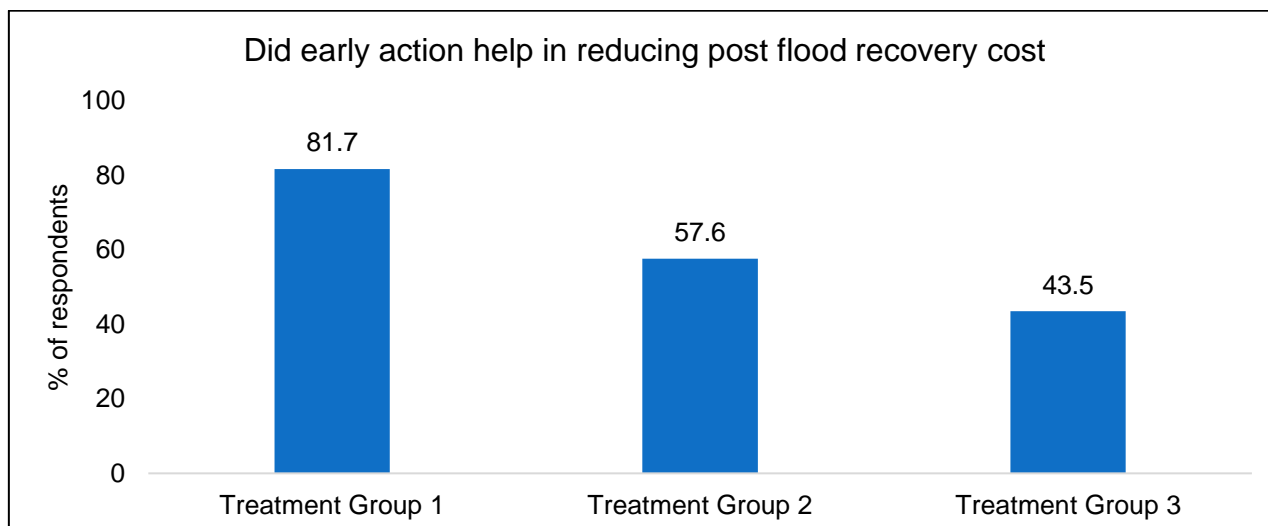
Capacity building of DMCs in flood management

The qualitative interviews with DMC officials threw light on the coverage of capacity building measures to implement FbA. In Saghata, Gaibandha (treatment group 1), the Upazila chairman reported receiving training on FbA quite long back which was organized by the government. However, other officials[18] including Project Implementation Officer (PIO), informed that they had not received any training on FbA in their districts. The officials received impact-based forecast information mostly from flood bulletins, BWDB FFWC's web portal, voice calls, internal WhatsApp groups of DMC members and from digital information boards, and found the information received through these portals useful. The officials from Gaibandha also reported that they had participated in cross-learning visits to different districts and have found them useful.

> *PIO, Saghata, Gaibandha - 'I have experience in visiting other districts outside my own. I visited Kurigram district where I participated on an inception workshop on SUFAL Project in 2019-20, where I gained in-depth learning and understanding about FbA.'*

In Ulipur, Kurigram (treatment group 1) officials reported that they received impact-based forecast information from television, BWDB-FFWC web portal and voice messages. But none of the officials reported receiving any training for FbA and reported receiving general disaster preparedness trainings and certain trainings on relief and rehabilitation.

The officials from Sariakandi, Bogura (treatment group 2) reported that they received training on early warning and early action from BRAC, which included topics on vulnerable sections, agriculture, livestock and fisheries. Mock drills were also conducted as a part of the trainings. The information received through these trainings was used by the officials to generate awareness among the communities and used government provided mics to provide early warnings.

---

[18] Some officials like the Upazila Nirbahi Officer(UNO) and Union Chairman (Ghuridah Union Parishad) have joined in the last one year.

However, the officials never had any opportunity to take part in cross-learning visits. Also, they were not provided a list of vulnerable sections to take targeted measures for vulnerable sections.

The officials from Madarganj, Jamalpur (treatment group 2) reported that none of them received training on FbA. The PIOs of both Sarishbari and Madarganj were unaware about the Early Action Matrix. They received impact-based forecast information from flood bulletins, calling 1090, the web portal and digital information board, and were able to understand the information easily.

In the Control district of Sirajganj, none of the officials reported having received any training on FbA and did not receive impact-based forecasts from any source.

Budgetary allocation by DMCs

The KIIs with DMC officials also threw light on the steps taken by DMCs to prepare for the upcoming floods and the budgetary allocation by DMCs for flood management.

All the districts reported that the budget is allocated by the Central Government. The officials in Gaibandha (treatment group 1) incorporated the Early action matrix and found it helpful in developing yearly plans and allocating budget for flood management. In Bogura (treatment group 2), officials reported allocating funds for FbA from Upazila level annual Government Budget. The officials of Kurigram (treatment group 1) and Jamalpur reported having no information regarding the Early Action Matrix. The officials from Kurigram (treatment group 1) reported that they prepared flood shelters and dry food packets for the communities if there was budgetary allocation in this regard.

3.2.2   During floods

The sub-section discusses the impact of floods in 2022 on the affected communities.

Loss due to floods

Of all respondents who were interviewed, 78.4% reported that they faced floods. In treatment group 2, 89.1% of respondents and treatment group 3, 86.8% of the respondents reported facing floods, while in treatment group 1 and control group 63.5% and 70% respondents reported facing floods respectively.

Of all the respondents from the three treatment groups who reported facing floods, the majority (78.2%) faced some loss due to floods, while almost all in the control group (95.7%) reported facing some kind of loss due to floods (Figure 18). Among the respondents who reported they faced loss, in the three treatment groups 60.1% respondents and in control group 56.7% respondents reported that they faced loss of crops. Highest percentage of respondents from treatment group 2 (74.9%) reporting crop loss. Further, 40.5% and 29.9% reported they faced loss of livestock in treatment and control group, respectively (Figure 19). The figures of loss caused due to floods should be assessed in the light of Risk classification of the treatment and control group. While treatment group 1 and treatment group 2 have high to very high-risk classification, treatment group 3 has medium to very high and control group has low to very high-risk classification (please refer to **Table 1**).

Figure 18: Respondents who faced loss.
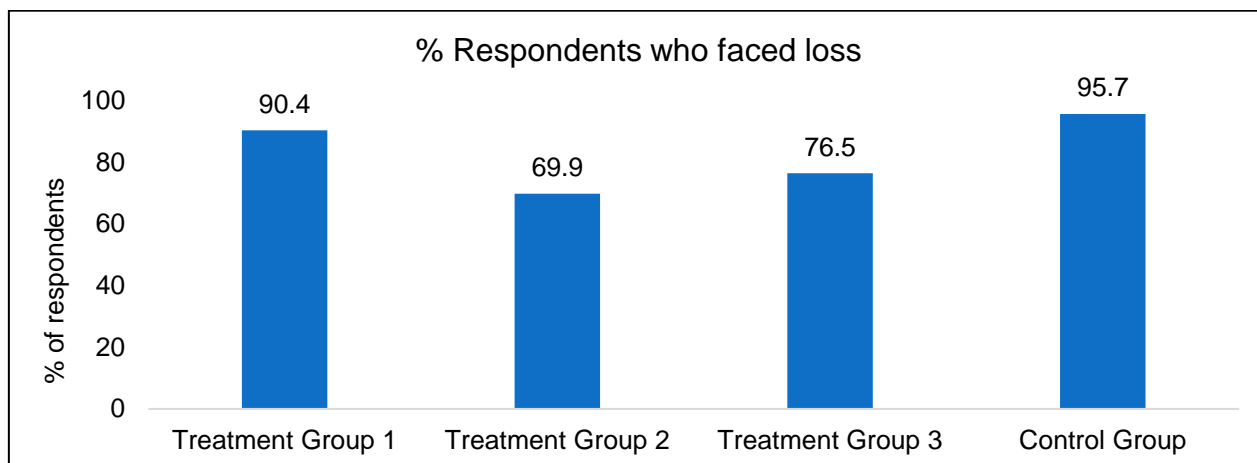
The loss faced due to floods was further analysed for each treatment and control group, and it was observed that in all treatment and control groups a majority of the respondents reported crop loss. On average the amount of crop loss reported by the respondents from treatment group 1 and 3 was of about Taka 8000 (EUR 87), and around Taka 26,000 (EUR 218) in treatment group 2 (Annex B: Supplementary tables and graphs – Table 15). Overall, the average loss in sectors of crop damage, livestock, poultry, damage to household and health in treatment group 1 was Taka 16,661 (EUR 140), in treatment group 3 was Taka 18,624 (EUR 156), in treatment group 2 was Taka 33,942 (EUR 284) and in control group was Taka 17,577 (EUR 147). The top four sectors where highest losses were reported by respondents were crop damage, livestock, damage to house and loss of agricultural labour. They remained common in all three treatment and control groups.

In treatment group 1, apart from crop loss (reported by 55.3%), more than half of the respondents reported health-related loss[19] (56.5%), livestock loss (51.2%), residential loss (~51.6%) and poultry loss (~51.2%). In treatment group 2, in addition to crop loss (74.9%), 36.4% of respondents reported poultry loss. In treatment group 3, respondents reported crop loss (~44.3%), residential house loss (54.2%), health related loss (48.6%) and livestock loss (38.7%). In the control districts, apart from crop loss (56.7%), livelihood loss (46.3%) was majorly reported by the respondents (Figure 19).

The qualitative findings also corroborate these results where respondents from treatment group 1 and 2 districts reported that they faced loss of crops and challenges regarding availability of clean water and sanitation facilities. In Kurigram and Jamalpur, respondents further faced challenges regarding poor access to medical support, death of livestock due to diseases and need to borrow money due to financial constraints to rebuild their houses. Other challenges highlighted by the respondents of Kurigram include, scarcity of food, bamboo, cooking gas, safe water and sanitation facilities, electricity, and poor access to shelter homes.

The highest percentage of loss of life was reported in treatment group 1 (19.9%), while the control group districts reported no loss of life due to floods (Figure 19). Of all respondents who reported

---

[19] Health-related losses include losses due to outbreak of air or water borne disease, lack of basic health facilities and increase in medical expenditure. The details of these have been provided in following paragraphs.

they faced loss of life due to floods, 92.3% said it was due to flood-borne diseases (Annex B: Supplementary tables and graphs- Table 12).

