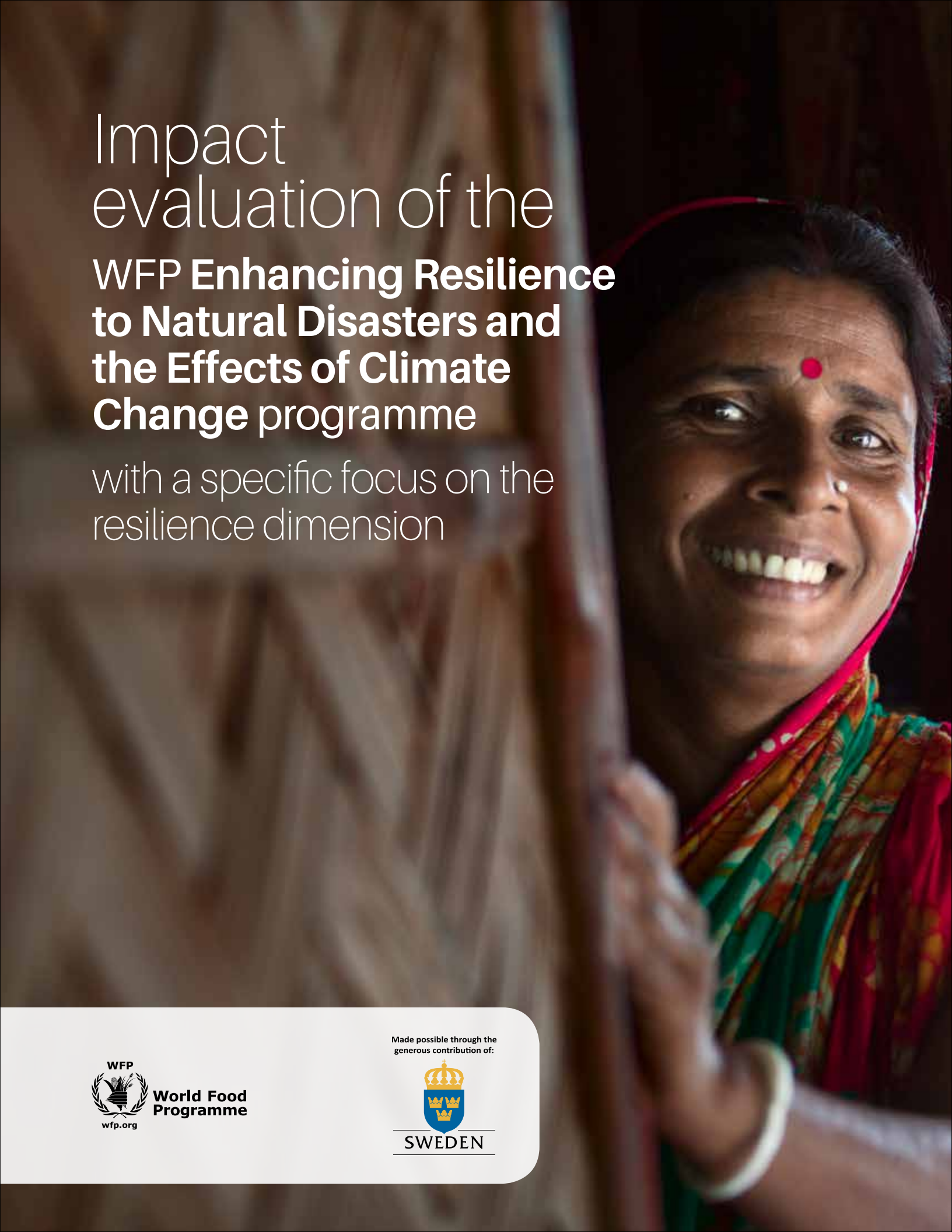

Impact evaluation of the

WFP **Enhancing Resilience to Natural Disasters and the Effects of Climate Change** programme

with a specific focus on the resilience dimension

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ACKNOWLEDGEMENT

This study was done by an independent (external) research team. The authors would like however to thank Christa Räder (Country Representative, WFP), Ashraful Amin, Manas Rudra and Mafizul Islam (WFP Bangladesh Country Office), Iqbal Hossain (WFP Barisal Suboffice), and Anna Law and Krishna Krishnamurthy (WFP Regional Office for Asia and the Pacific), for their support during the preparation of the work and for their useful comments on an earlier version of this report.

This study was made possible through the generous contribution of the Government of Sweden through the C-ADAPT programme. The Climate Adaptation Management and Innovation Initiative (C-ADAPT) is an initiative funded by the Government of Sweden's fast-track climate finance that allows WFP and partners to explore innovative climate-induced food insecurity analyses, programmes and best practices, with the goal to help individuals, communities and governments meet their food and nutrition needs under a changing climate.

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ISBN: 978-984-34-1033-7

Cover photo: ©WFP/Ranak Martin (All photographs)
Designed by Mohammad Inamul Shahriar
Printed by Printcraft Company Ltd.

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CONTENTS

ACRONYMS

ATT	Average Treatment effect on the Treatment group
BDT	Bangladesh Taka
CSI	Coping Strategy Index
ER	Enhancing Resilience
HFIAS	Household Food Insecurity Access Score
HH	Household
IFPRI	International Food Policy Research Institute
IDS	Institute of Development Studies
LGED	Local Government Engineering Department
LLP	Local Level Planning
NDRI	Natural Disaster Risk Index
NGO	Non-governmental Organization
M&E	Monitoring & Evaluation
PSM	Propensity Score Matching
PTSD	Post-traumatic Stress Disorder
ToC	Theory of Change
UzDMC	Upazila Disaster Management Committee
VAM	Vulnerability Analysis and Mapping
WFP	World Food Programme

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

The **Enhancing Resilience to Natural Disasters and the Effects of Climate Change** (ER) programme is a joint initiative by the Government of Bangladesh and the World Food Programme (WFP) that aims at addressing the vulnerability of the rural population (especially the ultra-poor) exposed to natural disasters and to the effects of climate change. It was started in 2011 in two distinct parts of the country: the river erosion prone areas of the northwest and the cyclone and salinity affected coastal belt in the south. Through a 3-year cycle of support and training activities one of its main expected outcomes is to strengthen the resilience of the targeted communities.

Although several components of the ER programme have already been internally and externally assessed, the specific objective of building the resilience of the targeted population has not. In this context, the WFP office in Bangladesh commissioned an evaluation of the ER programme in 2015, with the particular objective of assessing the programme's effectiveness in terms of improving beneficiaries' resilience. This report presents the key findings of this evaluation.

The WFP office in Bangladesh commissioned an evaluation of the ER programme in 2015, with the particular objective of assessing the programme's effectiveness in terms of improving beneficiaries' resilience. This report presents the key findings of this evaluation.

The assessment draws partially on recent conceptual advances made in the understanding of resilience in the context of food security, where resilience is understood as "the ability of individuals, households, communities, institutions or higher-level systems to adequately deal with shocks and stressors" (the terms 'adequately' referring to the ability to avoid short and longer term negative impacts).

In the absence of any resilience baseline data, an ex-post treatment versus control approach was adopted where the responses (outcome) and ability to recover from shock/stressors (impact) of the treatment group (households who benefited from the programme by being participants in the activities) were compared to the responses and ability to recover of control households (non-recipients with similar demographics and socioeconomic background living out of

Resilience is understood as **the ability of individuals, households, communities, institutions or higher-level systems to adequately deal with shocks and stressors.**

the areas where the programme has been operating).

The impact evaluation was constructed around two hypotheses: **(i) Hypothesis 1** at the outcome level, ER-beneficiaries were expected to show lower propensity to adopt detrimental (coping) responses and higher propensity to adopt positive (adaptive/ transformative) responses; **(ii) Hypothesis 2** at the impact level, ER-beneficiaries were expected to show faster recovery rates than households in the control group (everything else being equal).

The evaluation exercise was implemented in four unions in the southwest region, two of which were unions where the programme had completed a full 3-year cycle (treatment unions), and the two others were unions where the ER programme had no activities (control). In these unions a total of 502 beneficiaries (treatment) and 505 non-beneficiaries (control) were selected.

A series of preliminary descriptive analyses were performed to compare the treatment and control groups. Some general household characteristics were found to be similar between the two groups, but others differed. In particular (despite our effort to ensure that control and treatment groups were comparable) households in the treatment group were observed to be exposed to a higher number of shocks/stressors than those in the control group. The nature of these shocks/stressors also differed slightly, with control households more frequently affected by some idiosyncratic shocks such as serious illness or accident, while treatment households seem to be more exposed to covariant shocks and stressors such as flooding from excessive rainfall. On the other hand both groups reported similar levels of exposure to other co-variant (in particular cyclones) and idiosyncratic shocks (such as e.g. loss of small livestock) and showed similar self-assessed levels of shock/stressor severity.

> Although **treatment households** reported to be more exposed to shocks/stressors, they **appear to display a statistically lower propensity to engage in detrimental responses** (including reducing food consumption; changing the type of food consumed; reducing family expenses; taking loan; and seeking assistance from community members) **than the control group.**

Further analysis shows that, although treatment households reported to be more exposed to shocks/stressors, they appear to display a statistically lower propensity to engage in detrimental responses (including reducing food consumption; changing the type of food consumed; reducing family expenses; taking loan; and seeking assistance from community members) than the control group.

This first key result, which addresses directly our first hypothesis, was obtained without controlling for household characteristics. When controlling for those characteristics, analysis still shows that the ER programme reduces the probability of households to engage in detrimental coping strategies for half of the 20 major shock-response combinations that were tested. This reduction is statistically significant in 7 out of these 10 combinations. For these positive results, more in-depth computations show that the ER programme reduces those probabilities by **5** to **16%** -depending on the shock-response combination.

On the other hand the data did not permit to draw any rigorous conclusions about the more positive (adaptive/transformative) responses, essentially because the **number of ER-beneficiaries and non-beneficiaries who did engage in these uplifting strategies was too small to allow the use of robust econometric analyses**.

The second hypothesis (at the impact level) was tested for the five more important shock/stressors, using a self-reported indicator of household capacity to recover. A Propensity Score Matching technique was used to control for potential confounding factors and to identify and compare these recovery indicators between treatment households and a pool of comparable control households. The results indicate that the score for these recovery indicators is systematically higher for the treatment (in line with our Hypothesis 2) for the five shock/stressors considered, but that only one of these differences is statistically significant at 5% level (cyclone).

Finally ER-beneficiaries were also shown to be characterized by a statistically **higher income level than the non-beneficiaries** (other things being equal), **as well as higher levels of saving and lower levels of loan**. A plausible scenario

> The beneficiaries show faster recovery rate from different shocks than the non-beneficiaries and the result is statistically significant in **case of cyclone.**

In conclusion, the analysis demonstrates with reasonable certitude that the ER programme, not only did not do harm to the beneficiaries, but also contributed positively to strengthen their capacity to better handle shocks and stressors (their resilience) by altering positively their ability to avoid engaging into detrimental coping strategies when faced with shocks and stressors. There is also reasonable evidence to assume that these beneficiaries rely on this stronger capacity to better recover from shocks and stressors to improve their welfare (income and assets) above the level observed for the non-beneficiaries.

is that these ER-beneficiaries (who were initially poorer and more vulnerable than the rest of the communities), have been successful at improving their income and savings thanks to the activities/support of the ER programme, to the extent that they are now significantly better-off than non-beneficiaries.

From a resilience-building programme's M&E perspective, the main lesson that emerges from this analysis is that even if it appears now possible to provide robust and rigorous conclusions regarding the effectiveness of a particular resilience programme without a gold-standard framework relying on high-frequency sampling, one still needs to put in place some minimum conditions if one wants to be able to not simply monitor or even evaluate the programme but learn from it. In particular it seems indispensable to have a comprehensive baseline/endline assessment framework that allows to document and quantify medium-term changes in households' strategies in response to specific shocks and stressors, and that allows to identify which specific activities and interventions of the programme contribute to these outcome changes.

INTRODUCTION
AND BACKGROUND

INTRODUCTION AND BACKGROUND

Bangladesh is one of the most at-risk countries to disasters and extreme events in the world. It is estimated that 30 to 50 percent of the country is affected by severe climatic shocks every year (WFP 2012). These events have killed and injured thousands, ruined thousands of hectares of crops, and washed away large areas of cultivable land, homes, and productive assets, amounting to huge human and economic losses. Between 1980 and 2008 for instance, 219 natural disasters –cyclone, landslide, flood, or flash flood- were officially recorded in the country, causing over US$16 billion in total damage (UNDP estimates). Over the same period Bangladesh has seen 191,637 deaths as a result of major natural disasters, with storms alone claiming 167,178 lives (NDRI 2010). Most of these climate-related extreme events are expected to increase in frequency and severity over the coming decades. Populations living in the southern coastal belt are particularly vulnerable to the impact of these disasters.

