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AN ASSESSMENT OF PROMOTING FLOOD RESILIENT COMMUNITY PROJECT IN SATKHIRA DISTRICT

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ABSTRACT

The research is produced from the final evaluation of Nablok managed project titled 'Promoting Flood Resilient Community (PFRC) Project' implemented in flood and waterlogged affected Tala upazila of Satkhira district, Bangladesh from July 2014 to December 2015, financed by Diakonie Katastrophenhilfe, Germany. The research intended to assess household's vulnerability and the project's effectiveness in building flood resilience of the community. The study also proposed to compare household's disaster empowerment level between periods of before and after implementing the project The research interviewed 114 randomly selected households, out of 2136 project beneficiary households, and carried two FGD sessions. Result showed that the overall mean vulnerability score was 43.39 out of maximum 100, where households were the most vulnerable in material aspect, followed by attitudinal and institutional vulnerability. Project components were in line with vulnerabilities of the flood-affected people. The project facilities and process were relevant and appropriate. To fight against disaster, beneficiary households were more empowered in 2016 than 2013 disaster empowerment value. The research suggested taking measures for income safety by diversifying non-agricultural activities in the locality. The research also suggested excavation and proper management of local canals, rivers and sluice gates for better flood control and resilience.

KEYWORDS: Disaster empowerment, Flood resilient community, Vulnerability, Natural hazards, Water logging

1. INTRODUCTION

Bangladesh is a deltaic country, formed by the Ganges, Brahmaputra and Meghna rivers. The south-west coastal regional of Bangladesh face flood frequently due to proximity of Bay of Bengal, location in the monsoon zone, and for low lying of land. Heavier rain increases the pain as huge land and establishment are inundated. People take shelter in the higher places, which are free from floodwater. Many people build temporary houses in high road and in embankment. Some people take shelter in the cyclone shelter also. Flood damages houses, crops, roads and other rural infrastructures which threaten livelihoods. Satkhira district has a long history of flood and damages. Nabolok (2014) summarized the overall damage of the flash flood occurred in 2011 in Tala Sadar union and Kholilnagar union. Others unions of the upazila were also affected.

Table 1: Summary of Damage Caused by 2011 Flash Flood

Particulars of Damage	Tala Sadar Union	Kholilnagar Union	Total
No. of affected villages	21	12	33
No. of affected households	6,010	5,180	11,190

Table 1: Summary of Damage Caused by 2011 Flash Flood (continued)

Particulars of Damage	Tala Sadar Union	Kholilnagar Union	Total
No of affected people	32,772	9,817	42,589
No. of destroyed house	6,000	677	6,677
Damaged crops (hector)	440	482	922
No. of temporary shelters	4	7	11
No. of households living in temporary shelters	440	800	1,240
Damaged road (Km)	32	5	37
Livestock damage	4,500	2,100	6600

Source: Nabolok, 2014

Since sixties, many development interventions have been taken to increase food production in Tala upazila. Embankment was constructed which provided some benefit initially but poor management augmented water logging and disrupted exclusive ecological systems. River erosion, sediment and people's defective water management also augmented waterlogging. The river management system of this region is passing through a critical time. Failure in imperative action will release an ecological disaster (Islam, 2015). The National Program of Actions (NAPA) projects that the coast of Bangladesh might rise 14, 32 and 88 cm by the year 2030, 2050, and 2100 respectively (GOB, 2005). In the changing climate, coastal zone will be more vulnerable to climate change (GOB, 2006). In those cases, coastal households will be the most vulnerable group and need preparation.

2. OBJECTIVES OF THE STUDY

The research aimed to measure nature and extent of vulnerability of the rural households. This will help to identify whether PFRC project's components addressed need of flood affected households in order to minimize their vulnerability. At the same time, it will help for future strategic development of the project and of the community. Secondly, the research intended to assess the PFRC project in terms of its relevancy, appropriateness of the implementation (procedure), and effectiveness. This will help to identify whether it benefited the vulnerable households. It will help to justify use value, exactness in beneficiary selection, cost efficiency of the installed projects etc. Third objective of the research was to compare households' disaster empowerment sense between 2016 and 2013. This will help to identify whether the PFRC project helped households to gain more capacity to copy with disasters than the pre-project time.

The research will provide an idea whether the project addressed the main vulnerability i.e., material, institutional or attitudinal vulnerability of the disaster affected households. A project's success depends on whether it targeted to develop most vulnerable area of the affected people. At the same time identify whether the project increased empowerment level of the victims than before which is also a success indicator of any project. As we notice many NGO and government implement projects in the disaster-prone areas of Bangladesh, this search will help designing future projects in dimensions and technical aspects too.