Figure 19: Loss faced due to floods.
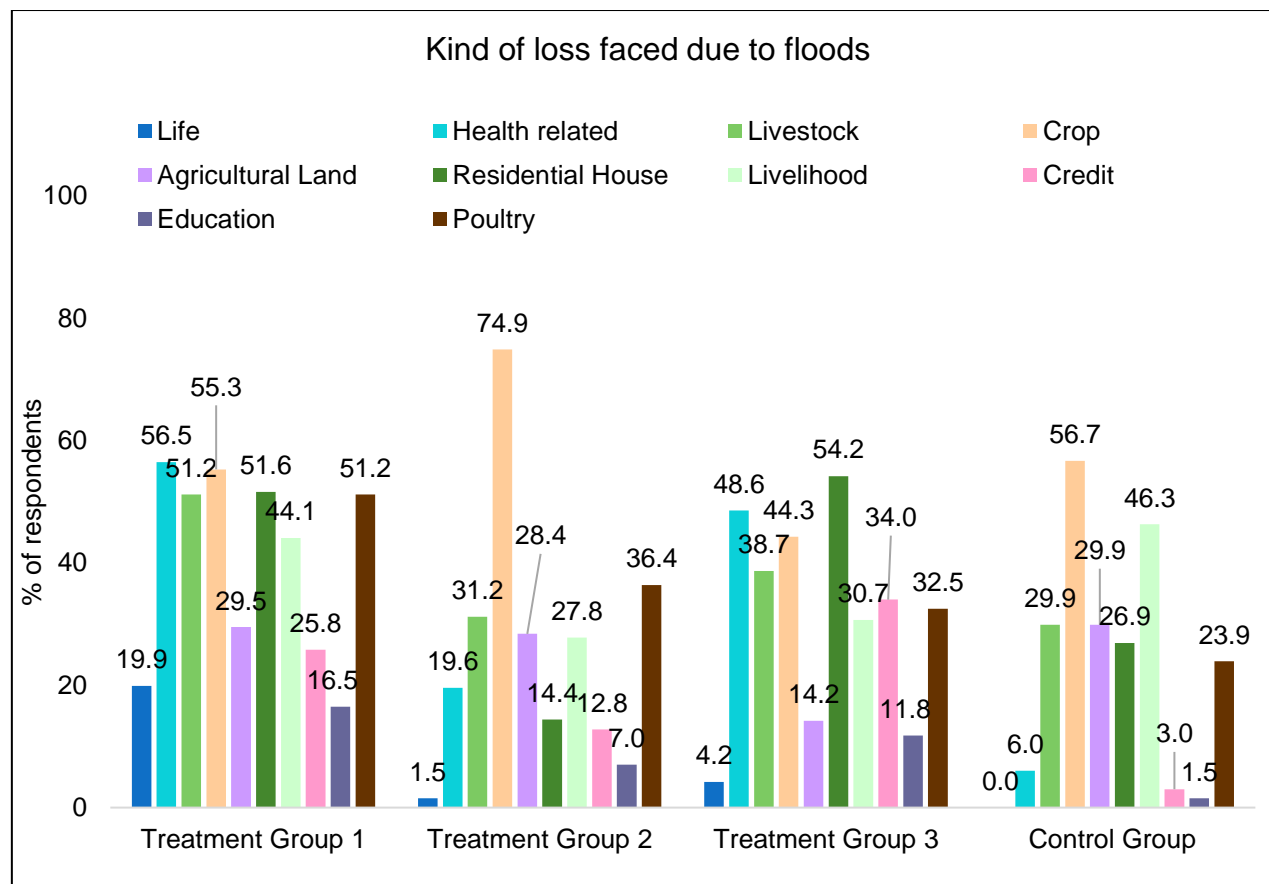
The respondents who reported that they faced some kind of loss due to floods were further asked about the details on the impact of floods on different sectors like infrastructure, health, food security, agriculture etc.

Overall, 97.6% of the respondents from the three treatment groups and 97% of respondents from control group (who reported they faced loss due to floods) reported that they faced losses with regard to **agriculture and livelihood**. In all three treatment groups, majority of the respondents reported losses due to crop damage (61.1%), damage to seedlings (37.1%), loss of agricultural employment (36.9%) and non-agricultural employment (31.9%) and death or disease in poultry (32.2%). Crop damage was highest in treatment group 2 (80.1%), while it saw the least loss in agriculture labour. In treatment group 1, apart from crop damage (51.6%), respondents also reported damage to seedlings (38.5%), loss of agricultural labour (48.1%) and non-agricultural employment (36.3%), death and diseases in poultry (49.7%) and livestock (31.7%) and less wages (33.9%). Loss of agricultural labour (50.5%) and non-agricultural labour (49.5%) was highest in treatment group 3 (Annex B: Supplementary tables and graphs- Table 13).

Overall, 38.4% of the respondents from all three treatment groups and 50.8% respondents from control group (who reported facing loss due to floods) reported that they did not face any loss with regard to loss to **infrastructure**. The treatment group 2 (61.2%) and control group (50.7%) reported the least losses to infrastructure. More than half of the respondents from treatment group 1 (55.6%) and 3 (50.9%) reported that there was a partial damage to their house. In treatment

group 1, 48.4% of the respondents also reported damage to roads and embankments. Majority of respondents (80.4%) reported poor mobile connectivity, which was a common trend across all treatment groups (Annex B: Supplementary tables and graphs - Table 13).

Overall, 30.4% of the respondents from all three treatment groups and 41.8 % respondents from the control group (who reported facing loss due to floods) reported that they faced no negative impact regarding **Water, Sanitation and Hygiene** (WASH). From treatment group 2, 60% of respondents and from control group 42% of respondents reported no negative impact on WASH. On the other hand, almost 84% of respondents from treatment group 3 and around 73% from treatment group 1 reported that they could not get clean drinking water due to floods. More than 60% respondents from treatment group 1 also reported lack of clean water for bathing/cooking, damage to toilets and lack of products of personal hygiene (Annex B: Supplementary tables and graphs- Table 13).

In contrast to Infrastructure and WASH -related losses, 86.1% of the respondents (who reported facing loss due to floods) from all three treatment groups and 67.2% respondents from the control group faced an adverse impact with regard to **food and nutritional security**. In treatment group 1, 76.7% of respondents and 61.3% in treatment group 3 reported that they faced scarcity of staple foods like rice and flour, high market prices and damage to stoves and cooking utensils (Annex B: Supplementary tables and graphs- Table 13).

A critical observation was regarding the increase in price of agriculture-based products, where 96% of the respondents from treatment group 1, 97.5% from the treatment group 2, 89.3% respondents from the treatment group 3 and all respondents from the control group reported that there was an increase in prices of cereals. Also, in all the three treatment groups more than 90% respondents reported an increase in the price of vegetables. In treatment group 1 and 2 respondents also reported an increase in the price of fruits. Apart from agricultural products, an increase in the price of cooking fuel, food for livestock and essential medicines was also reported (Figure 20). The details of other household products can be found in Annex B: Supplementary tables and graphs - Table 14.

Figure 20: Household products with increased prices due to floods
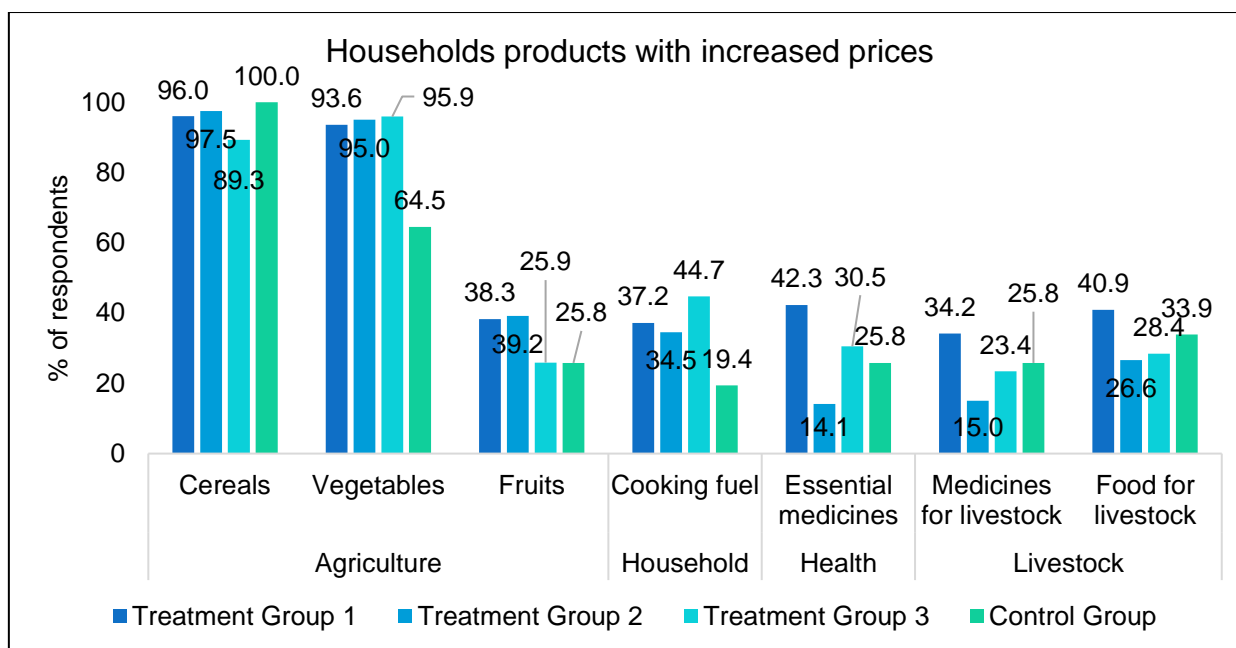
With regard to the impact of flood on **health** of respondents, overall 64.5% of the respondents (who reported facing loss due to floods) in all three treatment groups reported that they faced negative impact on their health due to floods. From treatment group 1, 73.9% respondents and 59.4% respondents from treatment group 3 reported that they faced outbreaks of water and air borne diseases due to floods. In treatment group 1, more than half of the respondents reported that they faced lack of basic healthcare services (51.9%) and increase in medical expenses (54.7%) due to floods (Annex B: Supplementary tables and graphs- Table 13). Majority of the respondents reported diarrhoea (73.2%) as the most prevalent disease, which was followed by skin diseases (34.5%) and gastro-intestinal diseases like dysentery and vomiting (Annex B: Supplementary tables and graphs- Figure 27). On the other hand, from the control group 62.7% respondents and 60% from treatment group 2 reporting no negative impact to health.

Overall, it can be observed that a higher percentage of respondents from the districts of treatment group 1 reported that they faced negative impact of floods in all aspects including, infrastructure, WASH, food security and nutrition and health. Here, it becomes important to highlight that the treatment and control group have different risk classification and thus face losses due to floods to different extents (please refer to **Table 1**).

Effect on household members

Figure 21 displays the perception of respondents on who was the most affected household member due to floods. Women and girls combined remained the most affected household members in all the four groups. In treatment group 1, 55.6% of women and 20% of the girls were reported to be affected by the floods. In treatment group 2, 24.8% of the respondents and 34.3% of the respondents from the control group reported that 'women' were the most affected household member.

Figure 21: Most affected household member.
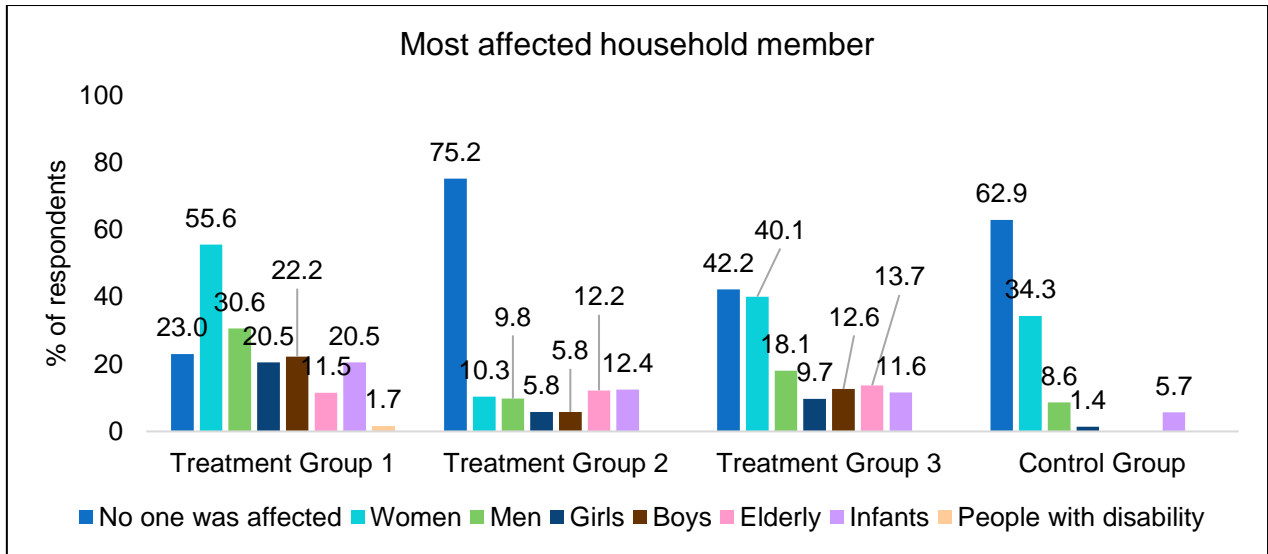
The type of impact experienced by members of households during flooding is provided in Figure 22. The major impact was related to waterborne diseases resulting from floods in all the three treatment and control groups with 21% more females facing the adverse impact compared to males, which was followed by lack of nutrition due to food shortages. While water-borne diseases were a cause of concern for all four groups, lack of nutrition due to food shortage was a bigger concern in treatment groups as compared to the control group. Another major issue in treatment group 1 and 2 was the increased debt of household members.