The *Enhancing Resilience to Natural Disasters and the Effects of Climate Change* (henceforth, ER) programme is a joint Government and WFP programme that was initiated in 2011 as part of the WFP country office's disaster risk management and resilience portfolio (WFP 2013). The ER programme has been implemented in the river erosion affected areas of the northwest and in the southern coastal belt and sought to address the vulnerability of the populations exposed to natural disasters and to the effects of climate change. As part of this programme, ultra poor rural women and men as well as other members of the community are engaged in a local level planning process whereby they are identifying and building community assets that are expected to increase their resilience and strengthen agricultural production. These households are also provided with regular training workshop/group sessions on disaster risk reduction, climate change adaptation as well as hygiene, sanitation and nutrition. Over the course of an initially two and then three-year cycle, the participants (approximately 70% women), received food and cash for the labour they contribute in building these community assets (during the dry season) and for their participation in training (during the rainy season). In 2013, for the first time a third programme year was introduced in three unions of Patharghata upazila of Barguna district. In this third year of the programme cycle, a woman from each participating household is trained on establishing a micro-enterprise and receives a cash grant (BDT 12,000 / USD 156) for investment, as well as a small monthly cash stipend for a year. The latter is expected to allow the women and their households to focus on growing their investment and to increase their families' economic resilience, food security and nutrition in the long term. A more detailed description of the

> Between 1980 and 2008 for instance, **219** natural disasters – cyclone, landslide, flood, or flash flood- were officially recorded in the country, causing over **US$16 billion** in total damage (UNDP estimates). Over the same period Bangladesh has seen **191,637** deaths as a result of major natural disasters, with storms alone claiming **167,178** lives (NDRI 2010).

programme is provided in the next section of this report.

The first phase of the ER programme was completed in end 2013/early 2014 and has been the subject of several evaluations. In 2012 an impact assessment was undertaken with a specific remit to identify impacts on 'protection, gender relations and social dynamics' ('the protection assessment') (WFP, 2012). In 2013 the programme was assessed again as part of a multi-country study of Food/Cash for Assets programmes (*Impact evaluation of Food for Assets on Livelihood Resilience in Bangladesh)* (WFP, 2013). An assessment of the added value of ER plus (the cash grant and micro-enterprise support component) was prepared in 2014 by the International Food Policy Research Institute (IFPRI) (Hernandez et al. 2016), and the same year the Institute of Development Studies (IDS) reviewed the programme as part of the *Strategic Review and Reconceptualization of WFP's Disaster Risk Management and Resilience Portfolio in Bangladesh and its linkages to the efforts of Government and other actors* (Béné and Hossain 2014).

The ER has therefore been (internally and externally) evaluated relatively comprehensively. Yet, despite all these evaluations, no rigorous assessment of whether the ER has *effectively* strengthened the resilience of its beneficiaries has been completed. In fact, the programme documents reveal that no attempt had ever been made to measure (or even to define) resilience at any stage of the programme even if one of the two main expected outcomes of the programme was to ensure: "the enhanced resilience among [the targeted] communities to natural disasters and the effects of climate change" (WFP ER factsheet –our emphasis). In 2015, the WFP office in Bangladesh therefore commissioned an evaluation of the ER programme (3-year model) with the particular objective of assessing the programme's effectiveness in terms of improving beneficiaries' resilience. This report presents the key findings of this evaluation.

More broadly, WFP's focus on resilience in Bangladesh mirrors the attention given to resilience within the organization at the global level since 2012. Resilience is now officially one of WFP's key programmatic objectives, and substantial amount of resources have been redirected to this agenda in the past few years. This has translated in the involvement of a wide range of units across the organization in resilience programming, measurement and analysis (including the Climate Change and Disaster Risk Reduction, Asset Creation, Vulnerability Analysis and Mapping (VAM), and Monitoring and Evaluation units).

THE ENHANCING RESILIENCE PROGRAMME

THE ENHANCING RESILIENCE PROGRAMME

The "Enhancing Resilience to Natural Disasters and the Effects of Climate Change" (ER) programme is implemented by the Local Government Engineering Department (LGED) of the Ministry of Local Government, Rural Development and Cooperatives in partnership with WFP under its Country Programme for Bangladesh 2012-2016.

The ER programme is based on a shared understanding of the linkages between natural disasters, climate change, poverty, food insecurity, undernutrition and gender inequalities, and builds on the respective technical expertise and capacities of LGED and WFP. At the community level, it is implemented in partnership with a range of different non-governmental organizations (NGOs), as well as upazila- and union-level government officials and elected representatives. The central purpose of the ER programme is to reduce the risks posed by natural disasters and the effects of climate change in the most vulnerable communities, while promoting food security and nutrition in ultra-poor households.

In order to achieve this, the programme initially followed a 2-year cycle. Ultra-poor households are first targeted and enrolled onto the programme with a strong priority for women's enrollment. Subsequently a process of local-level planning (LLP) takes place through which households identify and map their specific vulnerabilities to climatic shocks and identify priorities for infrastructure work, in conjunction with local government. Then, two key activities take place:

DEVELOPING INFRASTRUCTURE:

During the two dry seasons (from January to June), protective and productive infrastructure is rehabilitated under the technical guidance of LGED, using unskilled labour of the ultra-poor, largely women. The embankments, road cum embankments and canal infrastructures are intended to reduce the negative impacts of climate change effects and prevent flooding and tidal surges; and to facilitate drainage during the monsoon and irrigation water during the dry season.

EMERGENCY PREPAREDNESS/LIFE-SKILLS TRAINING:

During the two wet seasons (from July to December), disaster preparedness, climate change awareness and life-skills training are offered to participants to increase their capacity to respond to the natural shocks/ challenges and to manage to lead better livelihoods. The disaster preparedness trainings are also imparted to the local communities and institutions to harmonize the disaster preparedness knowledge and skills and to formulate better contingency/preparedness planning of the local disaster management committees. The life skills training also focuses on women rights and empowerment aspects; as well as building awareness of the participants on nutritional issues.

In exchange of their participation in work and training, participants were initially remunerated through a combination of food and cash, since 2015 exclusively in cash.

CASH GRANT FOR INVESTMENT:

From January 2013, the ER programme has been expanded on an experimental basis through the addition of a new component (referred to herein as "ER plus"), which attempts to address some of the underlying, structural causes of extreme poverty in targeted households and, in doing so, enable them to make a measurable and sustainable graduation out of extreme poverty by creating alternative options to manage their livelihoods. This component takes place after the original two-year cycle during a third year in which women from participating households are trained on developing a small business and receive a cash grant for investment as well as a monthly cash allowance. One of the first pilots of this ER plus approach was implemented in the study area of Patharghata Upazila under Barguna district. The entire three-year programme there, from 2011 to early 2014 was – funded by the private sector, LG Electronics.

CONCEPTUAL FRAMEWORK

CONCEPTUAL FRAMEWORK

Many different conceptualizations of resilience are available in the literature (see e.g. Frankenberger and Nelson 2013 for a review) but very few of them are specifically directed at development issues. Even fewer approaches are formulated with an operational impact evaluation framework in mind. In this study we follow Béné et al (2015) who proposed one of the only resilience M&E frameworks specifically designed in relation to development objectives. Their work partially draws on recent conceptual advances made in the understanding of resilience in the context of food security (see e.g. von Grebmer et al. 2013; Constas et al. 2014). In their framework resilience is defined as "the ability of individuals, households, communities, institutions or higher-level systems to adequately deal with shocks and stressors", where the terms 'adequately' refers to the ability to avoid short and longer term negative impacts (Béné et al. 2015, p.6).

One of the key principles that underlie recent conceptualisation of resilience is the recognition that resilience should not be seen as the final goal of a development programme, but instead as an intermediate outcome required for achievement of a more fundamental goal related to a longer-term developmental ambition, typically a measure of wellbeing (e.g., food security, health/nutrition status, poverty). This means that programmes cannot have resilience as their primary objective. Rather, ultimate goal of development programmes/projects should remain the improvement of people's wellbeing.

Framed into a theory of change, this understanding of resilience implies that programme interventions that focus on resilience should be designed and implemented so that they lead to an intermediate outcome (e.g., strengthened resilience capacity of the target population), which itself should then lead to an appropriate response outcome (e.g., improved resilience of the target population), which should eventually lead to the programme's ultimate goal, that is, improving the wellbeing of the target population. This generic theory of change is represented in Figure 1.

The process of formulating such a theory of change is also useful as it brings measurement requirements into focus. In particular, it highlights some of the key components that need to be included in the monitoring and evaluation system. In what follows we present what an ideal M&E framework for resilience programme should look like and the nature and characteristics of the data and indicators which should be measured as part of this framework.

To identify the appropriate indicators to be measured as part of a M&E system of a resilience intervention, one can use a standard logical framework approach (i.e., logframe) comparable to those adopted

Fig. 1. Generic theory of change of a resilience intervention (source Béné et al. 2015)

in the majority of development programmes. Such a logframe would be structured to include the following components: input => activities => outputs => intermediate outcome => outcome => impact. Fig.2 summarises these components for a resilience programme, including the nature of indicators, levels of interventions, and frequency of data collection. A detailed reading of the figure reveals that the overall structure of the logframe does not completely differ from that of "conventional" programmes[1]. In fact some of the steps and indicators are quite similar (in particular monitoring of, and indicators for, inputs, activities, and outputs).

In contrast the intermediate outcomes and outcome components will differ more significantly. In a resilience programme intermediate outcomes should measure whether individuals, households, communities or higher-level systems have gained or strengthened resilience capacities and whether they are on a resilience pathway[2]. These resilience capacity indicators will have to be measured at the beginning of the programme (baseline), and at the end (endline), and the change in these capacity indicators should, in theory, be attributable to the activities of the programme (see ToC in Fig.1 above). The other sets of information that will have to be collected as part of the baseline-endline are (a) the socio-economic and demographic characteristics of the households (e.g. income level, education, age, gender of the household-head household size, etc.), and (b) the wider political, agro-ecological and cultural contexts which are generally recognised to have a strong influence on households and communities; so that we can control for these variables in the analysis.

[1] With the exception, however, of the shock/stressor monitoring component, which is quite specific to resilience monitoring.
[2] In a "conventional" development programme (especially those focusing on capacity building), changes in these capacities would more typically be considered as (higher-level programme) outcomes, or even as impacts.

M&E systems designed for resilience programmes will measure outcomes through indicators of resilience response (i.e., how people respond to shocks or stressors). In that regard, appropriate resilience response indicators will include those that measure changes in both positive and negative behaviours. For example, a reduction in the adoption of detrimental coping strategies (i.e., a lower Coping Strategy Index) might serve as one universal indicator in resilience programmes. Resilience response indicators should however also measure positive changes in relation to adaptive and transformative responses (such as, e.g. the adoption of more diversified portfolios of income generating activities). Those indicators monitoring the occurrence of appropriate/ inappropriate responses are expected to have a strong local (spatial and temporal) dimension that reflects the specific nature of the initial event(s) to which the households/communities are responding and the specific nature of the capacities developed by the households/ communities under consideration. The households' responses have also to be considered in relation to the specific social and ecological contexts and constraints within which these households are operating. For instance the choice of responses put in place by households depends to a large extent on the types of livelihood strategies in which these households are engaged. Faced with a drought a farmer will not be able to adopt the same types of response than an agro-pastoralist.

The M&E system of a resilience programme differs from a more conventional programme's M&E in the way the impact indicator(s) is/are measured. Regardless of what wellbeing measures are used as ultimate impact indicator (e.g., z-score, household assets, HFIAS or PTSD[3]), what is important is to measure/monitor the change in the value of that indicator -not its absolute value. Only the change observed in the value of the impact indicator following an adverse event (compared to its value prior to that event) will inform us about the actual success/effectiveness of the resilience intervention.

Last but not least, the timing and frequency of collection of the outcome, impact, as well as shock/stressor indicators, are key aspects of M&E for resilience programming. In order to capture the dynamics of shocks (which are often unpredictable), the types of responses deployed, and the impact on individual or household wellbeing, high frequency monitoring (e.g., monthly, bi-monthly, or quarterly) is required. Finally, in order to follow changes in response that occur at the household level, panel data should be collected (i.e., from the same households).

Box 1 summarizes the data required for a proper and rigorous resilience impact assessment as highlighted in the paragraphs above. Needless to say, this overall approach should also accommodate for a control/ treatment approach, where these different indicators should be measured in parallel in communities that benefit from the programme's interventions (treatment) and in communities exposed to the same types of shocks/stressors but which are not part of the programme (control).

Box 1. "Gold-standard" data requirement for a rigorous impact evaluation of resilience programme

Treatment / control approach

Baseline/ endline
- household demographic and socio-economic characteristics
- resilience capacities
- information on wider context

High frequency panel data
- shocks/stressors
- household responses
- change in wellbeing indicators

These different requirements (especially the collection of high frequency panel data) represent quite stringent conditions which correspond to the 'ideal' case but, unfortunately, are rarely satisfied. In particular as we shall see just below none of these conditions were fulfilled in the case of the ER programme.