3. RESEARCH METHODOLOGY

3.1 Research context

Nabolok implemented the PFRC project (see details components in the following section) in flood affected community of Tala upazila of Satkhira district. After the project phase out, the research attempted to make an overall assessment of the project in 2016. The main essence was to check how far the project benefited concerned households in disaster related risk reduction and how far project components matched the needs of the concerned households. The research was conducted in the project implemented area, i.e. in Tala upazila.

3.2 The PFRC project

Nabolok, a voluntary non-government organization of Bangladesh with financial assistance from Diakonie Katastrophenhilfe, Germany implemented a project entitled 'Promoting Flood Resilient Community (PFRC)' in Islamkati and Tentulia union of Tala Upazila of Satkhira District, Bangladesh to rehabilitate and recover of the flood-affected community. The project was initiated in the Islamkati and Tentulia union of Tala upazila of Satkhira district in July 2014 and phased out in December 2015. This was done through a set of activities incorporating the capacity building of local disaster management, improving Water Sanitation and Hygiene (WaSH) practices, housing facilities, creating alternative IGAs focusing primarily the women etc. To minimize the risk of the flood-affected people, the project provided some material support, some livelihood support, arranged medical camp, and provided some training in different issues. Some components benefited specific household and some benefited community as a whole. The PFRC project offered some tangible (material benefits like home, tube well etc.) as well as some intangible benefits (training) to a number of 2136 households of the Tala upazila.

The PFRC project installed 25 swallow tube wells for specific household. It incurred all cost associated with installation. The base of the tube well was high enough so that it becomes usable during flood. The project constructed 50 houses which with concrete basement, tin shed and lighter fence. The length of the house is about 16 feet and width of the house is about 15 feet and 10 inches including balcony in the front side.

Table 2: Summary of the PFRC Project Activities

Sl. No.	Activities of PFRC Project		Number of Items		
			Islamkati Union	Tentulia Union	Total
1.	Shallow tube-well at household level		12	13	25
2.	House construction		25	25	50
3.	Constructed sanitary latrine		25	25	50
4.	Livelihood support	Cattle	23	25	48
		Grocery	02	00	02
5.	Arsenic Iron Removal Plant (AIRP) for single household		13	12	25
6.	Community based Arsenic Iron Removal Plant (AIRP) for several households		02	02	04

Table 2: Summary of the PFRC Project Activities (continued)

Sl. No.	Activities of PFRC Project	Number of Items		
		Islamkati Union	Tentulia Union	Total
7.	Earthen-mound: Raised the base of a flood prone school field	00	01	01
8.	Arranged free medical camp after flood	03	03	06
9.	Formed Ward Disaster Management Committee (WDMC)	09	09	18
10.	Training for WDMC, Union Disaster Management Committee (UDMC) and others	03	03	06

Source: Nabolok, 2016

The project constructed 50 latrines with mud base, tin shed and lighter fence. The base is also above the typical flood level. Livelihood support receivers got cash support. For purchasing cow, 48 households received BDT 10,000 each. AIRP was managed at household and community level. The project raised the base of field of Nowapara Secondary School situated in Tentulia union to protect livestock and other resources during flood. It was open for the nearby people and concerned WDMC are in charge of its management. The project arranged medical camp was open for all where people got treatment from the registered doctors free of cost. A total number of 18 WDMC were formed to assist in preparing disaster management plan and to assist villagers during, pre and post flood situation. They connected WDMC to the UDMC in both unions. The project trained all member of WDMC and government formed UDMC and other entities of the unions. The main focus was WaSH practice, sanitation, hygiene, disaster preparedness and disaster management strategy (Nabolok, 2016).

3.3 Study area

The research was confined to Islamkati and Tentulia unions of Tala upazila of Satkhira District, Bangladesh where Nabolok implemented the PFRC project. The upazila is situated between 22°32′ and 22°50′ north latitudes and 89°05′ and 89°20′ east longitudes. It is surrounded by Kalaroa upazila, Assasuni upazila, and Satkhira sadar upazila of Satkhira district, Keshabpur upazila of Jessore district, and Paikgachha, and Dumuria upazila of Khulna district. The area of this upazila is 337.24 sq. km. with the density being 889 per sq. km. (Islam, 2015). In 1913, Tala thana was established and was turned into an upazila in 1983. It comprises of 13 union parishads, 150 mouzas and 228 villages. According to BBS (2013), total population of Tala upazila is 300,000 having almost equal sex ratio with 50.9 percent literacy rate. There are 72,465 households where average size is 4. 13. There are 9 flood shelter and 2 cyclone shelters in the in upazila which is strong indicator that the upazila is flood and other disaster affected upazila. The upazila is 25 km. far from Satkhira district headquarter. Tectonically Tala upazila belongs to the fore deep for which the sedimentary layers are generally flat in the upzila. In this upazila, main two rivers are Kobadak and Betna. There is one beel (marsh) named Mathura. There are some canals connecting to main rivers. About 73 percent land is low land. There is no textile mill, garment factory, match factory, steel and engineering firm, aluminum firm, jute mill, sugar mill and no other mentionable major firms. There are 566 rice mills in the upazila (BBS, 2013).

