Working Paper No. 40

Loss and Damage, Caused by Cyclones Sidr, Aila and Mahasen: Coping Strategies, Adaptation and the Role of Microfinance

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Abstract

Climate change results recurrent natural disasters which cause an enormous loss in the household as well as in the community levels. This study is designed to meet two major objectives. Firstly, assessment of the household level loss and damage incurred from super cyclones Sidr and Aila and tropical storm Mahasen in three districts namely Khulna, Patuakhali and Satkhira. Secondly, coping strategies adopted by the affected households in the post-cyclone situation and the role of microfinance in the process of adaptation. The itinerary of the catastrophic cyclone Sidr and storm Mahsen includes Patuakhali district, whereas super cyclone Aila has gone through the districts Khulna and Satkhira. As expected, highest proportions of households of these areas were affected by the respective cyclones and storm and their total amount of loss and damage was higher compared to others. The average size of loss and damage studied in terms of loss of assets, from direct income, reconstruction expenses or increased expenditure are also evident to be larger by the itinerary of the disasters. However, the amount of loss and damage in all forms and average size per households resulted from Aila was substantially higher than that resulted from Sidr and Mahasen.

In focusing the second major objective, the adopted coping strategies are broadly classified as current income or savings, sale of assets, informal loan and government support. It is evident from the bivariate analysis that more of the program households choose current income or savings for adaptation purpose than their counterpart. Conversely, the percentage of households taken loan from informal market among control households was higher than that of program group households. In most of the cases higher percentage of program households received government support than control households. The variation in the percentage of households adopted different coping strategies over household characteristics is observed. Endogenous switching regression models with full sample and samples with counterfactual evaluate that the expected amount of coping from current income or savings was significantly higher for program group households than their counterpart in three cyclone cases and on the contrary, informal loan was significantly lower than that of control group households in the cases of Sidr and Aila, but reverse in case of Mahsen. The model of government support is only convergent for the case of Sidr and evident that the expected amount received by the affected households was lower for the program households. But, due to insufficient number of households the models for sale of assets do not converge. This study recommends some interventions to the households in climate vulnerable areas, further study to identify why more inclination towards informal loan to cope in the aftermath, a way to implement a comprehensive strategy and make justification on detailed assessment of loss and damage.

Keywords: Loss and Damage, Coping Strategies, Adaptation, Role of Microfinance

Loss and Damage, Caused by Cyclones Sidr, Aila and Mahasen: Coping Strategies, Adaptation and the Role of Microfinance

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1. Introduction

Bangladesh is highly vulnerable to natural disasters because of its low-lying topography, the dissection of much of the country by huge and highly mobile rivers, its location in the monsoon belt, and the low economic status of millions of its households. Most of the country was formed as one of the world's largest deltas, through the deposition of sediment by the Ganges, Brahmaputra and Meghna Rivers, and the other major rivers that flow through it (Huq and Ayers, 2008). It is thus of no surprise that the Ministry of Environment and Forest (MoEF, 2005) reports that 80 percent of the flat land of the country is subject to high risk of flood in the rainy season. Flooding is part-and-parcel of rural life in Bangladesh. It naturally replenishes the soil and in doing so sustains a vibrant rural economy, but at the same time floods are the country's greatest natural hazard. Cyclonic storms are another natural hazard that Bangladesh experiences periodically, on average about once every three years (UN, 2010). As with floods, they too have extorted a huge toll on human life and property. Since 1970, Bangladesh has faced a total of 36 cyclonic storms that collectively left 450,000 people dead. Highlighting the vulnerability of the country to natural hazards, Ali (1999) explains that while only one percent of all global cyclones strike Bangladesh, they are responsible for 53 percent of the total global deaths from cyclones.

Climate change is expected to increase Bangladesh's vulnerability to natural hazards through increased exposure of the country to climate shocks (Ayers, et al., 2014; Dasgupta et al., 2014; Jilani, et al., 2014; Islam, et al., 2014; Ruane, et al., 2013; Ahmed, et al. 2013; Shaw, et al., 2013; Kartiki, 2011; Shahid, 2011; Thurlow, et al. 2011).In the coastal area of Bangladesh, cyclones, storms, storm surges, and floods are already recurrent phenomena. Exactly how climate change will impact these events is difficult to model, but it is clear that climate change is likely to make life even more difficult for the mostly poor households living in the coastal belt. Because of the country's 724 km long coastline and the fact that most of Bangladesh's topography consists of flat land that is less than 10 meters above sea level, sea level rise and intrusion of salt water into aquifers are likely to pose major threats.

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Assessment of how and to what extent previous natural hazards have impacted rural households and their coping strategies can provide important ideas for how Bangladesh can adapt to climate change. Knowledge on the determinants of coping strategies is particularly important. Some strategies enable households to survive through periods of hardship without placing their long-term wellbeing in jeopardy (non-erosive strategies), while others provide short-term benefits but undermine a household's assets and thus can lead it into a downward poverty spiral (erosive strategies).Understanding what determines whether households adopt erosive or non-erosive strategies is important for several agendas – sustained poverty reduction, disaster risk reduction and climate change adaptation.

A number of published studies have analyzed the impacts of natural hazards in Bangladesh on households, the coping strategies they adopt, and the determinants of these coping strategies. In their study on responses to riverine hazards in Bangladesh, Haque and Zaman (1994) found that most flood affected households adapt to income and asset loss by selling land, livestock and other assets. Their study found migration not to be a direct coping mechanism in response to flood. Zaman (1999) also looked into flood impacts and coping strategies. He surveyed 1,072 households, finding that microfinance contributes to mitigating a number of factors that contribute to vulnerability. In analyzing the impacts of the 1998 floods in Bangladesh, Zaman concluded that microfinance assisted with coping by contributing to crisis-coping mechanisms and enabling households to build assets.[4] delNinno et al. (2001) also investigated impacts and coping strategies for the devastating floods of 1998. They surveyed 757 households about two months after the flood waters had receded, finding that in addition to tapping into Government food and cash support, households reduced expenditure and consumption, sold assets, purchased food on credit, and borrowed money to cope with the floods. In terms of value and intensity, borrowing was identified as the major coping mechanism.

Two other notable studies on flood impacts and coping are Brouwer et al. (2007) and Paul and Routary (2010). Brouwer et al. (2007) investigated the association between environmental risk, poverty and vulnerability in flood prone areas, through a survey of almost 700 households in south east Bangladesh. They focused on household and community level vulnerability and adaptive coping strategies, and distinguished between ex-ante and ex-post coping mechanisms. They found poorer households to be more exposed to flood risk, and to suffer more in relative terms but less in absolute terms. Community-level support including relief and borrowing, mainly from the informal market, were common ex-post coping strategies. The study concluded that income diversification is an effective ex-ante coping strategy for floods and other environmental risks, but observes that it can be difficult for some households (those living closest to the rivers) to develop alternative income generating activities.

Paul and Routary (2010) studied the coping strategies adopted by households in two

[4] As with microcredit, the role of microinsurance in catastrophic and other disaster risk management has also attracted a lot of scholarly attention (e.g., Kunreuther, 1996, 2006; Kleindorfer and Kunreuther, 1999; Hazell, 2001; Ganderton, Brookshire, McKee, Stewart, and Thurstan, 2000; Browne and Hoyt 2000; Brouwer and Akter, 2010).

flood-prone villages of Bangladesh. Ability to cope was found to varywith socio-economic variables, such as education, income and occupation. Indigenous coping strategies were found to be particularly important in enabling households to survive through periods of hardship and to mitigate flood damage.

Other studies have assessed impacts and coping of other types of natural hazards. Alam and Collins (2010), for example, studied vulnerability to cyclone hazards in coastal Bangladesh. Their analysis uses first-hand recollections of coping prior to, during and after the events. From this qualitative field data, they concluded that localized vulnerability is a function of response processes, infrastructure, socially uneven exposure, settlement development patterns, and livelihoods.

Still other studies have examined the strategies adopted by households to cope with shocks (unexpected events) in general and attempted to identify their determinants. Rashid et al. (2006) report on their survey of the coping strategies against shocks adopted by 1,600 rural households in northwestern Bangladesh. They found that households choose or adopt a particular set of coping strategies according to the type of shock and the availability of options. Employing a trivariate probit regression technique, they concluded that the diversity and stability of income sources are important determinants of coping strategies. Ex-post coping strategies were found to be less important for households with higher education level attainment as their incomes are more stable. The study also reveals a general sequence of coping strategies adopted by households, irrespective of their wealth.

This brief survey of the literature reveals a gradual accumulation of scientific knowledge on the impacts of natural hazards in Bangladesh, how households attempt to cope with shocks and the determinants of their coping strategies. Further empirical analysis can improve understanding of these issues by investigating impacts and responses across different types of natural hazards and across different geographic settings. This paper takes up this challenge by reporting on a study of the impacts and responses associated with three catastrophic cyclones in south-western Bangladesh, commonly referred to as Sidr, Aila, and Mahasen. A brief description of each event and its reported impacts are provided in Box 1.1.This paper reports on losses and damages incurred at household level, the coping strategies adopted by households, and whether participation in PRIME, a support program for ultra-poor households, contributed to household coping and adaptation. The discussion is structured as follows. Section 2 describes the data collection process and the methodology used to analyze the data. Section 3 presents the empirical findings on the losses and damages incurred by households and on their strategies to adapt to the conditions they faced in the post hazard period. Finally, section4 provides concluding comments, including recommendations for policy.

Box 1.1: Features of Sidr, Aila, and Mahasen.