Figure 22: Kind of impact on household members
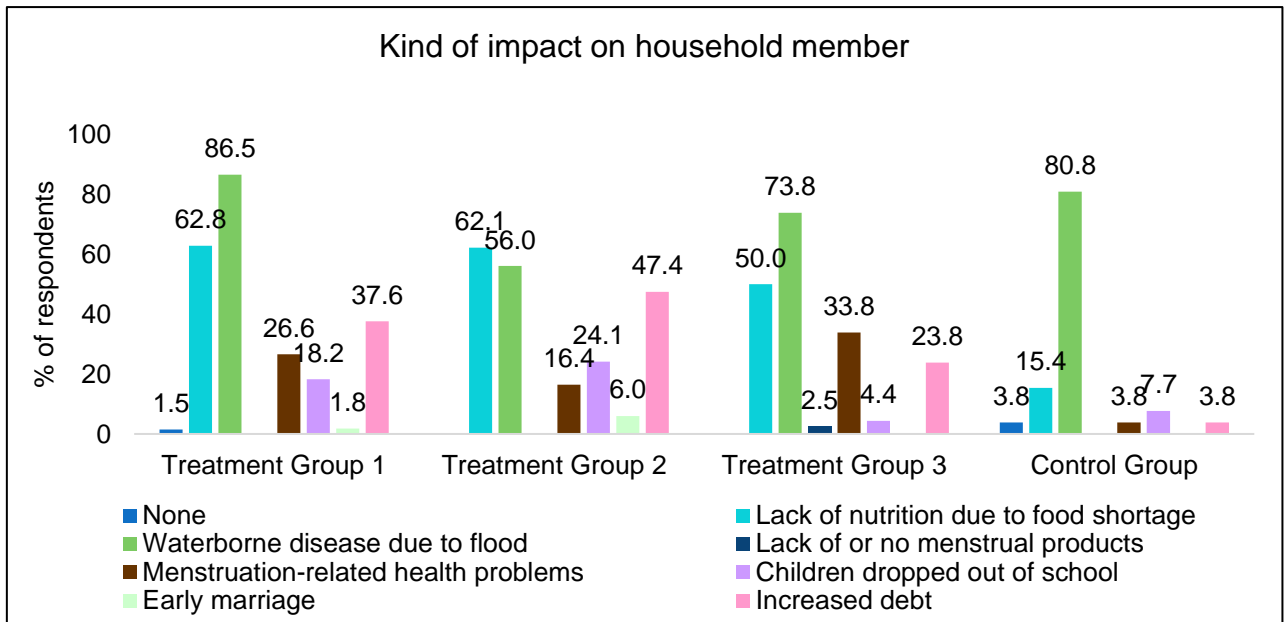
3.2.3 Response to floods

Response by households

Majority of households from both treatment and control groups reported that the major problem faced by them during flood rescue was related to absence of roads and shelter homes. The lack of roads was more prominent in treatment group 1 (63.2%) and lack of shelter homes was more prominent in treatment group 3 (65.7%). In treatment group 2, 38.5% of the respondents and one-fifth of respondents from treatment group 1 and 3 reported having insufficient information on disasters as being a major hurdle (Annex B: Supplementary tables and graphs- Table 16).

Shelter homes

Only 1.7% of treatment group 2 respondents, 23.5% of respondents from treatment group 3 and 28.4% of respondents from treatment group 1 reported that they moved to a shelter house during floods. The primary reason for not moving to shelter homes in all the three treatment groups was that there were no shelter homes nearby. This was followed by the concern of assets being stolen (Annex B: Supplementary tables and graphs- Table 16).

The respondents who went to shelter homes reported the poor infrastructural condition of shelter homes, with 90.2% of the respondents reporting that the shelter homes did not have a separate room and 96.2% reporting that there was no separate washroom for women, and 97.3% reporting there was no separate area to dispose menstrual waste. Almost 85.2% respondents reported that there was insufficient space, 77.6% reported inadequate toilet facility and around two-third reported unavailability of drinking facility. The shelter homes were also reported as being not safe for women and girls, with 23% reporting they faced problems of gender-based violence in the shelter homes (Annex B: Supplementary tables and graphs- Table 16). These results were corroborated by findings from FGDs, where respondents from Bogura and Jamalpur reported that they went to schools or stayed at homes as shelter homes did not have proper room and lacked water and sanitation facilities, particularly for women and disabled.

Migration

Among the treatment and control groups, the highest percentage of respondents who migrated were reported from treatment group 1 (27.8%) followed by treatment group 3 (23.5%), while less than 10% of respondents reported migration from treatment group 2 and the control group (Annex B: Supplementary tables and graphs- Table 17). In both treatment group 1 and 3, the primary reason for migration reported by the respondents was due to destruction or damage to their house due to floods. Majority of the respondents in all the three treatment groups and the control group reported that the migration was temporary.

Response by Government bodies

The KIIs conducted with the DMC officials threw light on various steps taken by the Government officials in response to the floods. A common step observed in all of the treatment group districts was with regard to preference given to vulnerable groups, like women, children and elderly in flood response. In Kurigram (treatment group 1) the DMCs prepared evacuation plans and informed people to relocate. In Gaibandha the officials informed that they activated the early warning system and mobilized community volunteers to disseminate early warnings. In both

Gaibandha and Jamalpur, the officials arranged medical support, dispatched boats, engaged local police and ensured safety of women.

Social Safety Net Programs (SSNPs)

Only 5.9% of the respondents in three treatment groups and 2.8% of respondents from the control group (who faced floods) reported that they received any support through SSNPs during floods, with around 14% of respondents from treatment group 1 and less than 3% from other groups reporting receiving any benefits. Of these respondents (who received support) majority reported they received rice (~80%), followed by dry food packets (~41%). Majority of the respondents reported (>40%) that the support of rice and dry food packets was provided to them by Government. The support of dry food packets was provided to 82% of the respondents 1 to 7 days after floods, while almost 58% of respondents reported receiving rice 1 to 7 days after floods. On average, 15.7 kg of rice was provided, with average of 17.5 kg in treatment group 1 and 10 kg in all other treatment and control groups. On the other hand, on average 3.5 kg of dry food packets were provided in all three treatment groups and no dry food packets were distributed in the control group (Annex B: Supplementary tables and graphs- Table 18). The findings were substantiated by findings from FGDs of the communities, where respondents from Kurigram and Gaibandha reported receiving rice, dry food, candles and medicines from the Government.

In contrast, the KIIs with the Union Chairman of Begumganj, Kurigram reported that the Upazila Government also provided cash support range from Taka 5000 to 10,000 (EUR 42-84) to almost 120 people based on the need to repair damaged houses.

3.2.4 Recovery from floods

Recovery steps taken by households.

In both treatment group 2 and control group more than 75% of the respondents reported that they did not take any steps for evacuation during floods, nor steps towards recovery of damage to agriculture, livestock, and fisheries or to improve health and WASH practices. The highest percentage of respondents from treatment group 1 took recovery steps for agriculture, livestock and health and wellbeing recovery (Figure 23).

Figure 23: Recovery steps taken by households.
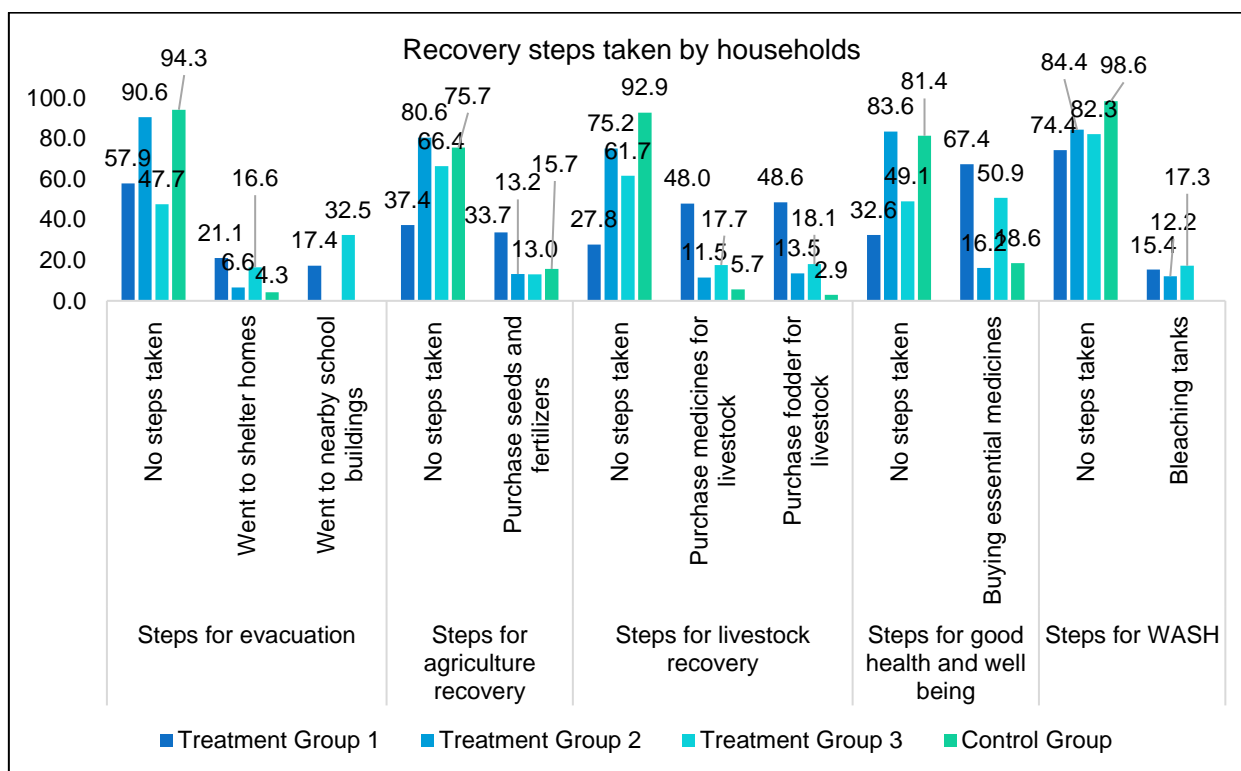
Almost 99% of the respondents from the three treatment groups and 98.6% of respondents from the control group reported that they required external support to cope with losses due to floods. In all three treatment groups, majority of the respondents required support in food (greater than 80% respondents from three treatment groups), cash (96.6% in treatment group1, 84.5% in treatment group 3 and 64.5% in treatment group 2) and medicine (greater than 80% in treatment group 1 and 3 and 53.4% in treatment group 2). Further, 48% of respondents from treatment group 1 also required support regarding Sanitation and 40.7% required support in housing. In treatment group 1, 73% of respondents and treatment group 3, 57% of the respondents reported spending up to 1500 Taka on health recovery post floods (Annex B: Supplementary tables and graphs - Table 19).

