



# Evaluation of the Flood Early Action Protocol (EAP)

## Quantitative Impact Assessment of the 2020 EAP Activation

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## FLOOD EARLY ACTION PROTOCOL (EAP) ACTIVATION

The FbF intervention appears to have been effective in enabling vulnerable households to evacuate the flood area where needed: 27% of FbF beneficiaries reported that they **evacuated adults** after receiving an early warning, vs 11% **(+16%)** of respondents among the comparison group.

### Successfully mitigated damages and losses

- 51% of FbF beneficiaries indicated that some of their **working equipment** (such as tools, fishing equipment, pumps, etc.) was damaged to some degree or lost, vs. 72% of comparison households **(-21%)**.
- The FbF cash transfer helped beneficiaries reducing livestock losses. Out of 42% of households who said they owned cows or calves or looked after them, FbF beneficiaries indicated to have lost 9% of their **cows and calves** vs. the comparison group losing 22% of them **(-13%)**.
- The FbF beneficiary group reported that 50% of their **chickens and pigeons** died because of the flood event. The comparison households lost 60% of their chickens and pigeons **(-10%)**.

### Protected health and well-being

- Fewer FbF beneficiaries reported having experienced **health problems** (such as coughing, skin rash) because of the flood (73% of FbF cash recipients vs 84% of comparison households, a **11%** reduction).
- Considering **personal feelings** in experiencing the flood event, FbF beneficiaries declared to feel psychologically better than comparison households. On a scale from 1 (very bad) to 5 (very good), FbF beneficiaries declared an average psychological and emotional status of 3.6 vs 2.3 of comparison group **(+1.3)**.
- 97% of FbF beneficiaries reported that they, or an adult member of their household, was **unable to work** for a period of time because of the flood, compared to 86% of comparison households without FbF assistance at the shelter **(+11%)**. This result is unexpected, but it might depend on external factors not linked to the intervention itself. There are no other significant differences on the averages of the two groups related to other aspects of damages, such as other health problems, damages to vehicles or to houses.

### Reduced negative coping strategies among beneficiaries

- 44% of FbF beneficiaries said they **had to borrow money to cope** with the impacts of the flood, vs. 56% of the comparison group **(-12%)**.
- None of the FbF beneficiaries had to **sell household assets** ( beds, furniture, cooking stoves, kitchen items, etc.), whereas 12% of the comparison group had to adopt that strategy to cope with difficult economic conditions after the flood **(-12%)**.

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# SUMMARY REPORT

## Quantitative Impact Assessment of the 2020 Activation of the Flood Early Action Protocol in Bangladesh

### 1. Background

Bangladesh is among the countries most vulnerable to natural disasters and climate change-related extreme weather in the world, because of its geographical conformation, land conditions, and river basins distribution. Flood events occur annually in the monsoon season (June to September), with significant impacts in many parts of the country, and particularly dire effects on the lives of the poorest and most vulnerable households. The areas which are most exposed to flood hazards are Jamuna, Padma, and Meghna river systems, and especially households living on char lands<sup>1</sup> and along the river bank. Floods can impact on personal security - such as in the case of death, injuries, or health problems; on infrastructure and assets – by causing damages or destruction; and on agricultural activities - causing damages or loss of grains, crops, and livestock. The highest impacts are experienced by people living in low-lying areas, below the poverty line, in fragile houses, and with several dependent family members to care for.

Forecast-based Financing (FbF) and Early Action Protocols (EAP) are a climate-related disaster intervention aiming to anticipate hazard through the implementation of planned activities based on weather forecast information, to reduce both risks and effects of the climatic event. Part of FbF and EAP interventions include unconditional pre-events funding, to improve the effectiveness of early actions of the households by stimulating coping strategies aimed at reducing risks and damages, and to provide essential primary resources for households' evacuations, sheltering actions, food and water stock purchasing; while also improving the resilience of the household in the next phase after the climate-related disaster (Gros et al., 2019). The aim of FbF and EAP is to make disaster risk management overall more effective. Documented past experiences confirmed that these are good approaches to climate-related hazard intervention in vulnerable areas.

The Bangladesh Red Crescent Society (BDRCS) in collaboration with other partners<sup>2</sup> organised the FbF mechanism and

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<sup>1</sup> River islands.

<sup>2</sup> German Red Cross (GRC), Red Cross Red Crescent Climate Centre (RCCC), International Federation of the Red Cross Red Crescent Societies (IFRC),

developed EAPs for floods and cyclones to help vulnerable households reduce the anticipated hazard impacts in vulnerable areas of Bangladesh. The EAP for floods was activated on 25 June 2020. BDRCS reached 3,789 households in 10 Unions under 3 districts with an unconditional multi-purpose cash grant of 4,500 Bangladeshi Taka (BDT) (about 53\$). The EAP states that, by providing early financial support before a flood event, households should be able to cope with all negative effects related to it, meaning experience fewer deaths and injuries, fewer damages to their assets, fewer deaths and losses of animals. Moreover, the FbF intervention should improve the resilience of the household after the event by reducing external money borrowing with unfavourable interest rates, the selling of valuable items (to get money), food-based coping strategies, and the number of days household

## **2. Aim of the work and research questions**

The aim of this work is to assess whether activation of the EAP and FbF mechanism by the BDRCS has been effective for beneficiaries, by conducting a counterfactual analysis through the use of a quasi-experimental design. The first part of this study is based on data cleaning and analysis of the two groups, considering key descriptive statistics to identify the main differences between the groups, in order to have an order of comparability. The second and main part has been the application of the best available statistical techniques to account for the main differences between the two groups.

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American Red Cross (AmCross), Swiss Red Cross (SRC), Government of Bangladesh's Ministry of Disaster Management and Relief (MoDMR), Department of Disaster Management (DDM), Bangladesh Post Office (BPO),

members are unable to work. Conversely, the intervention should improve the general psychological and household distress conditions (Red Cross International, 2021).

The eligibility of households to be included as beneficiaries in the FbF intervention was based on a vulnerability score computed for each household using five criteria: quality of the housing structure; level of inundation during previous floods; dependents in the family (children, elderly, or disabled); structure of the family (female-headed household, widowed or divorced); and, livelihood strategies (type of main employment or earning activity). The FbF intervention is activated in the ten days before the event occurs and it is triggered by a forecast provided by the Flood Forecast and Warning Centre (FFWC) along with global forecast models.

After the preliminary data analysis, the study explored several research questions to determine the effectiveness of the anticipatory actions, considering different outcome variables used as proxies of several dimensions of climate-related disaster effects to the households - such as action strategies, health and injuries, psychological distress, assets damages, animal losses, and mortality. Moreover, the study analysed the effects of the intervention on the beneficiaries' resilience using a comparison (non-beneficiary) group as a benchmark in considering different dimension of resilience and recovery:

Flood Forecasting and Warning Centre (FFWC), World Food Programme (WFP).

external money borrowing causing indebtedness, inability to work, dietary coping strategy, and emergency households' asset selling.

## The main research questions of the study are:

- **Did the FbF interventions reduce the impact of the flood on beneficiary households**, in comparison to similar households that did not receive the FbF intervention? (considering damages on assets, agricultural losses, loss of animals, health problems, injuries, and personal feelings)
- **Did the anticipatory interventions improve the conditions of recovery in the aftermath of the flood event for households beneficiaries of the FbF intervention**, in comparison to similar households that did not receive the FbF intervention? (considering working inability, financial conditions, food-based coping strategies, destitution sales of assets)

The main research questions split into specific objectives are the following:

- Rq 1:** *Were FbF beneficiaries better equipped and informed to evacuate than non-FbF-assisted households?*
- Rq 2:** *Did FbF beneficiaries suffer less injuries and health problems related to the flood than non-FbF-assisted households in the aftermath of the flood?*
- Rq 3:** *Did FbF beneficiaries experience less psychological distress than non-FbF-assisted households after the flood event occurred?*
- Rq 4:** *Did FbF beneficiaries experience less damages to household assets than non-FbF-assisted households?*
- Rq 5:** *Did FbF beneficiaries experience lower rates of animal mortality than non-FbF-assisted households?*
- Rq 6:** *Did FbF beneficiaries accrue fewer debts during the flood period than non-FbF-assisted households?*
- Rq 7:** *Did FbF beneficiaries reduce their dietary needs in some ways to cope with the effect of the flood than non-FbF-assisted households?*
- Rq 8:** *Did FbF beneficiaries make fewer destitution sales of valuable assets than non-FbF-assisted households to cope with the flood impacts?*

**Rq 9:** *Did FbF beneficiaries resume productive activities sooner than non-FbF-assisted households after the flood period?*

### 3. Data description and data cleaning

The study is based on a direct survey made in January 2021<sup>3</sup> in the area affected by the flood event. The survey was developed on the field by BDRCS volunteers and collected demographic, socio-economic, and geographical information on each respondent and her/his connected household. Additionally, several questions were related to the effect of the flood on the lives of the components of the households, damages to households' assets, and coping strategies in the aftermath of the flood. The respondents of the survey were divided into two groups: beneficiaries of the FbF anticipatory actions considered as 'intervention' group, and a comparison group with similar socio-economic and geographical characteristics.

In the first phase of the survey, the necessity of having two comparable groups lead to the decision of selecting randomly among FbF beneficiaries and then expanding the pool of respondents by including similar households located in the same districts. The first identification of the sample was based on the vulnerability index used during the triggering actions for the eligibility of households for anticipatory actions, extended to households that were not included in the final list of FbF beneficiaries. However, the initial geographical distribution across districts of FbF intervention beneficiaries and comparison group was slightly unbalanced. Moreover, the vulnerability scores in the two groups evidenced a remarked

variation,<sup>4</sup> then the identification of the comparison group was based on a within deviation of +/- 1.5 SD from the average vulnerability score of all households.

After the first phase of identification of potential households, the sampling process was done randomly among the identified potential respondents. The sampling was organised by geographical area stratifying the collection of information by districts and Unions targeting EAP and FbF beneficiaries who were supported by BDRCS, while the comparison group was identified among households with similar characteristics living in neighbouring areas, but that did not receive BDRCS support. The final sample was composed of 444 observations with 222 FbF beneficiaries and 222 comparison households. The sample resulted well balanced and comparable among the two groups. Table 1 describes the geographical distribution by Unions of the two groups.

The raw data from the survey has been controlled, cleaned, and processed to create a usable dataset for standard statistical and econometric analysis. The main variables identified for the analysis have been divided into confounding characteristics used for the matching method and outcome variables used for measuring the effect of the early actions on FbF beneficiaries. The final dataset is composed of 187 variables for 444

<sup>3</sup> The survey started on the 29<sup>th</sup> of January and ended on the 6<sup>th</sup> of February 2021.