Sidr

Sidr struck the south-western coast of Bangladesh on 15 November 2007. It arrived as a category-4 super cyclone with winds that reached 250 kilometers per hour. Eight point seven million people were affected across 30 districts. The number reported dead reached 3,295, with another 53,000 people reported missing. The impacts on agriculture were particularly severe as Sidr damaged about 0.89 million hectares of crops during thearea's only rice growing season. The damage to homestead buildings and livestock was also immense (IFRC, 2010).

Aila

Cyclone Aila struck the southwest coast of Bangladesh in May 2009. It was classified as a severe cyclonic storm and brought with it tidal surges of up to 6.5 metres that affected 11 of the coastal districts. The direct and immediate impacts included 190 deaths, approximately 7,100 injuries, the loss of about 100,000 livestock, damage to about 350,000 acres of crop land, and severe damage to the coastal embankment network (UN, 2010).

Mahasen

Tropical storm Mahasen was a less powerful event with winds peaking at about 85 km/hr. It struck ten central west-coast districts on 16 May 2013, affecting about 1.5 million people. The storm was responsible for 10 deaths and damaged over 150,000 houses (IFRC, 2013).

2. Data and Methodology

The data for this study was collected from the south-western region of Bangladesh through a sample survey conducted in February and March, 2014 by the Institute of Microfinance, Dhaka. A total of 3,687 households in three districts– Khulna, Patuakhali and Satkhira – were surveyed. The survey covered five upazila as consisting of 14 unions and 152 villages. All of the households were asked about the losses and damages they incurred as a result of the three cyclones and their coping strategies to adapt in the aftermath of the events.

2.1 Key Variables

Several variables are used to assess the loss and damage resulting from the cyclones. These are loss and damage of assets, loss from direct income, increased expenditure and reconstruction expenses. The nature of the variables is categorical.

Each household was asked a set of questions regarding strategies they adopted to cope with the post-cyclone situations and other related issues. The study is limited to an assessment of financial flows and relief. First, categories that represent the sources from where the affected households obtained financial support are used to analyze the coping and recovery strategies. The categories used are:

a) Current income/savings
b) Mortgage of land
c) Sale of land
d) Sale of livestock
e) Sale of other assets
f) Advance labor/crop sale
g) Loan from microfinance institutions
h) Informal loan
i) Assistance from neighbors/friends
j) Government cash/goods for work
k) Non-government cash/goods for work
l) Vulnerable Group Development/Vulnerable Group Feeding/Government 100 days program
m) Relief from Government
n) Relief from non-governmental organizations
o) Insurance
p) Others

Second, four broad categories are taken to better understand and identify the role of microfinance in the processes of coping and adaptation. Two categories, current income or savings and informal loan, are taken as they are from the above list. The other two, namely sale of assets and government support, are constructed by combining some of the categories. The sale of assets category combines selling land, livestock, and other assets, as well as advanced sale of labor and crops. The government support category combines government cash or goods transfer for works, Vulnerable Group Development (VGD)/Vulnerable Group Feeding (VGF) and the 100 days program, and government relief. On the basis of each of these variables, a dichotomous variable is generated where '1' represents households who adopted the particular strategy and '0' indicates other households.

A number of household characteristics including total land, family size, total income, age of the household head, educational attainment and occupation of the household head, and total loss caused by the cyclones are considered for analyzing the coping strategies adopted by the affected households. The age of the household head is defined as dichotomous having labels 0 indicating households with its head aged less than 50 years and 1 otherwise. Educational qualification is divided into four categories, namely illiterate, primary, secondary and higher, while occupation is categorized as agriculture, non-agriculture, wage earning and others. All other variables are continuous in nature. In addition to these, district is used as a categorical variable to observe regional variation.

2.2 Endogenous Switching Regression to Identify Impacts of Microfinance

This study is particularly interested in the role of microfinance in coping and adaptation to extreme weather events. Microfinance schemes can be found in villages across Bangladesh, where they bring financial and often other services (awareness, health, etc.) to the doors of rural households. If they enable household to build assets, diversify their income sources and better cope with and recover from extreme weather events, they could play a key role in the country's adaptation strategy.

The microfinance scheme under study is the PRIME program, which stands for Programmed Initiatives for Monga[5] Eradication. PRIME was launched in 2006 by the Palli Karma Sahayak

[5] Monga, or seasonal hunger, is experienced by poor households in parts of Bangladesh during the lean times in the agricultural season.

Foundation, an apex microfinance body, and is implemented through its partner microfinance institutions (MFIs). PRIME interventions include emergency loans and food-for-work, which are designed to assist households deal with immediate crises, and flexible microcredit, micro savings and training on income generating activities, which aim to permanently eradicate seasonal hunger. The microfinance services are provided as a year round intervention and are packaged with training and extension services to assist households in developing new income generating activities. PRIME works with ultra-poor households, which are defined as households with a monthly income less than or equal to Tk.3,000 during the lean period, having employment as a day laborer (in farming, fishing, logging, honey collection or other activities), or having less than or equal to 50 decimals of cultivable land.In the south-western region, PRIME covers 11 upazilas of four districts under Khulna and Barisal divisions (PRIME-PKSF, 2011).

An endogenous switching regression (Maddala, 1983) technique is employed to evaluate the role of microfinance in coping.The decision to join and participate in a microfinance scheme is not an exogenous variable; rather it is a choice variable and thus endogenous.To isolate the impact of the program, in our case PRIME, the counter factual of the status access to PRIME needs to be defined. In this context, the endogenous switching regression technique helps to observe the coping strategies not only for observed characteristics but also for unobserved characteristics, and thus enables selection bias tobe removed. The model was suggested by Maddala and Nelson (1975). This model allows us to compare each outcome variable for the same households by defining them ascomingfrom the program areaas well as the control area. For a group of households, if they have access to PRIME, then the counter factual would be what will happen if they had not and vice versa. The terminology of this regression model and its formulation are presented below:

The criterion function or latent variable I_i that determines the i^{th} household decision on access to PRIME is defined by the following selection equation.

I_i = 1 if $\gamma' Z_i \geq u_i$ i.e. the i^{th} household has access to PRIME
I_i = 0 otherwise i.e. the i^{th} household does not participate in PRIME

Where, Z_i is a vector of individual and household level characteristics that determines the household choice of access to PRIME, γ is the parameter to be estimated and u_i is the error term.

Consider the following two models:

Regime 1: $y_{1i} = \beta_1' X_{1i} + u_{1i}$ if $\gamma' Z_i \geq u_i$ (2.2.1)

Regime 2: $y_{2i} = \beta_2' X_{2i} + u_{2i}$ if $\gamma' Z_i < u_i$ (2.2.2)

where, y_{ji} are the values of the outcome variables and X_{ji} are the vector of characteristics including age, educational and occupational qualifications of the household head, family size, total land holdings in decimals, total income, total loss caused by cyclone, and districts, and β_1

and β_2 are vectors of parameters. The two regimes are the households with PRIME and without PRIME, respectively. The criterion function determines whether a household joins in the microfinance scheme or not and two equations indicate each of the outcome variables, such as current income or savings, sale of assets, loan from informal markets and government support for two groups of households. In the selection and outcome models, it assumes that u_i are correlated with u_{1i} and u_{2i} and have a trivariate normal distribution with zero mean vector and covariance matrix:

$$\Omega = \begin{bmatrix} \sigma_u^2 & . & . \\ \sigma_{1u} & \sigma_1^2 & . \\ \sigma_{2u} & . & \sigma_2^2 \end{bmatrix}$$

where, σ_u^2 = the error variance of the selection equation

σ_1^2 = the error variances of the outcome equations 1

σ_2^2 = the error variances of the outcome equations 2

σ_{1u} = covariance of u_i and u_{1i} and

σ_{2u} = covariance of u_i and u_{2i}

The maximum likelihood estimation of parameters of the model (Lokshin and Sajaia, 2004) would help us to evaluate the following conditional and unconditional expectations:

Unconditional expectations:

$$E(y_{1i} \mid X_{1i}) = \beta_1^{/} X_{1i} \tag{2.2.3}$$

= Unconditional expected value of the outcome variable for program households

$$E(y_{2i} \mid X_{2i}) = \beta_2^{/} X_{2i} \tag{2.2.4}$$

= Unconditional expected value of the outcome variable for control households

Conditional expectations:

$$yc_{1\_1i} = E\left(y_{1i} \mid I_i = 1, x_{1i}\right) = x_{1i}\beta_1 + \sigma_1\rho_1 f(\gamma Z_i) / F(\gamma Z_i) \tag{2.2.5}$$

= Conditional expected value of the outcome variable for program households if they are assigned to program group

$$yc_{0\_1i} = E\left(y_{2i} \mid I_i = 1, x_{1i}\right) = x_{1i}\beta_2 + \sigma_2\rho_2 f(\gamma Z_i) / F(\gamma Z_i) \tag{2.2.6}$$

= Conditional expected value of the outcome variable for program households if they are assigned to control group

$$yc_{0\_0i} = E\left(y_{2i} \mid I_i = 0, x_{2i}\right) = x_{2i}\beta_2 + \sigma_2\rho_2 f(\gamma Z_i) / \left[1 - F(\gamma Z_i)\right] \quad (2.2.7)$$

= Conditional expected value of the outcome variable for control households if they are assigned to control group

$$yc_{1\_0i} = E\left(y_{1i} \mid I_i = 0, x_{2i}\right) = x_{2i}\beta_1 + \sigma_1\rho_1 f(\gamma Z_i) / \left[1 - F(\gamma Z_i)\right] \quad (2.2.8)$$

= Conditional expected value of the outcome variable for control households if they are assigned to program group

where, $\rho_1 = \frac{\sigma_{1u}^2}{\sigma_u\sigma_1}$ is the correlation coefficient between u_1 and u and $\rho_2 = \frac{\sigma_{2u}^2}{\sigma_u\sigma_2}$ is the correlation coefficient between u_2 and u.