[3] HFIAS = Household Food Insecurity Access Score, PTSD = Post-traumatic Stress Disorder

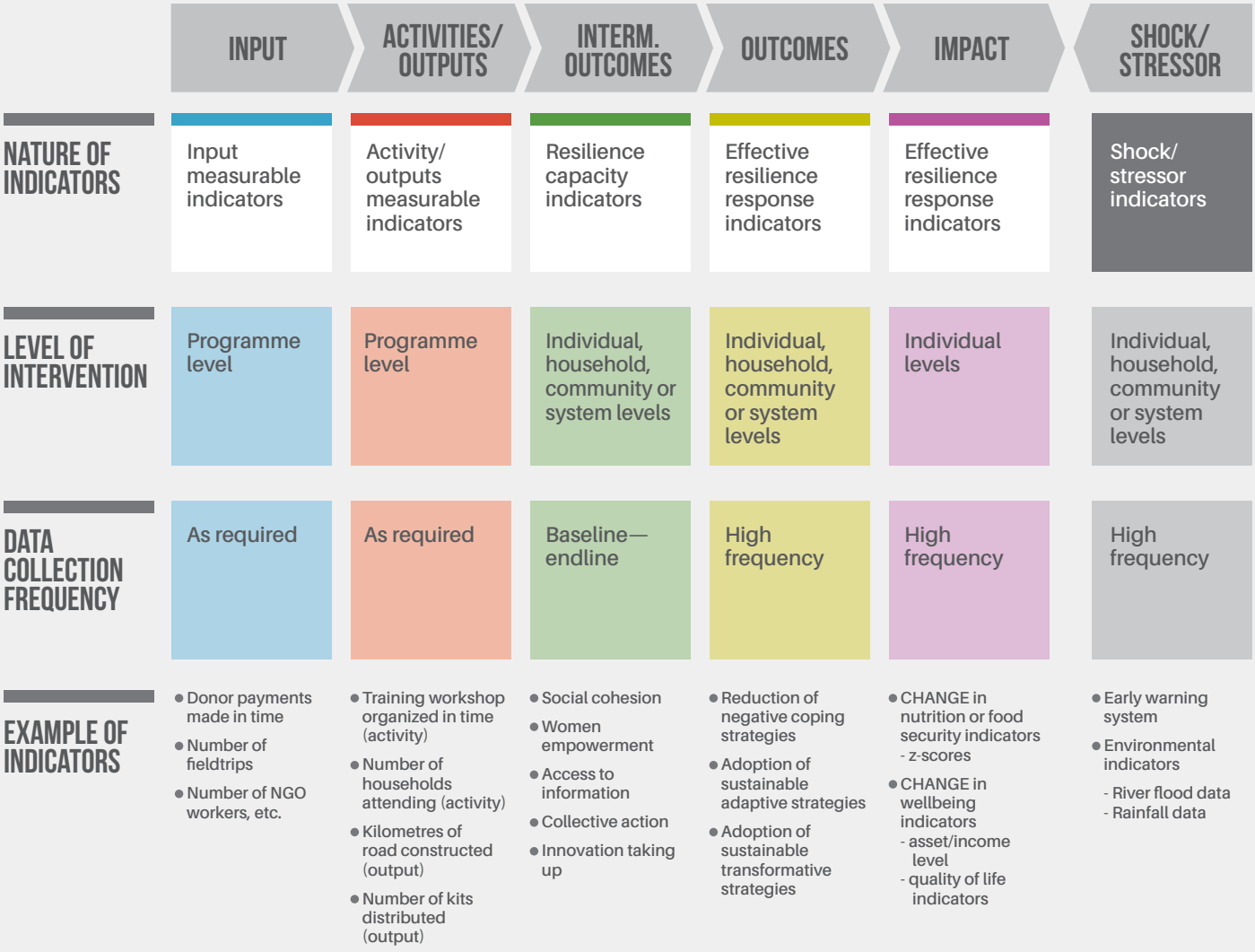

Fig.2. Logframe for an 'ideal' M&E of resilience programming intervention as it should be designed and completed in theory (source: Béné et al. 2015).

METHODOLOGY

METHODOLOGY

4.1. ASSESSMENT FRAMEWORK AND HYPOTHESES

The ER programme did not collect any baseline or endline data in relation to resilience, nor did it define, identify or (attempt to) measure any resilience indicators. No data on shocks or stressors were recorded during the life-span of the programme, and no indicators of change in wellbeing or welfare following specific shocks/stressors have been recorded. No theory of change was produced. In these conditions we adopted the following ex-post evaluation approach.

Based on the logframe presented in Fig.2 and the operational definition of resilience proposed above ("the ability of individuals, households, communities, institutions or higher-level systems to adequately deal with shocks and stressors", where the terms 'adequately' refers to the ability to avoid short and longer term negative impacts), we formulated two assessment hypotheses which will need to be tested within a treatment/control framework; one at the outcome level, and one at the impact level.

At the outcome level: if the ER programme has been effective in building beneficiary households' resilience capacities, the types and/or frequencies of response(s) put in place by treatment households are expected to differ from these adopted by control households under the same circumstances. More specifically, we expect to observe:

- ER-beneficiaries to show lower propensity to adopt detrimental (coping) responses
- ER-beneficiaries to show higher propensity to adopt positive (adaptive/transformative) responses

Hypotheses (1)

At the impact level: those more adequate responses (outcome) are expected to lead to stronger resilience (higher ability to 'bounce back' adequately) in the face of adverse events. More specifically we expect to observe:

- ER-beneficiaries to show higher level of recovery rate than households in the control group (everything else being equal)

Hypothesis (2)

4.2. IMPACT PATHWAYS ANALYSIS

To help formulate the statistical models that will be used to test these two hypotheses, the impact pathway of the ER programme at both outcome and impact levels was elaborated, drawing on the generic logframe presented in Fig.2 and series of discussions with WFP staff.

Outcome-level pathway (hypothesis 1)

At the outcome level, the main outcome of the programme is assumed to be related to the households' response to specific adverse events. The choice of these responses is assumed to be influenced by a series of different household characteristics and external factors. These are shown on Fig.3. At the basic level some of the household demographic and socio-economic characteristics (e.g. age, gender, education, size of the household) are assumed to be potentially important determinants of these responses (in theory we could expect for instance that younger and older heads of household may differ in their choices when faced with the same shock/stressor. Similarly we could expect that men and women may respond differently to the same stressors or shocks). Other household characteristics such as income and asset levels, social capital (e.g. "social connection"), access to information/knowledge are also very likely to influence households' choices. However those last three characteristics (income/assets, social connection, access to information) have been singled out in Fig.3 because they are expected to be directly influenced by some of the ER programme activities: income and assets are affected by the ER asset creation and employment generation activities, and by the cash grant provided to women during the 3rd year for productive investments; social capital is expected to be strengthened by the series of workshops and training implemented by the ER partners; and access to information is expected to be reinforced through the disaster risk reduction and life skills training activities.

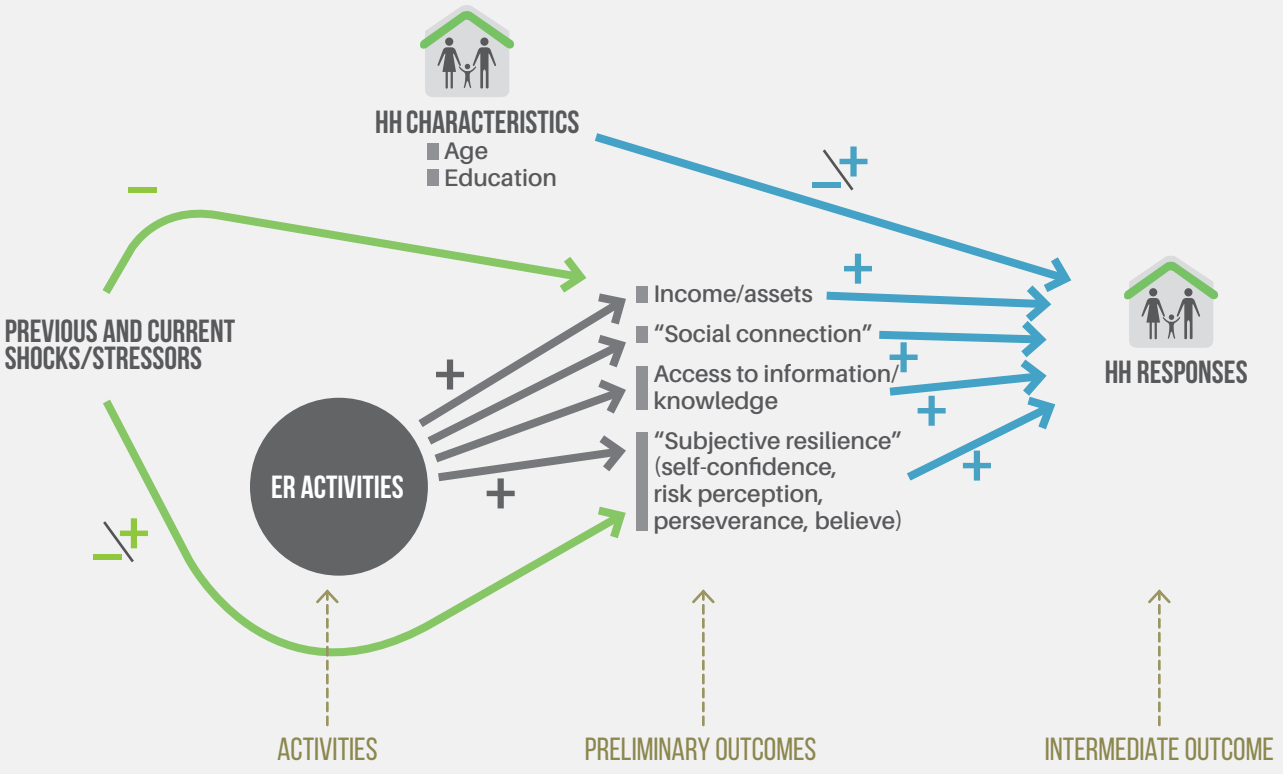

Fig.3. ER programme's impact pathways at the outcome level (see details in the text).

The other major component which is assumed to influence households' choice is what we term 'subjective resilience'. Recent empirical research have demonstrated the importance of factors such as risk-perception, self-efficacy, perseverance, aspiration, or fatalism in the decision making process of people in relation to response to climate change, adaptation, investment in innovation etc. (Bernard and Taffesse 2014; Jones and Tanner 2015; Béné et al. 2016). We captured this assumption through the introduction of a subjective resilience indicator (see details below).

Finally the last component which is represented on Fig.3 is the effect of the current and past shocks/stressors. Current shocks/stressors have by definition some impact on households' assets and income, and thus indirectly on the choice of people's responses. Past shocks/stressors affect not only households' assets and income, but also household members' emotions and cognitive processes, and therefore also influence that household's subjective resilience.

Translating this impact pathway into a model equation we have:

$$Resp_{shock} = \boldsymbol{f}\,(HH_{char};\ shock_{char};\ sub\_res;\ ER) \quad (1)$$

where $Resp_{shock}$ stands for the probability to adopt one particular type of response in relation to a particular shock; HH_{char} represents the sets of household's various demographic and socio-economic characteristics; $shock_{char}$ refers to the type, severity, and impact of adverse events affecting the households; sub_res is the subjective resilience level; and ER is the dummy variable representing the ER effect. The objective is to test the significance of the ER variable for particular types of response through the estimation of probit models[4] structured around equation (1).

Impact-level pathway (hypothesis 2)

At the impact level, the impact pathway is shorter and more direct. We assume that the ultimate impact (in terms of changes in wellbeing, food security or nutrition indicators) reflects the combination of three main dynamics: (i) the direct effect of the initial adverse events, (ii) the 'mitigating' effects of the responses put in place by the households, and (iii) the effect of the external support received by the household –including the humanitarian help (if any) delivered in the aftermath of a severe event. Note that for the effect of the responses the term 'mitigating' has been put between inverted commas. The reason for this is that although the responses are effectively adopted by the household with the objective to mitigate the immediate effect of the adverse event, these responses may themselves induce other (short or long-term) negative effects. The detrimental effect of some particular coping strategies (e.g. distress selling of assets, reduction of expenses or food consumption) has long been recognized and documented (e.g. Sinha et al. 2002; Dercon, et al. 2005; Hoddinott 2006; Kazianga and Udry 2006). This detrimental long-term outcome, however, can also be observed in the case of adaptive (or even transformative) responses, leading to what is referred in the climate change literature as "maladaptation" (Barnett and O'Neil 2013; Macintosh 2013).

These three components, i.e., (i) immediate effect of the adverse events, (ii) 'mitigating' effects of the responses put in place by the households, and (iii) effect of the external support received by the households, are represented in Fig.4. Note that because the ultimate impact indicators (i.e. measures of change in household wellbeing, such as food security or income) were not collected, the evaluation instead measures the intermediate impact: the ability of households to recover. This ability to recover was measured through a self-assessed recovery index estimated at the household level through series of recall and psychometric techniques (self-reporting evaluation using Likert scale) –see details below.