<sup>4</sup> The SD was 7.93 and the average total vulnerability score across all households was 83.5.

observations. Annex table 4 presents the main socio-economic, demographic, and geographical characteristics of the sample, whereas Annex

table 3 shows the main outcome variables used in the analysis to assess the effectiveness of the interventions.

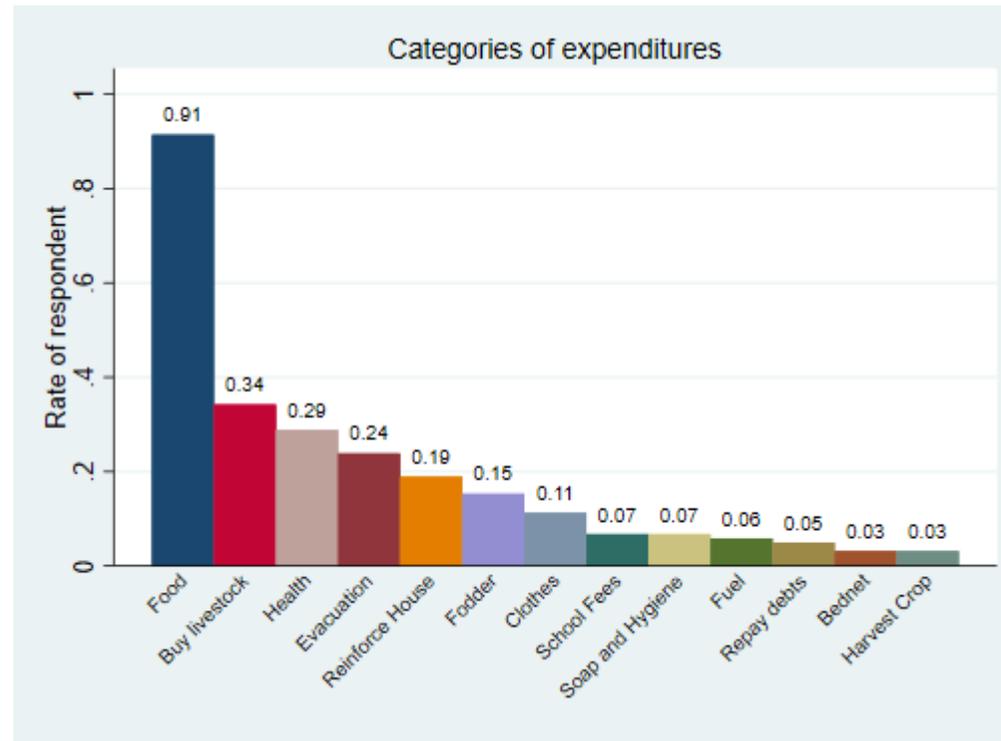
**Table 1. Geographical distribution of FbF beneficiaries and comparison group at Union level.**

<b>Union</b>	<b>Comparison group</b>	<b>EAP FLOOD</b>	<b>Total</b>
Belgachha	25	21	46
Chilmari	27	27	54
Chukaibari	29	26	55
Dewanganj	1	1	2
Erendabari	1	22	23
Hatia	32	32	64
Kamarjani	15	11	26
Kapasias	41	17	58
Kulkandi	30	33	63
Mollar Char	1	8	9
Ramna	20	24	44
<b>Total</b>	<b>222</b>	<b>222</b>	<b>444</b>

Anticipatory financial assistance played an important role for coping with the preparatory phase of the flood and in the aftermath period. FbF beneficiaries spent anticipatory financial help principally for food: 91% of the respondents reported to have spent at least some of the funds received on food. Other relevant expenditure categories are: purchasing of new livestock (34% of respondents), evacuation (24%), health expenses (29%), and activities for house reinforcement (19%). The distribution of the cash grant expenditure is similar to the previous intervention assessment (Gros et al., 2019), apart from few categories: the expenditure related to the purchase of new

livestock (which in this analysis was the second category with 34% of expenditure whereas it had previously not been considered); health expenditure, which almost halved in comparison with the previous assessment (29% vs 65% in Gros et al. 2019) - same as livestock fodder (15% vs 32% in Gros et al. 2019); and, expenditures for school fees - which were significantly lower than in the previous analysis (7% vs 30% in Gros et al.). The rest of the cash grant expenditures remained the same. Figure 1 shows the rate of each category for cash grant of FbF beneficiaries, while data are shown in table 7 in the Appendix.

**Figure 1. Expenditure categories of the BRCS financial contributions for FbF households (rate of positive responses).**



**Notes:** Total values can be higher than 1 as multiple answers were allowed. Total respondent for this question were 222 (only FbF group), see Table 7 in Appendix.

#### 4. Method

Because of the differences in the two groups, a “balancing method” was needed to simulate a randomisation of the intervention assignment for simulating that it had been delivered randomly, in order to build a quasi-experimental situation in which the main differences in key variables can be

associated only to the intervention itself. To this end, a matching method was employed, which associates each observation in the intervention group (households receiving the FbF intervention) with a similar observation in the comparison group (similar households for demographic, socio-

economic and geographical characteristics, which did not receive the FbF intervention). This allowed to assess the actual effect of the anticipatory actions.

The methodological framework for this study is the quasi-experimental design which recreates a randomised situation by balancing the two-sample group, with the aim of reducing distortions and biases in the process of comparison. The method has been the Propensity Score Matching (PSM) approach, using the two nearest neighbours algorithm (2NN) for comparing the two groups. This method allowed to simulate an experimental and randomised situation by controlling for confounding factors which can lead to biased estimations.

The use of PSM for comparing different groups is a well-established non-parametric technique method commonly used in policy evaluations and econometric analysis. It does not rely on any distributional assumption and it allows the identification and correction of the selection process and the unbalance of the data, providing comparability among the two groups. This method consists of selecting sub-samples in each group to be used for comparison by combining the groups by similar socio-economic characteristics and then calculating the main differences between the two groups in each variable of interest. By doing this, the final difference between the two groups can be considered as caused by the implementation of the FbF intervention. In analyst jargon this difference is called

‘average treatment effect on treated’ (ATT), which in this study can be defined as the average effect of FbF anticipatory actions on beneficiaries.

The PSM method involved two steps/phases. First, a probit regression<sup>5</sup> is run which calculates the probability of being a beneficiary of FbF by conditioning on different socio-economic, demographic and geographical characteristics which might otherwise lead to bias in the estimations due to selection problems and unobservable characteristics (such as congenital specific skills, propensity to take risks). The resulting probability of the probit model represents a synthetic measure of all the different observable descriptive characteristics of each household considered in the survey (such as income, family status, number of family components, number of children, education). This probability of ‘being assisted’ by the FbF intervention is called Propensity Score (PS) and it is used to match the two groups by finding similar ‘twins’ for the EAP and FbF beneficiaries’ households in the comparison group. With the 2NN algorithm a household in the beneficiary group is compared with the two most similar ‘twins’ considering the closest distance<sup>6</sup> between the level of the PS. Then, the average of the differences between the FbF beneficiary and the closest two observations of the comparison group in terms of PS in different variables of interest used as measure of the impact of the intervention (e.g., level of damages, external money borrowing) is calculated, thus giving the value of the impact for

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<sup>5</sup> A probit model is a non-linear regression using a dummy (0 or 1) as dependent variable describing a qualitative characteristic, in our case the characteristic is receiving the FbF (dummy=1) or not (dummy=0). The probit regression results must be interpreted in terms of probability of the dummy of assuming the value of 1. Therefore, the estimated coefficients of the regression indicate how much each regressor contributes to the probability of having a dummy equal to 1 and it should be interpreted as ‘determinant’

or driving factor if its coefficient is statistically significant (see Wooldridge, 2013).

<sup>6</sup> 1 FbF beneficiary vs 2 observations of the comparison group with the closest PSM (Euclidean distance from the PSM of the treated). The observations not matched are discarded from the ‘common support’ used for the analysis.

that variable<sup>7</sup> (for further information on PSM see Cerulli, 2015; Angrist and Pischke, 2009).

## 5. Data balancing

The first step of the analysis was to balance the sample in order to obtain unbiased results. It is important to ensure that the intervention group and the comparison group have comparable background characteristics. Otherwise, differences in their baseline or “starting conditions” could influence the extent to which an intervention affects outcomes (for example, the number of young children affects the early actions undertaken by the household).

Following the quasi-experimental framework, confounder variables are used for matching the two groups which have all those characteristics approximating at the most the similarities between the beneficiary group (FbF) and the comparison group (non-FbF). In this study, the following household characteristics were used as confounders: District, Upazila, severity of the flood at the household location (as measured on a scale of 1 to 5 following the respondents declarations of flood level reached in the house as reference<sup>8</sup>), age of the head of the household, head of the household is a female (Dummy), number of components living in the household, number of children in the household, the respondent does not have primary education (Dummy), the income level of the previous

month, the food spending of the previous week, and whether the household is engaged in agricultural activities (Dummy).

Subsequently, the main descriptive statistics between the two groups were compared to identify statistically significant differences which might distort the analysis. Table 2 shows the confounding variables used for matching the samples of the two groups. No evident significant distortions between the two groups emerged; in other words, the data appears to be overall balanced and comparable. The two groups are not statistically different apart from few confounder characteristics: no schooling of the household head and the number of cows and calves owned by the household are statistically different (t-stat > 2.58 P-Val < 0.01). The other confounders do not have relevant statistical differences in group means.

Although the two groups are similar, some adjustments had to be made in the two sub-sample distributions, in order to assess the actual effect of the FbF intervention on the beneficiaries. This is also evident when considering the kernel densities<sup>9</sup> of each variable of the two different groups. Although the sample is well balanced, any statistically significant diversity should be

<sup>7</sup> In order to do not lose many observations we processed the analysis using different outcome variables (our variables on which consider the effectiveness of the policy) considering the different level of missing data in relation to the survey structure.

<sup>8</sup> The scale of flood impact is 1 (No Flood), 2 (Low), 3 (Moderate), 4 (High), 5 (Very High). The flood reference used in the interview with the terms on

scale in brackets are: 'It did not reach the house' (1), 'Courtyard' (2), 'Floor of the room' (3), 'Above the floor' (3), 'Above the bed' (4), 'Near or above the roof' (5).