The following impact evaluation indicators can be calculated from the conditional and unconditional expectations which help us to evaluate the impact of PRIME on the outcome variable under study:

$$\Pi = \beta_1^{/} X_{1i} - \beta_2^{/} X_{2i}$$

= (Expected amount of the outcome variable of i[th] household withPRIME)
- (Expected amount of the outcome variable of the same household without PRIME)
= Expected gain of PRIME (calculated by using all households)

$$\Pi_1 = yc_{1\_1i} - yc_{0\_1i}$$

= (Expected amount of the outcome variable of i[th] sample program household withPRIME)
- (Expected amount of the outcome variable of the same household if they had not PRIME)
= Expected gain of PRIME (calculated by using sample households having PRIME)

$$\Pi_2 = yc_{1\_0i} - yc_{0\_0i}$$

= (Expected amount of the outcome variable of i[th] sample control household if they had PRIME)
- (Expected amount of the outcome variable of the same household)
= Expected gain of PRIME (calculated by using sample households without PRIME)

To evaluate the above expected values, the regression models were run in two phases. In the first phase, the access to PRIME is predicted by aprobit model using two variables, namely occupation of the household head and total land holdings in decimals. This model finally provides us the inverse Mills ratio. In the second phase, the tobit regression model is run for the different outcome variables, such as current income or savings, sale of assets including land,

livestock, other assets, advance sale of labor and crops, informal loan and government support on the inverse Mills ratio along with a series of other explanatory variables.

3. Empirical Findings

This section discusses the empirical findings on the extent of loss and damage caused by cyclones Sidr, Aila and Mahasen, how the affected households coped with the disasters, and the role of microfinance in adaptive coping. The analysis and results are presented under two separate headings –loss and damage, and adaptive coping.

3.1 Loss and Damage

The total loss and damagefrom natural disasterscan be assessed by combining loss and damage at household level and at community level. This study only measures household level loss and damage. This section presents ,data on the location, types and intensity of loss and damage.

3.1.1 Number of Households – Total, Program and Control –Affected by Cyclones

Table 3.1.1 presents a breakdown of control and program households that were and were not affected by each of the three cyclones. The table indicates that 1,826 households, which is around half of the sampled households, were affected by Sidr.The distribution over areas with and without PRIME interventions reveals that around 73 percent of the control households and 31 percent of the program households were affected by cyclone Sidr. The number of surveyed households affected by Aila was less at 1,172 households. In contrast to Sidr, the percentage of households affected in the program area (43 percent)was higher than for the control area (17 percent). At 16 percent, the number of sampled households affected by Mahasen was far less than the numbers affected by Sidr and Aila. For Mahasen, in the program areas around 20 percent of the households were affected compared with11 percent in the control areas.

Table 3.1.1: Total Number of Households and Number of Households in Program and Control Groups Affected by Sidr, Aila and Mahasen

Affected by Cyclones		Program/Control HHs		Total *(N=3,687)*
		Control *(N=1,608)*	Program *(N=2,079)*	
Sidr	No	429 (26.68)	1,432 (68.88)	1,861 (50.47)
	Yes	1,179 (73.32)	647 (31.12)	1,826 (49.53)
Aila	No	1,337 (83.15)	1,178 (56.66)	2,515 (68.21)
	Yes	271 (16.85)	901 (43.34)	1,172 (31.79)
Mahasen	No	1,427 (88.74)	1,671 (80.38)	3,098 (84.02)
	Yes	181 (11.26)	408 (19.62)	589 (15.98)

Note: ( ) represents column percentage.

3.1.2 Number of Affected Households by Districts

The sampled households were selected from three districts – Patuakhali, Khulna and Satkhira – affected by the cyclones. Sidr and Mahasen generally moved across Patuakhali, while Aila crossed the other two districts. Thus, it is expected that the percentage affected in all the districts would not be similar. The distribution of affected and non-affected households by district is presented in Table 3.1.2.1.

Table 3.1.2.1: Distribution of Affected and Non-Affected Households by Districts

Districts	Affected by					
	Sidr		Aila		Mahasen	
	No	Yes	No	Yes	No	Yes
Khulna	496 (63.92)	280 (36.08)	157 (20.23)	619 (79.77)	770 (99.23)	6 (0.77)
Potuakhali	141 (10.49)	1,203 (89.51)	1,238 (92.11)	106 (7.89)	782 (58.18)	562 (41.82)
Satkhira	1,224 (78.11)	343 (21.89)	1,120 (71.47)	447 (28.53)	1,546 (98.66)	21 (1.34)

Note: ( ) represents row percentages.

Table 3.1.2.1 indicates that around 90 percent of the sampled households in Patuakhali districts were affected by Sidr, compared with 36 percent in Khulna and around 22 percent in Satkhira. In the case of Aila, Khulna had the highest percentage of affected households followed by Satkhira and then Patuakhali. In the case of Mahasen, the highest percentage of affected households was in Patuakhali, compared to very small percentages in the other two districts. Table 3.1.2.2 in the appendix provides a more detailed breakdown at upazila level.

3.1.3 Distribution of Types of Damages from each Cyclone

The percentages of households incurring various types of damage from Sidr, Aila and Mahasen are presented in Table 3.1.3. The percentages are provided for all households and for affected households. The table shows that the most common damages reported by the affected households are house destruction, death of domestic animals, damage of trees and gardens, and damage to sanitation systems. Of the Sidr affected households (1,826), 95 percent (1,742 households) reported damage of their house. From this we conclude that about 47 percent of households in affected areas experienced house damage. The percentage of Aila affected households that suffered damage to their homes is similar to that for Sidr, though we calculated that only 17 percent of all households in the affected areas suffered damage to their homes.Mahasen also had severe impacts on houses, with around 97 percent of the surveyed affected households reporting damage to their homes.

Rearing animals is a common practices in rural Bangladesh and provides important sources of subsistence and income for poor households. Death of domestic animals is a common phenomenon during natural disasters. The impacts of Sidr, Aila and Mahasen were no

exception. The sampled households were asked about the fate of their domestic animals during the three cyclones. Fifty-four percent of the surveyed Sidr affected households reported that they lost their domestic animals during Sidr. The impacts of Aila on livestock were worse, with73 percent of affected households reporting death of their domestic animals. The impacts of Mahasen on livestock were similar to those of Sidr, with around half of the affected households experiencing loss of domestic animals.

Table 3.1.3: Percent of Households Incurring Various Types of Damage from Sidr, Aila and Mahasen

Types of Damage	Percent Frequency					
	Sidr		Aila		Mahasen	
	% of All HHs (N = 3,687)	% of Affected HHs (N = 1,826)	% of All HHs (N = 3,687)	% of Affected HHs (N = 1,172)	% of All HHs (N = 3,687)	% of Affected HHs (N = 589)
Land loss	0.46	0.93	0.49	1.54	0.08	0.51
House destroyed	47.25	95.40	30.16	94.88	15.46	96.77
Sanitation system damage	10.93	22.07	18.14	57.08	4.10	25.64
Lost cash	0.46	0.93	1.06	3.33	0.11	0.68
Lost jewelries	0.35	0.71	0.30	0.94	0.22	1.36
Death of domestic animals	26.77	54.05	23.16	72.87	7.92	49.58
Trees/garden destroyed	22.78	46.00	17.55	55.20	9.85	61.63
Other property damage	6.02	12.16	11.88	37.37	1.30	8.15
Crop damage	1.27	2.57	1.38	4.35	0.49	3.06
Shrimps/crabs got away	1.38	2.79	2.58	8.11	0.38	2.38
Stored food/everyday goods damage	2.33	4.71	5.26	16.55	0.08	0.51
Boat/net destroyed	2.31	4.65	2.47	7.76	0.46	2.89
Business/income generating property damaged	0.65	1.31	1.33	4.18	0.03	0.17
Death of a member	0.11	0.22	0.11	0.34	0.03	0.17
Sickness of a member	0.60	1.20	1.52	4.78	0.27	1.70
Injured family member	0.11	0.22	0.16	0.51	0.08	0.51
Land fertility lost due to salinity	0.76	1.53	1.11	3.50	0.24	1.53
Waterlogged land	0.19	0.38	0.46	1.45	0.03	0.17
Others	0.65	1.31	1.11	3.50	0.11	0.68

Movable assets are less susceptible to damage than immovable assets, and many can be saved if timely warning of approaching cyclones is provided and facilities and safe areas to move the assets to exist.Trees and gardens fall into the immovable asset category. While they are important assets for rural households in Bangladesh, they often suffer severe damage during cyclones.This can be seen in the impacts of all three studied cyclones. Around 46 percent of the surveyed affected households reported that their trees and gardens were destroyed by Sidr. For Aila, this figure is 55 percent and for Mahasen, 62 percent.

Weather-related hazards also commonly have major impacts on sanitation systems, another immovable asset type. Around 22 percent of the surveyed Sidr affected households reported

damage to their sanitation systems. For Aila, this figureis around 57 percent and Mahasen, 26 percent.

A range of other damages were reported by households, as captured in Table 3.1.3. These included damages to shrimp and crab ponds and stocks, stored foods and regular goods, boats and nets, business and income generating properties, and land fertility.. Aila was particularly severe in inflicting these types of damages. In addition, some cases of death and sickness of a family member were also reported by the affected households.

3.1.4 Loss and Damage by Districts

As part of the Cancun Adaptation Framework, in 2010 the Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) initiated a process to consider approaches to address loss and damage associated with climate change impacts in climate-vulnerable developing countries. Two years later, at COP19, the Parties established the Warsaw International Mechanism for Loss and Damage associated with Climate Change Impacts, as the main mechanism under the UNFCCC to promote the implementation of approaches to address loss and damage.