3.4 Sampling unit, sample size, sampling and data collection technique

The PFRC beneficiary households, at least from one category were main source of information, where a number of 114 households were selected randomly for survey. The research surveyed 54 households from Islamkati Union and 60 households from Tentulia union. Beneficiary households' head was respondent. Only one respondent was considered from a beneficiary household. For quantitative analysis, data was collected through direct personal interview with a structured questionnaire. In addition, two FGDs were also carried out in Islamkati and Tentulia unions. A few 12 people with a mix of both sexes were included in each FGD session.

3.5 Data analyzing tools

Composite vulnerabilities and capacities index1

1 Consult Mustafa et al. 2008 for sub-indicators and scores for both vulnerability and capacity

Based on Mustafa et al. (2008), the research constructed Vulnerabilities and Capacities Index for rural household (RHH-VCI) scored out of 100. There are several grounds for applying the method in this research. Firstly, Mustafa et al. (2008) developed vulnerability and capacity index separately for rural and urban households, where the research chose rural area version. In many countries, definitely in Bangladesh, there are huge differences in the rural and urban context in terms of infrastructure, education facilities, income, employment etc. For measuring vulnerability, customized tool separate for rural and urban area is practical and sensible. This tool considers wide range of issues on social, demographical, economical and environmental aspects. Murphy and Scott (2014) considered income, perception of future security, and life satisfaction for measuring household vulnerability but didn't consider environmental aspects. Christiaensen and Subbarao (2004) defined household vulnerability as expected poverty. Fishburn (1977) also focused on the same but their considered variables were different. Fang et al. (2016) considered food supply, income, education, variability in rainfall, and area affected by drought and floods. In the RHH-VCI, Some community variables are scored for assessing household vulnerability like road as an example. This method considers household's strength (capacity) and weakness (vulnerability) at a time where vulnerability is the difference between them. There are specific scoring directions for all sub-indicators where all the specific scenarios and narratives are converted into number (score) which minimizes judgment bias. Mustafa et al. (2019) mentioned that expression from narrative to numbers facilitate comparison and communication. Mustafa et al (2011) mentioned that narratives have limited influence on climate change and hazard adaptation policy. RHH-VCI is theoretically driven and empirically tested in different developing countries. These distinctive features dictated to adopt it in the current research.

Table 3: Dimensions and Score Distribution for RHH-VCI

Types of Vulnerability	Score
Material vulnerability	35
Institutional vulnerability	50
Attitudinal vulnerability (sense of empowerment)	15
Maximum vulnerability Score	100

Source: Mustafa et al. (2008)

In case of material vulnerability, Mustafa et al. (2008) considered income (percentage from local source, stability and safety from hazards), educational attainment (for all family members), fungible assets (monetary value of durable and sellable assets), and exposure to risk (distance of home from the main coast, house condition like basement height, material used etc.). In case of institutional vulnerability, the research considered households' social networks, extra- local kinship ties, infrastructure condition, proportions of dependency in a household, and warning system. Lastly, in case of attitudinal vulnerability the index focused leadership, approximate and access to local, regional and central leaders and knowledge on hazards. Under sub-indicators, Mustafa et al. (2008) used some specific questions with corresponding vulnerability score against each answer. Current research followed same weight in the major three dimensions of vulnerability but adjusted some issues and scores under the sub-indicators, suited with the rural Bangladesh context.

Disaster empowerment index

The study measured Disaster Empowerment Index (DEI) to check how far beneficiary households are empowered to minimize risk of disaster after implementing the project. This DEI symbolizes the level of preparation and strength of the household with respect to minimization of disaster risk. The application of sub-indicators commonly practiced in measuring empowerment. On the other hand, some issues are difficult to measure directly where measurable proxies are generally considered to gain overall idea of concerned issue. Mason and Smith (2013) used sub-indicators for women empowerment. In the same way, Parvin et al.(2005), Haque et al. (2011), Ali et al. (2014), and West (2006) used sub indicators in constructing empowerment index in various fields. The DEI index was constructed by following Human Development Index (HDI), which was developed by the United Nations Development Program (UNDP) as applied in (Haque et al., 2011). The formula is shown below:

$$\text{Disaster Prepared Index} = \frac{\text{Actual score-Minimum score}}{\text{Maximum score-Minimum score}}$$

The DEI value ranges from 0 (zero) to 1 (one) where value '1' indicates fully empowered to tackle disaster risk, and '0' means there seems no power or no preparation to tackle risk of disaster. For constructing DEI, the study analyzed 40 indicators of household's behavior in 7 broad dimensions as shown in table below.