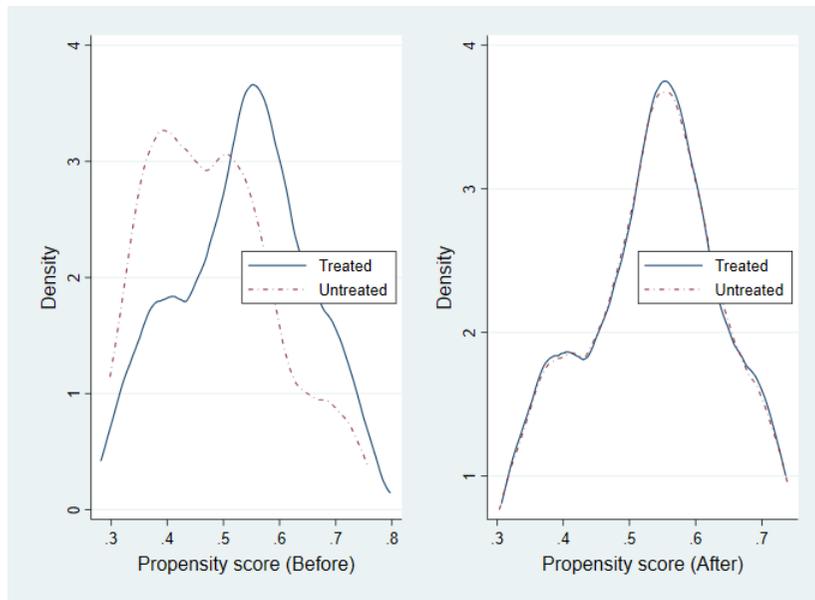
<sup>9</sup> Kernel density is a graphical description of the distribution of the data.

considered as possible bias which can lead to a 'naïve' evaluation of the FbF intervention.

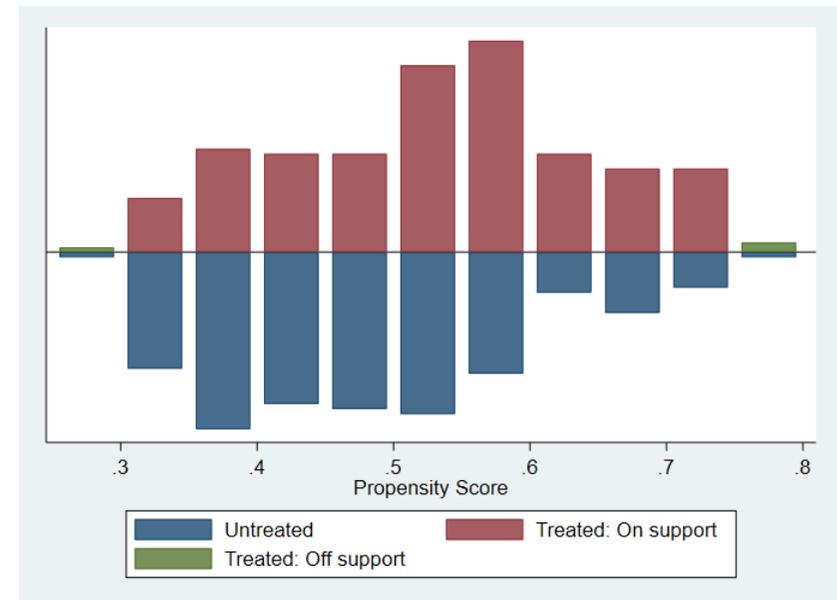
The confounders (characteristics) of the two groups do not look dissimilar in their density pattern (Figure 13 in Appendix), but after the PS 'adjustment' the overlapping and balancing of the two groups substantially improved (Figure 2 and 3). That is evident in Figure 2, which shows the PS of the two groups for different outcome variables and from which the improvement in terms of data comparability clearly emerges. The Appendix

includes both other graphs of PSM overlapping and statistical balancing tests for the main analysis. After the matching process, the two groups became strictly comparable in terms of overlapping and balancing of the PS. This indicates a good combination of 'twins' for the comparison, thus providing robust results on the effect of the anticipatory actions on beneficiaries.

**Figure 2. PSM before matching and after matching. group Treated (FbF) Untreated (Comparison group).**



**Figure 3. Balancing and overlapping of the observations matched by**



**Table 2. Confounding variables by treatment status. Balance is reached when no statistically significant differences emerged between the two groups. Significant differences are indicated respectively with \*90%, \*\*95% and \*\*\*99% level of significance.**

		Type	N. Observations		Means		Diff.	St Err	t value	p value
			FbF	Comp.	FbF	Comp.				
District	Geographic indication	Factor	222	222	2.09	2.11	-.02	.07	-.25	.81
Upazila	Administrative indication	Factor	222	222	3.83	3.67	.16	.2	.8	.42
Union	Administrative indication	Factor	222	222	5.86	5.91	-.06	.31	-.2	.85
Village	Village of the HH	Factor	222	222	34.1	34.77	-.6	1.98	-.3	.76
Severity impact	Index of flood severity from 1-5	Numeric	222	222	2.35	2.27	.09	.11	.8	.43
Head age	Age of the Head of HH	Discrete	217	222	47.7	46.65	1.1	1.4	.8	.43
Female	HH head is female	Dummy(0/1)	218	222	.5	.54	-.04	.05	-.85	.4
Hh people	Number of people of HH	Discrete	218	222	4.22	4.36	-.14	.15	-.95	.35
N children	Number of children of HH	Discrete	218	222	.53	.58	-.05	.06	-.8	.43
No education	No primary education	Dummy(0/1)	222	222	.72	.6	.12	.04	2.75***	.01***
Job Type	Main employment	Factor	218	222	4.78	4.52	.26	.24	1.05	.29
Income past month	Income of the past month	Continuous	208	214	508	4910.28	174.34	196.74	.9	.38
food spending	Food spending past week	Continuous	209	216	725.	727.55	-2.14	33.71	-.05	.95
Agriculture	HH employed in agriculture	Dummy(0/1)	222	222	.44	.41	.03	.05	.55	.57
Animals owned	Type of animals owned	Factor	218	222	8.52	8.54	-.02	.45	-.05	.96
N Ducks	Number of animals	Discrete	222	222	1.82	1.45	.37	.52	.7	.48
N Cows & Calves	Number of animals	Discrete	222	222	1.28	.9	.38	.16	2.45***	.01***
N Goats & Sheep	Number of animals	Discrete	222	222	.88	1.06	-.18	.17	-1.1	.27
N Chickens & Pigeons	Number of animals	Discrete	222	222	3.04	3.05	-.01	.61	0	.99

**Notes:** Group Means comparisons by treatment. Treatment = having received the Forecast-based-Financing (FbF) T-test results  $H_0: \text{mean} = 0$  with unequal variance.

## 6. Main Findings

The main findings of the study are reported in Table 3. The significant expected effects and unexpected results are highlighted. The tables show only statistically significant results

and findings related to the key variables. The main findings are further explored in details in the following subsections.

**Table 3. Main results**

Variable	Description	Unit	FbF	Comp	ATT	S.E.	T-stat	Sign.	N
<b>Desirable effects (sign in the “correct” direction)</b>									
borrowed_moneyD	Borrowed money	Dummy	0.44	0.56	-0.11	0.06	-1.99	**	414
feelings_scale	Personal feelings	scale 1-5	3.60	2.30	1.30	0.13	9.91	***	414
PercDied_CowsC~s	Died Cows and Calves	% Died animals	0.09	0.22	-0.13	0.05	-2.46	**	179
PercDied_Chick~s	Died Chickens and Pigeons	% Died animals	0.50	0.60	-0.11	0.06	-1.68	*	197
Damage_WorkEquip	Working equipment damaged	Dummy	0.51	0.72	-0.21	0.09	-2.17	**	145
AssetSell_Hous~s	Sold assets (House items e.g., Bed, furniture)	Dummy	0.00	0.12	-0.12	0.07	-1.63	*	98
Injury_Others	Health problems after flood ('Other' e.g., Cough, Skin rash)	Dummy	0.73	0.84	-0.11	0.05	-2.24	**	339
actionafter_EW~t	Action taken (evacuated adult)	Dummy	0.27	0.11	0.16	0.05	3.00	***	322
<b>Unexpected effects (in the “opposite” direction)</b>									
unable_workD	Adults in hh unable to work	Dummy	0.97	0.85	0.12	0.04	3.36	***	414
NOactionafter_~g	No action taken (Late warning)	Dummy	0.36	0.11	0.25	0.15	1.69	*	39
received_Jerry~n	Help received (Jerry Can)	Dummy	0.23	0.08	0.15	0.06	2.51	**	198

received_Water~f	Help received (Water)	Dummy	0.29	0.17	0.12	0.07	1.82	*	198
received_Salin~s	Help received (Saline)	Dummy	0.29	0.16	0.13	0.06	2.06	**	198
received_Foodp~2	Help received (Food P2)	Dummy	0.34	0.52	-0.18	0.08	-2.31	**	198

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**Variables without significant differences between the intervention and comparison group, while important for the intervention**

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CSI	Coping Strategy Index	num of days (weighted)	26.48	25.26	1.22	1.40	0.87		40 6
agriculture_lo~t	Agricultural losses	Decimal	0.39	0.39	0.00	0.05	0.00		414
unable_work_days	Number of days unable to work	Days	46.31	44.00	2.30	3.26	0.71		37 9
Injury_Physical	Physical injuries	Dummy	0.05	0.03	0.01	0.02	0.65		339
Injury_Diarrhea	Diarrhea and Dysentery	Dummy	0.66	0.55	0.11	0.07	1.47		339
borrowed_money~t	Amount of money borrowed	Taka	10561.11	11342.7	-	2437.	-0.32		20 8
interest_rate	Interest rate	%	6.48	6.14	0.34	0.97	0.35		169

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**Note:** The effect of the intervention is shown in column six where the Average Treatment Effect on the Treated (ATT) is shown. The ATT measures the impact of the intervention as the average difference between FbF and comparison group for each variable. In column eight (T-stat) the t-statistics and in column nine the significance level (\* 90%, \*\* 95%, \*\*\*99%) are shown respectively; column ten (N) shows the number of observations used for the analysis of each specific variable.