Assessing the impacts of past climate hazards can help in understanding risk and vulnerability.This in turn helps in assessing compensation that would be paid to developing countries when climate change impacts exceed their adaptive capacity. A comprehensive assessment of the loss and damage fromany climate hazard requires consideration of many parameters and is complicated by the fact that impacts of hazards can be both short and long term.In lieu of a comprehensive assessment, this sub-section attempts to quantify the total loss and damage from Sidr, Aila and Mahasen incurred by the affected households in all the forms discussed in the previous sub-section. We attempt to assess loss and damage at district level, as the paths of the cyclones across the study area are quite different, as explained in the introduction.

Table 3.1.4.1 provides summary statistics on loss and damage in different districts by categories including assets and direct income loss. N refers to the number of affected households in the respective districts and categories of loss, while total amount in Tk. million corresponds to the amount of loss experienced by the affected households. Average loss and damage per households was calculated to enable comparison of the intensity of loss and damage across districts and cyclones.

The summary statistics reveals that the total amount of loss and damage experienced by the 1,826 Sidr affected households was around Tk. 30 million. This figure was calculated from asset loss and direct income loss. Asset loss was the more severe andamounted to Tk. 25.80 million. On average, the amount of loss and damage per affected household was Tk. 16,451.

Table 3.1.4.1 Summary Statistics of Loss and Damage Caused by Cyclones by District

District		Sidr			Aila			Mahsen		
		Asset Loss	Direct Income Loss	Aggre-gate Loss	Asset Loss	Direct Income Loss	Aggregate Loss	Asset Loss	Direct Income Loss	Aggre-gate Loss
Khulna	N	275	133	280	614	285	619	6	3	6
	Total Amount (in million Tk.)	2.67	0.59	3.25	21.79	4.99	26.78	0.03	0.01	0.04
	Average per HH (Tk.)	9,699	4,420	11,625	35,491	17,496	43,260	4,333	3,533	6,100
Patuakhali	N	1,189	653	1,203	106	41	106	558	94	562
	Total Amount (in million Tk.)	20.39	3.25	23.64	0.78	0.10	0.88	3.09	0.21	3.30
	Average per HH (Tk.)	17,151	4,977	19,653	7,312	2,441	8,257	5,535	2,249	5,871
Satkhira	N	343	303	343	444	366	447	21	7	21
	Total Amount (in million Tk.)	2.74	0.40	3.14	10.71	1.35	12.06	0.13	0.01	0.14
	Average per HH (Tk.)	7,983	1,334	9,161	24,131	3,683	26,985	6,379	1,443	6,860
Total	N	1,807	1,089	1,826	1,164	692	1,172	585	104	589
	Total Amount (in million Tk.)	25.80	4.24	30.04	33.28	6.43	39.72	3.25	0.23	3.48
	Average per HH (Tk.)	14,277	3,895	16,451	28,592	9,298	33,887	5,553	2,232	5,909

Though the number of affected households was lower in Aila than Sidr, the amount of loss and damage wreaked by Aila was greater. The total amount of loss and damage experienced by 1,172 households during Aila was around Tk.3.9.72 million, 32 percent higher than that of Sidr. Per household average loss and damage from Aila was Tk..33,887,more than twice that of Sidr. As with Sidr, asset loss was particularly high at Tk..33.38 million, compared with direct income loss of Tk. 6.43 million. In the case of Mahasen, the total loss and damage from asset and direct income was much lower than for the other two cyclones at Tk. 3.48 million. The average per household loss and damage was also lower at Tk. 5,909, and as with Sidr and Aila, most of this loss and damage was in the form of asset loss.

When breaking the figures down to a district level, we find that Sidr inflicted the greatest aggregate and per household average loss and damage on Patuakhali, mostly in the form of

asset loss. Mahasen, too, had its greatest aggregate impacts in Patuakhali, though the average loss and damage per household was lower than for the other two districts.

Aila had its greatest impacts oin Khulna. The surveyed affected households of the district lost a total of Tk. 26.38 million,with a very high average per household loss of Tk. 43,260. The average asset loss per household amounted to Tk. 35,491, compared with Tk. 17,496, in income loss. Loss and damage were lowerin Satkhira and much smaller still in Patuakhali.

Table 3.1.4.2 reports the loss and damage in the form of increased expenditure or reconstruction expenses. A total of 1,563 of the surveyed households affected by Sidr stated that their expenditure increased or that they used money for reconstruction. For Aila and Mahasen, the numbers are 1,082 and 391 respectively. In terms of the total and per household average amount spent on increased expenditure or reconstruction, Aila had the greatest impacts, followed by Sidr and Mahasen.

Table 3.1.4.2 District Level Summary Statistics of Increased Expenditure or Reconstruction Expenses Caused by Cyclones

Upazila	Summary Statistics	Increased Expenditure or Reconstruction Expenses		
		Sidr	Aila	Mahasen
Khulna	N	262	592	5
	Total Amount (in million Tk.)	1.46	13.03	0.03
	Average per HH (Tk.)	5,577	22,010	5,900
Patuakhali	N	975	73	368
	Total Amount (in million Tk.)	8.79	0.29	2.71
	Average per HH (Tk.)	9,014	3,909	7,360
Satkhira	N	326	417	18
	Total Amount (in million Tk.)	2.41	9.45	0.08
	Average per HH (Tk.)	7,380	22,652	4,336
Total	N	1,563	1,082	391
	Total Amount (in million Tk.)	12.66	22.76	2.82
	Average per HH (Tk.)	8,097	21,037	7,202

The patterns of loss and damage in the form of expenditure increase or reconstruction expenses by districts are identical to those of asset loss and direct income loss, asobserved in Table 3.1.4.1. In terms of increased expenditure or reconstruction expenses, Patuakhali was the most affected by Sidr and Mahasen, while the impacts of Aila were greatest on Khulna and Satkhira.

The summary statistics of total loss and damage and reconstruction expenses or increased expenditure by Upazila, program and control households are presented in Tables 3.1.4.3 to 3.1.4.6 in the Appendix. The statistics of loss and damage and reconstruction expenses for only movable items by program and control households are presented in Tables 3.1.4.7 to 3.1.4.8 in the Appendix.

3.1.5 Loss and Damage from Movable Items by whether the Households Received any Warning

The summary statistics of loss and damage generated from movable items by whether the affected households received any warning is presented in Table 3.1.5.1. The movable assets are considered as loss and damage to them may be a function of prior warning of the cyclones.

Table 3.1.5.1: Summary Statistics of Amount of Loss and Damage from Movable Items during Sidr, Aila and Mahasen by whether the Affected Households Received Warning

Cyclones	Statistics ↓ Warning →	Broad Categories of Loss and Damage								
		Asset Loss			Direct Income Loss			Aggregate Loss		
		No	Yes	Total	No	Yes	Total	No	Yes	Total
Sidr	N	55	280	335	36	184	220	55	280	335
	Total Amount (in million Tk.)	0.64	2.98	3.62	0.15	0.79	0.94	0.80	3.77	4.57
	Average per HH (Tk.)	11,678	10,648	10,817	4,297	4,286	4,288	14,491	13,464	13,633
Aila	N	169	77	246	64	44	108	169	77	246
	Total Amount (in million Tk.)	1.38	0.43	1.81	0.18	0.07	0.25	1.55	0.51	2.06
	Average per HH (Tk.)	8,144	5,621	7,354	2,769	1,680	2,325	9,193	6,581	8,375
Mahasen	N	0	29	29	0	6	6	0	30	30
	Total Amount (in million Tk.)	0.00	0.14	0.14	0.00	0.00	0.00	0.00	0.14	0.14
	Average per HH (Tk.)	.-	4,831	4,831	. -	225	225	. -	4,715	4,715

Note: - indicates no average value is found as no household belongs to the respective categories.

The presented statistics indicate that early warning of Sidr did not make much difference to the average amount of loss and damage per household. However, for Aila households who received warning reported much lower average loss and damage of movable assets. Due to insufficient number of households in the sample, the analysis could not be conducted for Mahasen.

3.2 Adaptive Coping Strategies

Households in the coastal belt in Bangladesh adopt a range of adaptive coping strategies to deal with recurrent weather-related hazards such as cyclones and tornadoes.This section examines the coping strategies adopted by households in the wake of the three cyclones under study.

3.2.1 Households Adopting at Least One Adaptive Coping or Recovery Strategy

Most of the affected sampled households, as reported in Table 3.1.1, adopted at least one adaptive coping or recovery strategy. Table 3.2.1 reveals that around 93 percent of the affected households adopted at least one coping strategy in response to both Sidr and Aila, while only 65 per cent of households adopted at least one coping strategy for Mahasen.

Table 3.2.1: Households Adopting at least One Coping Strategy

Whether Adopted Any Strategy	Frequency (%)		
	Sidr	Aila	Mahasen
No	122 (6.68)	89 (7.59)	206 (34.97)
Yes	1,704 (93.32)	1,083 (92.41)	383 (65.03)
Total	1,826 (100.00)	1,172 (100.00)	589 (100.00)

3.2.2 Distribution of Households by Types of Coping Strategies

Table 3.2.2 presents percentages of affected households who adopted specific coping strategies.The percentages are also provided only for households who adopted coping strategies. For example, in the case of Sidr, 54 percent of all affected households and 58 percent of households adopting coping strategies used their current income and savings as a coping strategy.