Table 4: Dimension of Disaster Empowerment at Household Level

Sl No.	Dimensions of Disaster Empowerment Index	No. of Indicators
1.	Warning system	6 indicators
2.	Household safety	6 indicators
3.	Household preparation	6 indicators
4.	Social network and kinship ties	7 indicators
5.	Income	4 indicators
6.	Migration	4 indicators
7.	Water, Sanitation and Hygiene (WaSH) Behavior	7 indicators
Total	7 dimensions	40 indicators

Source: Author's compilation based on literature, 2016

Perceptions, practices and beliefs related to all 40 indicators were taken through a unique response among five options where 1 = never, 2 = rarely, 3 = sometimes, 4 = often, and 5 = very often. If the perception or practice in any indicator is marked either 4 (often), or 5 (very often), empowerment or preparedness value is considered as '1', otherwise considered as '0'.

4. RESULTS AND DISCUSSIONS

Result section firstly highlights on the socio-economic and demographic profile of the surveyed households. Secondly it covers dimension wise extent of vulnerability across Islamkati and Tentulia union. The third part assesses the PFRC project in terms of relevancy of project components, beneficiary selection process, cost efficiency, etc. The four part measures households' empowerment level through disaster empowerment index, compared between the periods 2016 and 2013. Based on results, the research recommends some policies in the end.

Socio-economic Profile

The study found that average family member per household is 4.5, which is symptom of large and combined family. Children under 5 are one of the most vulnerable categories during disaster. In his case, 40 percent families have at least one child under 5 years old. At least one member of about one quarter families reside in other places for education, job other purposes.

Table 5: Socioeconomic Profile

Area	Particulars	Islamkati Union (n=54)	Tentulia Union (n=60)	Total
Family	Average family size (number of family member)	4.15	4.82	4.5
	Percentage of families having at least one child under-5	39	42	40
	Percentage of HHs with at least one stays outside	30	25	27
Education	Percentage of families having at least 1 member completing primary education (female)	52	42	46
	Percentage of families having at least 1 member completing primary education (male)	78	67	72
	Average highest education by any male member (year of schooling)	8.11	6.43	7.23
Income	Average monthly income (BDT)	5,320	7,583	6,511
	Average earning member per family	1.13	1.28	1.21
	Income from direct agriculture only (number of HH)	21 (39%)	22 (37%)	43 (38%)
	Income from non-agriculture source only (number of HH)	25 (46%)	28 (47%)	53 (46%)
	Income from both sources (number of HH)	8 (15%)	10 (17%)	18 (16%)

Source: Author's compilation based on field survey, 2016

About 72 percent families have at least 1 male member who has passed primary education and this rate is 46 percent for female. Since women are the caregivers and household managers, their illiteracy increases the vulnerability of households. Alarmingly there are 24 households whose no member (neither male nor female) crossed primary education. So, their knowledge and capacity to cope with disaster-led vulnerabilities are supposed to be more than that of literate families. But some training can increase their discretion of decision making. In the traditional rural society in Bangladesh, males are family decision maker and responsible for managing livelihoods. In this case, the average highest year of schooling by any male member is 7.23.

Average monthly income per family is BDT 6,511 where the figure for Tentulia union is higher than Islamkati union. Households of the Tala upazila are mainly dependent on agriculture directly or indirectly. The result found that 43 households (38 percent of total) income solely depend on direct agriculture. Though many are engaged in other jobs, many of those are also related to agriculture. Only 16 percent household's income originates from both agriculture and non-agriculture sources. The rest has one source of income. Average earning member per family is 1.21. Large family size and less number of earning member led higher dependency on employed people. If single income source of family becomes vulnerable, then household's pain increases. FGD participants in both unions reported that earning options mainly depend on local area. When local economy disrupts, these people are supposed to face much pain of losing income and employment.

The sole dependency on agriculture is gradually decreasing because of recurrent flood and water logging. Farmers reported that disasters decrease both yield and income. Traditional farmers search for other income to maintain livelihood. Many of the non-agricultural income also originate from local sources but those also get affected by flood. Field survey (2016) found that about 81 percent income originates from local sources in Islamkati union, where this rate is about 96 percent for Tentulia union. Narrowed livelihood portfolios, which are sensitive to various hazards, force some adult to migrate temporarily to the nearby city especially in Khulna.