More than half of the respondents from treatment group 1 (53.7%) and treatment group 3 (53.8%) and 41.9% of respondents from treatment group 2 reported that they had to take loans for post-flood recovery. Majority of the respondents from all three treatment groups reported taking loans from friends or relatives (52.1%), followed by local NGOs (34.9%). Also, 11% of respondents from treatment group 1 also reported taking loans from informal money lenders. A small proportion of respondents from all three treatment groups and control group also reported taking loans from MFIs or Cooperatives. On average the amount of loan taken by respondents from treatment group 1 and 3 and the control group was around Taka 15000 (EUR 126), but the respondents of treatment group 2 reported taking an average loan of almost Taka 45000 (EUR 377). The average rate of interest of loan was reported around 8.69%, ranging from average interest of 2% in control group to 15% interest rate in treatment group 3 (Annex B: Supplementary tables and graphs - Table 19).

From treatment group 1, 67.9% of respondents reported that they were able to reduce losses due to flood. But on the flipside, only 33%, 26% and 3% of respondents from treatment group 2, treatment group 3 and control group, respectively, reported that they were able to reduce losses due to floods. A significantly positive relationship[20] was observed between taking early action and reducing loss due to floods, with people who took early action reporting that they were able to reduce loss due to floods.

Role of women in post-flood recovery

In the post-disaster period, the major role played by women was regarding storage of fuel and food, which was followed by women taking care of household chores. Only a small percentage of respondents from treatment group 1 (6.5%) and treatment group 3 (11.9%) reported that women provided support in livelihood activities to earn money for the household (Annex B: Supplementary tables and graphs - Table 20).

The qualitative findings from the district Kurigram showed the steps taken by the Government for recovery in the district. These include repairing roads, cleaning, and repairing/building drains.

3.3   Limitations of the study

The findings of this study must be seen in light of some limitations. Firstly, during the data collection process, the data collection agency, based on the suggestions of implementing partners, revisited a few households as some discrepancies were observed in the data. The analysis presented in this report is from the final data shared by the CARE team. Secondly, the household survey questionnaire only collected information on whether the household faced any floods or not and did not collect any information regarding the severity of the floods. To address this limitation, the risk classification[21] data for each district has been used as a proxy. It considers parameters like exposure to hazard, vulnerability and coping mechanism to calculate the risk index.

---

[20] Significance based on chi-square test.
[21] The RISK classification has been provided by INFORM- Index for Risk Management. The Risk classification is calculated based on Exposure to the Hazard, Vulnerability and Coping mechanisms. This secondary source of risk classification has been provided by the CARE team.

4 Recommendations

The findings from the baseline evaluation suggest that all districts in the three treatment groups are at different stages regarding FbA for floods. Both quantitative and qualitative findings underscore the potential for a wide scope of work that needs to be undertaken at community level as well as local, sub national and national government level. In this regard, we discuss possible strategies going forward, based on the findings of this study and the qualitative interviews with communities and Government.

Early warning and early action

At community level, the primary step is to ensure early warning dissemination and awareness generation of communities regarding early actions.

A direct and significant relationship was observed between timing of early warning and early action. Therefore, extending the lead time of early warnings can help people take timely early action and reduce losses. The early messaging should be more widespread with a focus on channels like mobile messaging and calls, display boards and visits by community volunteers. Further, the early warnings should have reliable information and be in local languages to increase their reach and trustworthiness among people. A crucial consideration regarding the source of early warning is the poor connectivity faced by people during floods. While the long-term strategy should be to improve connectivity, a short-term strategy could be to use messaging and calls before the floods and use of digital boards to provide reliable information during floods. Furthermore, the focus should be on providing reliable information. Generally, the information like timing of floods and intensity were covered, but the messages lagged behind in providing information on early action focusing on agromet and livestock advisories, health and nutrition advisories and flood coping mechanisms which should be covered.

The early warning and early action also should take an inclusive approach towards reaching more women (through community volunteers and courtyard sessions), along with specific messages on elderly, children, disabled, pregnant women and other vulnerable groups. The early messages should also include information on the nearest shelter and how to reach there.

For promotion of FbA, courtyard sessions can be organised, and community volunteers can be engaged to visit the households. They can provide information on the importance of taking timely early actions, steps that need to be taken before floods and steps for post-flood recovery. Conducting courtyard sessions and training of community volunteers can also be included in Upazila level and union level disaster management plans.

Reducing losses

The losses due to floods were largely reported in the sectors of agriculture, livestock, poultry, and household damage. To reduce these losses, steps like creation of floating seedbeds and vaccination, making available medicines for livestock and raising or elevating the land can be taken. Shelters homes should be built near each locality and at a height, so that people can observe the condition of their households from these shelters. Information on the locations of shelter homes should be provided in early warnings itself. As a response to floods, boats could be made available and provisions for safe drinking water and sanitation could be prepared. To

reduce impact on the health of people appropriate community level measures, like building mobile medicine clinics and incorporating preventive actions of most prevalent diseases like diarrhoea in the health advisory should be taken.

Cash grants and diversification of social safety net to include programs for employment generation, affordable healthcare and water and sanitation facilities, particularly focusing on females and elderly, is required for proper recovery of the communities from the floods. They can contribute to ensuring that people are able to cope with food scarcity, rising food prices and loss of agricultural labour due to floods. Furthermore, awareness of people on taking loans at banks, grassroot level micro-credit/micro-finance organisations versus using informal moneylenders to avoid debt traps needs to be raised.

Capacity building of DMCs

At the government level, FbA trainings should be provided to all members of DMCs at all levels, while involving female members in DMCs. Further the trainings should also include topics like strengthening communication among different stakeholders (like Upazila Parishad, DMC members etc), proper flood shelter management which should incorporate components on budget allocation, WASH (tubewell, sanitation, latrines), livestock management (cattle sheds, livestock food), stockpiling food for people, boats for evacuation and rescue, and repair of roads. These trainings should ensure proper understanding of early warning system, how warning messages work and are disseminated and how warning messages can reach to the community level effectively. The government at upazila and union level should focus on training community volunteers (like LSP, CPP or red crescent volunteers) who can disseminate reliable information to the communities.

Fund allocation

Fund allocation remains a barrier which was reported in all the districts. To address this, dedicated funds at district and upazila levels should be maintained instead of depending on central government funds at the time of need. For proper fund allocation the use of an Early Action Matrix should be encouraged, which can be included as a part of guidelines on utilization of funds. The government should also focus on diversifying the social safety net programs (SSNPs) for people, as they are currently only limited to food security (rice and dry food packets). The SSNPs can include programs for employment generation, and affordable healthcare and water and sanitation facilities particularly focusing on females and elderly. This can be done in collaboration with various non-governmental organizations working in these areas for welfare of the people. The local governments should be empowered to plan and implement disaster preparedness, rescue and relief and take a community-based approach to disaster management.

Annex A: Sampling

Sample size calculation

Power size calculations were undertaken[22] to determine the minimum sample size required to measure the impact of the project with sufficient accuracy. The household-level outcome indicator – the percentage reduction in households affected by floods – was utilized for power analysis.

Table 5: Parameters used for Power Analysis

Parameter	Value	Sources/Assumptions
Expected baseline levels – the proportion of households	0%	SUFAL II logframe
MDE	5% points	Assumed target
Significance level (alpha)	0.05	Standard
Design effect	1.211	SUFAL I Baseline sampling strategy
Target Population	48,115	Based on SUFAL II target population calculations.

Table 6: Possible sample size based on different power and cluster size

Power	Cluster size[23]	No. of clusters (in each arm)	Treatment sample size (Group 1)	Treatment sample size (Group 2)	Treatment sample size (Group 3)	Control Sample size	Sample	Attrition	Final sample with Attrition accounted for
95%	20	15	300	300	300	300	1200	25	1500
95%	15	20	300	300	300	300	1200	25	1500
95%	10	30	300	300	300	300	1200	25	1500
90%	20	13	260	260	260	260	1040	25	1300
90%	15	17	255	255	255	255	1020	25	1275
90%	10	25	250	250	250	250	1000	25	1250
85%	20	11	220	220	220	220	880	25	1100
85%	15	14	210	210	210	210	840	25	1050
85%	10	21	210	210	210	210	840	25	1050

NOTE: *For the above calculations, it was assumed that the baseline characteristics of both the Treatment and Control groups are similar.*

For the final sampling for baseline survey of SUFAL II, we considered the power of 95% and cluster size of 20 (without accounting for attrition). This gave us the total number of clusters as 60, cluster size as 25 and total sample size as 1500, which accounted for 25% attrition rate.

Sampling strategy

---

[22] This was done in STATA using OPM's power command – *power_cmd_opm*. Results were double-checked with the *clustersampsi* command.
[23] Cluster size calculated here does not account for attrition.

The following sampling procedure was employed to arrive at a final sample of households (spread evenly across treatment and control areas):

- The treatment and control sampling units were selected (i.e. wards (primary sampling units)) through a probability proportional to size (PPS) random sampling process.

- The data collectors then recorded the total number of households in each sampled ward. If the ward had more than 300 households then a ward segregation exercise was conducted. One of the segregated wards was then randomly selected by the data collectors.

- A sampling interval was generated by dividing total number of households in the ward (or in the selected segregated wad) by cluster size (twenty-five in this case).

- The data collectors randomly selected households using right-hand rule starting from the mid-point of the village in the sampled wards (or selected segregated ward). Data collection was done from these selected households.

The households selected at the baseline will be revisited again at the endline – this is a panel of households.

Annex B: Supplementary tables and graphs

Background of respondents

Table 7: Details of Background of respondents

Treatment/ Control Group	Treatment group 1	Treatment group 2	Treatment group 3	Control group	Total
N	550	525	319	100	1494
District					
Kurigram (%)	45.5	0.0	47.0	0.0	26.8
Gaibandha (%)	54.5	0.0	23.5	0.0	25.1
Bogura (%)	0.0	42.9	13.8	0.0	18.0
Jamalpur (%)	0.0	57.1	15.7	0.0	23.4
Sirajganj (%)	0.0	0.0	0.0	50.0	3.3
Tangail (%)	0.0	0.0	0.0	50.0	3.3
Gender					
Male (%)	16.2	29.3	32.9	26.0	24.9
Female (%)	83.8	70.7	67.1	74.0	75.0
Age group					
Below 20 yrs (%)	2.2	3.6	3.1	5.0	3.1
21 to 30 yrs (%)	21.1	20.4	15.7	13.0	19.1
31 to 40 yrs (%)	39.5	35.0	32.3	25.0	35.4
41 to 50 yrs (%)	21.3	21.5	25.7	31.0	23.0
51 to 60 yrs (%)	10.2	12.2	16.0	14.0	12.4
Above 60 yrs (%)	5.8	7.2	7.2	12.0	7.0
Any disability					
Yes (%)	25.1	8.8	18.8	10.0	17.0
Religion					
Islam (%)	94.7	98.7	91.2	100.0	95.7
Hindu (%)	5.3	1.1	8.8	0.0	4.2
Others (%)	0.0	0.2	0.0	0.0	0.1
Migration Status					
Original inhabitant of the village (%)	97.8	98.9	99.7	100.0	98.7
Migrant (%)	0.7	0.0	0.0	0.0	0.3
Internally Displaced Person (IDP) (%)	1.5	0.8	0.3	0.0	0.9
Ethnicity					
Bangali (%)	99.8	99.8	99.7	100.0	99.8
Indigenous tribes (%)	0.2	0.0	0.3	0.0	0.1
Bangali Lower castes (%)	0.0	0.2	0.0	0.0	0.1
Total monthly income(of Household)					
Less than Taka 3000	6.5	3.4	4.1	4.0	4.8
Taka 3000 - 5000	19.1	14.7	15.7	14.0	16.5
Taka 5000 - 10000	51.6	39.4	56.1	48.0	48.1
Taka 10000 - 20000	18.2	31.2	20.1	18.0	23.2
More than Taka 20000	4.5	11.2	4.1	16.0	7.6
Total monthly income of women					
Doesn't earn	74.5	77.5	82.1	93.0	78.4
Less than Taka 3000	17.6	12.2	9.4	4.0	13.1
Taka 3000 - 5000	4.4	3.2	6.6	0.0	4.1