Table 3.2.2 clearly shows that the use of current income or savings was the key coping strategy for Sidr, Aila and Mahasen. For Sidr, 54 percent of affected households resorted to this strategy, while for Aila and Mahasen the percentages are 61 and 45 percent, respectively. Government relief was the second most commonly used coping strategy. Forty-four percent (44%) of the affected households used this strategy to cope with Sidr and Aila, though for Mahasen the percentage is much lower at three percent (3%). To cope with Sidr, Aila and Mahasen, 23%, 38% and 2% of affected households, respectively, used relief from non-governmental organizations as a coping strategy, ranking it third in terms of most used coping strategies.

Table 3.2.2 reveals that the availability of coping strategies is not consistent across disasters. For example, after Aila the percentage of households who received both non-government and government cash or goods transfer for work is substantial, but not so for Sidr and Mahasen. Another interesting observation is that among the Sidr and Aila affected households, the percentage of households who received support in the form of VGD/VGF or participated in the

100 days program is more than four percent, while in case of Mahasen it is less than one percent.[6]

Table 3.2.2: Household Copying Strategies by Types for the Three Cyclones

Types of Damage	Percent Frequency					
	Sidr		Aila		Mahasen	
	% of All Affected HHs (N=1,826)	% of Adopted HHs (N=1,704)	% of All Affected HHs (N=1,172)	% of Adopted HHs (N=1,083)	% of All Affected HHs (N=589)	% of Adopted HHs (N=383)
Current Income/ Savings	54.49	58.39	61.26	66.30	44.82	68.93
Mortgage of Land	0.22	0.23	0.00	0.00	0.00	0.00
Sale of Land	0.11	0.12	0.09	0.09	0.00	0.00
Sale of Livestock	1.10	1.17	0.77	0.83	0.17	0.26
Sale of Other Assets	1.48	1.58	1.37	1.48	0.85	1.31
Advanced Labor/Crop Sale	0.55	0.59	0.51	0.55	0.17	0.26
Loan from MFIs	1.37	1.47	1.37	1.48	3.57	5.48
Informal Loan	16.59	17.78	10.49	11.36	15.28	23.50
Assistance from Neighbours/Friends	9.86	10.56	8.19	8.86	6.11	9.40
Government Cash/ Goods for Work	0.82	0.88	8.28	8.96	0.00	0.00
Non-Government Cash/Goods for Work	0.60	0.65	16.38	17.73	0.00	0.00
VGD/VGF/ Government 100 Days Program	5.31	5.69	3.84	4.16	0.17	0.26
Relief (Government)	44.47	47.65	43.94	47.55	3.06	4.70
Relief (Non-government)	22.95	24.59	38.05	41.18	1.87	2.87
Insurance	0	0.00	0.17	0.18	0.00	0.00
Others	1.20	1.29	1.71	1.85	0.17	0.26

This paper is particularly interested in whether households adopt erosive or non-erosive coping strategies. This distinction is not straight forward. For example, if a household has current income or savings that it can use for coping and in doing so avoids the sale of productive assets or taking loans from informal lenders at high interest rates, then use of this income and savings for coping is desirable. Over the long term, the household may be able to rebuild its wealth to pre-disaster levels as it avoided the sale of productive assets and/or taking on expensive loans that it could not repay. However, use of current income or savings could mean future income

[6] The VGD/VGF and 100 days program are designed to support poor households over the year, rather than serve recovery in the post-disaster period.

earning opportunities are lost and for some households could be one step towards deeper poverty. Given these complexities, generalizations of how particular coping strategies affect the household economy over the long-term are undesirable but nevertheless unavoidable in empirical studies using large datasets.

Loans from the informal sector, mortgage of land, sale of land, livestock, and other assets and advance sale of labor and crops can be generally viewed as less than desirable sources of recovery, compared to less erosive alternatives, such as use of savings and income. It is thus particularly disconcerting that informal loans rank fourth in terms of the coping strategies most used by affected households. Informal sector loans carry a high interest rate commonly reported to be about 10 percent per month, whereas the interest rate for loans from MFIs has been capped by the Microfinance Regulatory Authority at 27 percent per annum. It is thus equally disconcerting that less than two percent of Sidr and Aila affected households took loans from MFIs as a coping or recovery strategy, and less than four percent in the case of Mahasen.

Assistance from neighbors or friends ranks fifth in terms of most used coping strategies by affected households, and provides an indication of the “social capital” that individual households possess. This social capital, in the form of relationships and networks, serves as a form of informal mutual protection against risk. The importance of social capital to poor rural households in protecting against risk is evident not only from the fact that many affected households secured assistance from neighbours and friends, but also from the fact that formal insurance played almost no role in coping and recovery.

3.2.3 Distribution of Households by Broad Categories of Coping

The distribution of affected households in the cyclones under study is presented here by broad categories of coping, as defined earlier. The figures for current income / savings and informal loans are simply reproduced from Table 3.2.2.The sale of land, livestock, other assets, and labor and crops are aggregated into one figure, but lie below four percent (4%) for all the cyclones under study, indicating that distress sales of this sort were not a major coping strategy adopted by households for these events. The figure for government support is an aggregate of government programs and relief. Table 3.2.2 confirms the earlier observation that using current income and savings was the coping strategy most used by households for all three cyclones.

Table 3.2.3: Distribution of Households by Adopted Coping Strategies

Coping Strategies	Categories	Frequency (%)		
		Sidr (N=1,826)	Aila (N=1,172)	Mahasen (N=589)
Current income/savings	No	831 (45.51)	454 (38.74)	325 (55.18)
	Yes	995 (54.49)	718 (61.26)	264 (44.82)
Sale of Land, Livestock, Other Assets, Labor and Crop	No	1,768 (96.82)	1,142 (97.44)	582 (98.81)
	Yes	58 (3.18)	30 (2.56)	7 (1.19)
Informal Loan	No	1,523 (83.41)	1,049 (89.51)	499 (96.77)
	Yes	303 (16.59)	123 (10.49)	90 (15.28)
Government Support	No	959 (52.52)	617 (52.65)	570 (96.77)
	Yes	867 (47.48)	555 (47.35)	19 (3.23)

3.2.4 Average Coping Amount per Household

The number of households adopting each coping strategy and the corresponding coping amount and mean value are presented in Table 3.2.4. The total coping amount accumulated by 1,704 households to tackle loss and damage caused by Sidr was more than Tk.14 million. The amount was more than two-fold this in the case of Aila, but much less for Mahasen. The average amount per household was highest for Aila at Tk.27,000, followed by Sidr at Tk.8,609 and Mahasen at Tk. 6,722.

Table 3.2.4: Summary Statistics of Coping Strategies by Cyclones

Coping Strategies	Summary Statistics	Cyclones		
		Sidr	Aila	Mahasen
Current Income/Savings	N	995	718	264
	Sum (in million)	4.80	6.14	1.10
	Mean	4,820	8,550	4,188
Sale of Land, Livestock, Other Assets, Labor & Crop	N	58	30	7
	Sum (in million)	0.56	0.62	0.05
	Mean	9,726	20,827	6,587
Informal Loan	N	303	123	90
	Sum (in million)	2.07	1.36	1.00
	Mean	6,826	11,073	11,056
Government Support	N	867	555	19
	Sum (in million)	3.18	9.74	0.05
	Mean	3,671	17,546	2,445
Aggregate	N	1,704	1,083	383
	Sum (in million)	14.67	29.52	2.57
	Mean	8,609	27,260	6,722

Note: Aggregate sum is not equivalent to sum of all assessed categories as some categories are not considered here.

The summary statistics by categories reveals that most of the coping amount was collected either from current income or savings or government support. Sale of land, livestock, and other assets, advanced sale of labor and crops generated a lesser amount of money in aggregate, as the percentage of households resorting to these coping strategies is relatively low, though the mean amount generated per household who used these strategies is relatedly high. The average amount of informal loans taken per households who used this strategyis also higher than Government support per household. Informal loans were particularly resorted to as a coping strategy in the case of Mahasen, which perhaps can be accounted for by the fact that it was a less severe event with less government support available.

3.2.5 Household Characteristics and Coping Strategies

In this subsection, bi-variate distribution of coping strategies over household characteristics is

analysed to provide an understanding of the determinants of coping strategies.

3.2.5.1 Bi-variate Distribution of Household Characteristics and Coping Strategies: Sidr

The bi-variate distribution of different coping strategies for Sidr over area, age, educational and occupation of the household head and districts is presented in Table 3.2.5.1.1.

The distribution over area defined by the presence and absence of PRIME interventions shows no significant difference in the use of current income or savings as a coping strategy in the control and program areas. However, the sale of assets as a coping strategy is considerably higher in the control area (4 percent) than the program area (1 percent). The same is true for taking informal loans as a coping strategy, which was 19 per cent for the control and 13 percent for the program areas. The table also reveals that government support was given to around 54 percent of the affected households in the program area against around 44 percent in the control area.

Table 3.2.5.1.1 Coping Strategies by Household Characteristics: Sidr

Household Characteristics	Coping Strategies			
	Current Income/ Savings	Sale of Assets and Others	Informal Loan	Government Support
Area by PRIME interventions				
Control	54.62	4.33	18.58	43.68
Program	54.25	1.08	12.98	54.40
Age of HH Head				
Less than 50 years	57.65	3.45	17.56	46.05
50 & over	48.58	2.67	14.78	50.16
Educational Qualification of the HH Head				
Illiterate	53.27	2.98	16.63	50.12
Primary (up to class 5)	55.78	2.89	17.78	44.67
Secondary (up to SSC)	57.24	6.21	13.79	37.93
Higher (HSC & above)	77.27	0.00	9.09	22.73
Occupation of the household head				
Agriculture	56.44	5.33	19.56	48.89
Non-agriculture	57.23	1.57	16.04	46.23
Selling of Labor	56.31	3.61	16.76	45.60
Others	45.59	2.06	14.71	52.94
District				
Khulna	65.71	5.00	12.50	6.79
Patuakhali	43.89	3.41	19.95	67.17
Satkhira	82.51	0.87	8.16	11.66

Note: Figures are the percentage of HHs who adopted the particular coping strategy.