Translating this impact pathway into a model equation, we have:

$$Recov = \boldsymbol{f}(shock_{char};\ Resp;\ support) \quad (2)$$

where $Recov$ is the recovery rate measuring the ability of households to recover from past events used as the indicator of intermediate impact; $shock_{char}$ refers to the type and severity of adverse events

[4] Probit models are regression models in which the dependent variable is a probability, for instance the probability of occurrence of a particular event –in our case the probability of households to engage in one particular type of response.

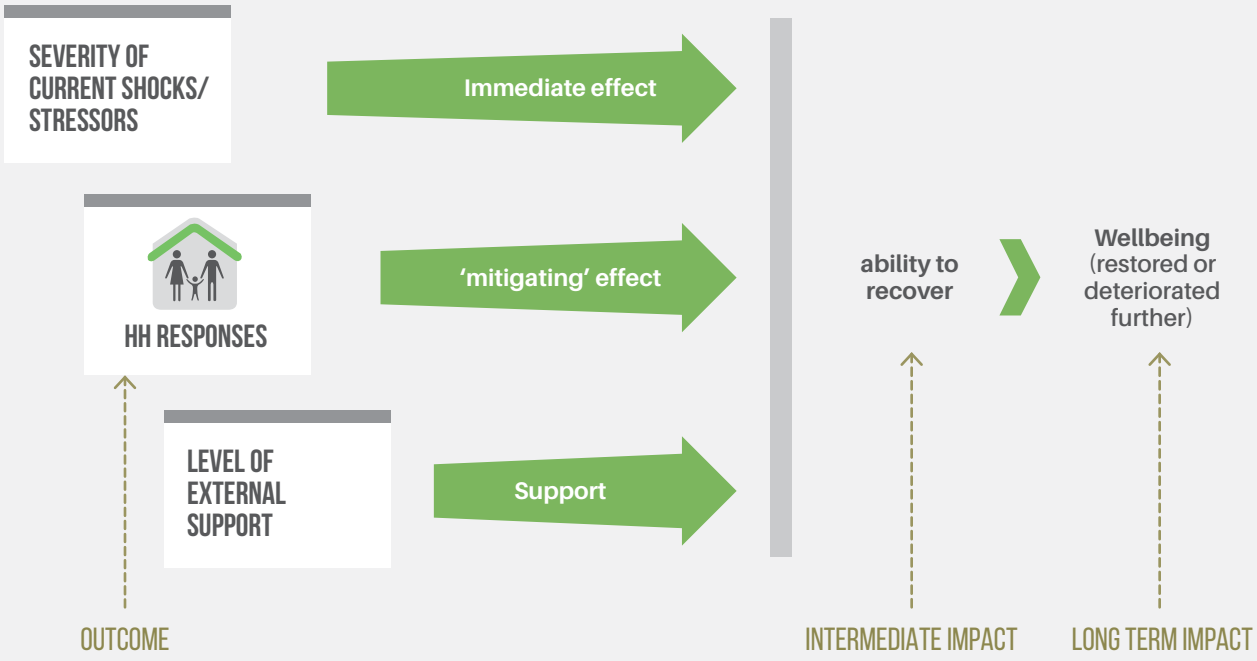

Fig.4. ER programme's impact pathways at the impact level

affecting the households; *Resp* is the type of response put in place by the households; and *support* is a variable capturing the level of support received by these households. The objective is to compare the recovery rate *Recov* between the treatment and the control using matching techniques. This corresponds to testing Hypothesis 2 at the impact level.

4.3. INDEX OF RESILIENCE

In theory a rigorous impact-level assessment of resilience would require to measure the instantaneous change in household's wellbeing, welfare (income, assets), food security or nutrition indicators following shocks/stressors occurrences (cf. Fig.2 above). Since none of this information had been collected at the time of the implementation of the programme, we had to base the assessment on a 'simpler' resilience indicator which was easier to construct in an ex-post context. For this we use an approach that was recently field-tested in four countries (Ghana, Fiji, Vietnam and Sri Lanka) (Béné et al. 2016). In this approach resilience outcomes are assessed using psychometric techniques (self-reporting evaluation using Likert scale) whereby households are asked to assess the degree of recovery they managed to achieve for each adverse event they had experienced in the past 5 years. The self-assessment process is based on 3 distinct recall questions: (i) self-recovery from past events; (ii) self-recovery compared to the rest of the community, and (iii) community recovery from past events. For each question, respondents select appropriate answers from a 5 point Likert scale systems and an index is constructed by combining the answers at the household level.

In the present case the resilience indicator constructed through this technique was used to estimate the household recovery rate *Recov* (see model 2 above) and will be used as indicator of ultimate outcome.

An additional fourth question can be included based on the same technique to estimate the subjective resilience of household, defined as the respondents' perception of their own ability to handle future adverse events.

4.4. STATISTICAL MODELS

4.4.1. Outcome model (hypothesis 1)

In order to test the first hypothesis, which seeks to evaluate the ER programme at the outcome level, we will estimate a series of probit models structured around the generic equation (1). These models will be tested for the 5 most frequent shocks/stressors identified by the surveyed households, and for the 4 most frequent strategies used by those households to mitigate the impact of these shocks/stressors.

For illustration; serious illness and reducing the level of household general expenditures were identified as, respectively, the most serious adverse event and the most frequently adopted responses at the aggregated level (treatment and control households together) (see Result section below). For this particular case we estimate the probit model shown in equation (3) below:

$$Red\_exp_{illness} = \alpha_1 + \sum_i \alpha_{2,i} HH_{i,j} + \alpha_3 sub\_res_j + \sum_k \alpha_{4,k} illness_{k,j} + \alpha_5 ER_j + \varepsilon_j \quad (3)$$

where $Red\_exp_{illness}$ is the probability that households will reduce their expenditure as a response to the impact of illness, $HH_{i,j}$ is the set of household characteristics i recorded for the group of households j who have reported serious illness, sub_res_j is the subjective resilience level of household j, $illnessk_{,j}$ is the set of characteristics k (severity, frequency, impact) of the illness reported by each household j, and ER is the dummy variable representing the ER effect (ER=0 for control; ER=1 for treatment). The objective is to test the statistical significance of α_5.

A similar procedure will be completed for the 4 other main shocks and the 4 main responses adopted by the households, leading to the estimation of 20 models.

4.4.2. Impact model (hypothesis 2)

In order to test the second hypothesis 2 (which seeks to evaluate the ER programme at the impact level), we run a series of Propensity Score Matching tests. Propensity Score Matching (PSM) techniques seek to estimate the effect of a treatment or intervention by comparing the treatment and control groups, while accounting for the potential effect of confounding factors[5]. The use of PSM tests is justified here due to the methodological difficulty of trying to compare two groups that are not comparable in the first place. Indeed since ER-beneficiaries are households who were initially selected by the programme because they were recognized to be poor and vulnerable to climate-related shocks (thus not randomly selected), comparing them to non-beneficiaries means that differences between these two groups can reasonably be expected, in particular in our case in their ability to recover from shocks/stressors. Whether this difference is the result of the ER programme (treatment) or reflects some other (initial) characteristics (e.g. aversion to risk, level of income or assets, education, social network, etc.) is difficult to determine. PSM techniques have been developed to address this issue of selection bias (Rosenbaum and Rubin 1983; Heckman et al. 1997, 1998; Dehejia and Wahba, 2002). A more technical description is provided in Box 1, but not absolutely necessarily for the understanding of the rest of this report.

4.5. SELECTION OF CONTROL/TREATMENT AREAS AND SAMPLING APPROACH

4.5.1. Control - treatment

In the absence of any baseline data, we adopted an ex-post treatment versus control approach where the responses (outcome) and ability to recover from shocks/stressors (impact) observed for the treatment group (households who benefited from the programme by being direct recipients of the activities) will be compared to the responses and ability to recover of control households. The appropriate choice of these control households is critical in order to reduce the potential effect of selection bias[7]. Concretely the control group needs to be as

[5] A confounding factor is be a factor that contributes to the initial status of the treatment group (in our case, being selected as a beneficiary) and at the same time contributes to the occurrence of the characteristics under consideration (here, household having a lower probability to engage in these coping strategies).

Box 1. Propensity Score Matching (PSM) -some technical details

Technically, PSM involves estimating first a probit model that predicts the probability of each household to be included in the ER programme as a function of observed household and community characteristics, using a household sample that contains both ER-beneficiaries and non-beneficiaries. In our case the analysis is disaggregated by type of shock/stressor and we also account for potential external support (i.e. relief aid) (see Fig.4). The probit model specification is then checked to test the equality of the mean and standard deviation of the observed characteristics across the treatment and control group. This test is called the 'balancing propensity' test[6].

The next step involves testing the 'match'. This means using the aforementioned propensity scores to identify 'matching' beneficiary (treatment) and non-beneficiary (control) households (i.e. which have the closest propensity scores), using the 'nearest neighbour' algorithm. Once each ER beneficiary household has been matched, the impact estimate (average treatment effect) is constructed by computing the difference in impact (in our case the Recovery rate) for each matching pair (the treated household and its statistical nearest neighbour) and then the mean difference across pairs. Standard errors of the impact estimates are estimated by bootstrap using 100 replications.

The different tests and procedures necessarily for these analyses are available through various econometric software packages. We used Stata 13 and the Stata commands *psmatch2* (to identify the matching) and *pstest* (to perform the nearest neighbour matching) (Leuven and Sianesi 2003).

comparable as possible to the treatment group in terms of socio-economics and demographics characteristics as well as exposure/vulnerability to shocks and stressors.

Initially the ER-beneficiaries had been selected by the programme through a targeting process combining both geographic and local participatory targeting, whereby the most vulnerable households (identified through participatory targeting at the community level) were selected within unions considered to be the most exposed to extreme events (geographic targeting)[8].

The evaluation exercise described in this report was completed in Patharghata upazila, in the southwest region. Pathargatha upazila is constituted of 7 unions (Charduani, Kakchira, Kalmegha, Kanthaltali, Nachna Para, Patharghata, Raihanpur).Five of these (Charduani, Kakchira, Kalmegha, Kathaltali, and Patharghata Sadar) were initially included in the ER programme, but only three benefited from a full 3-year cycle from 2011 to 2013 (early 2014) (Patharghata sadar, Charduani and Kalmegha)(see Table 1).

Out of the three unions having received the full 3-year ER cycle, two were selected as treatment areas for this evaluation: Patharghata Sadar and Charduani. The control unions could have been chosen from the 3 other unions where the ER programme had been implemented for at least two years (Kalmegha, Kataltoli or Kakchira) which were equally vulnerable to shocks. However the risk of

[6] If it was not possible to control for enough observable characteristics, PSM would be likely to provide biased estimates. However control households for this evaluation were selected in geographic pockets known to be highly exposed to natural disasters (specifically floods and cyclones), to ensure that they were as similar as possible to ER beneficiary (i.e. treatment) households. This helps reduce the risk of biased results, as both control and treatment households have similar household and community characteristics.

[7] Selection bias is a special case of confounding, occurs where intervention participants are non-randomly drawn from the beneficiary population, and the criteria determining selection are correlated with outcomes.

[8] The union selection had been done through a consultative process involving the LGED Upazila Engineer, WFP sub-office and partner NGOs. The selection was then endorsed by the Upazila Disaster Management Committee (UzDMC).

Table 1. Unions of the Patharghata upazila where ER was implemented

Unions of Patharghata upazila	ER project duration	Treatment / control
Patharghata Sadar	3 years	treatment
Charduani	3 years	treatment
Kalmegha	3 years	
Kataltoli	2 years	
Kakchira	2 years	
Nachnapara	No ER project	control
Raihanpur	No ER project	control

picking households who might have received some direct benefits from the ER programme or had benefited from 'spillover effect'[9] was non negligible. Consequently, the two remaining unions in the Patharghata upazila (Nachnapara and Raihanpur) where the ER programme had not been implemented were selected as control. Because these two unions were expected to be overall slightly less exposed to flood and cyclone than the 5 other unions included in the ER (due to their geographical location and more frequent presence of infrastructure like flood control embankment –see Table 2 below), the areas in these two unions where communities were selected as control were chosen in the geographic pockets which were recognized to be the most exposed to disasters ("disaster hotspots"), to improve further the matching with the communities used as treatment in Patharghata Sadar and Charduani unions. Table 2 summarizes some of the similarities/discrepancies observed between the control and treatment areas during the implementation of the assessment surveys.

4.5.2. Sampling frame and data collection

Five hundred treatment and five hundred control households were planned to be surveyed in the four pre-identified unions. Time and resource constraints were the principal reasons for this medium size sampling approach. The 500 treatment households were purposively selected amongst the households who benefited from the whole set of activities implemented by the ER programme (250 households in each of the two treatment Unions). Since vulnerable women were the main target of the programme (and specifically of the cash grant component), all the respondents were females. For the control households, these were selected randomly in "disaster hotspot" areas in the two control Unions. All of the respondents were also female.