Taka 5000 - 10000	2.7	3.0	1.9	3.0	2.7
Taka 10000 - 20000	0.4	3.0	0.0	0.0	1.2
More than Taka 20000	0.4	1.0	0.0	0.0	0.5
Children below 5 years getting treatment for malnourishment					
Yes(%)	5.6	4.8	0.9	0.0	3.9
Household ownership					
Owned	77.3	86.3	81.8	92.0	82.4
Rented	4.4	1.1	1.6	3.0	2.5
Shared	4.4	0.2	0.3	0.0	1.7
Living on premises with employer	6.2	1.0	4.1	3.0	3.7
House provided by employer	1.8	1.0	2.5	0.0	1.5
Government owned Khas land	0.4	6.9	6.3	1.0	3.9
Mortgaged house	2.2	0.2	0.3	0.0	0.9
Live in friend/family/others house	1.1	1.1	0.6	0.0	0.9
Ownership of assets					
House is owned by					
Male	95.1	95.1	94.3	90.2	94.6
Female	4.9	4.9	5.7	9.8	5.4
Owns a land	39.1	48.2	28.8	41.0	40.2
Land is owned by					
Male	99.1	98.4	96.8	97.6	98.3
Female	0.5	1.2	2.2	2.4	1.2
Owns a mobile phone					
Smart	38.5	47.0	29.5	52.0	40.5
Basic	91.1	81.5	75.2	94.0	99.9
Owns a television set	23.1	22.1	24.5	38.0	24.0
Main occupation of Household head					
Cultivation in own land	18.2	35.2	11.9	21.0	23.0
Landless agriculture Labour/ Manual casual labour/ Subsistence Farmer	42.0	39.8	56.7	28.0	43.4
Fishing	1.1	0.0	0.6	0.0	0.5
Regular salaried	2.4	0.8	0.9	7.0	1.8
Contractual labour	5.1	0.8	3.4	1.0	2.9
Domestic work	3.1	1.7	2.8	4.0	2.6
Domestic help (house helps)	0.7	0.8	0.9	0.0	0.7
Construction worker / plumber/ mason/ labour/ painter/ welder/ security guard/ coolie and other head-load worker	6.7	2.1	5.3	7.0	4.8
Home-based worker/ artisan/ handicrafts worker / tailor	0.4	0.8	1.9	1.0	0.9

Engine vehicle driver ? Bus/ Car driver / driver/ conductor/ helper to drivers and conductors	0.7	0.8	0.0	2.0	0.7
Non-engine vehicle driver - cart puller/ rickshaw puller	4.2	1.5	3.8	4.0	3.1
Shop worker/ assistant/ peon in small, establishment/ helper/ delivery assistant / attendant/ waiter	2.2	0.6	3.4	0.0	1.7
Regular salaried	1.6	3.2	2.2	6.0	2.6
Poultry/Livestock	0.7	0.4	0.6	1.0	0.6
No income from any source	2.7	1.0	0.9	4.0	1.8
Others	6.9	8.4	3.8	11.0	7.0

Early Warning

Figure 24: Timeliness of early warning
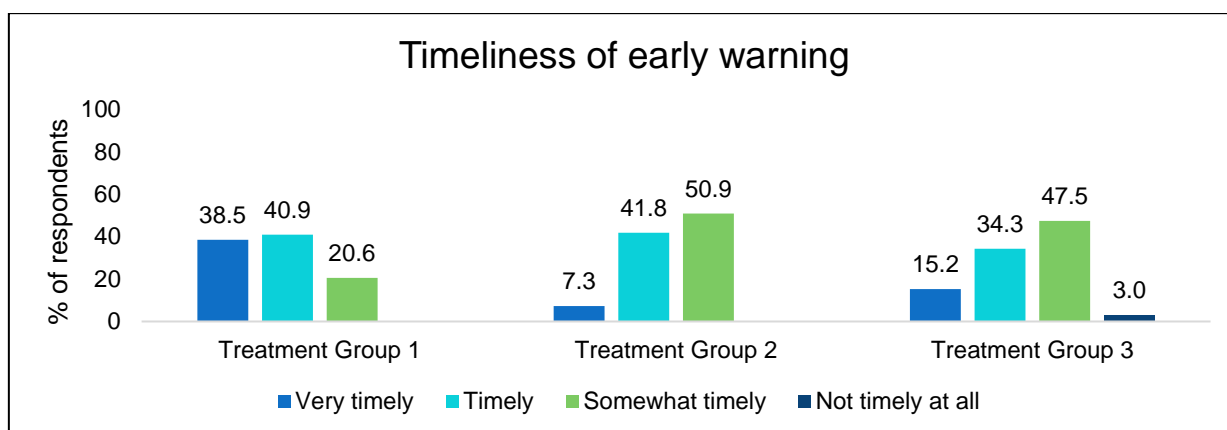
Figure 25: Were respondents able to understand early warning messages.
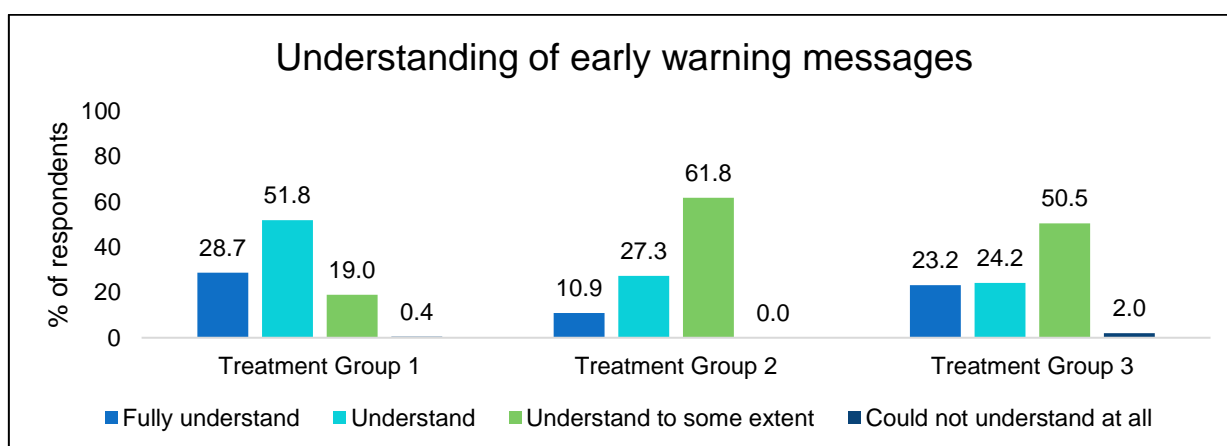
Figure 26: Trust in early warning

Trust in early warning
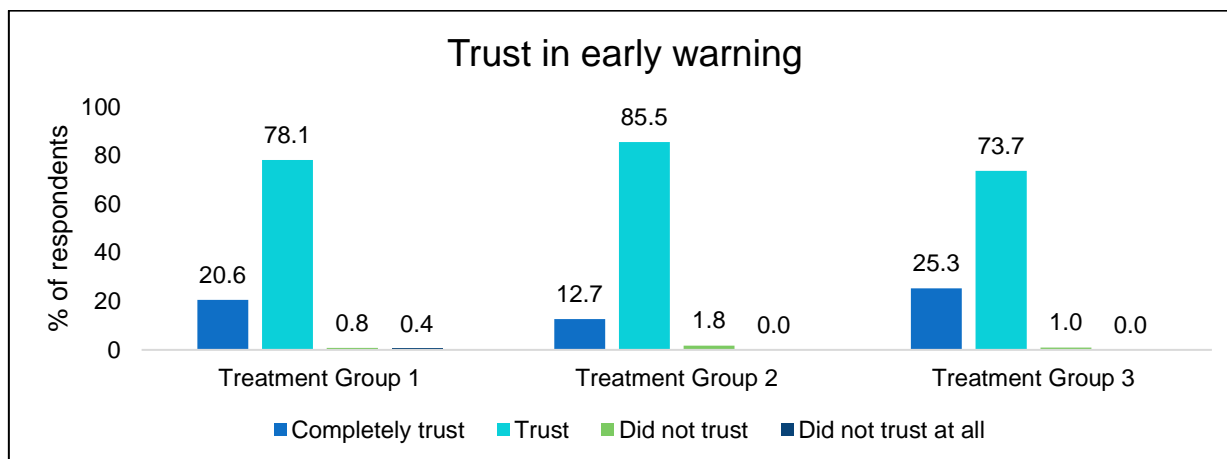
Early action

Table 8: Discussion on what early actions should be taken

Discussion on what early actions should be taken	Treatment group 1	Treatment group 2	Treatment group 3	Overall
There was discussion in family on the next steps after receiving early warning	82.2	45.5	73.7	75.1
Who participated in the discussion?				
Adult male members	92.6	96.0	87.7	91.7
Young male members	47.3	16.0	17.8	37.5
Adult female members	64.0	88.0	57.5	64.5
Young female members	18.7	12.0	6.8	15.3
Relatives / friends / neighbours	4.9	0.0	1.4	3.7

Table 9: What early action was taken

What Early action was taken	Treatment group 1 (%)	Treatment group 2 (%)	Treatment group 3 (%)	Overall (%)
Packed important documents and valuables (money, jewellery etc.) in a small bag	46.7	48.5	67.1	51.7
Packed clothes in bags	27.5	21.2	5.9	21.8
Preserved dry food, cooking fuel, firewood, firebox, portable stove	94.2	81.8	71.8	87.7
Arranged small boats and homemade raft	43.3	9.1	10.6	32.4
Collected water purification tablets before floods	27.5	6.1	8.2	20.9
Arranged tube well sealing, water reservoirs, heightened tube well heads	14.2	0.0	4.7	10.6
Collected emergency medicine and oral saline before flood	18.8	6.1	3.5	14.0
Relocated livestock on higher grounds, reserved livestock feed	36.7	24.2	9.4	29.1
Dissembled houses and moved household assets and belongings in higher or safer places	14.2	3.0	3.5	10.6
Dissembled houses and moved to higher or safer places	7.9	0.0	0.0	5.3
Charged mobile phones fully	40.0	18.2	11.8	31.3
Harvested crop/ fish early	1.7	3.0	1.2	1.7
Stored harvested crops in safe stores	5.4	3.0	0.0	3.9

What Early action was taken	Treatment group 1 (%)	Treatment group 2 (%)	Treatment group 3 (%)	Overall (%)
Secured the small shop/ SMEs	0.8	0.0	0.0	0.6
Arranged feminine hygiene products and medicines before the flood	2.9	0.0	0.0	2.0
Did nothing	0.8	3.0	0.0	0.8

Table 10: Early action taken for different sector.