The table also shows that households with heads aged less than 50 years depended more than households with heads 50 years and above on current income and savings, sale of assets and informal loans for their coping. The reverse is true for government support, which households with heads 50 years and above depended more on.

Table 3.2.5.1.1 also shows that the percentage of households that used current income or savings for their coping is positively correlated with level of education. There also appears to be some relationship between level of education and the sale of assets as a coping strategy. No households with heads in the higher education group were found to have sold assets, while the number for the “secondary group” was a little higher than for the “illiterate” and “primary” groups combined.The table also suggests that with the increasing level of education of the household head, the tendency of the household to borrow from informal lenders declines. The pattern is the same for government support. While around 50 percent of the illiterate group received government support, the figure for the highest educated group was only 23 percent.

No clear pattern of coping strategies is observed for occupation of the household head, though the data suggests that the tendency to sell assets and take loans from informal lenders is slightly higher if the household head is involved in the agricultural sector. This is not unexpected, given the extensive damage to crops from Sidr described in Box 1.1.

Some variation in coping strategies is observed by district. In Satkhira, around 83 percent of the households used either current income or savings to cope with the post-disaster situation, compared with around 66 percent in Khulna and around 44 percent in Patuakhali. Khulna was highest for households resorting to the sale of assets (5 percent), followed by Patuakhali (3 percent) and Satkhira (less than 1 percent).The percentage of affected households resorting to informal loans was highest in Patuakhaliat around 20 percent,which is around 12 percentage points higher than in Satkhira and around 7 percentage points higher than in Khulna. About 67 percent of the affected households availed themselves of government support in Patuakhali, compared with only 12 percent in Satkhira and 7 percent in Khulna.

Table 3.2.5.1.2 presents the average of some household characteristics by coping strategies. The average family size, total land (in decimals) and total income of the households does not differ much across households who used current income or savings to cope. However, the average loss and damage calculated by combining asset loss, direct income loss, increased expenditure and reconstruction expenses wasTk. 5,000 greater for households who did not draw on current income or savings than those who did. A notable observation from the table is that the average household total land holding was considerably higher for those who sold assets and others for coping than those who did not.The table also suggests that those who held the most land also lost the most in absolute terms, as would be expected.

Table 3.2.5.1.2 Average of Some Household Characteristics by Coping Strategies: Sidr

Household Characteristics	Coping Strategies							
	Current Income/ Savings		Sale of Assets and Others		Informal Loan		Government Support	
	No	Yes	No	Yes	No	Yes	No	Yes
Family Size	3.98	4.08	4.03	4.26	3.99	4.26	3.95	4.12
Total Land	14.64	15.64	14.96	22.18	14.69	17.65	15.02	15.36
Total Income	46,009	47,784	47,011	45,918	46,166	51,049	47,235	46,690
Total Loss	26,263	20,976	22,889	38,411	20,815	36,286	21,808	25,123

Households that resorted to informal loans to cope in the aftermath of Sidr had larger average family sizes, land holdings, income and losses. The table shows little differences in the use of government support for coping across the household characteristics, with the exception that the total average loss was slightly greater for those households who took government support.

3.2.5.2 Bi-variate Distribution of Household Characteristics and Coping Strategies: Aila

As can be seen in Table 3.2.5.2.1., for Ailaa higher percentage of PRIME households relied on current income or savings for coping than control households. As with Sidr, the number of households that relied on the sale of assets and others was quite small, but in contrast to Sidr, more program households relied on this strategy than control households. Around 18 percent of the control group households borrowed from informal lenders against only around eight percent in the program group. Around 58 percent of the program households received government support to cope with the post-cyclone situation, compared with around only 12 percent for the control group. The pattern of coping strategies across control and program groups is thus only slightly different between Sidr and Aila, with the main difference being related to the use of asset and other sales by control and program groups across the two cyclones.

Table 3.2.5.2.1 Coping Strategies by Household Characteristics: Aila

Household Characteristics	Coping Strategies			
	Current Income/ Savings	Sale of Assets and Others	Informal Loan	Government Support
Area by PRIME Interventions				
Control	56.09	0.74	18.45	11.81
Program	62.82	3.11	8.10	58.05
Age of HH Head				
Less than 50 years	63.28	2.20	10.53	46.39
50 & over	56.62	3.38	10.42	49.58
Educational Qualification of the HH Head				
Illiterate	59.58	2.38	10.35	48.53

Household Characteristics	Coping Strategies			
	Current Income/ Savings	Sale of Assets and Others	Informal Loan	Government Support
Primary (up to class 5)	64.21	2.68	11.04	46.15
Secondary (up to SSC)	63.31	2.16	10.79	44.60
Higher (HSC & above)	63.16	10.53	5.26	42.11
Occupation of the Household head				
Agriculture	55.83	1.67	11.67	66.67
Non-agriculture	66.67	2.15	10.75	38.71
Selling of Labor	62.07	3.03	10.76	46.62
Others	54.61	1.42	7.80	46.10
District				
Khulna	65.11	3.88	9.53	48.47
Patuakhali	24.53	0.00	31.13	2.83
Satkhira	64.65	1.34	6.94	56.38

Note: Figures are the percentage of HHs who adopted the particular coping strategy.

There is not much difference across the age of the household head with respect to the use of sale of assets and others and informal loans for coping. However, a greater percentage of households with household heads less than 50 years drew on income and savings for coping, whereas a greater percentage of households with heads 50 years or older received government support.

There is a considerable jump in the percentage of households with their heads in the “higher” education category that sold assets and others to cope over the other educational classes, while the reverse is true for informal loans. There is a steady decline in government support as a coping strategy from the lowest to the highest education categories.

A common pattern can be observed across occupational categories in the use of current income and savings as well as the sale of assets and others as coping strategies. The greatest percentage of households who used these strategies are households with heads engaged in the agricultural sector and sectors other than non-agriculture and wage earning. A much greater percentage of households with heads engaged in agriculture availed themselves of government support than households in the other occupational categories.

Among the districts, the table shows that the percentage of households who employed the use of current income or savings, sale of assets and government support for coping was lower in Patuakhali than Khulna and Satkhira. However, for informal loans the percentage was substantially higher in Satkhira.

Table 3.2.5.2.2 shows that the differences in the average family size across households who did and did not adopt each coping strategy is small across all the strategies; on average the family

size is slightly higher for households adopting the strategies. Average household landholdings are higher for households that used their current income or savings and sold assets and others for coping, though the reverse is true for informal loans.

Table 3.2.5.2.2 Average of Some Household Characteristics by Coping Strategies: Aila

Household Characteristics	Coping Strategies							
	Current Income/ Savings		Sale Assets and Others		Informal Loan		Govt. Support	
	No	Yes	No	Yes	No	Yes	No	Yes
Family Size	4.08	4.24	4.17	4.40	4.16	4.28	4.00	4.37
Total Land	9.85	13.99	11.88	31.88	12.64	10.22	12.11	12.70
Total Income	53,032	57,564	55,770	57,271	55,866	55,320	50,856	61,314
Total Loss	14,665	5,265	8,926	8,153	8,013	16,532	14,888	2,257

The average total income was comparatively higher for the households who used current income or savings, sale of assets and government support for coping, though the differences are not large.The opposite is true for informal loans, though the difference in average total income for households who used and did not use informal loans is very small.

The average total loss incurred by households was much lower for households who used current income and savings and government support for coping. The average loss for households who took informal loans was roughly twice that of households who did not.

3.2.5.3 Bi-variate Distribution of Household Characteristics and Coping Strategies: Mahasen

Table 3.2.5.3.1 shows that over twice as many PRIME households used current income and savings than non-PRIME households for coping in the aftermath of Mahasen. Program households resorted more than control households to the sale of assets for coping, while twice as many control households than program households resorted to the use of informal loans. Roughly twice as many control households as program households availed themselves of government support for their coping.

Table 3.2.5.3.1 Coping Strategies by Household Characteristics: Mahasen

Household Characteristics	Coping Strategies			
	Current Income/ Savings	Sale of Assets and Others	Informal Loan	Government Support
Area by PRIME Interventions				
Control	21.55	0.00	23.76	4.42
Program	55.15	1.72	11.52	2.70
Age of HH Head				
Less than 50 years	46.04	1.02	15.86	3.07
50 & over	42.42	1.52	14.14	3.54

Household Characteristics	Coping Strategies			
	Current Income/ Savings	Sale of Assets and Others	Informal Loan	Government Support
Educational Qualification of the HH Head				
Illiterate	46.36	0.73	15.05	3.64
Primary (up to class 5)	41.48	2.22	18.52	2.96
Secondary (up to SSC)	36.11	0.00	8.33	0.00
Higher (HSC & above)	66.67	16.67	0.00	0.00
Occupation of the Household Head				
Agriculture	33.33	1.52	21.21	3.03
Non-agriculture	54.07	2.22	14.81	6.67
Selling of Labor	43.17	0.37	15.50	1.48
Others	44.44	1.71	11.97	3.42
District				
Khulna	66.67	0.00	33.33	16.67
Patuakhali	44.13	1.25	15.12	3.20
Satkhira	57.14	0.00	14.29	0.00

Note: Figures are the percentage of HHs who adopted the particular coping strategy.

There is no large variation in the adoption of coping strategies associated with the age of the household head. However, some notable differences can be seen in the adoption of coping strategies across educational categories. A much higher percentage of households with heads in the highest education category used current income and savings for coping than households with heads in the other educational categories. This same observation holds for sale of assets and others. In contrast, a greater percentage of households with heads in the lower two educational categories resorted to informal loans and took government support for coping.