Households' Vulnerability Assessment

Both Islamkati and Tentulia union are victim of flood and water logging for which households get vulnerable. Table 6 shows the level of household vulnerability measured in three major dimensions i.e., material, institutional and attitudinal vulnerability. The research found that the mean (overall) vulnerability of Islamkati is 42.76 (out of 100 maximum vulnerability), where the value of Tentulia union is 43.95. The research noticed that households are the most vulnerable in material vulnerability. The main reasons were flood and water logging which affected agriculture and many other local livelihood options. Local canals connecting to the river were malfunctioning in many cases. Thus, surplus water of the locality cannot be passed to the river and thus get logged which hurt agriculture mostly.

Table 6: Types of Vulnerability in Islamkati and in Tentulia Union

Union	No. of Observation	Dimensions of Vulnerability			
		Material [35]	Institutional [50]	Attitudinal [15]	Total [100]
Islamkati	54	26.04	13.96	2.76	42.76
Tentulia	60	28.4	10.22	5.33	43.95
Overall	114	27.28	11.99	4.11	43.39

Source: Author's compilation based on field survey, 2016

Result showed that Islamkati is more vulnerable than Tentulia union in institutional vulnerability, where Telulia is more vulnerable than Islamkati union with respect to attitudinal vulnerability. Ability of the household to reach leaders at local, regional and central level differs for which differences observed. In broad sense, vulnerability of the two unions is almost similar. The main reasons behind similar vulnerability between unions are same geography, same livelihood pattern, victim of same calamity and same social institutions across unions.

Defective sluice gates and silted Kopotakkho river were main culprits for threat of income and employment in the Tala upazila. Some people encroach canals in the form of building dam, setting nets etc. There are some people that fill canal as extension of homestead. People throw multi-dimensional garbage in the canal, which is another major cause of filling canals. Sluice gates are controlling point of flow of water between canal and main rivers, located at various points of Tala upazila. It brings water in the locality for irrigation and fishing in the dry season, and exiles flood and excessive rainwater from the locality to the river. Unfortunately, many sluice gates were not malfunctioning properly. It is threat to agriculture and livelihood for the affected households.

Effect of Earning Source on Overall Vulnerability

The research investigated whether households' vulnerability vary as per their sole dependency on agriculture or not. This was done with hypothesis testing.

Null hypothesis (H0): There is no difference in overall vulnerability between households those are solely dependent on agriculture and other category (not solely dependent on agriculture)

Alternate hypothesis (H1): Households solely dependent on agriculture are more vulnerable than other category.

Table 7: Result of Hypothesis Test

Group	Obs.	Mean	Std. Err.	Std. Dev.	t-ratio
Not solely agricultural dependent	71	41.66	1.80	15.16	- 1.52
Solely agricultural dependent	43	46.23	2.46	16.15	
diff		-4.57	3.00	-	
diff = mean (Not solely agricultural dependent) - mean (solely agricultural dependent) Ha: diff < 0 Ha: diff != 0 Ha: diff > 0 Pr(T < t) = 0.07 Pr(|T| > |t|) = 0.13 Pr(T > t) = 0.93					

Source: Author's compilation based on field survey, 2016

Result in the hypothesis test showed that solely agriculture dependent households are more vulnerable than households are not solely dependent on agriculture, which is statistically significant at 10 percent level. Since flood hurts agriculture more than the non-agricultural sector, agriculture dependent households become more vulnerable. Flood damages crops in one hand; it reduces cropping intensity in other hand, as floodwater remains logged for longer time. Farmers cannot cultivate other crops in due time even after flood. The study observed that the Kopotakkho river is being excavated by central government.

5. ASSESSMENT OF THE PFRC PROJECT

Relevancy of the PFRC project

All relief and assistances of the PFRC project strived to reduce the pains of the flood affected people. Fund manager planned to extend assistance to the most vulnerable areas of the people. Though households' vulnerability do not follow unique pattern, FGD participants ranked six major problems they face during flood shown in the following table as per order of problem.

Table 8: Problem of the Households During Flood and Water Logging

Serial No.	Vulnerable Area	Problem Rank
1	House problem	Problem 1
2	Sanitation	Problem 2
3	Income loss	Problem 3
4	Water	Problem 4
5	Medical	Problem 5
6	Education	Problem 6

Source: Author's compilation based on field survey, 2016

The study noticed that some problems were household specific like house, and some were at community level like education, medical, etc. During flood homestead goes under water, the base of the earthen floor get marshy and damp, which are serious threat for health and safety issues. Women, old and children get sick repeatedly. Since water retains in all sides of a house, it weakens the base of earthen-based house for which people fear of collapsing earthen wall. Sometimes snakes and other insects take shelter in home. Because of these reasons, poor villagers ranked house problem as main problem. Others major problems as sequence from top were sanitation, income loss, water, medical and education problems. Though the problems represented overall scenario, problem raking was different from household to household. The research also noticed that most households faced multiple problems. Many tube well become unusable for high flood. To address water problem, the project provided number of community based and household based water treatment plant. Other components were also in line with the reported vulnerability. Training to WDMC, UDMC and other local people was nice as villagers need to take proper precaution and action for disaster management, preparedness, health safety, hygiene etc. Livelihood support included cash for cattle and grocery. In many cases, women of the households were responsible for rearing cattle at home which will be source of income and women employment. Having recognized the need of the flood affected households, the PFRC project designed benefit packages accordingly. Poor households were vulnerable in almost every dimension and any assistance to them reduced their pain. Thus, the study claim that all project facilities reached to the vulnerable