### 6.1. Early warning and action taken by households

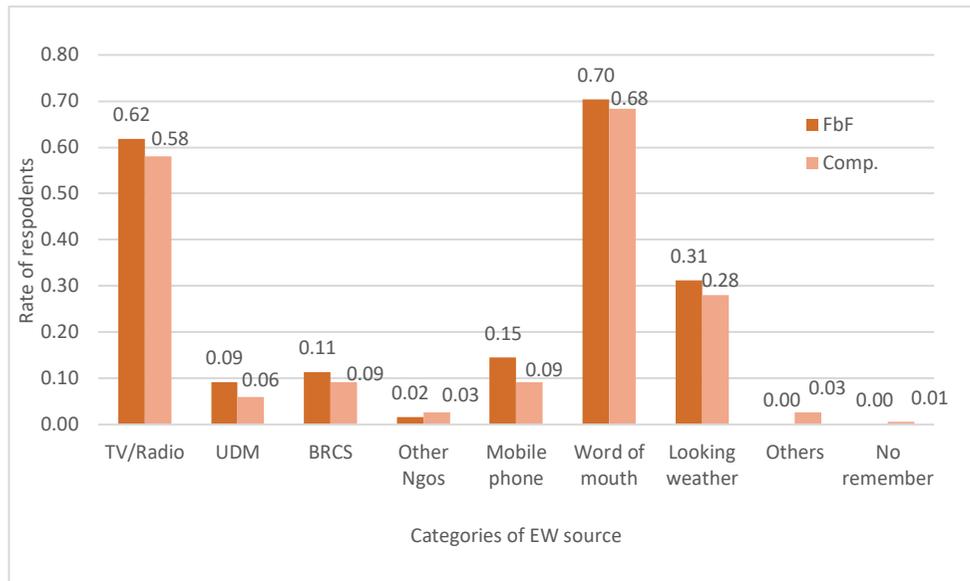
The type of sources for early warning (EW) to households did not highlight any statistically significant differences between FbF beneficiaries and the comparison group as it shown in Figure 4 (data available in table 10 in the appendix). The sources

of EW listed in the survey were: TV/Radio, Union Disaster Management Committee (UDMC), BDRCS, Other volunteers (CDMC, others), Mobile phone, Word of mouth (neighbours, family members, friends, etc), Looking at the weather /

traditional signs. None of the above resulted in a statistically significant difference between the two groups. Therefore, sources of EW are not to be considered as a relevant difference between households who received anticipatory actions and

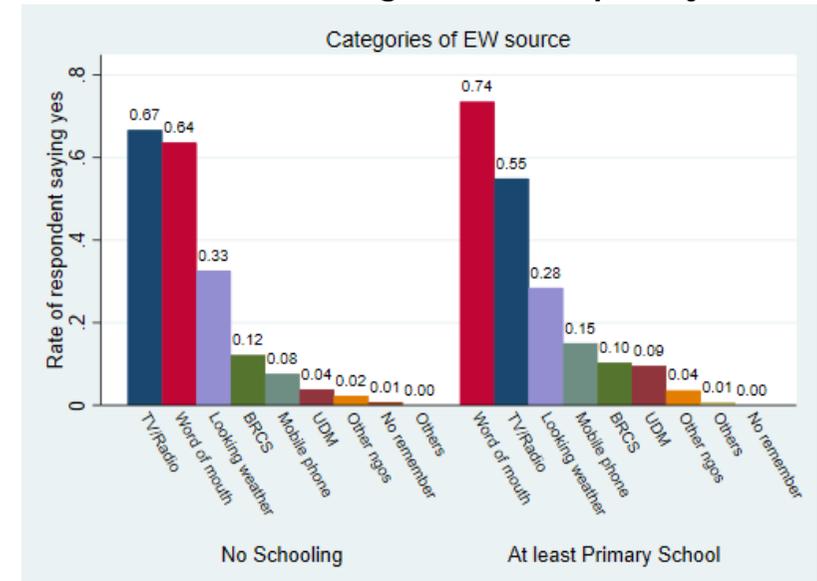
those who did not. Only for descriptive interest, Figure 5 illustrates EW sources by level of education (schooling or no schooling).

**Figure 4. Early Warning source by group (FbF and Comp. group).**



The analysis indicates that the unconditional FbF cash transfer successfully enabled beneficiary households to evacuate the flood-affected area where needed: 27% of FbF beneficiaries reported that they **evacuated adults** after having received an early warning vs 11% of the non-beneficiaries of the anticipatory

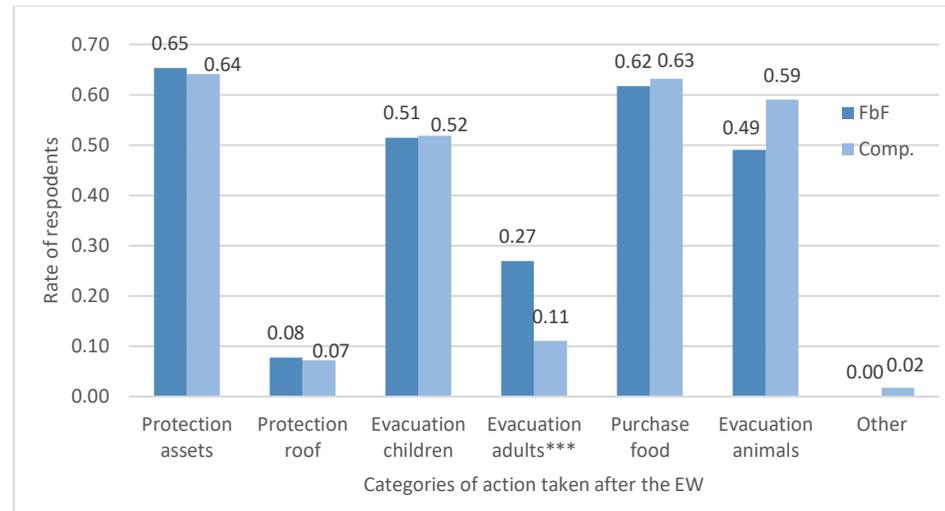
**Figure 5. Early Warning source by level of education 'No schooling' and 'At least primary school'.**



actions, with **a statistically significant difference of +16% more households evacuated in the FbF beneficiary group.**

Results are shown in Figure 6, while data are shown in Table 12 in the Appendix.

**Figure 6. Categories of early actions taken by households after receiving EW by group (FbF beneficiaries and comparison group).**

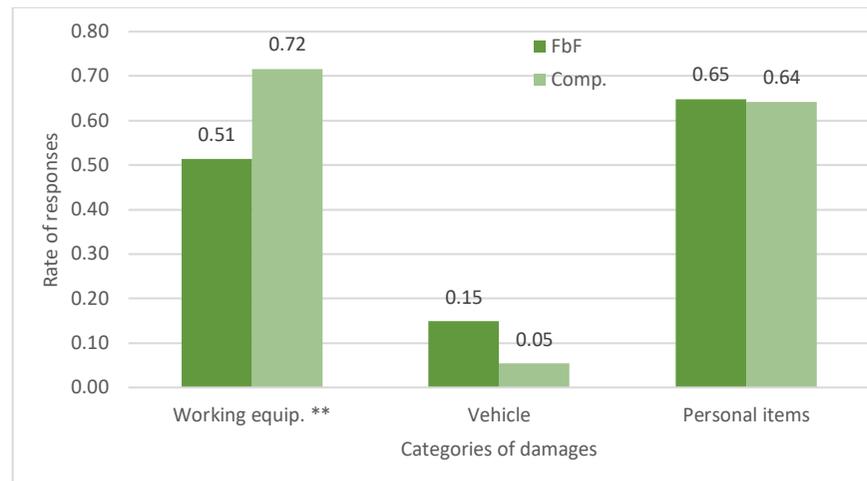


**Note:** see Table 12 in Appendix.

## 6.2. Impacts on household assets

The analysis further indicates that FbF beneficiaries were better able to protect their productive assets from the flood than the comparison group, thanks to the unconditional cash grant provided by BDRCS. Specifically, **72% of comparison households lost their working equipment (such as tools, fishing equipment, pumps, etc.) or found it damaged by the flood, vs. 51% of FbF beneficiaries - a difference of 21 percentage points.** Other statistical differences between the

two groups were not evident for the other assets considered, such as household assets (bed, furniture, cooking stoves, kitchen items). This may suggest that anticipatory actions are effective in enhancing early strategies for the protection of valuable assets, especially those needed for economic production and working activities. Results are shown in figure 7, while data are available in Table 13 in the Appendix.

**Figure 7. Effect of FbF intervention (ATT) for damages categories by group.**

**Note:** Only differences for Damage to working equipment is statistically significant, see Table 13 in Appendix for details.

### 6.3. Livestock and agricultural impacts

The anticipatory interventions were effective in helping households to protect their livestock for the categories “**chickens and pigeons**” and “**cows and calves**”, with statistically significant differences between FbF beneficiaries and the comparison group. Out of the 42% of households in the survey who declared to have at least one head of cow or a calf before the floods (26% of FbF beneficiaries hold a cow or a calf vs 35% of the comparison group), with regards to the animal death rate (number of dead animals over total number of animals owned before the flood event occurred), the FbF beneficiaries declared to have lost 9% of their **cows and calves**, whereas the households in the comparison group declared a

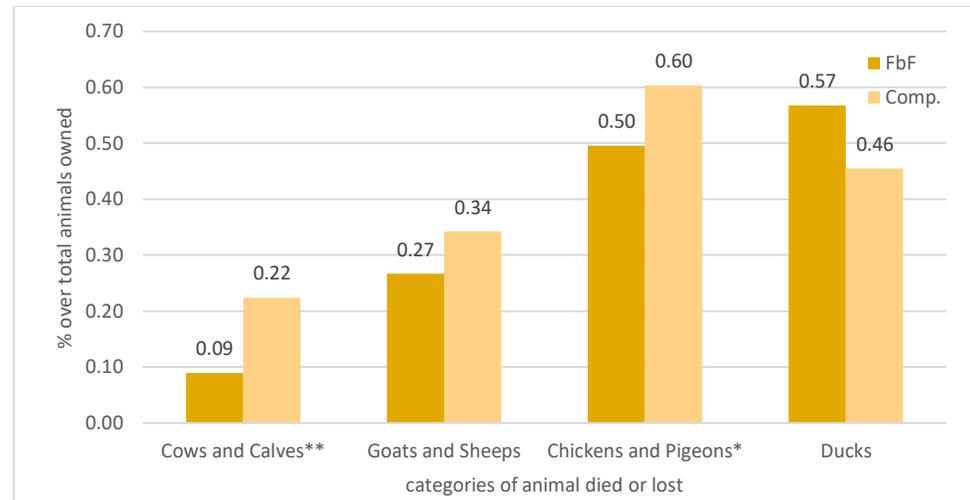
percentage death rate of 22%, with a significant statistical difference (95% level) between the two groups of **-13%**.