As with Sidr, a greater percentage of households with heads engaged in the non-agricultural sector used current income and savings and sale of assets and others for coping than households with heads engaged in agriculture. The reverse is true for informal loans, which were used more by households with heads engaged in agriculture than each of the other sectors.

Across the districts, with the exception of the sale of assets and others, which was only used for coping by a very small percentage of households in Patuakhali, the percentage of households adopting the coping strategies was much greater in Khulna than the other two districts.

In Table 3.2.5.3.2, no significant variation is observed in average family size with respect to whether the specific coping strategies were adopted or not. The average land holdings per household are slightly greater for households who adopted current income and savings and sale of assets and others as coping strategies, whereas the opposite is true for informal loans and government support.

Table 3.2.5.3.2 Average of Some Household Characteristics by Coping Strategies: Mahasen

Household Characteristics	Coping Strategies							
	Current Income/ Savings		Sale of Assets and Others		Informal Loan		Government Support	
	No	Yes	No	Yes	No	Yes	No	Yes
Family Size	4.02	4.04	4.03	4.14	4.07	3.81	4.03	3.89
Total Land	13.24	14.61	13.81	17.71	14.82	8.49	14.10	6.61
Total Income	43,887	51,324	47,324	38,544	47,307	46,740	47,231	46,888
Total Loss	25,170	15,910	21,142	10,800	20,256	25,255	21,217	15,105

Average household income was higher for households who used current income or savings for coping, while the opposite is observed for sale of assets and others. Average household income was slightly lower for households who took informal loans and government support for coping.

3.2.6 Endogenous Switching Regression to Identify the Impact of PRIME

The impact evaluation indicators in terms of outcome variables including current income or savings, sale of assets and others, loan from the informal market and government support are calculated for different samples to identify the impact of PRIME. Three separate tables summarize the output of the switching regression corresponding to cyclones Sidr, Aila and Mahasen. The statistics corresponding to all households is the expected difference in the outcome for the households with and without the program. The statistics in other rows use the sub-samples and show differences with expected value of their counterfactual.

Table 3.2.6.1: Endogenous Switching Regression Analysis: Sidr

Households	Expected Gain (Tk.) under PRIME			
	Coping Strategies			
	Current Income/ Savings	Sale of Assets and Others	Informal Loan	Government Support
All Households (Π)	479.84***	-	-2,082.28***	-295.76***
Program Households (Π1)	845.12***	-	-1,719.50***	95.18
Control Households (Π2)	842.96***	-	-2,189.85***	-598.37***

Note 1: *** p<0.01

2: Expected gain indicates the difference between expected amount for program households and their counterpart.

3. Switching regression does not converge due to insufficient number of households.

Table 3.2.6.1 presents the impact indicator by analyzing the coping strategies that were adopted by households after cyclone Sidr. The expected gain under PRIME in coping from current income or savings for all households reveals that the expected amount (Π) was around Tk.480 higher for the program households with PRIME than those of control households. By considering the counter factual, it is evident that the average current income or savings amount

(Π1) of program households is higher by around Tk.845 than if these households had not participated in PRIME. The other model comparing with the counter factual indicates that the expected amount of gain (Π2) in terms of current income or saving of the households without PRIME was around Tk..843 if they had access to PRIME. All the expected differences are significant at the 1 percent level.

The impact indicators from the full sample and sub-samples with counter factual for informal loan show negative signs. Thus, the average loan from the informal sector for coping was lower for the program group households than for the control group households. The sample of all households indicates that the households with PRIME borrowed around Tk. 2,082 less than the households without PRIME. By comparing the program households with their counterfactual, the amount was lower by around Tk. 1,719, and conversely, the amount was lower by around Tk. 2,190 for households with PRIME than their counter parts. The table shows that program households received lower government support than control households. Due to insufficient observations, the indicators for sale of assets and others were not found.

Table 3.2.6.2 represents the same statistics discussed above for the case of Aila. The expected difference for coping from current income or savings evaluated by using all households is Tk. 2,774. This indicates that program households used Tk. 2,774 more than control households from current income or savings for coping. Among the other two expected differences, one is positive and another is negative but both are insignificant at the 1 percent level. The expected differences cannot be calculated for the outcome variables sale of assets and others and government support due to the insufficient number of households who adopted these strategies. By comparing all households, the amount of informal loans taken by PRIME households was lower by around Tk.5,200 than control households. The analysis of the households with their counter factual indicates that the expected lower amount was lower by around Tk.10,444 and Tk.13,208 respectively for the two models. The differences are significant at the 1 percent level.

Table 3.2.6.2: Endogenous Switching Regression Analysis: Aila

Households	Expected Gain (Tk.) under PRIME			
	Coping Strategies			
	Current Income/ Savings	Sale of Assets and Others	Informal Loan	Government Support
All Households (Π)	2,773.82***	-	-5,199.62***	-
Program Households (Π1)	1,049.96	-	-10,443.61***	-
Control Households (Π2)	-869.19	-	-13,207.92***	-

Note 1: *** p<0.01

2: Expected gain indicates the difference between expected amount for program households and their counterpart.

3. Switching regression does not converge due to insufficient number of households.

For Mahasen, the expected differences for current income or savings outcome are consistent with those found in Sidr and Aila. Table 3.2.6.3 shows that PRIME households were able to generate more money from current income or savings for coping than their counterparts. The first two expected differences are significant at the 1 percent level, while the third expected difference is significant at the 10 percent level.

Table 3.2.6.3: Endogenous Switching Regression Analysis: Mahasen

Households	Expected Gain (Tk.) under PRIME			
	Coping Strategies			
	Current Income/ Savings	Sale of Assets and Others	Informal Loan	Government Support
All Households (Π)	652.32***	-	12,151.99***	-
Program Households (Π1)	429.36***	-	15,996.16***	-
Control Households (Π2)	584.77*	-	14344.75***	-

Note 1: *** p<0.01, * p<0.10
2: Expected gain indicates the difference between expected amount for program households and their counterpart.
3. Switching regression does not converge due to insufficient number of households.

The sign of the indicators for informal loan are opposite to that found for Sidr and Aila. The expected differences show that the program household borrowed more from the informal market than control households.

4. Conclusion

Due to its low lying topography, soft alluvial soils, dissection by several massive and many other major and minor rivers and their tributaries, its coastal location and its position in the monsoon belt, south-western Bangladesh frequently faces recurrent natural disasters such as tropical cyclones, storms and floods. The low economic standard of living of much of the rural population in this area makes households highly sensitive to extreme weather events. As climate change could increase the frequency and intensity of these events, understanding how they impact households in terms of the losses and damages incurred, how households attempt to cope and the determinants of their coping strategies is critical to developing an effective national adaptation strategy.

This study attempted to assess household level loss and damage resulting from three cyclones –Sidr, Aila and Mahasen – in Khulna, Patuakhali and Satkhira districts for a sample of households, the coping strategies they adopted, the determinants of these coping strategies, and the role of microfinance in coping and adapting in the aftermath of natural disasters. The impacts of microfinance on coping were studied by comparing the coping strategies of households that participated in the PRIME program with a control group.

The aggregate amount of loss and damage in all forms and average loss and damage per

household was substantially higher for Aila than for Sidr and Mahasen. Sidr and Mahasen moved across Patuakhali district, whereas Aila travelled through Khulna and Satkhira districts. Thus, it is of no surprise that this study recorded the greatest aggregate and per household average loss and damage of Sidr and Mahasen on Patuakhali, whereas Aila's greatest impacts were recorded in Khulna. The percentage of PRIME program households that were affected by Sidr was lower than the percentage of control households. The reverse is true for Aila and Mahasen. The path of the cyclones may be associated with this variation.

The major losses incurred were loss and damage of houses, other property and sanitation systems, death of domestic animals and destruction of trees and gardens. Losses of livelihood assets and crops were also significant. For Aila, households who received early warning reported much lower average loss and damage of movable assets, indicating the importance of early warning systems and having locations and facilities to move assets to.

The affected households employed a wide range of coping strategies. The use of current income or savings was the key coping strategy for all three cyclones. Government relief was the second most commonly used coping strategy, followed by relief from non-governmental organizations. This suggests that MFIs play an important role in household coping and recovery through the relief and other services they provide during and after major natural disasters.

It is disconcerting that informal loans rank fourth in terms of the coping strategies most used by affected households, whereas loans from MFIs were far less significant. The reasons for this deserve further analysis. MFIs commonly suspend loan repayments during and in the wake of natural disasters. They may be reluctant to provide new loans and prefer to encourage their members to use their savings for coping, though strategies and policies may differ widely across MFIs. What is clear is that households need access to quick sources of finance for coping and recovery and more thought may be required for how MFIs or government could best provide this, thereby reducing the need for households to rely on informal lenders.

Formal insurance played almost no role in coping and recovery, whereas social capital in the form of relationships and networks provided a form of mutual risk management that many households called upon. Whether and how insurance has a role to play in mitigating covariate risk is a subject that deserves further investigation through the field testing of innovative approaches that can accommodate high risk and low ability to pay contexts (i.e. the type of context found in south-western Bangladesh).

Loans from the informal sector, mortgage of land, sale of land, livestock, and other assets and advance sale of labor and crops can be generally viewed as less than desirable sources of recovery, compared to less erosive alternatives, such as use of savings and income. The bi-variate analysis shows that the PRIME program participants on average relied more on current income and savings for coping than non-PRIME members, however PRIME participation does not appear to have an impact on the sale of assets and others as a coping strategy. Across all three cyclones, the percentage of PRIME households resorting to borrowing from informal lenders for coping is a lot lower than for non-PRIME households.