Early action	Treatment group 1 (%)	Treatment group 2 (%)	Treatment group 3 (%)	Overall (%)
Agriculture				
Put agriculture input on raised platform	20.4	51.5	23.5	24.0
Put agriculture input in Shelter	10.8	24.2	5.9	10.9
Put agriculture input in relative's house	11.7	9.1	3.5	9.5
Put agriculture input in mait	9.2	39.4	2.4	10.3
Put agriculture input in Community seed bank	1.3	0.0	0.0	0.6
Put agriculture input in plastic bags	10.0	12.1	1.2	8.1
No action for agriculture inputs	4.6	12.1	8.2	6.1
Poultry				
Put poultry in Shelter	15.4	0.0	4.7	11.5
Put poultry in relative's house	24.2	0.0	5.9	17.6
Sell poultry	30.8	0.0	11.8	23.5
No action for poultry	14.6	15.2	10.6	13.7
Livestock				
Livestock taken on high ground/ embankment	24.6	18.2	8.2	20.1
Livestock taken to a shelter	9.6	0.0	1.2	6.7
Livestock taken to relative's house	6.7	6.1	0.0	5.0
Sell Livestock	6.3	0.0	2.4	4.7
Livestock vaccination	27.5	0.0	2.4	19.0
Storing deworming tablets	13.8	0.0	0.0	9.2
No actions for livestock	8.3	15.2	34.1	15.1
Menstruation				
Used pills	46.7	42.4	37.6	44.1
Kept medicines in waterproof box	27.5	3.0	3.5	19.6
Packed sanitary pads	21.7	48.5	3.5	19.8
No action	12.5	9.1	55.3	22.3
Health				
For general health kept important contacts	23.8	0.0	1.2	16.2
For general health kept medicines in waterproof box	15.0	0.0	2.4	10.6
For general health kept a first-aid box	27.5	3.0	0.0	18.7
Collect emergency medicine and oral saline for water borne disease	58.8	12.1	7.1	42.2
No action for health	7.1	33.3	9.4	10.1
Clothes				
Clothes in plastic bag	76.3	45.5	40.0	64.8
Clothes on raised platform	29.2	21.2	54.1	34.4
Clothes in shelter	12.5	0.0	5.9	9.8

Early action	Treatment group 1 (%)	Treatment group 2 (%)	Treatment group 3 (%)	Overall (%)
No action for clothes	2.9	0.0	2.4	2.5
Household				
Household utensils in plastic bag	39.6	42.4	16.5	34.4
Household utensils on raised platform	20.0	30.3	45.9	27.1
Household utensils in shelter	9.2	3.0	5.9	7.8
No action for Household utensils	3.8	9.1	2.4	3.9
Water				
Water in plastic	6.7	6.1	2.4	5.6
Water/mait	25.8	0.0	3.5	18.2
Water/gallon	2.1	0.0	1.2	1.7
Tube well sealing and heightened tube well head	15.8	0.0	2.4	11.2
No action for Water	3.3	0.0	1.2	2.5
Cooking fuel				
Cooking fuel on raised platform	20.8	12.1	5.9	16.5
Cooking fuel in shelter	9.2	0.0	2.4	6.7
Cooking fuel on roof	2.5	0.0	0.0	1.7
Cooking fuel in plastic	27.1	0.0	1.2	18.4
No action for cooking fuel	1.7	0.0	1.2	1.4
Food				
Food on raised platform	10.0	6.1	2.4	7.8
Food in relative's house	7.9	3.0	1.2	5.9
Food on roof	0.0	0.0	1.2	0.3
Food/ mait	12.1	0.0	2.4	8.7
Food/ plastic	2.9	0.0	1.2	2.2
No action for food	2.1	3.0	3.5	2.5
Jewellery				
Jewellery kept personally	27.5	54.5	67.1	39.4
Jewellery kept on raised platform	5.8	24.2	11.8	8.9
Jewellery kept in shelter	1.7	0.0	4.7	2.2
Jewellery kept in plastic bags	7.1	33.3	3.5	8.7
No action for jewellery	7.1	9.1	8.2	7.5
Cash				
Cash kept personally	55.0	45.5	10.6	43.6
Cash kept on raised platform	3.3	21.2	3.5	5.0
Cash kept in shelter	8.8	0.0	1.2	6.1
Cash kept in plastic bags	30.8	3.0	1.2	21.2
No action for cash	3.3	0.0	3.5	3.1
Documents				
Documents in plastic bag	30.0	3.0	9.4	22.6
Documents in shelter	3.8	0.0	3.5	3.4
Documents on raised platform	9.2	3.0	2.4	7.0
No action for documents	11.7	15.2	5.9	10.6

Table 11: Who took the decision to pack things?

Who took the decision on what to pack/ arrange?	Treatment Group 1	Treatment Group 2	Treatment Group 3	Overall
Adult male members	82.5	51.5	92.9	82.1
Young male members	30.4	3.0	20.0	25.4
Adult female members	70.8	42.4	69.4	67.9
Young female members	8.3	0.0	2.4	6.1
Relatives / friends / neighbours	0.8	0.0	0.0	0.6
Who packed / arranged things?				
Adult male members	70.4	48.5	85.9	72.1
Young male members	28.7	0.0	21.2	24.3
Adult female members	76.7	33.3	72.9	71.8
Young female members	7.9	0.0	0.0	5.3
Relatives / friends / neighbours	0.4	0.0	0.0	0.3

During floods

Table 12: Loss due to floods

Loss due to floods	Treatment group 1	Treatment group 2	Treatment group 3	Control group
Life	19.9	1.5	4.2	0.0
Health related	56.5	19.6	48.6	6.0
Livestock	51.2	31.2	38.7	29.9
Crop	55.3	74.9	44.3	56.7
Agricultural Land	29.5	28.4	14.2	29.9
Residential House	51.6	14.4	54.2	26.9
Loss of other assets	2.8	2.1	0.5	1.5
Livelihood	44.1	27.8	30.7	46.3
Credit	25.8	12.8	34.0	3.0
Education	16.5	7.0	11.8	1.5
Job opportunity	2.2	0.9	0.0	1.5
Poultry	51.2	36.4	32.5	23.9
Flood-borne disease	96.9	60.0	77.8	
Washed away by flood	10.9	40.0	22.2	
Electrocution	4.7	0.0	0.0	
House/tree collapse	28.1	40.0	11.1	

Table 13: Loss due to floods in different sectors

Loss due to floods	Treatment group 1 (%)	Treatment group 2 (%)	Treatment group 3 (%)	Control group (%)
Agriculture and livelihood				
None	1.9	3.4	1.9	3.0
Crop damage	51.6	80.1	46.2	56.7
Damage of seedlings	38.5	39.8	30.7	41.8
Not able to sell produce (crop)	12.7	11.9	11.3	7.5
Low price of produce (crop)	13.7	10.7	11.3	4.5
Loss of employment as day labour (agriculture)	48.1	17.1	50.5	34.3

Loss due to floods	Treatment group 1 (%)	Treatment group 2 (%)	Treatment group 3 (%)	Control group (%)
Loss of employment as day labour (non-agriculture)	36.3	16.2	49.5	13.4
Less wage	33.9	9.5	32.5	26.9
Loss of forestry resources (trees)	3.4	1.5	0.5	3.0
Death, disease, injury of cattle/livestock	31.7	18.7	13.2	19.4
Shortage of fodder/feed for livestock	25.2	17.1	11.3	16.4
Not able to sell produce (livestock)	1.2	3.1	0.5	0.0
Low price of produce (livestock)	2.8	2.8	2.4	1.5
Death, disease, injury of poultry	49.7	25.4	16.0	20.9
Shortage of feed for poultry	31.7	18.0	13.7	17.9
Not able to sell produce (poultry)	18.6	10.1	5.2	3.0
Low price of produce (poultry)	14.6	8.0	4.7	4.5
Damage to fish ponds	0.6	1.5	0.0	1.5
Fish produce loss	0.6	0.6	0.0	0.0
Low price of produce (fish)	0.3	0.0	0.0	0.0
Migration due to loss of livelihood	0.6	0.0	0.0	1.5
Food security and nutrition				
None	6.2	23.9	10.4	32.8
Scarcity of staple food (rice, flour)	76.7	55.4	61.3	53.7
High market prices of rice and vegetables	81.1	56.6	68.4	37.3
Damage to stoves and cooking utensils	73.0	23.9	66.0	26.9
Damage/spoilage of stored food (rice, paddy, flour)	27.0	20.5	10.4	10.4
Health				
None	18.0	59.6	25.0	62.7
Outbreaks of air and water borne diseases	73.9	28.1	59.4	37.3
Lack of access to healthcare services (doctor, medicine)	51.9	23.2	34.4	0.0
Increase in medical expenses	54.7	21.4	38.2	0.0
WASH				
None	12.7	59.3	12.7	41.8
Shortage of clean drinking water	73.3	27.8	83.5	41.8
Shortage of clean water for cooking and cleaning/bathing	66.8	25.4	47.2	31.3
Damage to toilets	60.9	21.7	48.1	23.9
Lack of products for personal hygiene, e.g. soap, clean water	62.1	16.8	32.1	3.0
Shortage of menstrual hygiene products	31.1	5.8	9.9	0.0
Infrastructure, shelter, and communication				
None	22.4	61.2	27.8	50.7
Partial damage of house	55.6	24.5	50.9	34.3
Complete damage of house	5.9	1.2	4.7	0.0
Domestic utensils/ valuable assets/ documents	20.2	6.7	29.2	0.0
Damage of roads and embankments	48.4	15.6	12.7	16.4
Disruption of electrical lines	9.0	5.5	1.4	0.0
Mobile connectivity				
Good Connectivity	16.6	22.6	6.9	10.0
Poor connectivity	74.2	76.9	92.1	90.0

Loss due to floods	Treatment group 1 (%)	Treatment group 2 (%)	Treatment group 3 (%)	Control group (%)
No connectivity at all	9.3	0.4	1.1	
Electricity supply				
Continuous	25.8	19.0	59.6	5.7
Day time	10.7	11.1	2.9	0.0
Night-time	5.3	2.4	2.9	8.6
Schedule hours	22.5	56.8	12.6	51.4
Solar Panel	15.4	9.0	13.0	31.4
No electricity	20.2	1.7	9.0	2.9