The same occurred for the category **chickens and pigeons**. 46% of household in the survey declared to have at least a chicken or a pigeon before the flood event occurred (47% of FbF beneficiaries owned a chicken or a pigeon vs 45% of the comparison group). Of these, considering the animal death rate defined as above, the FbF beneficiaries declared to have lost 50% of their **chickens and pigeons**, whereas households in the comparison group declared a percentage death rate of 60% - with a statistically significant difference (90% level) between the two groups of **-10%**. Differences in death rates for other animal categories (sheep and goats, ducks) were not

statistically significant. Moreover, differences in agricultural impacts in terms of losses and destruction of grain, crop, and

food stock between the two groups were not statistically significant.

**Figure 8. Animal Mortality Rate for animals category by (group).**



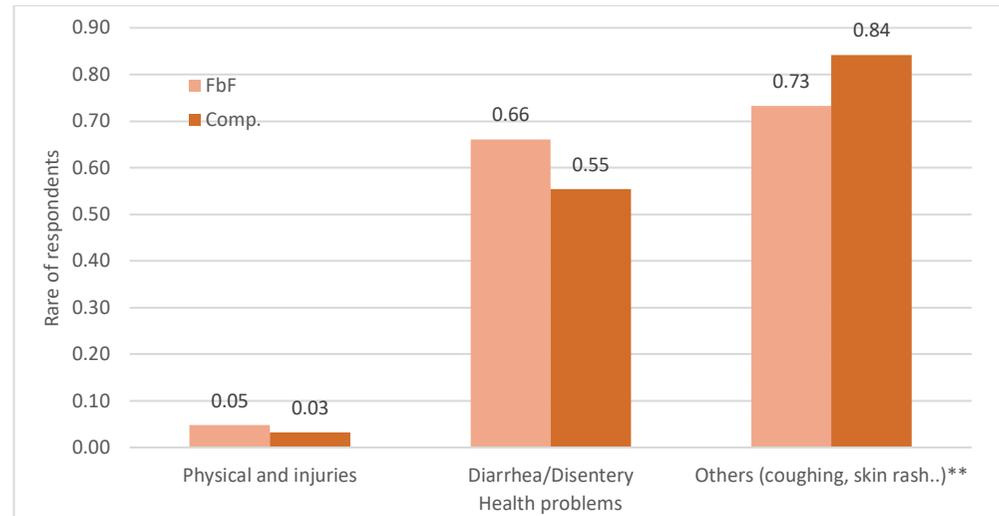
**Note:** See table 14 in Appendix for details.

#### 6.4. Impacts on health and psychological distress

FbF beneficiaries reported better physical and psychological conditions than non-beneficiaries. In particular, 73% of FbF beneficiaries reported to have experienced health problems (such as coughing, skin rash, fever) after and because of the flood, vs. 83% of comparison households - with a statistically

significant (95% level) difference of -11%. A review of the data on health problems related to the digestive system (e.g., diarrhoea, dysentery) and physical injuries (e.g., broken bones) did not evidence statistically significant differences (Figure 9).

**Figure 9. Health problems and injuries by group.**

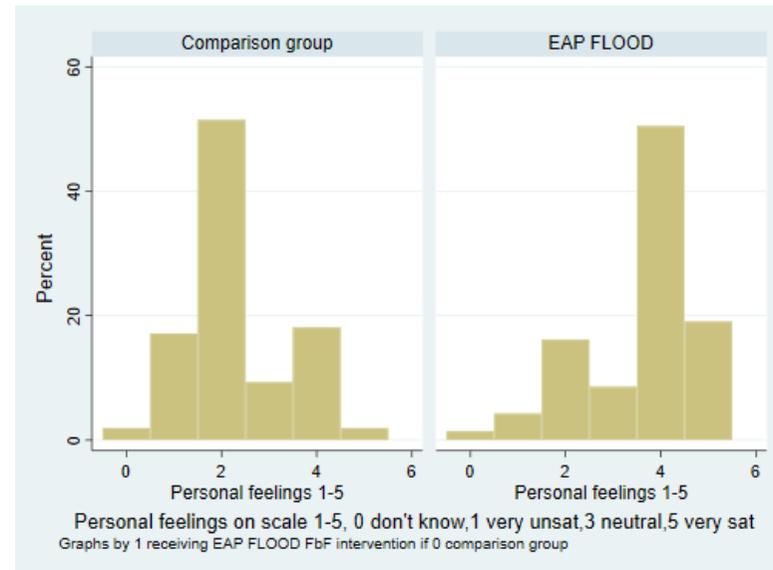


**Note:** Only differences for Other health problems (Coughing/Skin rash/Fever) is statistically significant. See Table 15 in Appendix for details.

With regards to **personal feelings** and psychological distress in the aftermath of the flood event, the unconditional FbF cash grant appears to have helped beneficiaries to cope better with the flood and its impacts than non-beneficiaries: On a scale

from 1 (very bad) to 5 (very well), FbF beneficiaries declared an average psychological and emotional status of 3.6 vs 2.3 of the comparison group, with a statistically significant (99% level) difference of **+1.3** on that scale.

**Figure 10. Personal feelings and psychological conditions by group (on scale 1-5, 0 neutral).**



### 6.5. Impact on productive activities

The FbF intervention has been ineffective in reducing the impact of the flood on working conditions for FbF beneficiaries. In fact, 97% of FbF beneficiaries reported that they, or at least an adult member of their household, was **unable to work** for a period of time because of the flood, compared to 86% of comparison households (+11%)<sup>10</sup>.

This result is unexpected, and it might depend on external factors not linked to the intervention itself, such as specific

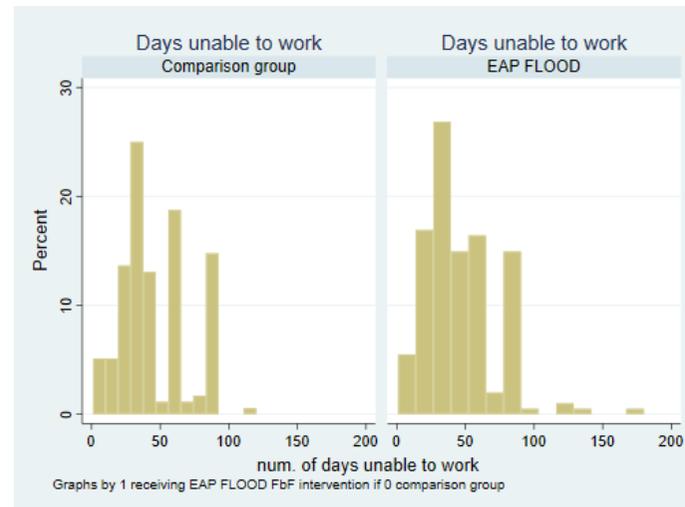
conditions of the households which hampered the resumption of working activities of certain household members. Another possible explanation is that anticipatory cash assistance enabled households to spend time repairing their house, taking care of family members, or recovering assets damaged by the flood, whereas non-beneficiaries had no choice but to go back to their working activities because of financial constraints.

<sup>10</sup> Anyway, there was no statistically significant difference in the number of days that households were unable to work, reported at an average of 46 days per household.

With regards to the number of days households declared to be unable to work for, there was no statistically significant difference in the reported number - with an average of 46 days

per FbF beneficiaries and 44 days for comparison households. In future FbF evaluations, the motivations for the reported inability to work should be explored.

**Figure 11. Number of days unable to work by group.**

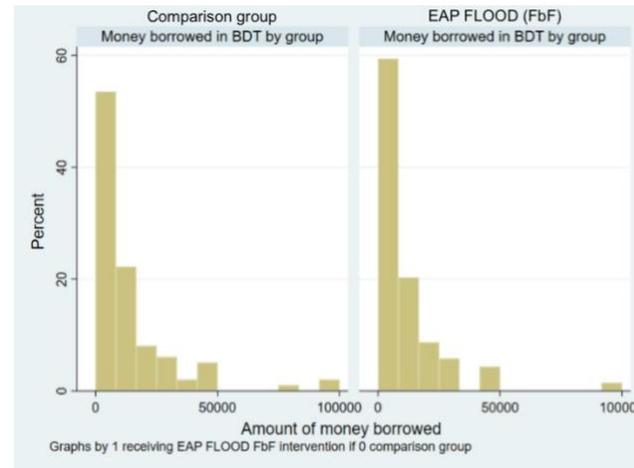


**Note:** No statistical significance in the number of days without working, but in the dummy variables indicating if any component of the HH has been unable to work in the aftermath of the flood.

### 6.6. Coping strategies and resilience after flood event

Anticipatory actions had an effect on coping strategies: The analysis showed that FbF beneficiaries reduced external borrowing of money to cope with financial constraints and economic issues experienced by the household. 44% of FbF beneficiaries declared they **had to borrow money to cope** with the flood impacts, whereas 56% of the comparison group declared the same, with a statistically significant (95% level) difference of **-12%**. This result indicates that the FbF mechanism

helped households in their financial recovery, thus reducing the risk of over-indebtedness of the household. A comparison of borrowing households showed no statistical differences for both the amount of money borrowed (FbF mean: 10,462 BDT, median: 5,500 BDT, std: 13,917.43; Comparison group mean: 13,031 BDT, median: 7,000 BDT, std: 17,581 BDT) and interest rates of the borrowing (FbF mean: 6.32, median: 5, std: 5.38; Comparison group mean: 5.70, median: 6, std: 4.73).

**Figure 12. Amount of money borrowed by group (no significant differences).**

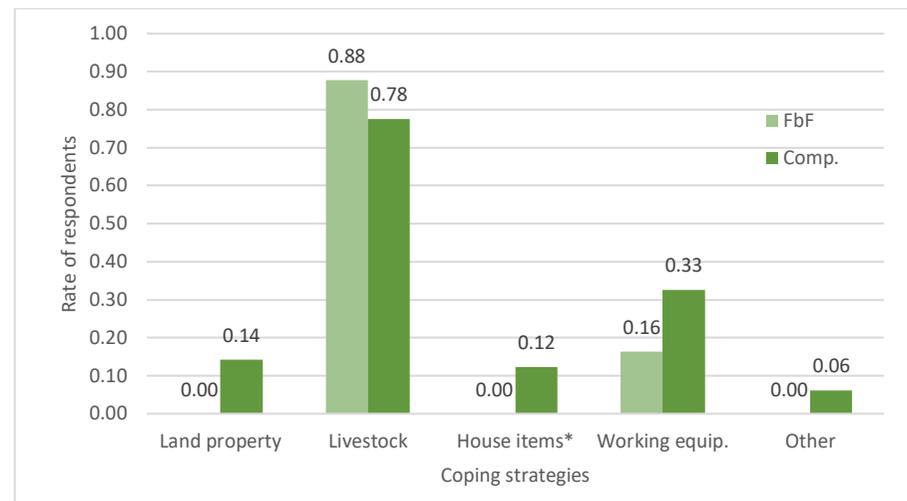
**Note:** The amount of money borrowed is not significant whereas the dummy indicating whether the household borrowed money or not is significant.