The survey was conducted by 16 trained enumerators. The data collection team had two back-checkers and one field supervisor. The enumerators, back-checkers and field supervisor were provided a 4 day long training before they were sent to the field. The enumerators used electronic devices (tablet pc) for the data collection. Approximately 40 percent of all the data collected were back-checked to ensure quality by designated back-checkers. The collected data (100%) were checked by the enumerators at the end of the day. Finally all data (including issues raised by back-checkers) were cross-checked by the team supervisor once again before they were uploaded to the server.

[9] Spillover effect refers to situations where members of the control group are affected by the intervention.

Map of the study area: Patharghata Upazila under Barguna District

Table 2. Differences and commonalities between the control and treatment areas based on field observation made during data collection

Key Area Characteristics	Treatment Unions (Patharghata Sadar and Charduani)	Control Unions (Nachnapara and Raihanpur)
Geography/ topography	Villages are situated in low lands and therefore extremely susceptible to water logging and flooding.	Villages are situated at higher elevation than treatment villages, and are therefore less severely affected by floods and high tides.
	Padma, Ruhita Upgrade, Horinghata and Jinntala villages of Patharghata Sadar union and Amratala, Takar Khal, Beribadh, and Shorkari Pushkuni of Charduani union are situated in close proximity to rivers. Several small canals also run through these villages. During excessive rainfall and high tides, these villages get flooded. Once flooded, water does not recede quickly enough, causing frequent waterlogging.	The control unions are not situated near any rivers. Although several canals (khals) run through the villages of these two unions, floods and waterlogging incidents are low.
Communication and transport	In Patharghata Sadar union, though the main roads are concrete, frequent water logging has caused the roads to be covered with potholes, making journey time consuming and difficult. Some villages in this union (e.g. Horinghata, Jinntala, Padma, Ruhita Upgrade, Badurtala, Chowmuhuni) only have earthen and brick roads.	The main roads are concrete and in much better conditions.
	High transport fares due to poor road conditions, requiring frequent repairs.	Lower transport fares due to better road conditions.
Housing: types and conditions	Most houses are constructed of corrugated iron sheets (wall, roof) and clay (floor). Many of them are in dilapidated condition due to frequent adverse weather events and disasters.	Same housing materials used, but houses are in much better condition due to less frequent climate disasters.
	Concrete houses are rare, due to poverty, access constraints (difficult and costly to bring construction material), and poor soil quality (as the unions are low-lying and by the river, the surface layer of soil is too weak to support concrete houses and the likelihood of houses sinking is high, discouraging investment in housing).	Higher number of concrete houses, due to better access and better soil conditions (land located on higher grounds, less susceptible to sinking and waterlogging).
Access to education	Very low education levels, due to lack of schools, colleges and madrasas. Poor road conditions make travelling to schools in other parts of the upazila expensive and time-consuming. In Patharghata Sadar Union for example, residents estimate that only about 10% of the population has received some form of schooling.	Higher levels of education, due to the presence of schools and colleges in both unions, as well as good transportation systems allowing access to higher education institutions in neighboring areas.
Access to markets	There are no big or established markets/bazars in Horinghata Padma, Ruhita Upgrade and Jinntala villages. People have to travel five kilometres to access a medium-sized market in Badurtala. If people wish to buy high quality clothes or food, they have to travel to Patharghata Sadar bazar. In Charduani union there are three markets.	Nachnapara union does not have any market. However, Raihanpur union has a big bazar where all kinds of products are available. There is another bazar at the other end of Raihanpur.
Cyclone centers	Twenty six cyclone centers in the two unions, indicating high disaster risks.	Nine cyclone centers in the two unions, indicating lower disaster risk.

RESULTS

RESULTS

5.1. DESCRIPTIVE STATISTICS OF HOUSEHOLDS AND THEIR EXPOSURE TO SHOCKS

In total, 505 control and 502 treatment households were surveyed. A series of preliminary basic analyses were performed to compare the treatment and control groups. Some general household characteristics were found to be similar between the two groups, such as average household size (4.36 and 4.09 members, treatment and control respectively) and age of head of household (45 and 41 years, respectively). However despite initial effort to ensure that the control and treatment groups were comparable, some other characteristics were found to differ (at least at the inter-group average level). In particular, the head of household appeared to be better educated in the control group (18% of control respondents said they had received no schooling, compared to 30% in the treatment respondents' group). Exposures to shocks and stressors were also found to be different, with households in the treatment group exposed to a higher number of shocks/stressors than those in the control group (Fig.5a). This observation was confirmed by a t-test ($P < 0.001$). The nature of these shocks/stressors is also slightly different, with control households more frequently affected by some idiosyncratic shocks such as serious illness or accident, while treatment households seem to be more exposed to covariant shocks[10] and stressors such as flooding from excessive rainfall (Fig.5b). Those same treatment households however also reported to be exposed to some idiosyncratic shocks such as loss of livestock due to diseases or loss of productive assets. On the other hand both groups reported a similar level of exposure to cyclones (covariant) or loss of small livestock (idiosyncratic).

Further analysis implemented for the 7 most commonly reported shocks/stressors reveals that while the treatment group was exposed to a higher number of shocks (cf. Fig.5a), the severity of each shock/stressor was generally similar between the two groups (Table 3). In fact the only two shocks for which the difference is statistically significant are serious illness and loss of small livestock and in these cases the higher level of severity is reported by the control group.

[10] Idiosyncratic events are events (shocks or stressors) that affect individuals or households independently (e.g. illness) i.e. without affecting their neighbours, while covariant shocks/stressors are events that affect a whole group/community at the same time (e.g. flood).

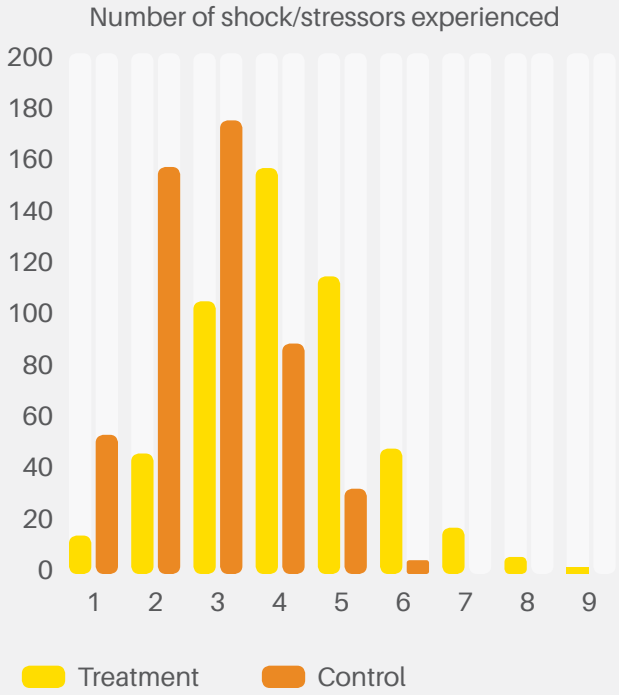

Fig.5.a. Average number of shocks and stressors experienced by control and treatment households over the last 5 years.

Fig.5.b. Most frequently reported shocks and stressors that have affected control and treatment households over the last 5 years (expressed as percentage of households which reported these shocks).

Table 3. Severity of the 7 most frequently reported shocks/ stressors, as reported by treatment and control households (the lower the scores (1) the more severe the event). Shocks for which there is a statistically significant difference in severity between the two groups are shown in bold.

Type of event	Treatment	Control	Total	p-value
Accident (physical injury)	1.51	1.42	1.45	0.229
Serious Illnesses	1.54	1.43	1.48	0.018
Loss of livestock (due to diseases)	1.74	1.61	1.69	0.116
Cyclone short term impact (e.g. destruction of house)	1.75	1.66	1.71	0.175
Flooding from excessive rainfall	1.92	1.92	1.92	0.990
Loss of productive assets (destruction/stolen)	1.98	1.83	1.95	0.324
Death of ducks and hen	2.24	2.01	2.12	0.002

Note (1) Score generated through psychometric techniques (self-reporting evaluation using Likert scale).

The figures on income losses induced by shocks/stressors show no significant difference between the treatment and the control groups (t-test; P=0.67). In fact for both groups, the vast majority (almost 95%) of the households report some loss of income. In contrast the data suggests that a larger number of households reported losses of assets amongst the treatment than the control households (t-test; P<0.0001) (Table 4.a and 4.b respectively). This last result is in line with the fact that the control group was identified as being less exposed to adverse events.

5.2. RESPONSES TO SHOCK AND STRESSORS

Interestingly, although treatment households reported being more exposed to shocks (Figure 5.a above), they also appear to have been able to handle these shocks better (Table 5 and Fig.6). A $\chi 2$ test confirms that the difference is statistically significant (Pearson $chi^2(6) = 89.7677$, $P < 0.0001$).

Taken alone, these results could be interpreted as evidence that the ER programme -through its activities- has successfully strengthened the ER-beneficiaries' ability to handle shocks and stressors. This assumption relates directly to our impact-level hypothesis (2). However, when these results are interpreted alongside results on household income, savings and loan levels, the picture becomes more complicated. First data indicates that (at the time of the assessment exercise) households in the treatment group have on average a higher income than the households in the control group (Table 6). The difference is highly significant ($P < 0.0001$). Conjointly households in the treatment groups have also smaller loan to

Table 4. Number of households reporting having (a) their income affected by shocks/stressors; and (b) lost assets, due to immediate impact of shocks/stressors (both figures expressed in percentage of total number in group).

	(a) Income loss				(b) Asset loss			
Group	Obs	Mean	[95% Conf. Interval]		Obs	Mean	[95% Conf. Interval]	
Treatment	502	0.94	0.917	0.959	502	0.95	0.931	0.969
Control	505	0.94	0.925	0.965	505	0.75	0.715	0.790
p-value	0.670				0.000			

Table 5. (Self-reported) assessment of how households handled shocks/stressors the last time they occurred (in percentage of households)[1].

	Treatment (n = 1454)	Control (n = 1230)	Total (n = 2684)	p-value
Very easily	0.96	0.24	0.63	0.019
Somewhat easily	10.39	4.31	7.60	0.000
With a bit of difficulty	31.50	22.60	27.42	0.000
With a lot of difficulty	48.14	63.58	55.22	0.000
Was not able to handle it at all	8.53	9.19	8.83	0.549
I don't know	0.41	0.08	0.26	
No answer	0.07	0.00	0.04	
Pearson $chi^2(6) = 89.7677$		$P < 0.0001$		

Note: [1] average for the top 9 shocks/stressors shown in Fig. 5.b.

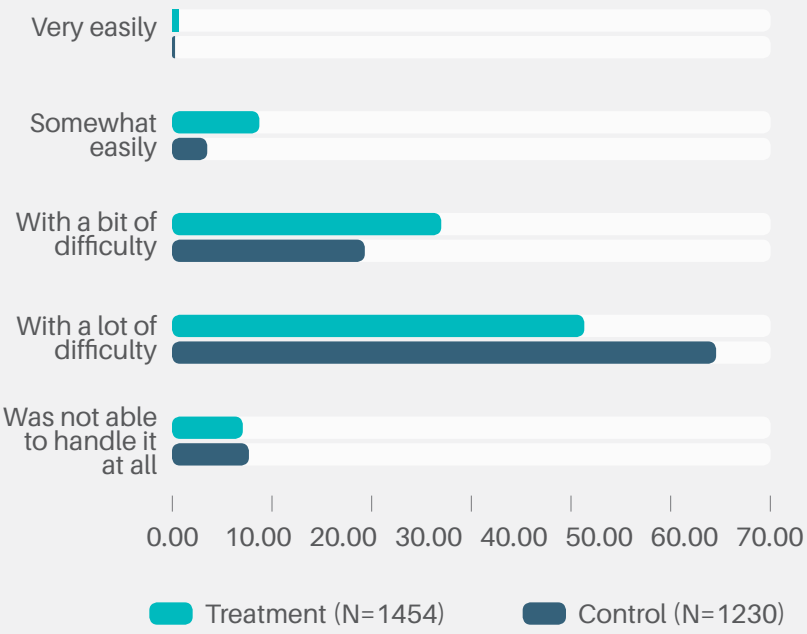

Fig.6. Capacity of the household to handle past events

Table 6. Average income per household derived from income generating activities and remittances (in Taka).

Group	Obs	Mean	[95% Conf. Interval]	
Treatment	502	11,776	11,066	12,486
Control	505	8,862	8,423	9,300
Total	1007	10,314	9,889	10,740
Difference		2,914	2,081	3,746
p-value		P = 0.000		

Table 7. Present amount of loan (in Taka) -average per household.

Group	Obs	Mean	[95% Conf. Interval]	
Treatment	446	42,490	34,069	50,910
Control	477	49,584	40,316	58,851
Total	923	46,156	39,879	52,433
Difference		-7,094	-19,653	5,465
p-value		P = 0.2679		

reimburse (Table 7) and a higher level of saving (Table 8). The difference between treatment and control in terms of loan is not statistically significant (P = 0.267), but that between the two groups' levels of saving is highly significant (P = 0.0001).