Figure 27: Most prevalent disease due to floods
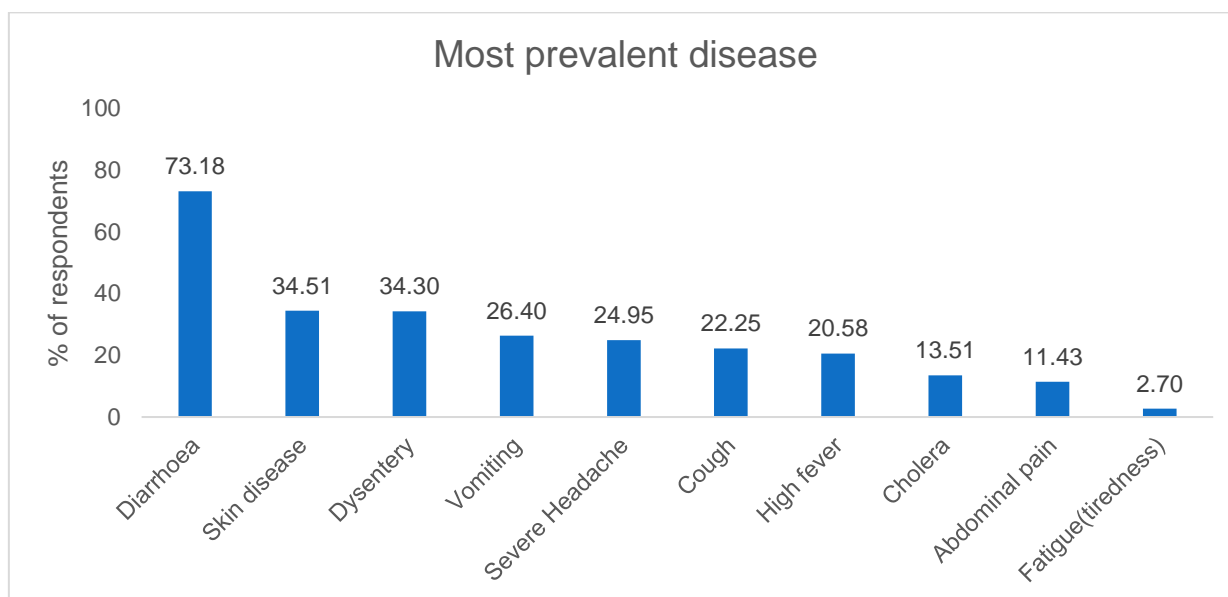
		Treatment Group 1	Treatment Group 2
Was there inrease in price of household products	Yes	83.7	68.2
If yes, which products?			
Agriculture	Cereals	96.0	97.5
	Vegetables	93.6	95.0
	Fruits	38.3	39.2
Fisheries	Fish based food	14.4	16.0
	Fishing equipment	15.4	3.8
Household	Cooking fuel	37.2	34.5

		Treatment Group 1	Treatment Group 2
	Electricity	0.7	0.9
Health	Fees of health service providers	11.1	5.3
	Essential medicines	42.3	14.1
Livestock	Medicines for livestock	34.2	15.0
	Food for livestock	40.9	26.6
WASH	Menstrual hygiene products	14.8	2.5
	Drinking water	1.7	0.3
	Hygiene related products	10.4	2.2
Transport	Natural gas	0.3	0.9

Table 14: Increase in prices of household products?

		Treatment group 1 (%)	Treatment group 2 (%)	Treatment group 3 (%)	Control group (%)
Was there increase in price of household products	Yes	83.7	68.2	71.1	88.6
If yes, which products?					
Agriculture	Cereals	96.0	97.5	89.3	100.0
	Vegetables	93.6	95.0	95.9	64.5
	Fruits	38.3	39.2	25.9	25.8
Fisheries	Fish based food	14.4	16.0	1.5	3.2
	Fishing equipment	15.4	3.8	1.5	0.0
Household	Cooking fuel	37.2	34.5	44.7	19.4
	Electricity	0.7	0.9	0.0	0.0
Health	Fees of health service providers	11.1	5.3	4.1	0.0
	Essential medicines	42.3	14.1	30.5	25.8
Livestock	Medicines for livestock	34.2	15.0	23.4	25.8
	Food for livestock	40.9	26.6	28.4	33.9
WASH	Menstrual hygiene products	14.8	2.5	19.3	1.6
	Drinking water	1.7	0.3	0.0	1.6
	Hygiene related products	10.4	2.2	20.3	0.0
Transport	Natural gas	0.3	0.9	0.0	0.0

Table 15: Average amount of damage due to floods

Amount of damage due to floods (in Taka)	Treatment group 1	Treatment group 2	Treatment group 3	Control group
Crop damage	8078.6	26080.4	8507.9	11656.7

Amount of damage due to floods (in Taka)	Treatment group 1	Treatment group 2	Treatment group 3	Control group
Horticulture	687.4	156.9	548.6	1798.5
Forestry	431.7	1.5	40.1	2194.0
Livestock	3798.0	4167.9	3629.1	3907.5
Fish farming	48.1	901.7	179.3	373.1
Fishing (natural)	25.9	98.2	84.4	0.0
Poultry	1487.0	1342.0	941.0	610.4
Small business	357.1	767.6	1056.6	0.0
Job opportunity	1170.8	376.1	0.0	298.5
Health	1405.1	1150.9	1484.6	283.6
WASH (Water, Sanitation, toilet and Hygiene for Health)	670.9	627.1	813.0	80.6
Domestic utensils/ valuable assets/ documents	579.2	184.6	2926.4	164.2
Migration	615.5	472.3	847.0	119.4
Damage of household	1892.4	1200.8	4061.5	1119.4
Loss of agricultural labor	1815.8	3217.1	5436.8	925.4
Loss of non-agricultural labor	1181.4	1479.7	1423.3	583.6

Figure 28: Women of household found gender-responsive early actions beneficial.
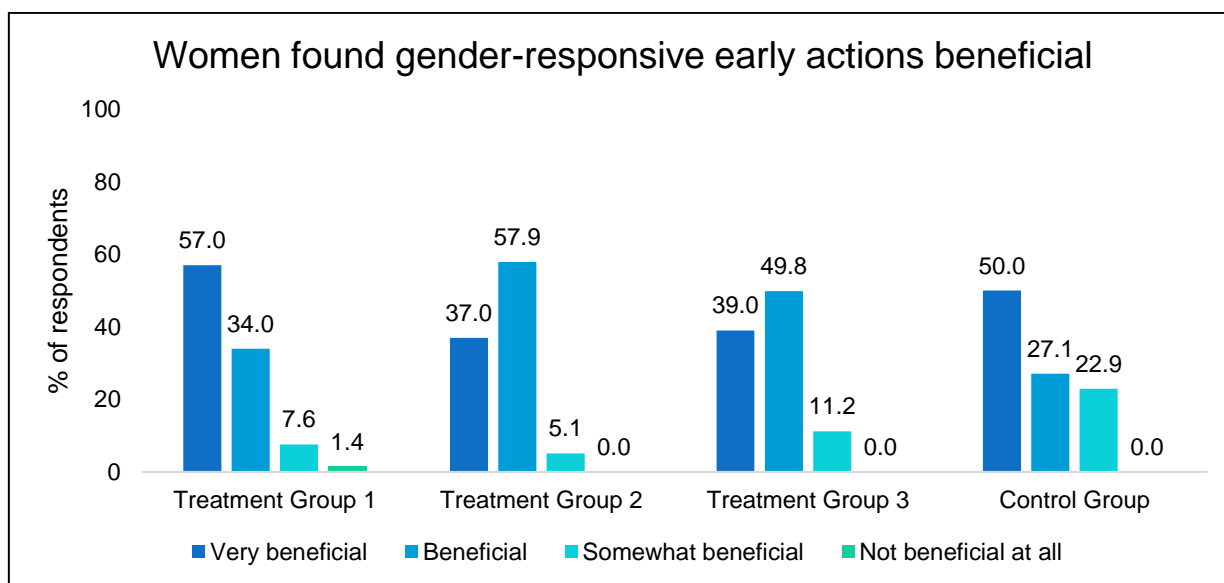
Table 16: Flood coping strategy

Flood coping strategy	Treatment group 1 (%)	Treatment group 2 (%)	Treatment group 3 (%)	Control group (%)
Respondents who left home to stay with neighbours/ friends?	36.2	3.6	29.2	4.3
Consequences on family due to moving				
No consequences to the family	4.7	29.4	8.6	0.0
Reduced food expenditure	67.4	64.7	85.2	100.0
Reduced non-food expenditure	48.1	35.3	71.6	0.0
Could not seek treatment if sick	55.8	5.9	60.5	33.3
Could not pay for child's education	23.3	5.9	53.1	33.3
Sale assets	23.3	0.0	3.7	0.0

Flood coping strategy	Treatment group 1 (%)	Treatment group 2 (%)	Treatment group 3 (%)	Control group (%)
Borrow money from lender / relatives	39.5	5.9	6.2	0.0
Major problems faced during flood rescue?				
No Road	63.2	43.8	39.4	22.9
No Shelter home	37.4	34.2	65.7	1.4
Lack of security for Women/ Children/ Elderly in shelter homes	30.6	13.9	17.3	0.0
No Bridge/Culvert	34.6	15.2	13.0	0.0
Insufficient Information on disaster	20.5	38.5	19.1	35.7
Shelter homes				
Respondents who moved to a shelter home (%)	28.4	1.7	23.5	10.0
Reasons for not moving to a shelter house				
Asset back at home might be stolen	20.2	36.5	16.5	38.1
Taking small livestock with us is a problem	6.7	3.7	2.4	3.2
Taking large livestock with us is a problem	6.7	2.2	2.8	3.2
Spaces in the shelter is inadequate	15.0	4.1	5.2	0.0
Toilet facility in the shelter is a problem for female	13.0	9.3	4.7	3.2
Travelling the distance to the shelter with all family members is a problem	6.7	10.0	1.9	1.6
Did not feel the magnitude of the disaster required to relocate to shelter	0.8	2.6	0.9	1.6
Lack of privacy for women	5.5	6.5	0.5	1.6
Incidences of violence and sexual harassment against women and children	2.0	0.2	0.0	1.6
Lack of child friendly spaces	2.0	3.7	0.0	1.6
There is no Shelter centre	25.3	32.0	58.0	1.6
Took shelter in the relatives house	5.5	1.3	1.4	0.0
Experience at shelter houses				
Was there separate room for women in the shelter?	10.7	12.5	9.2	0.0
Was there separate toilet for women in the shelter?	4.9	12.5	1.5	0.0
Was there separate area to dispose menstrual waste?	1.9	12.5	3.1	0.0
Problems faced in shelter homes				
No problem were faced at shelter homes	3.9	0.0	0.0	0.0
Unavailable toilet facility	66.0	100.0	90.8	100.0
Unavailable drinking water facility	52.4	25.0	93.8	57.1
Insufficient space	86.4	25.0	92.3	71.4
Lack of privacy	70.9	50.0	86.2	42.9
Not secure for Women and Adolescent girls	68.9	12.5	72.3	42.9
Gender based violence	17.5	0.0	32.3	42.9
Respondents who moved to a shelter home (%)	28.4	1.7	23.5	10.0

Table 17: Migration by respondents

Migration by respondents	Treatment group 1 (%)	Treatment group 2 (%)	Treatment group 3 (%)	Control group (%)
No migration	72.2	96.2	76.5	94.3

Migration by respondents	Treatment group 1 (%)	Treatment group 2 (%)	Treatment group 3 (%)	Control group (%)
Yes, family/family head migrated to another locality due to damage of cultivable land caused by flood	5.3	0.4	2.5	1.4
Yes, family/family head migrated to another locality due to damage/destruction of house caused by flood	18.5	3.2	18.8	2.9
Yes, family/family head migrated to another locality due to lack of work and food caused by flood	2.5	0.0	1.1	1.4
Type of migration (if migrated)				
Temporary	96.0	88.9	90.8	100.0
Permanent	4.0	11.1	9.2	0.0

Table 18: SSNP support

SSNP support	Treatment group 1 (%)	Treatment group 2 (%)	Treatment group 3 (%)	Control group (%)
Respondents who received support during floods (%)	14.3	1.9	2.2	2.9
What kind of support?				
Cash for work (%)	0.0	0.0	16.7	0.0
Unconditional cash (%)	2.0	11.1	0.0	0.0
Food for work (%)	0.0	0.0	16.7	0.0
Rice (%)	78.4	88.9	83.3	100.0
Dry food packets (%)	45.1	11.1	66.7	0.0
Animal food packets (%)	0.0	0.0	16.7	0.0
Baby food (%)	2.0	0.0	0.0	0.0
Housing grant (%)	3.9	11.1	0.0	0.0
Rice				
Who Provided the support?				
Government (%)	77.5	100.0	100.0	100.0
International NGO (%)	0.0	0.0	20.0	0.0
National NGO (%)	5.0	0.0	0.0	0.0
Friends/Relatives (%)	5.0	0.0	0.0	0.0
Local voluntary organizations (%)	15.0	0.0	40.0	0.0
Local elites (%)	7.5	0.0	20.0	0.0
Religious organisations (%)	5.0	0.0	0.0	0.0
When did you receive the support?				
1-5 days before the flooding started (%)	2.5	0.0	40.0	100.0
1-7 days after the flooding started (%)	62.5	50.0	60.0	0.0
8-14 days after the flooding started (%)	27.5	12.5	0.0	0.0
More than two weeks after the flooding started (%)	7.5	37.5	0.0	0.0
Who received the compensation/help?				
Adult male member (%)	80.0	50.0	80.0	50.0
Adult female member (%)	20.0	50.0	20.0	50.0
Young member of the household (absence of adult member) (%)	5.0	0.0	0.0	0.0
How much? (in kg)	17.5	10.0	10.0	10.0
Dry food packets				
Who Provided the support?				
Government (%)	30.4	100.0	100.0	-