FbF interventions were also effective when considering other coping strategies adopted by the household to react to the effects of the flood event. None of the FbF beneficiaries **sold household assets** (such as beds, furniture, cooking stoves, kitchen items, etc.) for gathering financial resources, whereas 12% of the comparison group had to adopt that strategy to cope with difficult economic conditions after the flood, with a statistically significant (95% level) difference of **-12%**. No other coping strategies related to selling assets (land properties, livestock, working equipment or personal items) showed

statistically significant differences on the averages of the two groups. Results are shown in Figure 13, while data are available in Table 16 in the Appendix.

Food-based coping strategies (CSI) such as food limitations or dietary changes did not show any statistically significant differences between FbF and non-beneficiary households. The average CSI score was 26.41 among beneficiaries and 25.43 among comparison households (Figure 21 in Appendix).

**Figure 13. Categories of HH assets sold in the aftermath of the flood (by group).**



**Note:** *only selling of working equipment is statistically significant.*

## 6.7. Other assistance received from NGOs or the government

Considering additional assistance interventions not included in the FbF anticipatory action scheme,<sup>11</sup> the analysis highlighted some statistically significant differences between the two

- 23% of FbF beneficiaries reported that they received a **jerry can** vs 8% of the comparison group (**+15%**) (95% level).
- 29% of FbF beneficiaries reported that they received a **water purification kit**, vs. only 17% of the comparison group (**+12%**) (90% level).

These findings are quite unexpected and puzzling as FbF beneficiaries are not specifically targeted for post-flood water and jerry can distributions. The fact that FbF beneficiaries are receiving further additional help (as suggested by the analysis) may be by chance, or because the specific geographical distribution of the assistance interventions reflected the

groups under analysis. In particular, FbF beneficiaries received a higher level of assistance than the comparison group for the following types of assistance:

- 29% of FbF beneficiaries reported that they received **saline solutions**, vs. only 16% of the comparison group (**+13%**) (95% level).

geographical distribution of the households in the survey. Another possible explanation can be related to fact that emergency interventions may rely on similar parameters and measures of vulnerability of the households, leading to concentration of interventions in vulnerable ‘hot-spots’.

**Conversely, FbF beneficiaries received less assistance for one type of food assistance:**

- 34% of FbF beneficiaries reported receiving **food (Pack2)** vs. 52% of comparison group respondents (**-18%**). *This*

This last finding on food distribution can be easily explained by the fact that BDRCS post-flood food assistance excludes

*result is not relevant as food distribution was provided by four categories of “packages”<sup>12</sup>.*

FbF beneficiaries from the provisioning of food packages as they are already eligible for financial help.

<sup>11</sup> Initially these variables (receiving additional assistance or not, and what type of assistance) were designed for matching the two groups but we did not use this variable for it as it narrowed the comparability between the two groups (the sample is halved). Therefore, it has been used as outcome

variable for deepening understanding on other assistance not included in the FbF intervention.

<sup>12</sup> Food package 1 (10kg + 20kg + 20kg of rice), Food package 2 (15kg rice), Food package 3 (1kg lentils, 1 liter soybean oil) and Food package 4 (5kg flattened rice, 1kg molasses)

## 7. Effects of the EAP intervention

Summarising the above findings, **there is statistical evidence to conclude that the FbF intervention was effective**. The main benefits of the FbF intervention were:

1. Helping households to evacuate adult members (RQ1)
2. Reducing the overall impacts of the flood on the health conditions of household components (RQ2)
3. Improving the general psychological conditions after the flood event (RQ3)
4. Reducing flood impacts on working equipment (RQ4)
5. Reducing flood impacts on livestock (RQ5)
6. Reducing the borrowing of money and the selling of household assets as coping strategies after the flood event (RQ6)
7. Reducing the selling of household assets as a coping strategy for financial and economic constraints after the flood event (RQ8)

No evidence was found of the effectiveness of the intervention in improving food-based coping strategies (RQ7). Results have highlighted puzzling effects of the intervention considering the

resilience of the household in terms of resuming working activities (RQ9).

Some aspects which should be further explored in future evaluation studies are:

- Why did FbF beneficiaries experience more inability to work? This may depend on financial assistance, evidencing that helping households before the flood hazard is beneficial for recovery as member of the households can help rebuild and fix destroyed or damaged assets instead of having to resume work to get essential financial resources (RQ9).
- Why did FbF beneficiaries receive, as this study suggests, more additional help from other NGOs and governmental organisations than the comparison group?

## 8. References

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**Annexes****A.1. Other tables****Table 4. Descriptive statistic of the variables describing socio-economic, demographic and geographical characteristics used for matching the two groups.**

Variable			Obs	Mean	Std. Dev.	Min	Max
DistrictC	Factor	District where HH is located	444	2.104	.785	1	3
UpazilaC	Factor	Upazila where HH is located	444	3.748	2.097	1	7
UnionC	Factor	Union where HH is located	444	5.885	3.223	1	11
VillageNameC	Factor	Village where HH is located	444	34.464	20.871	1	73
Severity impactC	Factor	Severity index of the flood	444	2.309	1.153	1	5
head age	Numeric	Age of the HH head	439	47.194	14.662	20	99
female	Dummy	HH head is female	440	.516	.5	0	1
hh people	Numeric	Number of person living in the HH	440	4.293	1.527	1	11
n children	Numeric	Number of children in the HH	440	.552	.656	0	4
noeduc	Dummy	HH head received no education	444	.664	.473	0	1
job typeC	Dummy	Main work occupation in the HH	440	4.65	2.546	1	13
income pastmonth	Numeric	Income of the past month	422	4996.209	2020.062	1000	20000
food spending	Numeric	Money spent for food past week	425	726.494	347.003	100	2300
agricultureD	Dummy	HH is employed in agriculture	444	.428	.495	0	1
animalsbeforeN Ducks	Numeric	Num. animals (Ducks)	444	1.633	5.519	0	100
animalsbeforeN Cow~s	Numeric	Num. animals (Cows/Calves)	444	1.088	1.647	0	10

animalsbeforeN Goa~p	Numeric	Num. animals (Goats/Sheeps)	444	.971	1.769	0	15
animalsbeforeN Chi~s	Numeric	Num. animals (Chickens/Pigeon)	444	3.045	6.439	0	100

**Table 5. Descriptive statistic of the main variables for the analysis.**

Variable	Type	Description	Obs	Mean	Std. Dev.
actionafter EW Pro~s	Dummy	Action taken after EW (Protection assets)	342	.629	.484
actionafter EW Pro~f	Dummy	Action taken after EW (Protection roof)	342	.091	.288
actionafter EW Eva~d	Dummy	Action taken after EW (Evacuation children)	342	.485	.501
actionafter EW Eva~t	Dummy	Action taken after EW (Evacuation adults)	342	.193	.395
actionafter EW Pur~d	Dummy	Action taken after EW (Purchasing food)	342	.605	.49
actionafter EW Eva~l	Dummy	Action taken after EW (Evacuation animals)	342	.538	.499
Injury Physical	Dummy	Injury after flood (physical injuries)	358	.05	.219
Injury Diarrhea	Dummy	Injury after flood (digestive system)	358	.62	.486
Injury Others	Dummy	Injury after flood (others e.g. cough, skin rash)	358	.749	.434
Feelings scale	Scale 1 -5	Personal feelings and psychological distress	444	2.935	1.33
Damage WorkEquip	Dummy	Working equipment damaged	152	.533	.501
Damage Vehicle	Dummy	Vehicle damaged	152	.086	.281
Damage items	Dummy	Household assets damaged	152	.678	.469
PercDied CowsCalves	Fractional	Animal death rate (Cows and Calves)	188	.119	.261
PercDied GoatsSheep	Fractional	Animal death rate (Goats and Sheeps)	163	.305	.377
PercDied ChickenPi~s	Fractional	Animal death rate (Chickens and Pigeons)	210	.559	.384
PercDied Ducks	Fractional	Animal death rate (Ducks)	120	.506	.429
borrowed money	Numerical	Amount of money borrowed	217	11918.894	16112.256

amo~t					
interest rate	Numerical	Interest rate of borrowing	176	5.963	5.005
agriculture lostD	Dummy	HH experience losses of grains, crops or stocks	444	.392	.489
borrowed moneyD	Dummy	HH borrowed external money	444	.505	.501
replantD	Dummy	HH replant crops	444	.218	.414
other damagedD	Dummy	HH experienced other damages	444	.342	.475
sold assetsD	Dummy	HH sold assets	444	.239	.427
unable workD	Dummy	HH had a component unable to work	444	.892	.311
house repairedD	Dummy	HH had to fix part of the house	444	.651	.477
CSI	Numeric	Coping Strategy Index	429	25.93	12.975