people and the components of the PFRC project were relevant accordingly to the vulnerabilities of the people in both unions. FGD participants in the Tala union reported that within the household, the project benefited the children, women and the old more than other category.

Appropriateness of the PFRC project

The research assessed appropriateness of the project in various dimensions. The main area of measuring appropriateness was beneficiary selection, implementation of benefit package, cost efficiency, installation and management of community packages etc.

Appropriateness in beneficiary selection

While selecting the beneficiary, the PFRC project management was open but tactful. FGD responders in both Tentulia and Islamkati union reported that the project management invited local people including intended beneficiaries, civil society, and local government leaders in a common place and directed them to select required number of beneficiaries. As all participants knew the villagers, they were able to identify the needy. One FGD participant in the Islamkati union told that "I strived for house support (including sanitary latrine as package) but didn't get. I know some beneficiaries in this category who seem more eligible than me to get house". Many participants reported that housing decision was made with the intervention of multiple local agents through an open discussion where really needy got the selection. It is seen that average monthly income of overall benefit receiving households is BDT 6,511. Vulnerability score reported that the highest vulnerability of the households exist with material vulnerability. Based on this data and information, the research concludes that the needy were provided the many material supports though there were more needy households too. Responders also reported that some components were open to anyone intended and claimed for like free medical camp after flood. All needy and poor people who reached in the camp got consultancy services. At the same time, any needy households can use earthen mound in need.

Appropriateness in implementation and cost efficiency

Nabolok management played a supervisory approach in implementing every components of the PFRC project. For building house and latrine, it did not provide cash to the beneficiary household, rather the project management built houses for the beneficiaries. Nabolok constructed houses, latrines, tube wells, household based AIRP, and community based AIRP etc. Under livelihood support, the project allotted cash for purchasing cow. Instead of providing cash directly, project management was present at the local cow selling market and provided cash at the time of transaction. Direct involvement in the implementation ensured that a project component was implemented as intended by the project management. One livelihood support receiver (cattle support) told that "If I got BDT 10,000 in cash for purchasing a cow, I wouldn't do so, rather use money in other purposes. Because of Nabolok's presence, I had to purchase a cow and now I am happy for that as my cow has gained value". Beneficiary households might use cash in other purposes. There are numerous instances in rural area where poor households didn't use small loan or microcredit in the stated purposes. Many banks release some loans on the basis of field supervision to ensure that loan is used in the stated purposed. PFRC project management's direct involvement ensured this. The project components was implemented on

time and accordingly the project was phased out in due time. Thus, it ensured that the beneficiary households enjoyed all benefits and on time. Field survey and researcher's visit at many sites in 2016 certified well functioning of the project components.

Beneficiary households expressed satisfaction for getting facilities in given budget. Cattle and grocery beneficiaries received full amount of cash. In many cases, PFRC project management built the components like building house and latrine. The estimated budget for constructing a house and a latrine was BDT 88,000 (TK. eighty eight thousand). One beneficiary told, "It was absolutely impossible for me to construct such house and latrine with allotted budget." FGD responders in both union mentioned that Nabolok project management contracted with masons, labourers for several units and also purchased inputs and raw materials for multiple units at a time. Concerned project member certified the issue. The PFRC management attained scale of economies in raw materials purchase. On time completion also avoided inflation issue. In the same way, service charge associated with construction and installations were also lower.

Appropriateness in terms of service of PFRC component

The technical aspects of the provided facilities were appropriate for flood-affected people of Tala upazila of Satkhira district. The main positive aspect was height of the basement of tube well, house, latrine, community AIRP etc. All these facilities were constructed above the flood level in general for which villagers did not face problem to use those during flood. On an average, the highest elevation of water during flood in last 5 years reported by 87 respondents is 2.63 feet though the highest level of water does not persist for long. The 4 feet high concrete basement of house helps them to remain non-dump and more hygienic during flood and assisted villagers to be flood resilient. Since the basement is made of pucca brick (fire burnt brick, which is strong and durable), there is less or no chance to collapse. When their kitchen goes under water, they can complete household activities in the balcony. The base of the tube well was constructed high to keep it safe from typical flood height, which protected entering dirty water in tube well. Many houses in the rural area have pucca latrine, where many villagers have temporary latrines at the ground level as well. During floods that become problematic in terms of access and hygiene. PFRC built latrine with high base so that those can be used in general flood level. In the similar pattern, community based AIRP was also constructed in the high plinth. FGD responders told that AIRP water is iron free and helps digestion. In case of the community based AIRP, some selected families are responsible for maintenance. Nabolok formed a committee for maintenance also. They change water, clean the tank, change the brick after few weeks and collects subscription for maintenance cost. Thus, the research found smooth functioning of a common property, which is not the case in many instances. Apart from providing some material support, the PFRC project trained UDMC and WDMC and others about various aspects of disaster warning, preparedness, recovery, hygiene practice etc.