Those results (higher income, higher saving, and lower indebtedness) could potentially explain why treatment households report a higher ability to handle past shocks and stressors than control households (cf. Table 5 and Fig.6). This possibility is explored in more detail in section 5.4 below, where we use propensity matching score (PSM) techniques to test more rigorously our second hypothesis (i.e. that the ER programme increased beneficiaries' ability to bounce back from shocks).

Before completing these tests, however, we first need to look into the specific responses – both negative ("coping strategies") and positive ("adaptive/ transformative responses") – adopted by households when faced with these shocks. Starting with negative responses, we look more specifically at the probability of the households to engage in six coping strategies which are commonly considered in the literature to be detrimental. Those are: (a) reduce food consumption; (b) change the type of food consumed; (c) reduce family expenses; (d) take loan; (e) sell assets; and (f) seek assistance from community members. The results, shown in Table 9, indicate that the most frequent coping strategy in the

Table 8. Levels of savings (in Taka) -average at the household level.

Group	Obs	Mean	[95% Conf. Interval]	
Treatment	336	6,372	4,904	7,840
Control	291	3,087	2,523	3,651
Total	627	4,847	4,010	5,684
Difference		3,285	1,625	4,944
p-value		P = 0.0001		

communities surveyed is one that consists of 'reducing family expenses': more than 60% of the households (across both control and treatment groups) report to engage in such a strategy when they face shocks. This percentage is in fact above 70% for the control group. The next most frequent coping strategy is 'change the type of food consumed' (usually purchasing and consuming cheaper and less preferred food) (53%); followed by 'take loan' (49%), 'reduce food consumption' (46%), 'sell assets' (11%); and 'seek assistance from community members' (8%). Worth-noticing is the fact that for all six coping strategies the probability to engage in those strategies is systematically higher amongst the control group than the treatment group, and in 5 out of the 6 cases the difference is statistically significant ($p<0.001$ in all 5 cases).

Table 9. Percentage of households engaging in various negative coping strategies when faced by shocks or stressors

Group	Obs	Mean	[95% Conf. Interval]		Obs	Mean	[95% Conf. Interval]	
	(a) Reduce Food Consumption				(b) Change type of food consumed			
Treatment	1769	41.0	38.690	43.278	1769	45.9	43.577	48.226
Control	1380	53.6	50.989	56.258	1380	61.3	58.735	63.880
Total	3149	46.5	44.780	48.266	3149	52.7	50.908	54.398
Difference		-12.6	-16.125	-9.154		-15.4	-18.881	-11.930
p-value	p = 0.000				p = 0.000			
	(c) Reduce level of family expenditure				(d) Take loans			
	1769	52.6	50.245	54.903	1769	43.0	40.709	45.328
	1380	70.3	67.876	72.704	1380	57.0	54.341	59.572
	3149	60.3	58.628	62.047	3149	49.1	47.380	50.874
		-17.7	-21.105	-14.326		-13.9	-17.426	-10.450
p-value	p = 0.000				p = 0.000			
	(e) Sold assets				(f) Ask assistance from community			
	1769	10.8	9.349	12.245	1769	4.4	3.452	5.367
	1380	11.7	10.039	13.440	1380	13.4	11.606	15.206
	3149	11.2	10.107	12.312	3149	8.4	7.385	9.319
		-0.9	-3.164	1.280		-9.0	-10.920	-7.073
p-value	p = 0.4059				p = 0.000			

These 5 strategies are: reducing food consumption; changing the type of food consumed; reducing family expenses; taking loan; and seeking assistance from community members.

These results are important. They suggest that the treatment group systematically displays a lower propensity to engage in detrimental responses than the control group.

The survey also provides more detailed insights into the patterns of specific coping strategies. For example, households who had reported resorting to reducing household expenditures were asked to specify which specific expenditure(s) they reduced. Results (Table 10) show that control households are more likely than treatment ones to reduce food and health-related expenses (t-tests, P<0.0001 and P=0.002 respectively), which are obviously important results in terms of ER impact.

Households who had reported changing the types of food they consumed in the face of a shock/stressor were also asked which specific food categories they consumed less or more of (Table 11). While changes in grains, tuber, pulses, vegetables, fish and wild food consumption were similar between control and treatment households (in terms of number of households), significant differences were observed with regard to fruit and egg/dairy consumption – with

Table 10. Type of expenses reduced (as percentage of households having reported reducing household expenses as a coping strategy)

	Treatment (N = 930)	Control (N = 970)	Total (N = 1900)	p-value
Farming activity expenses (e.g. less input)	5.7	0.5	3.1	0.000
Leisure and small consumable expenses (e.g. cigarettes)	35.7	32.2	33.9	0.104
Food expenses	49.1	59.7	54.5	0.000
Household general expenses (clothes, toiletries, etc.)	53.5	55.3	54.4	0.455
Health expenses	5.7	9.5	7.6	0.002
Stop paying school fees of children	4.5	3.4	3.9	0.213
Relocation of the household to alternative housing	0.2	0.6	0.4	0.175

Table 11. Change in food consumption, by type of food (as percentage of households having reported reducing food consumption as a coping strategy)

	Treatment (N = 812)	Control (N = 846)	Total (N = 1658)	p-value
Increase foraging wild food including wild fish	52.1	54.4	53.3	0.353
Reduce starchy vegetables/tuber consumption	31.9	31.3	31.6	0.802
Reduce consumption of pulses[11]	18.6	20.6	19.6	0.312
Reduce the consumption of grains	10.6	10.3	10.4	0.838
Reduce the consumption of legumes[12]	11.7	14.3	13.0	0.116
Reduce the consumption of fruits	44.5	58.0	51.4	0.000
Reduce the consumption of egg and dairy products	76.6	81.6	79.1	0.013
Reduce the consumption of fish bought from market	86.7	88.5	87.6	0.257

[11] Pulses relate to regular "dal" cooked in Bangladeshi ways. It includes different kinds of lentils (yellow split, mung etc) and chick peas.
[12] Legume refers essentially to beans and seeds.

control households significantly more likely to eat less of these two food groups (t-tests: $p < 0.001$ and $p = 0.013$, respectively). This is significant from a nutritional perspective, as it suggests that control households are more likely to suffer micro-nutrient (including calcium) and protein deficiencies following a shock, compared to treatment households.

Households who had reported resorting to loans as a coping strategy were asked the source of the loan. Results (Table 12) show that treatment households are more likely to rely on local banks, NGOs and local shops, while the control group is more likely to rely on local money lenders and neighbours. The most significant difference is related to local money lenders, who provided loans to 26 percent of control households, compared to only 8.1 percent of treatment households. This is another important result as local money lenders are known to impose high interest rates.

Another interesting result concerns the impact of shocks/stressors on household income. Households were asked whether they had ever been forced to temporarily reduce or stop one of their income generating activities, as a result of a shock or stressor. While stopping an income earning activity is more a reflection of the magnitude of the shock than a coping mechanism per se, it is still indicative of how shocks affect households. Results (Table 13) show that while being forced to stop an income earning activity is common across all households, it is slightly more frequent amongst the control group (83% of control households, compared to 75% of treatment households) but not significantly ($P = 0.289$).

So far we focused on the nature of negative coping strategies adopted by households. The duration for which these coping strategies are employed is however an equally important dimension of resilience. Results show that treatment households are not only less likely to adopt negative coping strategies, they also engage in these coping strategies for a shorter period after a shock. For instance when asked to estimate the length of the time during which they engaged in a specific coping strategy, treatment households seem, again, to be in a better position than non-beneficiaries (Fig.7). These findings were confirmed through statistical tests (Pearson $chi2(7) = 99.91$; $Pr < 0.001$ for reduction of food consumption; and Pearson $chi2(7) = 86.01$; $Pr < 0.001$ for change in food type).

Analysis has so far focused on the negative coping strategies adopted by households in the face of shocks and stressors.

Table 12. Source of loan (percentage of households who reported taking loans as a coping strategy)

Sources	Treatment (N = 761)	Control (N = 786)	Total (1547)	p-value
Friends/relatives	75.7	78.6	77.2	0.169
NGO	24.7	18.1	21.3	0.001
Local money lenders	8.1	26.0	17.2	0.000
Local merchants	4.7	3.3	4.0	0.154
Local bank	4.3	2.3	3.3	0.024
Neighbours	0.9	4.1	2.5	0.000
Local/community cooperative	0.8	0.3	0.5	0.143
Local shop	0.5	0	0.3	0.042
Others	0.3	0.3	0.5	0.982

Table 13. Percentage of households who reported having to stop or reduce any income generating activities due to shocks or stressors (as percentage of all households)

Group	Obs	Mean	[95% Conf. Interval]	
Treatment	81	75.2	65.7	84.9
Control	48	83.2	72.4	94.3
Total	129	78.4	71.1	85.5
Difference		-8.00	-2.29	0.69
p-value		0.289		

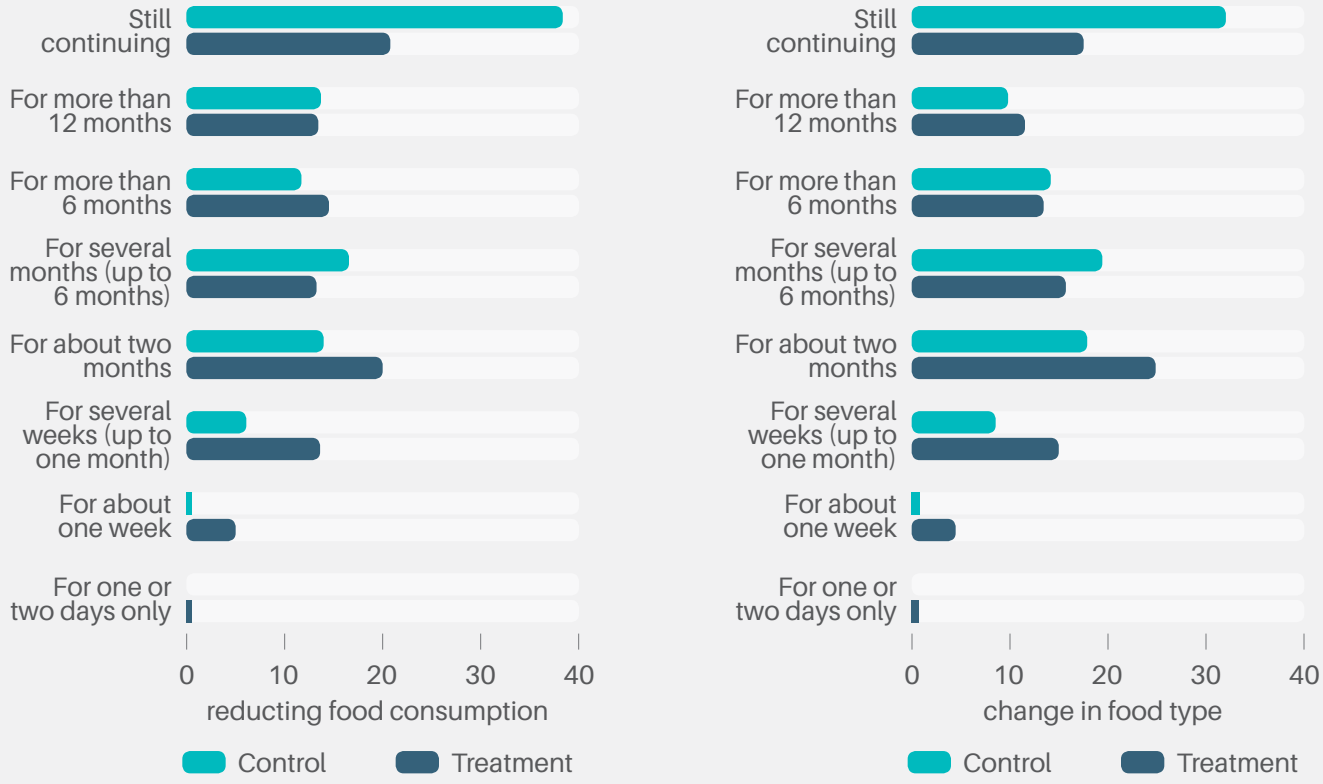

Fig.7. Average time during which households reduced food consumption (left) and changed the type of food they were eating (right), following a shock (as a percentage of households).

However, in order to assess whether the ER programme has effectively increased beneficiaries' resilience, it is also important to understand whether it has increased those households' propensity to implement positive (i.e. adaptive or transformative) responses. Households were asked to list any new activities they had started (or at least tried out) in response to shocks or stressors (Table 14). The distinction between starting an 'uplifting' (i.e. considered adaptive or transformative) activity and what is more of engaging in an 'activity of last resort' (i.e. considered more like negative coping) is often blurry and locally-specific. However, we would argue that the four most frequently mentioned activities (day-labour in agro and non-agro-based activities; rickshaw/van pulling; and maid/ servant job) are activities of last resort. Importantly, control households were found to be more likely to engage in all four of these negative activities than treatment ones. The difference is statistically significant only for maid/servant job however. Conversely, the next two most commonly cited new activities – 'paid sewing/ handicraft/ cottage industry' and 'other small businesses' – can be considered 'uplifting' activities. The proportion of households who took up both of these activities was higher among treatment households than control ones and statistically so for small businesses (P = 0.092).