**Notes:** Max and min have been omitted as most of them are dummies.

**Table 6. Descriptive statistics for the outcome variables considering the whole sample.**

Variable	Type	Description	Obs	Mean	Std. Dev.
actionafter EW Pro~s	Dummy	Action taken after EW (Protection assets)	342	.629	.484
actionafter EW Pro~f	Dummy	Action taken after EW (Protection roof)	342	.091	.288
actionafter EW Eva~d	Dummy	Action taken after EW (Evacuation children)	342	.485	.501
actionafter EW Eva~t	Dummy	Action taken after EW (Evacuation adults)	342	.193	.395
actionafter EW Pur~d	Dummy	Action taken after EW (Purchasing food)	342	.605	.49
actionafter EW Eva~l	Dummy	Action taken after EW (Evacuation animals)	342	.538	.499
actionafter EW Oth~s	Dummy	Action taken after EW (Others)	342	.003	.054
Injury Physical	Dummy	Injury after flood (physical injuries)	358	.05	.219
Injury Diarrhea	Dummy	Injury after flood (digestive system)	358	.62	.486
Injury Others	Dummy	Injury after flood (others e.g. cough, skin rash)	358	.749	.434
Feelings scale	Scale 1 -5	Personal feelings and psychological distress	444	2.935	1.33
Damage WorkEquip	Dummy	Working equipment damaged	152	.533	.501
Damage Vehicle	Dummy	Vehicle damaged	152	.086	.281
Damage items	Dummy	Household assets damaged	152	.678	.469
PercDied CowsCalves	Fractional	Animal death rate (Cows and Calves)	188	.119	.261
PercDied GoatsSheep	Fractional	Animal death rate (Goats and Sheep)	163	.305	.377
PercDied ChickenPi~s	Fractional	Animal death rate (Chickens and Pigeons)	210	.559	.384
PercDied Ducks	Fractional	Animal death rate (Ducks)	120	.506	.429
borrowed money amo~t	Numerical	Amount of money borrowed	217	11918.894	16112.256
interest rate	Numerical	Interest rate of borrowing	176	5.963	5.005
EW receivedD	Dummy	Household received the EW	444	.867	.34
action taken	Dummy	HH taken coping actions after EW	444	.77	.421
died animalsD	Dummy	HH experience death of animals	444	.523	.5
agriculture lostD	Dummy	HH experience losses of grains, crops or stocks	444	.392	.489
borrowed moneyD	Dummy	HH borrowed external money	444	.505	.501
replantD	Dummy	HH replant crops	444	.218	.414
other damagedD	Dummy	HH experienced other damages	444	.342	.475
sold assetsD	Dummy	HH sold assets	444	.239	.427
injuries afterD	Dummy	HH experienced health problems or injuries	444	.806	.396

unable workD	Dummy	HH had a component unable to work	444	.892	.311
house repairedD	Dummy	HH had to fix part of the house	444	.651	.477
Noworking1 10	Dummy	HH did not work for at least 10 days	396	.048	.214
Noworking11 20	Dummy	HH did not work for at least 20 days	396	.121	.327
Noworking21 30	Dummy	HH did not work for at least 30 days	396	.275	.447
Noworking over30	Dummy	HH did not work over 30 days	396	.556	.498
CSI	Numeric	Coping Strategy Index	429	25.93	12.975
received Jerrycan	Dummy	HH received external assistance (Jerrycan)	207	.179	.384
received Tent	Dummy	HH received external assistance (Tent)	207	.01	.098
received Waterpurif	Dummy	HH received external assistance (Water purif.)	207	.232	.423
received Salinesac~s	Dummy	HH received external assistance (Saline sol.)	207	.242	.429
received Foodpack1	Dummy	HH received external assistance (FoodPack1)	207	.169	.376
received Foodpack2	Dummy	HH received external assistance (FoodPack2)	207	.372	.485
received Foodpack3	Dummy	HH received external assistance (FoodPack3)	207	.256	.438
received Foodpack4	Dummy	HH received external assistance (FoodPack4)	207	.3	.459
received Anotheritem	Dummy	HH received external assistance (Other)	207	.072	.26
EW source TVRadio	Dummy	EW source(TV/Radio)	385	.59	.493
EW source UDM	Dummy	EW source(UDM)	385	.075	.264
EW source BRCS	Dummy	EW source(BRCS)	385	.109	.312
EW source Otherngos	Dummy	EW source(Other Ngos)	385	.031	.174
EW source Mobileph~e	Dummy	EW source(Mobile)	385	.125	.331
EW source Wordmouth	Dummy	EW source(Word of mouth)	385	.701	.458
EW source weather	Dummy	EW source(Weather)	385	.299	.458
EW source Others	Dummy	EW source(Other)	385	.005	.072
EW source Noremember	Dummy	EW source(No remember)	385	.003	.051

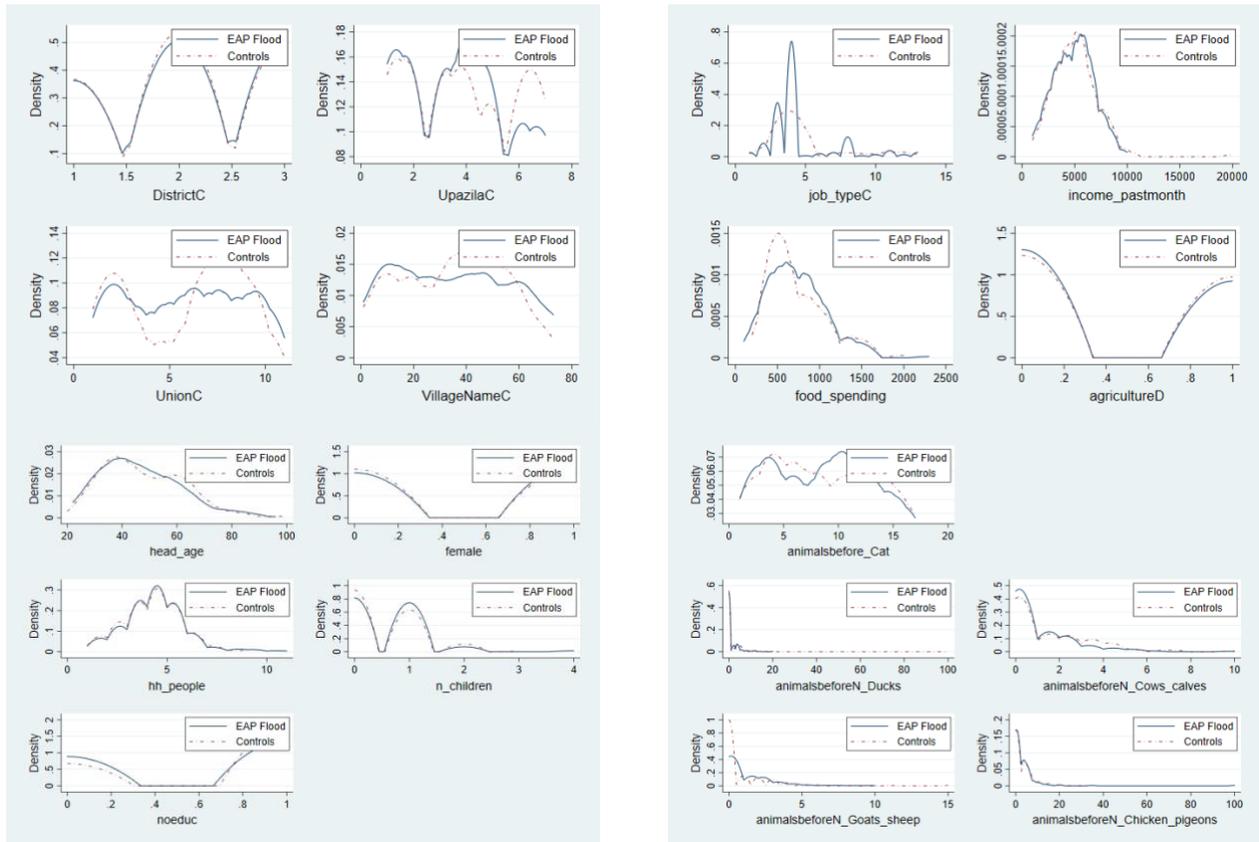
**Table 7. Cash grant expenditure rate by categories.**

Variable	Obs	Expenditure rate	Std. Dev.
Food	222	.914	.28
Evacuation	222	.239	.427
Fuel	222	.059	.235
Reinforce House	222	.189	.393
Harvest crop	222	.032	.175
Buy Livestock	222	.342	.476
Buy fodder	222	.153	.361
Soap and Hygiene items	222	.068	.252
Bed net	222	.032	.175
Clothing	222	.113	.317
School fees	222	.068	.252
Repay debts	222	.05	.218
Health expenses	222	.288	.454

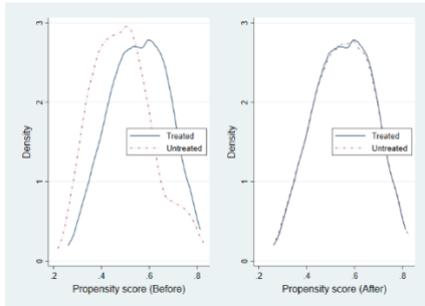
**Note:** Expenditure rate is expressed in terms of number of respondents saying yes for each category over total respondents. To obtain the percentage value just multiply it by 100.

## A.2 Graphs and balancing tests

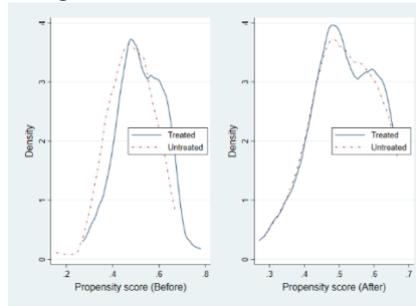
**Figure 14. K-density of the characteristic of Table 1.**



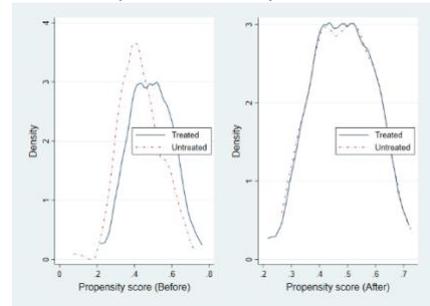
**Figure 15. PSM balancing test for action taken after EW.**



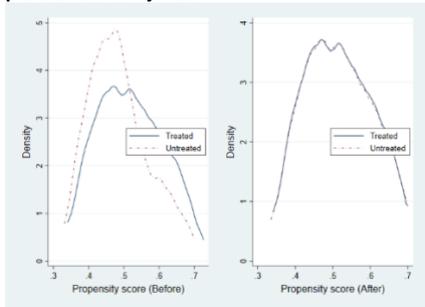
**Figure 16. PSM balancing test for agricultural damages.**



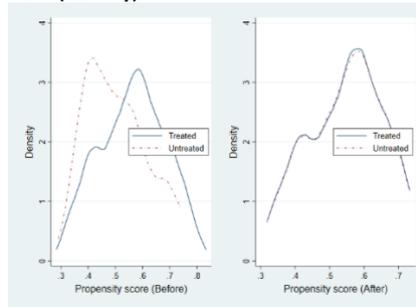
**Figure 17. PSM balancing test for Animal Death Rate (Cows and Calves).**



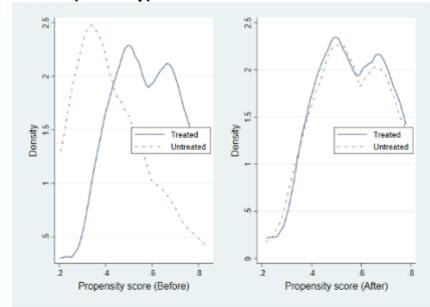
**Figure 18. PSM balancing test for health problems and injuries.**