SSNP support	Treatment group 1 (%)	Treatment group 2 (%)	Treatment group 3 (%)	Control group (%)
International NGO (%)	8.7	0.0	0.0	-
National NGO (%)	8.7	0.0	25.0	-
Friends/Relatives (%)	4.4	0.0	0.0	-
Local voluntary organizations (%)	39.1	0.0	25.0	-
Local elites (%)	8.7	0.0	0.0	-
Religious organisations (%)	13.0	0.0	0.0	-
When did you receive the support?				
1-5 days before the flooding started (%)	0.0	0.0	50.0	-
1-7 days after the flooding started (%)	87.0	100.0	50.0	-
8-14 days after the flooding started (%)	8.7	0.0	0.0	-
More than two weeks after the flooding started (%)	4.4	0.0	0.0	-
Who received the compensation/help?				
Adult male member (%)	78.3	0.0	75.0	-
Adult female member (%)	17.4	100.0	25.0	-
Young member of the household (absence of adult member) (%)	13.0	0.0	0.0	-
How much? (in kg)	3.4	3.0	3.8	-

Recovery steps taken during floods

Table 19: Recovery steps taken by households

Recovery steps taken by households	Treatment group 1 (%)	Treatment group 2 (%)	Treatment group 3 (%)	Control group (%)
Steps taken for evacuation of you and your family after the disaster				
No steps taken (%)	57.9	90.6	47.7	94.3
Went to shelter homes (%)	21.1	6.6	16.6	4.3
Went to nearby school buildings (%)	17.4	1.3	32.5	0.0
Went to relatives/ friend's house (%)	6.7	0.6	0.0	0.0
Steps taken to recover the damage due to floods regarding agriculture				
No steps taken (%)	37.4	80.6	66.4	75.7
Constructing embankments (%)	5.6	3.6	4.7	1.4
Soil testing (%)	2.0	0.2	1.4	0.0
Soil treatment (%)	3.1	2.6	1.1	0.0
Purchase seeds and fertilizers (%)	33.7	13.2	13.0	15.7
Steps taken to recover the damage due to floods regarding livestock				
No steps taken (%)	27.8	75.2	61.7	92.9
Purchase medicines for livestock (%)	48.0	11.5	17.7	5.7
Purchase fodder for livestock (%)	48.6	13.5	18.1	2.9
Built platform (%)	24.4	1.9	1.1	0.0
Steps taken to recover the damage due to floods regarding fisheries				
No steps taken (%)	37.4	80.1	58.8	84.3
Constructing embankments (%)	4.2	0.6	2.9	0.0
Water testing (%)	1.7	0.0	1.8	0.0
Water treatment (%)	2.2	0.4	2.2	0.0

Recovery steps taken by households	Treatment group 1 (%)	Treatment group 2 (%)	Treatment group 3 (%)	Control group (%)
Fry (baby fish) food like green water, infusoria etc (%)	2.8	0.4	0.4	0.0
Steps taken to ensure good health and well-being after the disaster for you and your family				
No steps taken (%)	32.6	83.6	49.1	81.4
Buying essential medicines (%)	67.4	16.2	50.9	18.6
Steps taken take to ensure proper hygiene and sanitation practices after the disaster for you and your family				
No steps taken (%)	74.4	84.4	82.3	98.6
Clean septic tank (%)	3.7	6.2	0.4	1.4
Bleaching tanks (%)	15.4	12.2	17.3	1.4
Did you need more external support to cope with losses due to floods?				
No external support needed (%)	0.0	2.1	0.4	1.4
Food (%)	90.2	81.0	93.9	85.7
Medicine (%)	81.7	53.4	81.6	77.1
Cooking fuel (%)	34.6	28.6	33.6	22.9
Water (%)	18.5	6.8	10.8	8.6
Sanitation (%)	48.0	24.6	41.2	32.9
Cash money (%)	96.6	64.5	84.5	94.3
Agriculture inputs (%)	14.9	22.6	14.4	20.0
Livestock (%)	33.1	25.9	25.3	27.1
Poultry (%)	0.3	0.2	0.7	0.0
Fish culture (%)	0.6	0.9	0.0	0.0
Fishing inputs (%)	0.3	0.9	0.0	0.0
Housing support (%)	40.7	10.5	38.6	22.9
Cost of post-flood health recovery				
No expense (%)	19.7	58.8	30.0	60.0
0 – 1000 Taka (%)	35.1	10.3	18.4	34.3
1001 – 1500 Taka (%)	37.9	15.6	38.6	1.4
1501 – 2000 Taka (%)	4.2	4.5	4.0	0.0
2000+ Taka (%)	3.1	10.9	9.0	4.3
Respondents who took loans for post-flood recovery	53.7	41.9	53.8	27.1
Source from which loans were taken				
Local NGO (%)	27.2	38.3	40.3	10.5
National NGO (%)	3.1	0.5	0.7	0.0
Cooperatives/ MFIs (%)	10.5	8.7	12.1	21.1
Friends/Relatives (%)	54.5	59.2	39.6	84.2
Government Agency (%)	0.0	1.5	0.0	0.0
Mohajon (%)	11.5	2.6	7.4	0.0
Bank (%)	0.0	0.0	5.4	0.0
Average amount of loan taken (in Taka)	15990.1	44993.4	14308.7	15579.0
Average interest rate on loan taken (%)	7.7	5.1	15.5	2.3

Table 20: Role of Women in post-flood recovery

Role of women in post-flood recovery	Treatment group 1 (%)	Treatment group 2 (%)	Treatment group 3 (%)	Control group (%)
Food storage (%)	90.2	72.2	81.2	75.7
Fuel storage (%)	87.9	76.7	97.1	91.4
Take care of livestock (%)	69.4	47.6	30.0	38.6
Take part in household reconstruction (%)	66.0	26.9	26.0	31.4
Borrow from micro-credit institutions for supporting family's rehabilitation (%)	11.0	3.0	6.1	0.0
Childcare (%)	47.8	38.2	28.9	20.0
Care for elderly/sick (%)	31.7	21.2	25.3	17.1
Household chores – cooking, cleaning (%)	77.8	41.7	40.1	70.0
Fetching water (%)	33.4	11.1	5.8	20.0
Support with livelihood activities for earning money (%)	6.5	0.4	11.9	0.0

Annex C: Baseline indicator values

Table 21: Baseline indicator values

Indicator	Treatment group 1	Treatment group 2	Treatment group 3	Baseline Value (Avg of treatment groups)	Control group
# Of people whose lives, assets and livelihoods are protected from monsoon-related impacts through forecast-based actions	240 (67.4%)	33 (7.1%)	85 (30.1%)	358 (32.5%)	0
% of participants using the knowledge of agromet training service	15.4%	14.5%	6.1%	13.0%	0
Perception of people on the effectiveness of EW messages	70%	27%	40%	57%	NA
# of people who took early actions based on information on digital boards	3	0	0	3	0
% of Women/ Vulnerable groups benefitting from gender-responsive and inclusive early actions	91.0%	94.9%	88.8%	91.2%	77.1%
% of HHs who reported they were helped by volunteers working under the program	26.3% (65 people)	NA	12.1% (12 person)	19.2% (77 people)	NA
Total amount received by HHs under cash support	Taka 22500	Taka 2000	Taka 5000	Taka 29500	0

Annex D: Details of FGDs and KIIs

Focus Group Discussions

Table 22: Details of FGDs

District	Upzilla	Union/Ward	Type	Male	Female	Total
Bogura	Sariakandi	Chaluabar	Farmer	10	2	12
		Bohail	Women	0	12	12
		Kazla	Farmer	5	5	10
		Kornibari	Youth	4	10	14
		Takani Chukainogor	Women	0	12	12
		Kazla	Youth	3	7	10
Gaibandha	Saghata	Saghata	Women	0	12	12
		Holdia	Women	0	12	12
		Gazaria	Farmer	4	8	12
		Bharatkhali	Farmer	4	8	12
		Jumarbari	Youth	2	10	12
		Ghuridah	Youth	6	6	12
Jamalpur	Madarganj	Teguria	Farmer	12	0	12
		Teguria	Women	0	11	11
		Charpakerdo	Women	0	11	11
		Moslemabad	Farmer	12	0	12
		Sukhnagari	Youth	7	5	12
		Jorkhali	Youth	11	1	12
Kurigram	Moyajipara	Begumganj	Farmer	8	2	10
		Buraburi	Women	0	10	10
		Buraburi	Youth	10	0	10
		Hatia	Farmer	7	3	10
		Hatia	Youth	4	5	9
		Saheber Alga	Women	0	10	10
Sirajganj	Maizbari	Ward 9	Women	0	10	10
		Ward 5	Women	0	10	10
		Ward 9	Farmer	7	4	11
		Ward 5	Farmer	6	4	10
		Ward 9	Youth	5	7	12
		Ward 5	Youth	6	4	10

Key Informant Interviews

Table 23: Details on KIIs

District	Upazila	Gender	Occupation
Sirajganj	Kazipur	Male	Upzila DMC chairman
	Kazipur	Male	Upzila Fisheries Officer
	Kazipur	Male	Project Implementation Officer
	Kazipur	Male	Union Chairman, Maizbari
	Kazipur	Male	Upzila Nirbahi Officer

District	Upazila	Gender	Occupation
	Kazipur	Male	DRRO
Kurigram	Begumganj	Male	Upzila Parishad Chairman
		Male	DRRO
	Ulipur	Male	Upzila Project Implementation Officer
	Ulipur	Male	Upzila Parishad Chairman
	Ulipur	Male	Upzila Nirbahi Officer
Bogura	Sariakandi	Male	DRRO
	Sariakandi	Male	Project Implementation Officer (PIO)
	Sariakandi	Male	Chairman
	Sariakandi	Male	Upzila Agriculture Officer
	Sariakandi	Male	Upzila Chairman
Gaibandha	Saghata	Male	Upzila Chairman
	Saghata	Female	Union Livestock Officer (ULO)
	Saghata	Male	Project Implementation Officer (PIO)
	Saghata	Male	Union Chairman, Ghuridah Union Parishad
	Saghata	Male	Upzila Nirbahi Officer (UNO)
	Saghata	Male	Acting DRRO
Jamalpur	Madarganj	Male	Upzila Nirbahi Officer (UNO)
	Madarganj	Male	UP Chairman
	Madarganj	Male	Upzila Chairman
	Madarganj	Male	DRRO
	Madarganj	Male	Assistant Engineer
	Sarisabari	Male	Project Implementation Officer (PIO)

Annex E: Questionnaires

Household Survey
Tool_Bengali_ cleaned

SUFAL_qual
tool_community_1118

SUFAL_qual
tool_DMCs_111822_c