The educational attainment of the household head is expected to be positively correlated with household wealth. This would explain why households with their head having the highest level of educational attainment generally are able to rely more on income and savings and the sale of assets and others than households with their heads having a lower educational attainment. Across the three cyclones the percentage of households with the highest educational attainment resorting to informal loans was much lower than for the other educational categories.

Endogenous switching regression models with full sample and samples with counter factual find that the expected amount of coping from current income or savings was significantly higher for PRIME households than their counterparts across the three cyclones. The average size of loans taken from the informal market by the PRIME households was significantly lower than that of the control group households in the cases of Sidr and Aila. For Mahasen, the opposite is true.

This analysis suggests that PRIME and other microfinance interventions, especially when packaged with extension, training and other support services, can make an important contribution to building household resilience to withstand external shocks such as extreme weather events and to recover from these. Making these interventions available to households in climate vulnerable areas should thus be a priority. Why the surveyed households affected by Sidr, Aila and Mahasen relied much more heavily on informal loans than loans from MFIs to cope in the aftermath of these events needs to be studied further.

A comprehensive strategy that combines sustainable development, disaster risk reduction and climate change adaptation in south-western Bangladesh is overdue.To develop this strategy further assessment of past disasters and responses and their effectiveness at various levels would be helpful. More detailed assessment of loss and damage would assist the Government of Bangladesh in lobbying the global community for compensation when climate change related disasters exceed adaptive capacities.

Appendix A

Table 3.1.2.2: Distribution of Households by whether Affected by Cyclones and Upazila

Districts	Affected by					
	Sidr		Aila		Mahasen	
	No	Yes	No	Yes	No	Yes
Dacope	16 (7.17)	207 (92.83)	154 (69.06)	69 (30.94)	218 (97.76)	5 (2.24)
Koyra	480 (86.80)	73 (13.20)	3 (0.54)	550 (99.46)	552 (99.82)	1 (0.18)
Golachipa	141 (10.49)	1,203 (89.51)	1,238 (92.11)	106 (7.89)	782 (58.18)	562 (41.82)
Kaliganj	1,038 (78.46)	285 (21.54)	1,120 (84.66)	203 (15.34)	1,302 (98.41)	21 (1.59)
Shayamnagar	186 (76.23)	58 (23.77)	0 (0.00)	244 (100.00)	244 (100.00)	0 (0.00)

Note: ( ) represents row percentages.

Table 3.1.4.3 Summary Statistics of Loss and Damage Caused by Cyclones by Upazila

Upazila	Summary Statistics	Sidr			Aila			Mahasen		
		Asset Loss	Direct Income Loss	Aggregate Loss	Asset Loss	Direct Income Loss	Aggregate Loss	Asset Loss	Direct Income Loss	Aggregate Loss
Dacope	N	202	102	207	64	36	69	5	2	5
	Total Amount (in million Tk.)	2.00	0.47	2.47	0.23	0.11	0.34	0.02	0.01	0.03
	Average per HH (Tk.)	9,912	4,610	11,944	3,530	3,100	4,891	4,600	5,000	6,600
Koyra	N	73	31	73	550	249	550	1	1	1
	Total Amount (in million Tk.)	0.66	0.12	0.78	21.57	4.87	26.44	0.003	0.001	0.004
	Average per HH (Tk.)	9,108	3,792	10,718	39,211	19,577	48,074	3,000	600	3,600
Golachipa	N	1189	653	1203	106	41	106	558	94	562
	Total Amount (in million Tk.)	20.39	3.25	23.64	0.78	0.10	0.88	3.09	0.21	3.30
	Average per HH (Tk.)	17,151	4,977	19,653	7,312	2,441	8,257	5,535	2,249	5,871
Kaliganj	N	285	273	285	200	165	203	21	7	21
	Total Amount (in million Tk.)	2.02	0.35	2.36	1.78	0.37	2.15	0.13	0.01	0.14
	Average per HH (Tk.)	7,072	1,267	8,286	8,900	2,223	10,575	6,379	1,443	6,860
Shayamnagar	N	58	30	58	244	201	244	-	-	-
	Total Amount (in million Tk.)	0.72	0.06	0.78	8.93	0.98	9.92	-	-	-
	Average per HH (Tk.)	12,457	1,947	13,464	36,616	4,881	40,637	-	-	-

Note: - indicates no observations.

Table 3.1.4.4 Summary Statistics of Increased Expenditure or Reconstruction Expenses Caused by Cyclones by Upazila

Upazila	Summary Statistics	Increased Expenditure or Reconstruction Expenses		
		Sidr	Aila	Mahasen
Dacope	N	200	56	4
	Total Amount (in million Tk.)	0.90	0.17	0.03
	Average per HH (Tk.)	4,484	3,056	6,875
Koyra	N	62	536	1
	Total Amount (in million Tk.)	0.56	12.86	0.002
	Average per HH (Tk.)	9,102	23,991	2,000
Golachipa	N	975	73	368
	Total Amount (in million Tk.)	8.79	0.29	2.71
	Average per HH (Tk.)	9,014	3,909	7,360
Kaliganj	N	277	174	18
	Total Amount (in million Tk.)	2.04	1.49	0.08
	Average per HH (Tk.)	7,362	8,591	4,336
Shayamnagar	N	49	243	-
	Total Amount (in million Tk.)	0.37	7.95	-
	Average per HH (Tk.)	7,478	32,721	-

Note: - indicates no observations.

Table 3.1.4.5: Summary Statistics of Amount of Loss and Damage during Sidr, Aila and Mahasen by Program and Control Areas

Cyclones	Statistics ↓ Area →	Broad Categories of Loss and Damage								
		Asset Loss			Direct Income Loss			Aggregate Loss		
		Control Area	Program Area	Total	Control Area	Program Area	Total	Control Area	Program Area	Total
Sidr	N	1,167	640	1,807	891	198	1,089	1,179	647	1,826
	Total Amount (in million Tk.)	19.23	6.57	25.80	3.85	0.39	4.24	23.08	6.96	30.04
	Average per HH (Tk.)	16,477	10,264	14,277	4,318	1,993	3,895	19,573	10,763	16,451
Aila	N	266	898	1,164	187	505	692	271	901	1,172
	Total Amount (in million Tk.)	1.93	31.35	33.28	0.41	6.03	6.43	2.34	37.38	39.72
	Average per HH (Tk.)	7,254	34,913	28,592	2,183	11,933	9,298	8,627	41,484	33,887
Mahasen	N	180	405	585	45	59	104	181	408	589
	Total Amount (in million Tk.)	1.19	2.06	3.25	0.10	0.13	0.23	1.30	2.18	3.48
	Average per HH (Tk.)	6,629	5,074	5,553	2,294	2,184	2,232	7,163	5,353	5,909

Table 3.1.4.6: Summary Statistics of Increased Expenditure or Reconstruction Expense due to Sidr, Aila and Mahasen by Program and Control Areas

Cyclones	Statistics ↓ Area →	Increased Expenditure or Reconstruction Expense		
		Control Area	Program Area	Total
Sidr	N	1,046	517	1,563
	Total Amount (in million Tk.)	8.53	4.13	12.66
	Average per HH (Tk.)	8,154	7,981	8,097
Aila	N	232	850	1,082
	Total Amount (in million Tk.)	1.46	21.30	22.76
	Average per HH (Tk.)	6,303	25,058	21,037
Mahasen	N	103	288	391
	Total Amount (in million Tk.)	0.86	1.95	2.82
	Average per HH (Tk.)	8,366	6,785	7,202

Table 3.1.4.7: Summary Statistics of Amount of Loss and Damage from Movable Items during Sidr, Aila and Mahasen by Program and Control Areas

Cyclones	Statistics ↓ Area →	Broad Categories of Loss and Damage								
		Asset Loss			Direct Income Loss			Aggregate Loss		
		Control Area	Program Area	Total	Control Area	Program Area	Total	Control Area	Program Area	Total
Sidr	N	265	70	335	197	23	220	265	70	335
	Total Amount (in million Tk.)	3.19	0.43	3.62	0.93	0.02	0.94	4.11	0.45	4.57
	Average per HH (Tk.)	12,034	6,210	10,817	4,699	767	4,288	15,526	6,463	13,633
Aila	N	42	205	247	28	81	109	42	205	247
	Total Amount (in million Tk.)	0.16	1.65	1.82	0.02	0.23	0.25	0.18	1.89	2.07
	Average per HH (Tk.)	3,885	8,059	7,349	629	2,898	2,315	4,304	9,204	8,370
Mahasen	N	15	14	29	2	4	6	16	14	30
	Total Amount (in million Tk.)	0.12	0.02	0.14	0.00	0.00	0.00	0.12	0.02	0.14
	Average per HH (Tk.)	7,800	1,650	4,831	375	150	225	7,359	1,693	4,715

Table 3.1.4.8: Summary Statistics of Increased Expenditure or Reconstruction Expense from the Movable Items Due to Sidr, Aila and Mahasen by Program and Control Areas

Cyclones	Statistics ↓ Area →	Increased Expenditure or Reconstruction Expense		
		Control Area	Program Area	Total
Sidr	N	95	8	103
	Total Amount (in million Tk.)	0.24	0.02	0.26
	Average per HH (Tk.)	2,492	2,801	2,516
Aila	N	9	66	75
	Total Amount (in million Tk.)	0.01	0.21	0.22
	Average per HH (Tk.)	1,494	3,114	2,920
Mahasen	N	1	0	1
	Total Amount (in million Tk.)	1,000	0.00	1,000
	Average per HH (Tk.)	1,000	-	1,000

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