Those results should, however, be interpreted with some caution, given that they are based on a comparatively small number of observations. This small number also means that we were unable to run any probit models (see below) and therefore to make any conclusive statement on whether or not these differences in adoption of new positive adaptive/ transformative activities can –or cannot- be attributed to the ER programme.

All these different results relate to the first hypothesis (1) of our evaluation, which is that the nature and intensity of the responses put in place by the

Table 14. New activities started/tried by households in response to shocks (in percentage of households having reported starting new activities)

	Treatment (N = 51)	Control (N = 35)	Total (N = 86)	p-value
Non agro based day labour (Example: Road repairing, construction worker)	35.3	40.0	37.2	0.662
Agro based day labour (to others' land)	7.8	14.3	10.5	0.343
Rickshaw/van driver	9.8	11.4	10.5	0.812
Maid/servant/work in other people's house	2.0	14.3	7.0	0.028
Sewing/handicraft/cottage industry (With payment)	7.8	2.9	5.8	0.338
Other small business	7.8	-	4.7	0.092
Farming/agriculture	3.9	5.7	4.7	0.702
Deep sea fishing	5.9	2.9	4.7	0.519
Poultry rearing	5.9	2.9	4.7	0.519
Vegetable/nursery	2.0	2.9	2.3	0.789
Various micro enterprises in own house	3.9	0	2.3	0.241
Non-government service/NGO worker	-	5.7	2.3	0.086
Beggar	2.0	2.9	2.3	0.789
Industrial labour (Example: Garments worker)	-	2.9	1.2	0.230
Animal rearing	-	2.9	1.2	0.230
Restaurant/shop worker	-	2.9	1.2	0.230
Hawker/mobile hawker	-	2.9	1.2	0.230
Restaurant/shop owner	2.0	-	1.2	0.411
Collecting/gathering rice	2.0	-	1.2	0.411
Others	11.8	8.6	10.5	0.639

households in the treatment group is expected to be different from the responses put in place by the households in the control group for the same shocks/ stressors. What we propose in the next section is to test more rigorously this hypothesis.

5.3 TESTING THE OUTCOME LEVEL HYPOTHESIS

Having presented the "raw" results of the survey, we now seek to test our two assessment hypotheses in a more rigorous manner, to determine whether the observed differences in control and treatment households' behaviour at both outcome and impact level can be attributed to the ER programme.

We start with the first hypothesis, which sought to evaluate the effectiveness of the ER programme at the outcome level. If the ER programme has been effective at the outcome level, then

- ER-beneficiaries are expected to show lower propensity to adopt detrimental (coping) responses
- ER-beneficiaries are expected to show higher propensity to adopt positive (adaptive/transformative) responses

Hypotheses (1)

and we propose to test these hypotheses through probit models of the form:

$$Resp\_A_S = \alpha_1 + \sum_i \alpha_{2,i} HH_{i,j} + \alpha_3 sub\_res_j + \sum_k \alpha_{4,k} S\_char_{k,j} + \alpha_5 ER_j + \varepsilon_j \quad (3)$$

where $Resp\_A_S$ is the probability of households engaging in Response A as an attempt to mitigate the impact of a shock/stressor S, $HH_{i,j}$ is the set of household characteristics i recorded for the pool of households j who have reported being affected by S, $S\_char_{k,j}$ is the set of characteristics k (severity, frequency, impact) of the shock/stressor S reported by each household j, and ER_j is the dummy variable representing the ER effect (ER=0 for control;

ER=1 for treatment). The objective is to test the statistical significance of α_5.

In order to keep the analysis focused on the most relevant shock-response combinations, we only apply the probit models to the five most reported shocks/stressors and the four most frequent responses (i.e. we estimate 20 models). As an example Table 15 shows the results of the probit model estimated for the pair ('serious illness' - 'reduce family expense') which is the most reported shock/stressor paired with the most reported response for that shock/stressor. The estimation shows that being a beneficiary of the ER programme reduces statistically the probability to engage in the strategy 'reduce family expenses' (p = 0.023).

Table 15. Result of the probit model testing the effect of the ER programme on the probability that a household affected by serious illness (shock/stressor) responds by 'reducing family expenses' (negative coping strategy).

Probit regression – dependent variable: Reduce family expenses						LR chi²(25)	77.71
Log likelihood = -117.8						Prob > chi²	0.000
Number of obs = 709						Pseudo R²	0.248
	Coef.	Std. Err.	z	P>z		[95% Conf.	Interval]
Programme effect							
ER	-0.574	0.253	-2.27	0.023	**	-1.071	-0.078
HH characteristics							
disability_respondent	-1.217	0.873	-1.39	0.163		-2.927	0.493
gender_hh_head	-0.180	0.375	-0.48	0.632		-0.915	0.555
marital_status	-0.823	0.556	-1.48	0.138		-1.913	0.266
respondent_age	-0.017	0.091	-0.19	0.848		-0.195	0.161
respondent_age_squared	0.000	0.001	0.00	0.998		-0.002	0.002
hh_head_age	0.021	0.064	0.33	0.743		-0.104	0.146
hh_head_age_squared	0.000	0.001	-0.47	0.639		-0.001	0.001
the level of education of the head of household2	-0.049	0.231	-0.21	0.832		-0.502	0.404
the level of education of the head of household3	0.080	0.307	0.26	0.795		-0.522	0.682
the level of education of the head of household4	0.044	0.477	0.09	0.926		-0.891	0.980
the level of education of the head of household5				(omitted)			
the level of education of the respondent2	0.350	0.299	1.17	0.242		-0.236	0.936
the level of education of the respondent3	0.043	0.368	0.12	0.908		-0.678	0.764
the level of education of the respondent4	-0.640	0.536	-1.19	0.233		-1.691	0.411
total_value_assets_ln	-0.328	0.141	-2.32	0.020	**	-0.605	-0.051
total_land_value_ln	0.019	0.019	0.97	0.331		-0.019	0.057
income_log	0.463	0.163	2.85	0.004	***	0.144	0.782
services_accessed	-0.003	0.007	-0.48	0.631		-0.017	0.010
number of member benefiting from safety net programmes	0.289	0.129	2.25	0.025	**	0.037	0.541
Subjective resilience							
future_recovery	-0.089	0.061	-1.44	0.149		-0.209	0.032
Shock characteristics							
bad_event	-0.171	0.130	-1.31	0.190		-0.427	0.085
income_hamper_event	0.191	0.209	0.91	0.362		-0.219	0.600
disruptions_event	0.337	0.247	1.37	0.172		-0.147	0.820
lost_asset_event	0.052	0.322	0.16	0.871		-0.578	0.683
cons	2.248	2.110	1.07	0.287		-1.888	6.384

Stars indicate statistical significance at the .10 (*), .05 (**) and .01 (***) levels

The other 19 probit models were designed using the same approach described above. Table 16 summarizes the results obtained for the 20 probit models estimated across the 5 major shocks/stressors and 4 main types of responses.

Results show that the ER programme reduces the probability that households will engage in detrimental coping strategies for half of the shock-response combinations (10 out of the 20 models tested). This reduction is statistically significant in 7 out of these 10 models ($p < 0.10$). For those 7 statistically significant cases, we then calculate the marginal effects dy/dx[13] to determine the magnitude of the ER programme's positive effect. Results show that participation in the ER programme reduces

Table 16. Result of all 20 probit models.

Shock/ stressor	Serious Illness	Cyclone	Death of ducks and hens	Loss of livestock	Flooding
RESPONSES					
Reduce the level of family expenses	**Significant positive effect (likelihood of reducing expenses decreased by 5.1%)**	**No effect**	**Significant positive effect (likelihood of reducing expenses decreased by 5.9%)**	**Significant positive effect (likelihood of reducing expenses decreased by 10.4%)**	**Significant positive effect (likelihood of reducing expenses decreased by 15.8%)**
Take loan	**Positive effect, but not statistically significant.**	**No effect**	**Significant positive effect (likelihood of taking loans reduced by 8.0%)**	**Positive effect, but not statistically significant.**	**Positive effect, but not statistically significant.**
Change type of food consumed	**Significant positive effect (likelihood of changing the type of food consumed reduced by 5.1%)**	**No effect**	**No effect**	**Significant positive effect (likelihood of changing the type of food consumed reduced by 11.1%)**	**No effect**
Reduce food consumption	**No effect**	**No effect**	**No effect**	**No effect**	**Significant negative effect (likelihood of reducing food consumption increased by 17.1%)**

Note: This table shows the results of all 20 probit models testing the effects of the ER programme on households' response to the five most reported shocks/ stressors. Text on deep-blue background indicates a statistically significant positive effect (i.e. the ER programme makes it less likely that a household would engage in that particular negative coping strategy) ($p < 0.10$); text on light-blue background indicates a positive but not significant effect ($0.10 < p < 0.25$); text on orange background indicates no effect ($p > 0.25$); and text on red background indicates statistically significant negative effect. The marginal effect dy/dx indicates the change in a household's probability of engaging in a particular coping strategy, if it becomes enrolled in the ER programme (i.e. dummy variable ER changed from 0 to 1), expressed in %.

[13] The marginal effect dy/dx indicates the change in a household's probability of engaging in a particular coping strategy, if it becomes enrolled in the ER programme (i.e. dummy variable ER changed from 0 to 1),

the probability of engaging in detrimental coping strategies by 5 to 16% -depending on the shock-response combination (Table 16).

The ER programme does not seem to have any clear impact on household's use of negative coping strategies in 9 cases ($p > 0.25$). In the last model, which combines floods (shock) and reduced food consumption (response), the ER programme was actually found to increase the likelihood of resorting to this negative coping strategy.

Finally as noted previously, due to the very small number of households reporting trying adaptive or transformative responses, the sample size was too small for any rigorous statistical analysis[14]. We were therefore unable to use probit models to test the first hypothesis' second statement, regarding the ER programme's effect on propensity to adopt positive responses.

5.4. TESTING SECOND HYPOTHESIS (IMPACT LEVEL)

Our second hypothesis sought to evaluate the effectiveness of the ER programme in terms of impact:

To test this hypothesis, we compare control and treatment households' self-reported ability to recover from past shock/stressors. However, as highlighted in the impact pathway analysis, we recognize that this ability is likely to be determined or influenced by many factors beyond just the participation in the ER programme. We therefore use a PSM method to compare treatment households with control households which are as similar as possible. The PSM approach assumes that after controlling for all observable household characteristics, non-beneficiaries have the same average ability to recover from shocks as beneficiaries - had they not participated in the ER programme.

Similar to the approach adopted with the outcome evaluation, the PSM models were run only for the five most commonly reported shocks/stressors. Results are shown in Table 17, while intermediary calculations and models are presented in Annex 3[15].

Table 17 shows the details of the difference in the self-reported capacity to recover between the treatment and control households calculated for the matched households (what is called the Average Treatment effect on the Treatment groups -noted ATT[16]) - and their t-statistical significance. We used a one-tailed test –as our hypothesis was that the self-reported ability to recover for the treatment group is expected to be larger than for the control groups. The results indicate that the value is indeed systematically higher for the treatment (in line with our hypothesis (2)) in the five cases considered, but that only one of these differences is statistically significant at 5% level (cyclone).

Table 17. Results of the Propensity Score Matching test. Value of t-statistics is based on bootstrapped standard errors (100 iterations).

	N treated	N control	Mean Treated	Mean Control	ATT	Std.Err.	*t* (1)	
Serious illness	319	117	5.897	5.601	0.293	0.478	0.62	
Cyclone	252	98	6.267	4.756	1.511	0.580	2.61	***
Death of Ducks and Hens	153	62	5.839	5.551	0.287	0.650	0.44	
Loss of Livestock	186	59	5.326	4.707	0.619	0.779	0.79	
Flooding due to excessive rainfall	183	42	5.555	4.711	0.844	0.967	0.87	

Note: (1) 5% level one tailed test: t-critical value = 1.645; 10% level one tailed test: t-critical value = 1.282.

[14] The most frequently reported adaptive/transformative response - trying or starting a new income generating activity – was only mentioned by 95 households (63 treatments and 32 controls).
[15] These intermediary calculations include the five probit models that were estimated to test the balancing property (one for each type of shock/stressor). The analysis shows that the balancing property was satisfied for each model (cf. Annex 3).
[16] The Average Treatment effect on the Treatment groups (ATT) is the difference in mean (average) outcomes between treatment and control –see Box 1 for detail. In our case it represents the difference in the self-reported capacity to recover between the treatment and control households calculated for the matched households.

DISCUSSION

DISCUSSION

The objective of this study was to assess the impact of the 3-year Government and WFP Enhancing Resilience programme implemented in Bangladesh from 2011 to 2013 (early 2014), and more specifically to explore and, if possibly, to evaluate whether the ER activities had effectively strengthened the resilience of the direct beneficiaries of the programme. As such this objective initially raised a series of serious methodological challenges.