**Figure 19. PSM balancing test for unable to work (dummy).**



**Figure 20. PSM balancing test for sold any assets (dummy).**



**Table 8. Probit regression as first step for PSM calculus for full observed outcome variable (with non-missing).**

Variables	Coef.	Std.	Err.	z	P>z	[95%Conf.Interval]
DistrictC	-0.0037967	0.084736	-0.04	0.964	-0.169877	0.162284
UpazilaC	-0.0227256	0.031181	-0.73	0.466	-0.0838399	0.038389
Severity_impactC	-0.0058244	0.054607	-0.11	0.915	-0.1128511	0.101202
head_age	0.0034286	0.005014	0.68	0.494	-0.0063982	0.013255
female	0.1438882	0.130915	1.1	0.272	-0.1127012	0.400478
hh_people	0.0498275	0.04925	1.01	0.312	-0.0467007	0.146356
n_children	0.045959	0.107296	0.43	0.668	-0.164338	0.256256
noeduc	-0.4211295	0.150325	-2.8	0.005	-0.7157619	-0.1265
income_pastmonth	-0.0000274	3.69E-05	-0.74	0.459	-0.0000998	4.51E-05
food_spending	-4.74E-06	0.000211	-0.02	0.982	-0.000418	0.000409
agricultureD	-0.1102022	0.13523	-0.81	0.415	-0.3752489	0.154845
_cons	0.1206805	0.440616	0.27	0.784	-0.7429103	0.984271
Num obs	414	Pseudo R2	0.0223			
Chi2	0.3075	Log likelihood	-280.52			

**Table 9. Balancing test for the confounders used in the probit (fig.6).**

	Unmatched	Mean	%reduct	t-test				
Variable	Matched	FbF	Comparison	%bias	bias	t	p>t	V(T)/V(C)
DistrictC	U	2.1238	2.1078	2	0.2	0.838	0.98	
	M	2.1292	2.1268	0.3	85	0.03	0.976	0.92
UpazilaC	U	3.6619	3.8529	-9	-0.92	0.36	0.93	
	M	3.6507	3.5407	5.2	42.4	0.53	0.595	0.94
Severity_impactC	U	2.2857	2.3284	-3.7	-0.37	0.709	0.86	
	M	2.2823	2.1722	9.5	-157.6	1	0.318	0.98
head_age	U	46.448	47.392	-6.6	-0.67	0.503	1.01	
	M	46.392	47.263	-6.1	7.8	-0.59	0.554	0.84
female	U	0.52381	0.47549	9.7	0.98	0.327	.	
	M	0.52632	0.52632	0	100	0	1	.
hh_people	U	4.3905	4.2941	6.4	0.65	0.517	1.24	
	M	4.3636	4.4115	-3.2	50.3	-0.33	0.742	1.19
n_children	U	0.59048	0.53431	8.5	0.87	0.387	1.09	
	M	0.57416	0.57177	0.4	95.7	0.04	0.971	0.78
noeduc	U	0.60476	0.73529	-28	-2.84	0.005	.	
	M	0.60766	0.6244	-3.6	87.2	-0.35	0.726	.
income_pastmonth	U	4925.2	5083.8	-7.8	-0.8	0.426	0.75*	
	M	4924.9	4907.2	0.9	88.8	0.1	0.921	1.12
food_spending	U	731.67	728.97	0.8	0.08	0.938	0.99	
	M	732.78	714.86	5.1	-564.6	0.52	0.604	0.97
agricultureD	U	0.42381	0.45098	-5.5	-0.56	0.578	.	
	M	0.42105	0.4378	-3.4	38.4	-0.35	0.73	.

**Note:** after the matching a balancing test is run to test the overlapping. Rule of thumb is not having a statistically significant difference after matching (M), to see that one should look at t-stat and p-val after matching (M). Here, it is evident how the balancing worked well as there are no differences after matching.

### A.3 Results table and graphs.

**Table 10. Source of early warning (fig. 4).**

Variable	FbF	Comp.	ATT	S.E.	T-stat	sign	n.obs
TV/Radio	0.62	0.58	0.04	0.07	0.53		362
UDM	0.09	0.06	0.03	0.03	1.11		362
BRCS	0.11	0.09	0.02	0.04	0.53		362
Other NGOs	0.02	0.03	-0.01	0.01	-0.76		362
Mobile phone	0.15	0.09	0.05	0.04	1.28		362
Word of mouth	0.70	0.68	0.02	0.06	0.35		362

Looking weather	0.31	0.28	0.03	0.06	0.54	362
Others	0.00	0.03	-0.03	0.02	-1.1	362
No remember	0.00	0.01	-0.01	0.00	-1.41	362

**Table 10. Categories of EW source by education (no schooling No, at least primary school Ed).**

EW source type	N		mean		sd	
	Ed	No	Ed	No	Ed	No
TV/Radio	253	132	.549	.667	.499	.473
UDM	253	132	.095	.038	.294	.192
BRCS	253	132	.103	.121	.304	.328
Other NGOs	253	132	.036	.023	.186	.15
Mobile phone	253	132	.15	.076	.358	.266
Word of mouth	253	132	.735	.636	.442	.483
Looking weather	253	132	.285	.326	.452	.47
Others	253	132	.008	0	.089	0
No remember	253	132	0	.008	0	.087

**Table 11. Type of action undertaken by the HH after the EW by group.**

Variable	FbF	Comp.	ATT	S.E.	T-stat	sign	n.obs
Protection assets	0.65	0.64	0.01	0.07	0.18		322
Protection roof	0.08	0.07	0.01	0.04	0.17		322
Evacuation children	0.51	0.52	0.00	0.06	-0.05		322
Evacuation adults	0.27	0.11	0.16	0.05	3.00	***	322
Purchase food	0.62	0.63	-0.01	0.07	-0.22		322
Evacuation animals	0.49	0.59	-0.10	0.07	-1.48		322
Other	0.00	0.02	-0.02	0.02	-1.06		322

**Table 12. Categories of damages (dummies).**

Variable	FbF	Comp.	ATT	S.E.	T-stat	sign	n.obs
Working equip.	0.51	0.72	-0.20	0.09	-2.17	**	145
Vehicle	0.15	0.05	0.09	0.06	1.54		145
Personal items	0.65	0.64	0.01	0.11	0.06		145

Note: Comp. = comparison group

**Table 13. Animal mortality rate by groups.**

Variable	FbF	Comp.	ATT	S.E.	T-stat	sign	n.obs
Cows and Calves	0.09	0.22	-0.13	0.05	-2.46	**	179
Goats and Sheeps	0.27	0.34	-0.08	0.07	-1.02		156
Chickens and Pigeons	0.50	0.60	-0.11	0.06	-1.68	*	197

Ducks	0.57	0.46	0.11	0.09	1.18	112
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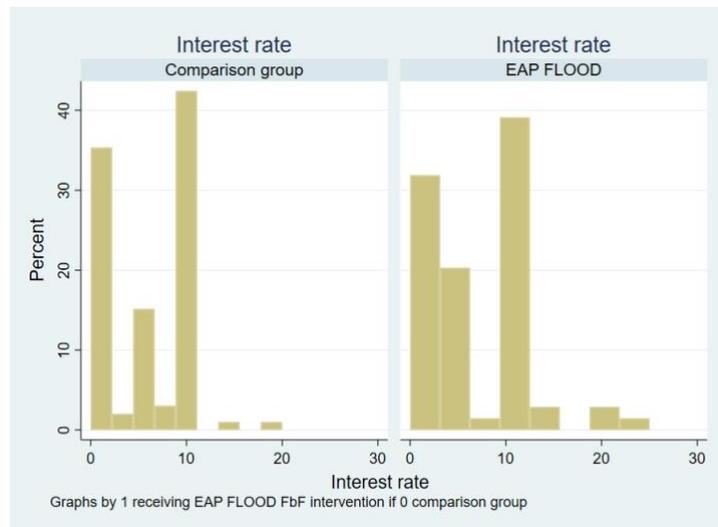
**Note:** *Comp. = comparison group*

**Table 14. Health problems by groups.**

Variable	FbF	Comp.	ATT	S.E.	T-stat	sign	n.obs
Physical and injuries	0.05	0.03	0.01	0.02	0.65		339
Diarrhea/Dysentery	0.66	0.55	0.11	0.07	1.47		339
Others (coughing, skin rash.)	0.73	0.84	-0.11	0.05	-2.24	**	339

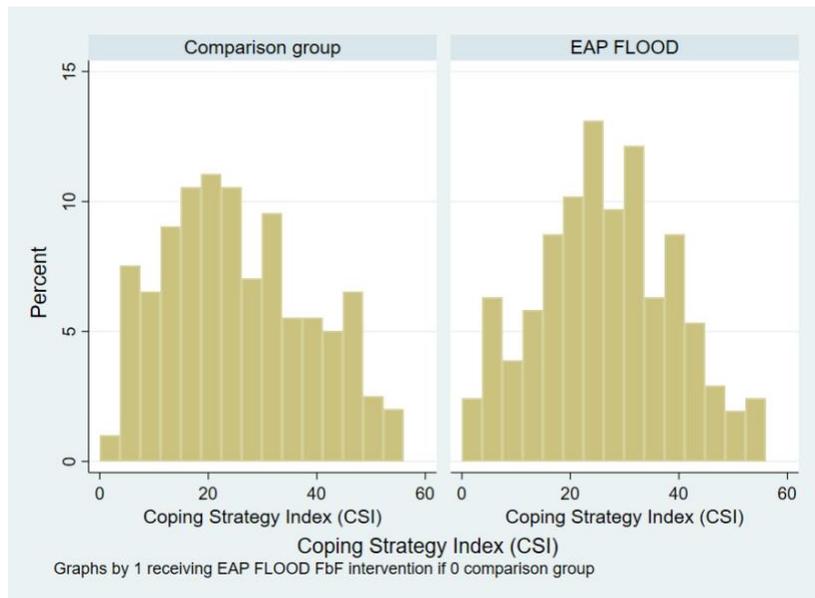
**Note:** *Comp. = comparison group*

**Figure 21. Interest rates for money borrowed by group (no significant differences).**



**Note:** *results for interest rate are not significant.*

**Figure 22. Coping Strategy Index (CSI) by group(no significant differences).**



**Note:** CSI is a composite indicator related to the number of days spent in changing diet or other food-based coping strategy (Maxwell and Caldwell, 2008).