Plan to replicate PFRC model

Many rural people were satisfied with the technical aspects of Nabolok installed components. The beneficiaries and villagers also appreciated high base of house, tube-well and latrine. The study asked about people's intension to replicate Nabolok model immediately. As shown in the below table, many replied intend to construct houses in the similar patter as constructed by PFRC project.

Table 9: Households' Immediate Plan to Replicate PFRC Model

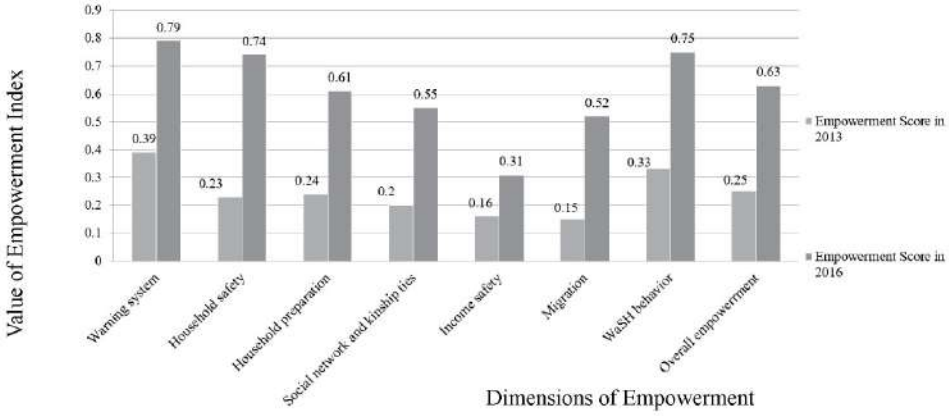
Components	Have idea about facility (N=114)	Willingness to follow the model	
		Number	Percentage
Swallow tube-well	84	38	45
Sanitary latrine	85	41	49
HH AIRP	41	31	37
Community AIRP	60	27	32

Source: Author's compilation based on field survey, 2016

Apart from houses, many wanted to copy technical aspects other components of PFRC project. Out of 114 respondents, 84 told that they knew about high basement of swallow tube well. Among the respondents, 45 percent intended to take immediate action to install tube well in own cost. In the same way, 49 percent households intended to construct sanitary latrine, 37 percent intended to install HH AIRP, and 32 percent intended to set-up community AIRP, shortly. This intension is an indicator of appropriateness of the project. Many reported that they would follow the same strategy when they will have money to do so. The study also noticed some new houses with high bases, constructed with own money. Household cannot prevent flood or disaster but individual action can reduce disaster risk. PFRC project introduced some innovative and easily adaptable idea like high basement of tube well and house. Their awareness of increased from different training. Having various facilities and experience of neighbors, many households intend to avail different facilities in future. So, if the notion of the PFRC model is properly followed widely, it would be able to reduce pain of the disaster affected villagers.

Effect of the PFRC Project on Disaster Empowerment of Households

Different components of the PFRC project reduced pain of the flood-affected people in the concerned dimensions. In addition to material benefits, the project also created awareness among people in many issues like hygiene, disaster warning system, disaster preparedness etc. The research measured empowerment level of the household to check how far households are capable in tackle risk associated with flood and other natural hazards.



Source: Author's compilation based on field survey, 2016

Figure 1: Households' Empowerment Level in 2013 and 2016

Figure 1 shows the change in strength of the household to reduce flood and other disaster-induced risks and pains between the year 2013 and 2016. Statistics showed that overall empowerment index is 0.63 for 2016 and only 0.25 for 2013.

It is very pleasing that, households' empowerment in all dimensions increased in 2016, compared with 2013 standard. Higher empowerment indicates reduced loss and sufferings. Among considered dimensions, households experienced the lowest level of empowerment in income safety. Since income mostly depended on local sources, their income gets hurt during flood. The study observed the highest strength in warning system for both periods. It is important to say that PRFC have benefited households in different components. The research did not measure the DEI change (between 2016 and 2013) for non-beneficiary households and hereby do not claim that only PFRC project alone increased DEI of the PFRC beneficiary households but it created substantive role in increasing awareness. As shown in the graph, the DEI is based on diverse components including knowledge on warning system, income safety, social network ties, disaster preparedness, WaSH behavior etc. Many government programs, other NGOs programs also created direct and demonstration effect on the households. At the same time PFRC project exerted demonstration effect on the non-beneficiaries too. A household having better resilience practice can aware other households too. Researcher observed demonstration effect of good practices in the community.