First the ER programme had not collected any resilience baseline data nor had it defined, identified or (attempted to) measure any forms of resilience indicators. No data on shocks or stressors had been recorded during the life-span of the programme, and no indicators of the programme's final impact on the beneficiaries (measured either in term of *changes* in incomes, assets, wellbeing, food security or nutritional indicators following shocks/stressors) had been systematically recorded.

Second, while techniques for monitoring and impact evaluations in general are now well established, in contrast monitoring or impact evaluations of *resilience* interventions are still in their infancies. While some promising conceptual progresses have been achieved in the last two to three years in relation to the measurement of resilience notably through the work of the Resilience Measurement Technical Working Group (Constas et al. 2013; 2014), very little is available on *monitoring* and *evaluating* the impact of resilience interventions. The only document which addresses this question in a relatively comprehensive manner is Béné et al. (2015). However, this publication presents an 'ideal', gold-standard M&E framework (reproduced in Fig.2 above), which was not applicable in the case of the ER evaluation, given the lack of data.

In these conditions we developed an ex-post treatment versus control framework where the responses to shocks/stressors (outcome) and ability to recover (intermediate impact) observed for the treatment group (households who benefited from the programme) were compared to the responses and ability to recover for control households. The evaluation framework was structured around the programme impact pathways (reconstructed for this purpose) and two sets of hypotheses; one at the outcome level, and one at the impact level. At the outcome level we hypothesized that the types of strategies put in place by the beneficiaries of the ER programme (treatment group) to respond to shocks and stressors would differ from those put in place by the non-beneficiaries (control group). At the impact level, we hypothesized that the ability of recover from shock/stressor would be higher amongst the beneficiaries of the ER programme (treatment) than amongst the non-beneficiaries (control group).

The data and information about shocks, stressors, responses and ability to recover were collected using recall and psychometric techniques (self-reporting evaluation using Likert scale). Due to budget constraints, the control and treatment groups were limited to 500 households each (1000 households in total).

Before discussing the key-findings of the study, one first point needs to be clarified. While the activities of the ER programme were mainly targeting individual women, the unit of analysis of our work was the household where those women live. While some would argue that this could represent a critical flaw in the evaluation process, our position was driven by empirical experience. Decisions related to how to anticipate or to respond to a shock/stressor are rarely taken at the individual level. Instead they result from discussion, negotiations, trade-offs, and compromises made at the household level, based on the resources (knowledge, labour, assets, etc.) that are available at that household's level, not at the individual level[17]. Therefore even though the ER programme was effectively targeting women, the outcome/impact was felt at the household level, where the impact evaluation effort focused.

At the outcome level, initial results show that beneficiary households were systematically less likely to engage in negative coping strategies than non-beneficiaries (Table 9). In order to determine whether this difference could effectively be attributed to the ER programme – and therefore test our first hypothesis more rigorously – we used a probit model approach. Results from the analysis (Table 16) show that controlling for other potential co-variables slightly tampers the initial findings, but does not change the overall conclusion: half of the probit models which we tested (10 out of 20) confirmed that the ER programme did indeed reduce the probability of households to engage in detrimental coping strategies with the difference being statistically significant in 7 out of these 10 positive cases. For these 7 cases, the probability of engaging in detrimental coping strategies is reduced by 5 to 16% (depending on the shock-response combination). For only one of the other (non-positive) cases does the model suggest that being part of the ER programme increases statistically the probability of households to engage in a detrimental coping strategy. This case is the combination of flood (shock) with 'reduce household food consumption' (copying strategy). While this negative result may not be entirely surprising -especially because flood is the only event amongst the five most severe shocks/ stressors for which the treatment group was significantly more exposed than the control group (cf. Fig.5b)-, this case does still raise some questions –in particular around the reason why 'reduce food consumption' appears to be the only coping strategy for which the ER programme does not seem to have any positive effect (cf. Table 16).

Except in this specific case, the ER programme appears to have either a neutral or positive effect in helping the beneficiaries reduce their propensity to engage in negative coping strategies. In terms of outcomes, it seems therefore reasonable to assert that the ER programme has had an overall positive effect at least on detrimental coping strategies.

The second important (and positive) aspects which is worth recalling is the fact that the propensity of households to engage in coping strategies is not the only aspect of these coping strategies which appears to be modified under the effect of the ER programme. The period during which households have to rely on these coping strategies also seems to be modified/shortened. This was the case for instance for the responses involving a reduction of food consumption or a change in food type. The data revealed that in both cases the ER-beneficiaries reported to rely on these two coping strategies for a shorter period of time than non-beneficiaries. Likewise, for households who had reported resorting to reducing household expenditures data showed that non-beneficiaries were more likely to reduce food and health-related expenses than ER-beneficiaries. Finally and very importantly in the context of Bangladesh where the issue of over-indebtedness is so

[17] This approach does not mean, however, that we assume an equal and gender-balanced decision making process *between* the household members. The way the ER programme affected this decision-making process within the households would be another extremely interesting piece of research.

prevalent, data also showed that non-beneficiaries have a far larger propensity to rely on money-lenders when they need to borrow money than ER-beneficiaries (26% versus 8%). All these different results are additional signs that demonstrate that the ER programme effectively mitigates the negative effects of households' responses to shocks/stressors and as such enhances their resilience (as defined in this report).

Our results also shed interesting insight on the link between the coping strategies adopted by households in response to shocks/stressors (outcomes), and the longer term negative implications of these coping strategies on household members' wellbeing (impact). For instance, examined together, Fig.7.b and Table 11 show that not only do non-beneficiaries adopt coping strategies for a longer period (slower recovery) than ER-beneficiaries, but that these strategies are potentially leading to serious negative nutritional impacts, by leading to reduced consumption of fruits, eggs and dairy products. Likewise, taken together, Fig.7.a and Table 10 suggest that non-beneficiaries not only have a higher tendency to reduce household expenses, but that these reductions mostly affect food and health expenses – which could have negative long term effects on their general wellbeing. Finally, Tables 12 and 14, examined alongside tables 6, 7 and 8, suggest a direct, concrete link between how households respond to shocks (in particular whether or not they start new adaptive/ transformative activities -Table 14)-, and where/ from whom they take loans from – Table 12- and the economic status and welfare of these households a few months or few years later (Tables 6, 7 and 8).

On the other hand the data did not permit to draw any rigorous conclusions about the more positive (adaptive/ transformative) responses, essentially because the number of ER-beneficiaries and non-beneficiaries who did engage in these uplifting strategies was too small to allow the use of robust econometric analyses. However, the very fact that for the vast majority of the households (ER-beneficiaries as well as non-beneficiaries) the main types of responses adopted are still mainly absorptive coping strategies is in itself very informative from an ER-programmatic perspective – it suggests that at present the main contribution of the ER programme at the outcome level still remains its effect on these coping strategies.

At the impact level, initial results suggested that, while ER-beneficiaries were on average more exposed to shocks than non-beneficiaries (Fig.5), they also reported being better able to handle these shocks (Table 5 and Fig.6). In order to determine whether this difference could be attributed to the ER programme rather than to other confounding factors – and therefore test our second hypothesis more rigorously – we used a statistical matching technique (propensity score matching, PSM).

Results here are mixed. Once potential confounding factors were controlled for, ER-beneficiaries were still overall more able to recover from shocks, but the variation with non-beneficiaries is less apparent. While beneficiaries display a higher ability to recover in all the 5 cases that were tested, the difference was statistically significant in only one case – cyclones (Table 17).

There could be a number of explanations for this less marked difference between ER-beneficiaries and non-beneficiaries. A first (simple) explanation could be related to the size of the sub-sample of treated and control households which were matched together during the PSM test. Some of these sub-samples were relatively small and associated to large standard errors (cf. Table 17), possibly contributing to some of the low t-values that were observed for the ATT values.

Another explanation is that the effects of the confounding factors are important and as such are masking or overriding the potential effect of the ER programme. For instance household income level shows a systematic positive sign in the preliminary probit model used in the PSM analysis (not shown) -the coefficient is in fact highly significant in three out of the five PSM models-, suggesting that beneficiaries of the ER programme are characterized by a statistically higher income level than non-beneficiaries (other things being equal). This higher income level could very well be a critical factor explaining the ability of ER-beneficiaries to recover more easily from shock/stressors than non-beneficiaries. It is indeed now

well accepted in the literature that the level of wealth (asset, income) is an important factor determining the abilities of people to 'bounce back' better or faster after a shock (see e.g. Hoddinott 2006, Carter et al. 2007).

However in the ER case, the higher incomes -or similarly the higher levels of saving and lower levels of loan (cf. Table 7 and 8)- which are observed for the ER-beneficiaries cannot be considered as confounding factors even if they probably contributed to the apparent higher ability of the ER-beneficiaries to recover from shocks and stressors. Indeed in the present case, the ER programme's beneficiaries had been initially specifically selected for their extreme poverty and vulnerability. Therefore, unless the preliminary targeting process done by WFP and their local partners had been so inadequate that the programme had in fact selected better-off women (a hypothesis which does not hold scrutiny very long), higher savings and income cannot be a confounding factor. Instead a more reasonable scenario is that these ER-beneficiary women who were initially poor and vulnerable have been successful at improving their income and savings due to the activities/support of the programme, to the extent that they are now significantly better-off than non-beneficiaries. Interestingly this possible explanation was reinforced recently by the findings of another study which looked specifically at the impact of the cash grant of BDT 12,000 distributed during the last year of the ER programme cycle (Hernandez et al., 2016). Those authors used a difference-in-difference framework to compare the income (expenses), savings and asset levels of the ER-beneficiaries with those of other ultra-poor households not included in the programme (control) before and after the ER programme (baseline/endline). They found that the ER programme has a positive effect on beneficiaries' expenses, assets and savings.

Overall, based on our own results, and those of Hernandez et al. it seems reasonable to assume that the ER-beneficiaries are effectively characterized by a higher income and lower level of debt than non-beneficiaries, and that this is the result of the ER programme.

Having established this result does not put us however in a position to draw any strong lessons or recommendations about the ER programme. Because of the nature of the assessment framework that was adopted (an ex-post evaluation) it is not possible to identify rigorously whether one or even several specific activity/ies amongst the different interventions that have been implemented by the ER programme had more effect in building the resilience of the beneficiaries than others. It seems natural to assume that the cash-grant for investment has played an important role in the improvement of the income and savings of the ER-beneficiaries (a conclusion that is also reached by Hernandez et al 2016 in their evaluation of the cash-grant component), but it is unclear how effectively the link operates between the grant and the higher income/saving.

In fact -as highlighted earlier in this discussion-, even if the ER programme seems to be successful at boosting the income and saving of its beneficiaries, the responses adopted by those ER-beneficiaries still remain mainly absorptive coping strategies (as opposed to adaptive or even transformative ones) – suggesting that there is still some 'space for improvement' in the ER programme's outcomes. Whether a substantial increase in the proportion of households engaging in adaptive or transformative responses would require different activities or could progressively emerge as a result of the current ones is difficult to determine at this stage.

From a resilience-building programme's M&E perspective, the main lesson that emerges from this analysis is that even if it appears now possible to provide robust and rigorous conclusions regarding the effectiveness of a particular resilience programme without a gold-standard framework relying on high-frequency sampling, one still needs to put in place some minimum conditions if one wants to be able to not simply monitor or even evaluate the programme but learn from it. In particular it seems indispensable to have a comprehensive baseline/endline assessment framework that allows to document and quantify medium-term changes in households' strategies in response to specific shocks and stressors, and that allows to identify which specific activities and interventions of the programme contribute to these outcome changes.

7

CONCLUSION

In this study we designed and applied an ex-post treatment versus control framework to test the potential effect of a 3-year programme (the Enhancing Resilience (ER) programme) on the resilience of ultra-poor rural households living in the southern coastal belt of Bangladesh. The evaluation framework was structured around the impact pathways of the programme and two sets of hypotheses; one at the outcome level, and one at the impact level. In the absence of proper baseline/endline data on resilience, the analysis demonstrates with reasonable certitude that the ER programme, not only did not do harm to the beneficiaries, but contributed positively to strengthening their capacity to better handle shocks and stressors (their resilience) by altering positively their ability to avoid engaging in detrimental coping strategies when faced with shocks and stressors. There is also reasonable evidence to assume that these beneficiaries rely on this stronger capacity to better recover from shocks and stressors to improve their welfare (income and assets) above the level observed for the non-beneficiaries.

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C-ADAPT Climate Resilience for Food Security: ANALYSES, INNOVATIONS & STANDARDS

The production of this special report has been made possible through the generous contribution of the Government of Sweden through C-ADAPT. The Climate Adaptation Management and Innovation Initiative (C-ADAPT) is an initiative funded by the Government of Sweden's fast-track climate finance that allows WFP and partners to explore innovative climate-induced food insecurity analyses, programmes and best practices, with the goal to help individuals, communities and governments meet their food and nutrition needs under a changing climate.

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ISBN: 978-984-34-1033-7

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