Tala upazila is a disaster affected upazila where material vulnerability is mostly observed. For income and employment a large group depends on agriculture related jobs which are hurt by flood and water logging. In the upazila, temporary cropped area is more than 9 times higher than permanent cropped area (BBS, 2013). Flood and waterlogged become the main culprit for cultivation. With regard to temporary land, single cropping land area is 1.25 times higher than combined land area of double and triple cropped land. If they cannot use the land properly, they will remain poor and will be vulnerable. Bogale et al. (2006) find that land is the most fundamental resources for generating income and wealth transfer between generations. Despite having some land, they were unable to use it properly for flood, water logging and other disasters. Another problem is salinity which increased hardship for agriculture based livelihood in the coastal area of Bangladesh (Ahmed, 2017; Getzner and Islam, 2013). It decreases number of crops per year and productivity. Average family size is 4.5 where per month average households income is BDT 6,511. According to World Bank (2018) definition, all households are poor on an average. Households are also mostly vulnerable in material aspects. So there is link between vulnerability and poverty which is supported by Vo (2018). About four-fifth of the households depend on single earning source and majority of those accrue from local sources. Kapotakkho river and connecting local canals siltation and sluice gate mismanagement also responsible for poor performance of agriculture. During flood, water logging and other natural disaster People's sufferings get exaggerated because of narrowed livelihoods options in the regions. The benefit packages of the PFRC project were designed in line with the problems of the local people. Technical aspects of provided facilities reduced sufferings in the disaster context. After the project households' disaster empowerment level was increased massively. Paul and Routray (2011) reported that many huge coastal people of Bangladesh have poor idea about understanding weather signal. This is a notion of lack of awareness. DEI score for knowledge on warning system

increased massively in 2016 which is another success of the project and project design. The different training provided to the WDMC, UDMC and other local people were perfect in terms of need which focused WaSH behavior, disaster management hygiene etc. So, it can be claimed that the PFRC played role it its improvement. As many families intended to construct particular facilities in their own cost in future, it can be concluded that the project can play major role in future too to gain risk reduction knowledge and support easy adaptation.

6. RECOMMENDATIONS

During flood and water logging, authorities must take steps to secure income and earnings for victims in the locality. For regaining agriculture and associated jobs, local canals named Sibsa, Kopotakkho, and others and Kopotakkho river need to be excavated. Many villagers claimed that only excavation of river might not solve flood or water logging problems instantly if local canals are also not excavated. Actually both need to perform well at the same for inflow and outflow of water between locality and main river. Local government should take action against encroachment and all sorts of activities that retard flow of water in canals. On the other hand, it is also an urgent necessity to repair and manage sluice gates in way that benefit majority of villagers. There is an urgent need to create some alternate employment opportunities. There can be training for some adaptive measures for floating garden, fish cultivation etc. Many claim that cattle rearing are becoming profitable and demandable to the households. Women can be offered some training and job and support for income which are insensitive to local hazards. Banu et al. (2001) concluded that that women's involvement is essential to income generating activities (IGAs) for reducing venerability of the poor people. Economically empowered women can help in educating child for building future generation in Bangladesh (Islam & Dogra, 2011). Employed women also enjoy higher decision-making power in the family (West, 2016). Otherwise, people might migrate to other cities, where large scale out migration from the coastal area will create social conflict and unrest (Ali, 2003). Local government is not financially strong enough to tackle all uncertainties and hazards originated locally. There can be special allocation for selected vulnerable unions that face different natural hazards frequently. Allotted fund can be used instantly especially for relief support and managing local infrastructure. Awareness program on disaster preparedness and adaptation should be extended to frequent victims. Local government also needs to take initiative to spread adaptable convenient approaches and good practices for risk reduction and better resilience.

7. CONCLUSION

Tala upazila faces different natural disasters frequently. Households' vulnerability is mostly observed in material aspects. During flood, poor people's needs are huge and diverse. The Nabolok managed PFRC project's support reduced pain of many households and assisted to increase their strength in dealing with disaster. Many project components incorporated pragmatic idea for risk reduction and resilience. Apart from personal initiatives, authority should excavate Kapotakkho river and connecting canals for maintaining required flow of water in both dry and rainy season. Efficient management of sluice gates is to be ensured. Simultaneous action in both household level and government level is essential for reducing risk and pain of the victim people.

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